# **COURSE STRUCTURE AND SYLLABUS**

For

# **ELECTRONICS AND COMMUNICATION ENGINEERING** (Applicable for batches admitted from 2016-2017)



## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA KAKINADA - 533 003, Andhra Pradesh, India

# I Year - I Semester

S.No.	Subjects	L	Т	Р	Credits
1-HS	English – I	4			3
2-BS	Mathematics - I	4			3
3-ES	Mathematics -II (Numerical Methods and Complex Variables)	4			3
4-BS	Applied Physics	4			3
5-ES	Computer Programming	4			3
6-ES	Engineering Drawing	1		3	3
7-HS	English - Communication Skills Lab -1			3	2
8-BS	Applied / Engineering Physics Laboratory			3	2
9-BS	Applied / Engineering Physics – Virtual Labs - Assignments			2	
10-ES	Engineering Workshop& IT Workshop			3	2
	Total Credits				24

# I Year - II Semester

S.No.	Subjects	L	Т	Р	Credits
1-HS	English – II	4			3
2-BS	Mathematics -III	4			3
3-BS	Applied Chemistry	4			3
4-ES	Electrical and Mechanical Technology	4			3
5-HS	Environmental Studies	4			3
6-ES	Data Structures	4			3
7-BS	Applied / Engineering Chemistry Laboratory			3	2
8-HS	English - Communication Skills Lab -2			3	2
9-ES	Computer Programming Lab			3	2
	Total Credits				24

# II Year - I Semester

S.No.	Subjects	L	Т	Р	Credits
1	Electronic Devices and Circuits	4			3
2	Switching Theory and Logic Design	4			3
3	Signals and Systems	4			3
4	Network Analysis	4			3
5	Random Variables and Stochastic Process	4			3
6	Managerial Economics & Financial Analysis	4			3
7	Electronic Devices and Circuits Lab			3	2
8	Networks & Electrical Technology Lab			3	2
	Total Credits				22

# II Year - II Semester

S.No.	Subjects	L	Т	Р	Credits
1	Electronic Circuit Analysis	4			3
2	Control Systems	4			3
3	Electromagnetic Waves and Transmission Lines	4			3
4	Analog Communications	4			3
5	Pulse and Digital Circuits	4			3
6	Management Science	4			3
7	Electronic Circuit Analysis Lab			3	2
8	Analog Communications Lab			3	2
	Total Credits				22

# **III Year - I Semester**

S.No.	Subjects	L	Т	Р	Credits
1	Computer Architecture and Organization	4			3
2	Linear I C Applications	4			3
3	Digital I C Applications	4			3
4	Digital Communications	4			3
5	Antenna and Wave Propagation	4			3
6	Pulse and Digital Circuits Lab			3	2
7	Linear I C Applications Lab			3	2
8	Digital I C Applications Lab			3	2
MC	Professional Ethics & Human Values		3		
	Total Credits				21

# III Year - II Semester

S.No.	Subjects	L	Т	Р	Credits
1	Micro Processors & Micro Controllers	4			3
2	Micro Wave Engineering	4			3
3	VLSI Design	4			3
4	Digital Signal Processing	4			3
5	<ul> <li>OPEN ELECTIVE</li> <li>1. OOPs through Java</li> <li>2. Data Mining</li> <li>3. Industrial Robotics</li> <li>4. Power Electronics</li> <li>5. Bio-Medical Engineering</li> <li>6.Artificial Neural Networks</li> </ul>	4			3
6	Micro Processors & Micro Controllers Lab			3	2
7	VLSI Lab			3	2
8	Digital Communications Lab			3	2
MC	IPR & Patents		2		
	Total Credits				21

# IV Year - I Semester

S.No.	Subjects	L	Т	Р	Credits
1	Radar Systems	4			3
2	Digital Image Processing	4			3
3	Computer Networks	4			3
4	Optical Communications	4			3
5	<ul> <li>Elective I</li> <li>1. TV Engineering</li> <li>2. Electronic Switching Systems</li> <li>3. System Design through Verilog</li> </ul>	4			3
6	<ul> <li>Elective II</li> <li>1.Embedded Systems</li> <li>2. Analog IC Design</li> <li>3.Network Security &amp; Cryptography</li> </ul>	4			3
7	Micro Wave Engineering & Optical Lab			2	2
8	Digital Signal Processing Lab			2	2
	Total Credits				22

## IV Year - II Semester

S.No.	Subjects	L	Т	Р	Credits
1	Cellular Mobile Communications	4			3
n	Electronic Measurements and	4			3
3	Instrumentation				
3	Satellite Communications	4			3
4	Elective III 1.Wireless sensors & Networks 2. Digital IC Design 3. Operating Systems	4			3
5	Seminar		3		2
6	Project				10
	Total Credits				24

Total Course Credits = 48+44 + 42 + 46 = 180

#### **Syllabus**

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#### **ENGLISH - I**

#### Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

#### **Objectives:**

- 1. To imporve the language proficiency of the students in English with emphasis on LSRW skills.
- 2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theorotical and practical components.
- 3. To develop the communication skills of the students in both formal and informal situations.

#### LISTENING SKILLS:

#### **Objectives:**

- 1. To enable the students to appreciate the role of listening skill and improve their pronounciation.
- 2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
- 3. To enable the students to listen for general content, to fill up information and for specific information.

#### **SPEAKING SKILLS:**

#### **Objectives:**

- 1. To make the students aware of the importance of speaking for their personal and professional communication.
- 2. To enable the students to express themselves fluently and accurately in social and professional success.
- 3. To help the students describe objects, situations and people.
- 4. To make the students participate in group activities like roleplays, discussions and debates.
- 5. To make the students particiapte in Just a Minute talks.

#### **READING SKILLS:**

#### **Objectives:**

- 1. To enable the students to comprehend a text through silent reading.
- 2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
- 3. To enable the students to skim and scan a text.

- 4. To enable the students to identify the topic sentence.
- 5. To enable the students to identify discourse features.
- 6. To enable the students to make intensive and extensive reading.

## WRITING SKILLS:

#### **Objectives:**

- 1. To make the students understand that writing is an exact formal skills.
- 2. To enable the students to write sentences and paragraphs.
- 3. To make the students identify and use appropriate vocabulary.
- 4. To enable the students to narrate and describe.
- 5. To enable the students capable of note-making.
- 6. To enable the students to write coherently and cohesively.
- 7. To make the students to write formal and informal letters.
- 8. To enable the students to describe graphs using expressions of comparision.
- 9. To enable the students to write techincal reports.

#### Methodology:

- 1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
- 2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
- 3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher interventionis perimitted as per the complexity of the task/exercise.
- 4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
- 5. The teacher is perimitted to use lecture method when a completely new concept is introduced in the class.

#### **Assessment Procedure: Theory**

- 1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
- 2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the langauge skills learnt in the unit are to be tested.
- 3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails,letters and reports-- are to be tested along with appropriate language and expressions.
- 4. Examinations:

I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%

(80% for the best of two and 20% for the other)

Assignments= 5%

End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech I Semester (Common for all branches)and I B.Pharma I Sem of JNTU Kakinada from the academic year 2016-17

## (R-16 Regualtions)

## **DETAILED TEXTBOOK:**

## ENGLISH FOR ENGINEERS AND TECHNOLOGISTS, Published by Orient Blackswan Pvt Ltd

## **NON-DETAILED TEXTBOOK:**

## PANORAMA: A COURSE ON READING, Published by Oxford University Press India

The course content along with the study material is divided into six units.

## UNIT I:

1. 'Human Resources' from English for Engineers and Technologists.

## **OBJECTIVE:**

To develop human resources to serve the society in different ways.

## **OUTCOME:**

The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly.

2. 'An Ideal Family' from Panorama: A Course on Reading

## **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

## **OUTCOME:**

Acquisition of writing skills

## **UNIT 2:**

1. 'Transport: Problems and Solutions' from English for Engineers and Technologists.

## **OBJECTIVE:**

To highlight road safety measures whatever be the mode of transport.

## **OUTCOME:**

The lesson motivates the public to adopt road safety measures.

2. 'War' from 'Panorama : A Course on Reading'

#### **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

#### **OUTCOME:**

Acquisition of writing skills

#### **UNIT 3:**

1. 'Evaluating Technology' from English for Engineers and Technologists.

## **OBJECTIVE:**

To highlight the advantages and disadvantages of technology.

#### **OUTCOME:**

The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival.

2. 'The Verger' from 'Panorama : A Course on Reading'

#### **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

#### **OUTCOME:**

Acquisition of writing skills

#### **UNIT 4:**

1. 'Alternative Sources of Energy' from English for Engineers and Technologists.

#### **OBJECTIVE:**

To bring into focus different sources of energy as alternatives to the depleting sources.

#### **OUTCOME:**

The lesson helps to choose a source of energy suitable for rural India.

2. 'The Scarecrow' from Panorama : A Course on Reading

## **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

## **OUTCOME:**

Acquisition of writing skills

## **UNIT 5:**

1. 'Our Living Environment' from English for Engineers and Technologists.

## **OBJECTIVE:**

To highlight the fact that animals must be preserved beacuase animal life is precious.

## **OUTCOME:**

The lesson creates an awareness in the reader as to the usefulness of animals for the human society.

2. 'A Village Host to Nation' from Panorama : A Course on Reading

## **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

## **OUTCOME:**

Acquisition of writing skills

## UNIT 6:

1. 'Safety and Training' from English for Engineers and Technologists.

## **OBJECTIVE:**

To highlight the possibility of accidents in laboratories, industries and other places and to follow safety measures.

## **OUTCOME:**

The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.

2. 'Martin Luther King and Africa' from Panorama : A Course on Reading

## **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

## **OUTCOME:**

Acquisition of writing skills

## NOTE:

All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

## **OVERALL COURSE OUTCOME:**

- 1. Using English languages, both written and spoken, competently and correctly.
- 2. Improving comprehension and fluency of speech.
- 3. Gaining confidence in using English in verbal situations.

## MODEL QUESTION PAPER FOR THEORY

#### PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

## PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks

B from non-detailed text: 3 marks

C on grammar and Vocabulary: 6 marks

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## **MATHEMATICS-I**

## **Course Objectives:**

- 1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
- 2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

## Course Outcomes: At the end of the Course, Student will be able to:

- 1. Solve linear differential equations of first, second and higher order.
- 2. Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
- 3. Calculate total derivative, Jocobian and minima of functions of two variables.

## UNIT I: Differential equations of first order and first degree:

Linear-Bernoulli-Exact-Reducible to exact.

Applications: Newton's Law of cooling-Law of natural growth and decay-Orthogonal trajectories- Electrical circuits- Chemical reactions.

## UNIT II: Linear differential equations of higher order:

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type  $e^{ax}$ , sin ax, cos ax, polynomials in x,  $e^{ax} V(x)$ , xV(x)- Method of Variation of parameters. Applications: LCR circuit, Simple Harmonic motion.

## **UNIT III: Laplace transforms:**

Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

#### **UNIT IV: Partial differentiation:**

Introduction- Homogeneous function-Euler's theorem-Total derivative-Chain rule-Generalized Mean value theorem for single variable (without proof)-Taylor's and Mc Laurent's series expansion of functions of two variables–Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

## **UNIT V: First order Partial differential equations:**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

## **UNIT VI: Higher order Partial differential equations:**

Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type  $e^{ax+by}$ ,  $\sin(ax+by)$ ,  $\cos(ax+by)$ ,  $x^m y^n$ . Classification of second order partial differential equations.

## **Text Books:**

- 1. **B.S.Grewal,** Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

#### **Reference Books:**

- 1. Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India
- 2. Micheael Greenberg, Advanced Engineering Mathematics, 9<sup>th</sup> edition, Pearson edn
- 3. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
- 4. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
- 5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
- 6. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

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## MATHEMATICS-II (Numerical Methods and Complex Variables)

#### **UNIT I: Solution of Algebraic and Transcendental Equations:**

Introduction- Bisection method – Method of false position – Iteration method – Newton-Raphson method (One variable and simultaneous Equations).

#### **UNIT II: Interpolation:**

Introduction- Errors in polynomial interpolation – Finite differences- Forward differences- Backward differences –Central differences – Symbolic relations and separation of symbols - Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.

#### UNIT III: Numerical Integration and solution of Ordinary Differential equations:

Trapezoidal rule- Simpson's 1/3<sup>rd</sup> and 3/8<sup>th</sup> rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations-Euler's method - Runge-Kutta method (second and fourth order).

#### **Unit-IV: Functions of a complex variable**

Complex function, Real and Imaginary parts of Complex function, Limit, Continuity and Derivative of complex function, Cauchy-Riemann equations, Analytic function, entire function, singular point, conjugate function, C - R equations in polar form, Harmonic functions, Milne-Thomson method, Simple applications to flow problems,

#### **Unit-V: Series Expansion and Complex Integration**

Line integral of a complex function, Cauchy's theorem(only statement), Cauchy's Integral Formula. Absolutely convergent and uniformly convergent of series of complex terms, Radius of convergence, Taylor's series, Maclaurin's series expansion, Laurent's series.

#### **Unit-VI: Singularities and Residue Theorem**

Zeros of an analytic function, Singularity, Isolated singularity, Removable singularity, Essential singularity, pole of order m, simple pole, Residues, Residue theorem, Calculation of residues, Residue at a pole of order m, Evaluation of real definite integrals: Integration around the unit circle, Integration around semi circle, Indenting the contours having poles on the real axis.

#### **Text Books:**

- 1. **B.S.GREWAL**, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

#### **Reference Books:**

- 1. **DEAN G. DUFFY,** Advanced engineering mathematics with MATLAB, CRC Press
- 2. V.RAVINDRANATH and P.VIJAYALAKSHMI, Mathematical Methods, Himalaya Publishing House.
- 3. ERWIN KREYSZIG, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India
- 4. **DAVID KINCAID, WARD CHENEY**, Numerical Analysis-Mathematics of Scientific Computing, 3<sup>rd</sup> Edition, Universities Press.

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#### **APPLIED PHYSICS**

<u>**OBJECTIVES:**</u> Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by JNTUniv.Kkd. that serves as a transit to understand the branch specific advanced topics. The courses are designed to:

- Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.
- Teach Concepts of coherent sources, its realization and utility optical instrumentation.
- Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.
- Understand the physics of Semiconductors and their working mechanism for their utility in sensors.

#### UNIT-I

**INTERFERENCE:** Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings – construction and basic principle of Interferometers.

## UNIT-II

**DIFFRACTION:** Fraunhofer diffraction at single slit - Cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscopes.

### UNIT-III

**POLARIZATION:** Types of Polarization – Methods of production - Nicol Prism -Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter).

**LASERS:** Characteristics– Stimulated emission – Einstein's Transition Probabilities- Pumping schemes - Ruby laser – Helium Neon laser.

#### UNIT-IV

**ELECTROMAGNETIC FIELDS:** Scalar and Vector Fields – Electric Potential- Gradient, Divergence of fields – Gauss and Stokes theorems-Propagation of EM waves through dielectric medium.

#### UNIT-V

QUANTUM MECHANICS: Introduction - Matter waves – Schröedinger Time Independent and Time Dependent wave equations – Particle in a box. FREE ELECTRON THEORY: Defects of Classical free electron theory –Quantum Free electron theory - concept of Fermi Energy.

#### UNIT-VI

**BAND THEORY OF SOLIDS:** Bloch's theorem (qualitative) – Kronig – Penney model – energy bands in crystalline solids – classification of crystalline solids – effective mass of electron & concept of hole.

**SEMICONDUCTOR PHYSICS:** Conduction – Density of carriers in Intrinsic and Extrinsic semiconductors – Drift & Diffusion – relevance of Einstein's equation- Hall effect in semiconductors

**Outcome**: Construction and working details of instruments, ie., Interferometer, Diffractometer and Polarimeter are learnt. Study EM-fields and semiconductors under the concepts of Quantum mechanics paves way for their optimal utility.

## **List of Text Books:**

- 1. A Text book of Engineering Physics by Dr. M.N.Avadhanulu and Dr.P.G.Kshira sagar, S.Chand & Company Ltd., (2014)
- 2. 'Solid State Physics' by A.J.Dekker, Mc Millan Publishers (2011)

## **List of Reference Books:**

- 1. Engineering Physics by D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)
- 2. Applied Physics by P.K.Palanisamy, Scitech publications (2014)
- 3. Lasers and Non-Linear optics by B.B.Laud, New Age International Publishers (2008).

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1 Year - 1 Semester	4	0	0

## **COMPUTER PROGRAMMING**

#### Learning objectives:

Formulating algorithmic solutions to problems and implementing algorithms in C.

• Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.

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- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

#### UNIT-I:

**History and Hardware** - Computer Hardware, Bits and Bytes, Components, Programming Languages - Machine Language, Assembly Language, Low- and High-Level Languages, Procedural and Object-Oriented Languages, Application and System Software, The Development of C Algorithms The Software Development Process.

#### UNIT-II:

Introduction to C Programming- Identifiers, The main () Function, The printf () Function
Programming Style - Indentation, Comments, Data Types, Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization.
Assignment - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

#### UNIT -III:

#### **Control Flow-Relational Expressions - Logical Operators:**

**Selection**: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples. **Repetition**: Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, The while Statement, The for Statement, Nested Loops, The do-while Statement.

#### UNIT-IV

**Modular Programming:** Function and Parameter Declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Storing Addresses, Using Addresses, Declaring and Using Pointers, Passing Addresses to a Function.

Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

## UNIT-V:

## Arrays & Strings

**Arrays:** One-DimensionalArrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, LargerDimensionalArrays- Matrices

Strings: String Fundamentals, String Input and Output, String Processing, Library Functions

## **UNIT-VI:**

## **Pointers, Structures, Files**

**Pointers**: Concept of a Pointer, Initialisation of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.

**Structures**: Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.

**Data Files**: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

## **Outcomes:**

- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers
- Use different data structures and create/update basic data files.

## **Text Books:**

- 1. ANSI C Programming, Gary J. Bronson, Cengage Learning.
- 2. Programming in C, Bl Juneja Anita Seth, Cengage Learning.
- 3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

## **Reference Books:**

- 1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
- 2. Programming with C, Bichkar, Universities Press.
- 3. Programming in C, ReemaThareja, OXFORD.
- 4. C by Example, Noel Kalicharan, Cambridge.

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ENGINEERING DRAWIN	G			

Objective: Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The

objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

Unit I

**Objective:** To introduce the students to use drawing instruments and to draw polygons, Engg. Curves.

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general methods, cycloids, involutes, tangents & normals for the curves.

#### **Unit II**

**Objective:** To introduce the students to use scales and orthographic projections, projections of points & simple lines.

Scales: Plain scales, diagonal scales and vernier scales

**Orthographic Projections:** Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either to of the reference planes (HP,VP or PP)

#### Unit III

**Objective:** The objective is to make the students draw the projections of the lines inclined to both the planes.

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT

#### Unit IV

**Objective:** The objective is to make the students draw the projections of the plane inclined to both the planes.

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

## Unit V

**Objective:** The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.

Projections of Solids - Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

## Unit VI

**Objective:** The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

#### **Text Books:**

- 1. Engineering Drawing by N.D. Butt, Chariot Publications
- 2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

#### **Reference Books:**

- 1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
- 2. Engineering Graphics for Degree by K.C. John, PHI Publishers
- 3. Engineering Graphics by PI Varghese, McGrawHill Publishers
- 4. Engineering Drawing + AutoCad K Venugopal, V. Prabhu Raja, New Age

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	ENGLISH - COMMUNICATION SKILLS LAB-	1			

#### PRESCRIBED LAB MANUAL FOR SEMESTER I:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

#### **OBJECTIVES:**

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

#### **OUTCOME:**

A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

### UNIT 1:

- 1. WHY study Spoken English?
- 2. Making Inqueries on the phone, thanking and responding to Thanks Practice work.

#### **UNIT 2:**

1. Responding to Requests and asking for Directions Practice work.

#### **UNIT 3:**

- 1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
- 2. Apologising, Advising, Suggesting, Agreeing and Disagreeing Practice work.

#### **UNIT 4:**

1. Letters and Sounds Practice work.

#### **UNIT 5:**

1. The Sounds of English Practice work.

## UNIT 6:

- 1. Pronunciation
- 2. Stress and Intonation Practice work.

## Assessment Procedure: Laboratory

- 1. Every lab session (150 minutes) should be handled by not less than two teachers (three would be ideal) where each faculty has to conduct a speaking activity for 20/30 students.
- 2. The teachers are to assess each learner in the class for not less than 10 speaking activities, each one to be assessed for 10 marks or 10%. The average of 10 day-to-day activity assessments is to be calculated for 10 marks for internal assessment.

The rubric given below has to be filled in for all the students for all activities.

## The rubric to assess the learners:

Body la	inguage	Fluency & Audibilit y	Clarity in Speech	Neutraliz ation of accent	Appropriate Language		Total 10 marks	Remarks
Gesture s & Posture s	Eye Contac t				Gram mar	Vocabulary & expressions		

## • Lab Assessment: Internal (25 marks)

- 1. Day-to-Day activities: 10 marks
- 2. Completing the exercises in the lab manual: 5 marks
- 3. Internal test (5 marks written and 5 marks oral)

## • Lab Assessment: External (50 marks)

- 1. Written test: 20 marks (writing a dialogue, note-taking and answering questions on listening to an audio recording.
- 2. Oral: Reading aloud a text or a dialogue- 10 marks
- 3. Viva-Voce by the external examiner: 20 marks

## **Reference Books:**

- 1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
- 2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
- 3. Unlock, Listening and speaking skills 2, Cambridge University Press
- 4. Spring Board to Success, Orient BlackSwan
- 5. A Practical Course in effective english speaking skills, PHI
- 6. Word power made handy, Dr shalini verma, Schand Company
- 7. Let us hear them speak, Jayashree Mohanraj, Sage texts
- 8. Professional Communication, Aruna Koneru, Mc Grawhill Education
- 9. Cornerstone, Developing soft skills, Pearson Education

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#### **APPLIED / ENGINEERING PHYSICS LAB**

#### (Any 10 of the following listed experiments)

# **Objective:** *Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.*

#### LIST OF EXPERIMENTS:

- 1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
- 2. Newton's rings Radius of Curvature of Plano Convex Lens.
- 3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
- 4. Determination of Rigidity modulus of a material- Torsional Pendulum.
- 5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
- 6. Melde's experiment Transverse and Longitudinal modes.
- 7. Verification of laws of vibrations in stretched strings Sonometer.
- 8. Determination of velocity of sound Volume Resonator.
- 9. L- C- R Series Resonance Circuit.
- 10. Study of I/V Characteristics of Semiconductor diode.
- 11. I/V characteristics of Zener diode.
- 12. Characteristics of Thermistor Temperature Coefficients.
- 13. Magnetic field along the axis of a current carrying coil Stewart and Gee's apparatus.
- 14. Energy Band gap of a Semiconductor p n junction.
- 15. Hall Effect in semiconductors.
- 16. Time constant of CR circuit.
- 17. Determination of wavelength of laser source using diffraction grating.
- 18. Determination of Young's modulus by method of single cantilever oscillations.
- 19. Determination of lattice constant lattice dimensions kit.
- 20. Determination of Planck's constant using photocell.
- 21. Determination of surface tension of liquid by capillary rise method.

**Outcome:** *Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements.* 

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## **APPLIED / ENGINEERING PHYSICS VIRTUAL LABS - ASSIGNMENTS**

#### (Constitutes 5% marks of 30marks of Internal-component)

**Objective:** *Training Engineering students to prepare a technical document and improving their writing skills.* 

## LIST OF EXPERIMENTS

- 1. Hall Effect
- 2. Crystal Structure
- 3. Hysteresis
- 4. Brewster's angle
- 5. Magnetic Levitation / SQUID
- 6. Numerical Aperture of Optical fiber
- 7. Photoelectric Effect
- 8. Simple Harmonic Motion
- 9. Damped Harmonic Motion
- 10. LASER Beam Divergence and Spot size
- 11. B-H curve
- 12. Michelson's interferometer
- 13. Black body radiation
- URL: <u>www.vlab.co.in</u>

**Outcome:** *Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.* 

#### **ENGINEERING WORKSHOP & IT WORKSHOP**

#### **ENGINEERING WORKSHOP:**

Course Objective: To impart hands-on practice on basic engineering trades and skills.

Note: At least two exercises to be done from each trade.

#### **Trade:**

Carpentry	1. T-Lap Joint
	2. Cross Lap Joint
	3. Dovetail Joint
	4. Mortise and Tenon Joint
Fitting	1. Vee Fit
C	2. Square Fit
	3. Half Round Fit
	4. Dovetail Fit
Black Smithy	1. Round rod to Square
	2. S-Hook
	3. Round Rod to Flat Ring
	4. Round Rod to Square headed bolt
House Wiring	1. Parallel / Series Connection of three bulbs
	2. Stair Case wiring
	3. Florescent Lamp Fitting
	4. Measurement of Earth Resistance
Tin Smithy	1. Taper Tray
	2. Square Box without lid
	3. Open Scoop
	4. Funnel

#### **IT WORKSHOP:**

#### **OBJECTIVES:**

- Understand the basic components and peripherals of a computer.
- To become familiar in configuring a system.
- Learn the usage of productivity tools.
- Acquire knowledge about the netiquette and cyber hygiene.
- Get hands on experience in trouble shooting a system?

#### 1. System Assembling, Disassembling and identification of Parts / Peripherals

2. **Operating System Installation**-Install Operating Systems like Windows, Linux along with necessary Device Drivers.

### 3. MS-Office / Open Office

- a. Word Formatting, Page Borders, Reviewing, Equations, symbols.
- b. Spread Sheet organize data, usage of formula, graphs, charts.
- c. **Power point** features of power point, guidelines for preparing an effective presentation.
- d. Access- creation of database, validate data.
- 4. Network Configuration & Software Installation-Configuring TCP/IP, proxy and firewall settings. Installing application software, system software & tools.
- 5. Internet and World Wide Web-Search Engines, Types of search engines, netiquette, cyber hygiene.
- 6. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.
- 7. MATLAB- basic commands, subroutines, graph plotting.
- 8. LATEX-basic formatting, handling equations and images.

## **OUTCOMES:**

- Common understanding of concepts, patterns of decentralization implementation in Africa †
- Identified opportunities for coordinated policy responses, capacity building and implementation of best practices †
- Identified instruments for improved decentralization to the local level †
- Identified strategies for overcoming constraints to effective decentralization and sustainable management at different levels

### **Text Books:**

- 1. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern Economy Edition.
- 2. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition by Gary B. Shelly, Misty E. Vermaat and Thomas J. Cashman (2007, Paperback).
- 3. LATEX- User's Guide and Reference manual, Leslie Lamport, Pearson, LPE, 2/e.
- 4. Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Rudraprathap, Oxford University Press, 2002.
- 5. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008
- 6. The Complete Computer upgrade and repair book, 3/e, Cheryl A Schmidt, Dreamtech.
- 7. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
- 8. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

#### I Year - II Semester

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#### **ENGLISH -II**

#### Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

#### **Objectives:**

- 1. To imporve the language proficiency of the students in English with emphasis on LSRW skills.
- 2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theorotical and practical components.
- 3. To develop the communication skills of the students in both formal and informal situations.

## LISTENING SKILLS:

#### **Objectives:**

- 1. To enable the students to appreciate the role of listening skill and improve their pronounciation.
- 2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
- 3. To enable the students to listen for general content, to fill up information and for specific information.

#### **SPEAKING SKILLS:**

#### **Objectives:**

- 1. To make the students aware of the importance of speaking for their personal and professional communication.
- 2. To enable the students to express themselves fluently and accurately in social and professional success.
- 3. To help the students describe objects, situations and people.
- 4. To make the students participate in group activities like roleplays, discussions and debates.
- 5. To make the students particiapte in Just a Minute talks.

#### **READING SKILLS:**

#### **Objectives:**

- 1. To enable the students to comprehend a text through silent reading.
- 2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
- 3. To enable the students to skim and scan a text.
- 4. To enable the students to identify the topic sentence.
- 5. To enable the students to identify discourse features.
- 6. To enable the students to make intensive and extensive reading.

## WRITING SKILLS:

## **Objectives:**

- 1. To make the students understand that writing is an exact formal skills.
- 2. To enable the students to write sentences and paragraphs.
- 3. To make the students identify and use appropriate vocabulary.
- 4. To enable the students to narrate and describe.
- 5. To enable the students capable of note-making.
- 6. To enable the students to write coherently and cohesively.
- 7. To make the students to write formal and informal letters.
- 8. To enable the students to describe graphs using expressions of comparision.
- 9. To enable the students to write techincal reports.

## Methodology:

- 1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
- 2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
- 3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher interventionis perimitted as per the complexity of the task/exercise.
- 4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
- 5. The teacher is perimitted to use lecture method when a completely new concept is introduced in the class.

#### **Assessment Procedure: Theory**

- 1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
- 2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the langauge skills learnt in the unit are to be tested.
- 3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails,letters and reports-- are to be tested along with appropriate language and expressions.
- 4. Examinations:

I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%

(80% for the best of two and 20% for the other)

Assignments= 5%

End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech II Semester (Common for all branches)and I B.Pharma II Sem of JNTU Kakinada from the academic year 2016-17 (**R-16 Regulations**)

## DETAILED TEXTBOOK: ENGLISH ENCOUNTERS Published by Maruthi Publishers.

## DETAILED NON-DETAIL: THE GREAT INDIAN SCIENTISTS Published by Cenguage learning

The course content along with the study material is divided into six units.

## **UNIT 1:**

1. 'The Greatest Resource- Education' from English Encounters

## **OBJECTIVE:**

Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts.

## **OUTCOME:**

The lesson underscores that the ultimate aim of Education is to enhance wisdom.

2. ' A P J Abdul Kalam' from The Great Indian Scientists.

## **OBJECTIVE:**

The lesson highlights Abdul Kalam's contributions to Indian science and the awards he received.

## **OUTCOME:**

Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.

## **UNIT 2:**

1. ' A Dilemma' from English Encounters

**OBJECTIVE:** The lesson centres on the pros and cons of the development of science and technology.

**OUTCOME:** The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.

2. 'C V Raman' from The Great Indian Scientists.

## **OBJECTIVE:**

The lesson highlights the dedicated research work of C V Raman and his achievements in Physics.

## **OUTCOME:**

The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists.

## **UNIT 3:**

1. 'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.

## **OBJECTIVE:**

The lesson depicts of the symptoms of Cultural Shock and the aftermath consequences.

## **OUTCOME:**

The lesson imparts the students to manage different cultural shocks due to globalization.

2. 'Homi Jehangir Bhabha' from The Great Indian Scientists.

## **OBJECTIVE:**

The lesson highlights Homi Jehangir Bhabha's contributions to Indian nuclear programme as architect.

#### **OUTCOME:**

The seminal contributions of Homi Jehangir Bhabha to Indian nuclear programme provide an aspiration to the readers to serve the nation and sterngthen it.

## UNIT 4:

1. 'The Lottery' from English Encounters.

## **OBJECTIVE:**

The lesson highlights insightful commentary on cultural traditions.

#### **OUTCOME:**

The theme projects society's need to re examine its traditions when they are outdated.

2. 'Jagadish Chandra Bose' from The Great Indian Scientists.

## **OBJECTIVE:**

The lesson gives an account of the unique discoveries and inventions of Jagadish Chandra Bose in Science.

**OUTCOME:** The Scientific discoveries and inventions of Jagadish Chandra Bose provide inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.

## **UNIT 5:**

1. 'The Health Threats of Climate Change' from English Encounters.

## **OBJECTIVE:**

The essay presents several health disorders that spring out due to environmental changes

## **OUTCOME:**

The lesson offers several inputs to protect environment for the sustainability of the future generations.

2. ' Prafulla Chandra Ray' from The Great Indian Scientists.

## **OBJECTIVE:**

The lesson given an account of the experiments and discoveries in Pharmaceuticals of Prafulla Chandra Ray.

## **OUTCOME:**

Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader.

## UNIT 6:

1. 'The Chief Software Architect' from English Encounters

## **OBJECTIVE:**

The lesson supports the developments of technology for the betterment of human life.

## **OUTCOME:**

Pupil get inspired by eminent personalities who toiled for the present day advancement of software development.

2. 'Srinivasa Ramanujan' from The Great Indian Scientists.

## **OBJECTIVE:**

The lesson highlights the extraordinary achievements of Srinivasa Ramanujan, a great mathematician and the most romantic figure in mathematics.

## **OUTCOME:**

The lesson provides inspiration to the readers to think and tap their innate talents.

## NOTE:

All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

## MODEL QUESTION PAPER FOR THEORY

## PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

## PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks

B from non-detailed text: 3 marks

C on grammar and Vocabulary: 6 marks

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#### **MATHEMATICS-III**

#### **Course Objectives:**

- 1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
- 2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
- 3. Understand the most basic numerical methods to solve simultaneous linear equations.

#### **Course Outcomes: At the end of the Course, Student will be able to:**

- 1. Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations.
- 2. Solve simultaneous linear equations numerically using various matrix methods.
- 3. Determine double integral over a region and triple integral over a volume.
- 4. Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

#### **UNIT I: Linear systems of equations:**

Rank-Echelon form-Normal form – Solution of linear systems – Gauss elimination - Gauss Jordon- Gauss Jacobi and Gauss Seidal methods. Applications: Finding the current in electrical circuits.

#### UNIT II: Eigen values - Eigen vectors and Quadratic forms:

Eigen values - Eigen vectors- Properties - Cayley-Hamilton theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Diagonalization- Quadratic forms- Reduction of quadratic form to canonical form - Rank - Positive, negative and semi definite - Index - Signature. Applications: Free vibration of a two-mass system.

#### **UNIT III: Multiple integrals:**

Curve tracing: Cartesian, Polar and Parametric forms. Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration. Applications: Finding Areas and Volumes.

#### **UNIT IV: Special functions:**

Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.

Applications: Evaluation of integrals.

#### **UNIT V: Vector Differentiation:**

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities. Applications: Equation of continuity, potential surfaces

#### **UNIT VI: Vector Integration:**

Line integral – Work done – Potential function – Area- Surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems. Applications: Work done, Force.

## **Text Books:**

- 1. **B.S.Grewal**, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

## **Reference Books:**

- 1. Greenberg, Advanced Engineering Mathematics, 2<sup>nd</sup> edition, Pearson edn
- 2. Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India
- 3. Peter O'Neil, Advanced Engineering Mathematics,7<sup>th</sup> edition, Cengage Learning.
- 4. D.W. Jordan and T.Smith, Mathematical Techniques, Oxford University Press.
- 5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
- 6. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

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#### APPLIED CHEMISTRY (Common to EEE, ECE, CSE, IT, EIE, E.Com.E, )

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

#### **Learning Objectives:**

- Plastics are nowadays used in household appliances; also they are used as composites (FRP) in aerospace industries (Unit I).
- Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced (Unit II).
- The basics for the construction of galvanic cells as well as some of the sensors used in instruments are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory (Unit III).
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced (Unit IV).
- Understanding of crystal structures will help to understand the conductivity, semiconductors and superconductors. Magnetic properties are also studied (Unit V).
- With the increase in demand for power and also with depleting sources of fossil fuels, the demand for alternative sources of fuels is increasing. Some of the prospective fuel sources are introduced (Unit VI).

#### **UNIT I: HIGH POLYMERS AND PLASTICS**

Polymerisation : Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties – Plastics as engineering materials : advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4/5 techniques)-Preparation, properties and applications of polyethene, PVC, Bakelite Teflon and polycarbonates

Elastomers – Natural rubber- compounding and vulcanization – Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers.

Composite materials & Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

#### **UNIT II: FUEL TECHNOLOGY**

*Fuels*:- Introduction – Classification – Calorific value - HCV and LCV – Dulong's formula – Bomb calorimeter – Numerical problems – Coal — Proximate and ultimate analysis – Significance of the analyses – Liquid fuels – Petroleum- Refining – Cracking – Synthetic petrol –Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knock agents – Power alcohol – Bio-diesel – Gaseous fuels – Natural gas. LPG and CNG – Combustion – Calculation of air for the combustion of a fuel – Flue gas analysis – Orsat apparatus – Numerical problems on combustion.

*Explosives:-* Introduction, classification, examples: RDX, TNT and ammonium nitrite - rocket fuels.

#### UNIT III: ELECTROCHEMICAL CELLS AND CORROSION

Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc – air cells.

*Corrosion:*- Definition – Theories of Corrosion (electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Design and material selection – Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating)
# UNIT IV: CHEMISTRY OF ADVANCED MATERIALS

*Nano materials:-* Introduction – Sol-gel method & chemical reduction method of preparation – Characterization by BET method and TEM methods - Carbon nano tubes and fullerenes: Types, preparation, properties and applications *Liquid crystals:-* Introduction – Types – Applications

*Superconductors* :- Type-I & Type-2, properties & applications

Green synthesis:- Principles - 3or 4 methods of synthesis with examples - R<sub>4</sub>M<sub>4</sub> principles

# **UNIT V: SOLID STATE CHEMISTRY**

Types of solids - close packing of atoms and ions - BCC, FCC, structures of rock salt - cesium chloride- spinel - normal and inverse spinels,

Non-elemental *semiconducting Materials:*- Stoichiometric, controlled valency & Chalcogen photo/semiconductors, Preparation of Semiconductors - Semiconductor Devices:- p-n junction diode as rectifier – junction transistor. **Insulators** (electrical and electronic applications)

Magnetic materials:- Ferro and ferri magnetism. Hall effect and its applications.

# UNIT VI: NON CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICESSolar Energy: -

Introduction, application of solar energy, conversion of solar energy (Thermal

conversion & photo conversion) - photovoltaic cell: design, working and its importance

# Non-conventional energy sources:

- (i) Hydropower include setup a hydropower plant (schematic diagram)
- (ii) Geothermal energy: Introduction-schematic diagram of a geothermal power plant
- (iii) Tidal and wave power: Introduction- Design and working-movement of tides and their effect on sea level.
- (iv)Ocean thermal energy: Introduction, closed-cycle, ocean thermal energy conversion (OTEC), open cycle OTEC, hybrid OTEC, schematic diagram and explanation.
- (v) Biomass and biofuels

*Fuel cells:* - Introduction - cell representation,  $H_2$ - $O_2$  fuel cell: Design and working, advantages and limitations. Types of fuel cells: Alkaline fuel cell - methanol-oxygen - phosphoric acid fuel cells - molten carbonate fuel cells.

**Outcomes:** The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nanomaterials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. Conductance phenomenon is better understood. The students are exposed to some of the alternative fuels and their advantages and limitations.

## **Standard Books:**

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.

2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

## **Reference Books:**

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).

2.Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.

3.A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition

4.Applied Chemistry by H.D. Gesser, Springer Publishers

5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

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# **ELECTRICAL & MECHANICAL TECHNOLOGY**

## **ELECTRICAL TECHNOLOGY:**

### **Preamble:**

This course covers the topics related to analysis of various electrical circuits, operation of various electrical machines, various electronic components to perform well in their respective fields.

## Learning Objectives:

- To learn the basic principles of electrical law's and analysis of networks.
- To understand the principle of operation and construction details of DC machines.
- To understand the principle of operation and construction details of transformer.
- To understand the principle of operation and construction details of alternator and 3-Phase induction motor.
- To Understand the principles and construction of various measuring instruments.

## Unit - I

## **DC Machines:**

Principle of operation of DC generator – emf equation – types of DC machine – torque equation of DC motor – applications – three point starter, speed control methods – OCC of DC generator

**Transformers:** Principle of operation of single phase transformers – e.m.f equation – losses –efficiency and regulation.

# Unit - II

# **AC Rotating Machines:**

Principle of operation of alternators – regulation by synchronous impedance method –principle of operation of 3-Phase induction motor – slip-torque characteristics - efficiency – applications.

# Unit III

# **Measuring Instruments:**

Classification – Deflection, controlling, damping torque, ammeter, voltmeter, wattmeter, MI, MC instruments – Energy meter – Construction of CRO.

## **Learning Outcomes:**

- Able to analyse the various electrical networks.
- Able to understand the operation of DC generator, DC Motor ,3-point starter and Speed control methods.
- Able to analyse the performance of transformer.
- Able to explain the operation of 3-phase alternator and 3-phase induction motors.
- Able to explain the working principle of various measuring instruments.

# MECHANICAL TECNOLOGY

**Learning Objectives:** The content of this course shall provide the student the basic concepts of various mechanical systems and exposes the student to a wide range of equipment and their utility in a practical situation. It shall provide the fundamental principles of fuels, I.C. Engines, transmission systems, heat transfer fundamentals and various manufacturing operations usually exist in any process plant.

# UNIT-IV:

Energy Sources: Renewable and non renewable energy resources, renewable energy forms and conversions. Thermodynamic principles and laws.

Internal combustion engines: classification – working principle - engine components. Four stroke and two stroke petrol and diesel engines, comparisons. Performance parameters: IP, BP, FP, SFC, BTE, ITE, ME.

# UNIT-V:

Heat Transfer: Modes of heat transfer- heat transfer parameters, various thermo physical properties. Conduction - heat transfer for extended surfaces, Types of fins, Fin equation for rectangular fin, Fin efficiency, Fin effectiveness. Convection – Mechanism, Natural and Forced Convection. Heat Transfer in laminar and turbulent flow over a flat plate. Radiation heat transfer: Thermal radiation, Blackbody radiation, Radiation intensity, Radiative properties, Basic laws of radiation.

# **UNIT-VI:**

Transmission of power and manufacturing methods:

Belt, rope and chain drives- Different types - power transmission by belts and ropes, initial tensions in the belt.

Gears: classification of gears, applications.

Metal joining: arc welding, resistance welding, gas welding, brazing and soldering Metal forming: forging – operations, rolling and extrusion principles Machine tool: lathe classification, specifications, and operations.

# **Outcomes:**

After completing the course, the student shall be able to understand:

- Working of I.C. Engines
- Modes of Heat transfer
- Power transmission by drives and different manufacturing methods.

# **Text Books**:

- 1. Electrical Technology by Surinder Pal Bali, Pearson Publications.
- 2. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor & Francis Group
- 3. Mechanical Engineering Science K R Gopala Krishna, Subhas publications

4. Elements of Mechanical Engineering, M.L. Mathur, F.S.Metha & R.P.Tiwari Jain Brothers Publs., 2009.

5. Heat transfer by P.K. Nag, Tata McGraw-Hill

# **Reference Books:**

- 1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah, TMH Publications
- 2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2<sup>nd</sup> edition
- 3. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2<sup>nd</sup> edition
- 4. Electrical Engineering Prasad, Sivanagaraju, Cengage Learning
- 5. Theory of machines by Rattan McGraw-Hill publications
- 6. Production Technology by P.N.Rao by I & II McGraw-Hill publications

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#### **ENVIRONMENTAL STUDIES**

### **Course Learning Objectives:**

The objectives of the course is to impart

- Overall understanding of the natural resources
- Basic understanding of the ecosystem and its diversity
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- An understanding of the environmental impact of developmental activities
- Awareness on the social issues, environmental legislation and global treaties

#### **Course Outcomes:**

The student should have knowledge on

- The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
- The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
- The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
- Social issues both rural and urban environment and the possible means to combat the challenges
- The environmental legislations of India and the first global initiatives towards sustainable development.
- About environmental assessment and the stages involved in EIA and the environmental audit.
- Self Sustaining Green Campus with Environment Friendly aspect of Energy, Water and Wastewater reuse Plantation, Rain water Harvesting, Parking Curriculum.

#### Syllabus:

**UNIT – I Multidisciplinary nature of Environmental Studies:** Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, Carbon Credits, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

#### UNIT - II Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Literate, Coal, Sea and River sands.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT – III Biodiversity and its conservation:** Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

**UNIT – IV Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies.

**Solid Waste Management:** Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

**UNIT – V Social Issues and the Environment:** Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

**UNIT – VI Environmental Management**: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry/Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

## **Text Books:**

- 1. Environmental Studies, K.V. S. G. Murali Krishna, VGS Publishers, Vijayawada
- 2. Environmental Studies, R. Rajagopalan, 2<sup>nd</sup> Edition, 2011, Oxford University Press.
- 3. Environmental Studies, P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

## **Reference:**

- 1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
- 2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
- 3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
- 4. "Perspectives in Environment Studies" Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014

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### **DATA STRUCTURES**

#### **OBJECTIVES:**

- To be familiar with basic techniques handling problems with Data structures
- Solve problems using data structures such as linear lists, stacks, queues, hash tables

#### **UNIT-I: ARRAYS**

Abstract Data Type, The Array as an Abstract Data Type, The Polynomial Abstract Data type-Polynomial Representation- Polynomial Addition. Spares Matrices, Introduction- Sparse Matrix Representation- Transposing a Matrix- Matrix Multiplication, Representation of Arrays.

#### **UNIT-II: STACKS AND QUEUES**

The Stack Abstract Data Type, The Queue Abstract Data Type, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

#### **UNIT-III: LINKED LISTS**

Single Linked List and Chains, Circular Lists, Available Space Lists, Linked Stacks and Queues, Polynomials, Polynomial Representation- Adding Polynomials- Circular List Representation of Polynomials, Equivalence Classes, Sparse Matrices, Sparse Matrix Representation- Sparse Matrix Input- Deleting a Sparse Matrix, Doubly Linked Lists, Generalized Lists, Representation of Generalized Lists- Recursive Algorithms for Lists- Reference Counts, Shared and Recursive Lists

#### **UNIT-IV: TREES**

Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Tress, Binary Tree Representations, Binary Tree Traversal, Introduction, Inorder Traversal Preorder Traversal, Postorder Traversal, Thread Binary Trees, Threads, Inorder Traversal of a Threaded Binary Tree, Inserting a Node into a Threaded Binary Tree, Heaps, Priority Queues, Definition of a Max Heap, Insertion into a Max Heap, Deletion from a Max Heap, Binary Search Trees, Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Height of Binary Search Tree.

## **UNIT-V: GRAPHS**

The Graph Abstract Data Type, Introduction, Definition, Graph Representation, Elementary Graph Operation, Depth First Search, Breadth First Search, Connected Components, Spanning Trees, Biconnected Components, Minimum Cost Spanning Trees, Kruskal S Algorithm, Prim s Algorithm, Sollin's Algorithm, Shortest Paths and Transitive Closure, Single Source/All Destination: Nonnegative Edge Cost, Single Source/All Destination: General Weights, All-Pairs Shortest Path, Transitive Closure.

# **UNIT-VI: SORTING**

Insertion Sort, Quick Sort, Merge Sort Merging, Iterative Merge Sort, Recursive Merge Sort, Heap Sort, Summary of Internal Sorting

# **OUTCOMES**:

- Apply advanced data structure strategies for exploring complex data structures.
- Compare and contrast various data structures and design techniques in the area Of Performance.
- Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs

## **Text Books:**

- 1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.
- 2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
- 3. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson

## **Reference Books:**

- 1. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
- 2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
- 3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

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APPLIED/ENGINEERING CHEMISTRY LABORATORY						

- 1. Introduction to Chemistry laboratory Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.
- 2. Trial experiment Determination of HCl using standard Na<sub>2</sub>CO<sub>3</sub> solution.
- 3. Determination of alkalinity of a sample containing Na<sub>2</sub>CO<sub>3</sub> and NaOH.
- 4. Determination of KMnO<sub>4</sub> using standard Oxalic acid solution.
- 5. Determination of Ferrous iron using standard  $K_2Cr_2O_7$  solution.
- 6. Determination of Copper using standard K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution.
- 7. Determination of temporary and permanent hardness of water using standard EDTA solution.
- 8. Determination of Copper using standard EDTA solution.
- 9. Determination of Iron by a Colorimetric method using thiocynate as reagent.
- 10. Determination of pH of the given sample solution using pH meter.
- 11. Conductometric titration between strong acid and strong base.
- 12. Conductometric titration between strong acid and weak base.
- 13. Potentiometric titration between strong acid and strong base.
- 14. Potentiometric titration between strong acid and weak base.
- 15. Determination of Zinc using standard EDTA solution.
- 16. Determination of Vitamin C.

**Outcomes**: The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

# **Reference Books**

- 1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
- Dr. Jyotsna Cherukuris (2012) Laboratory Manual of engineering chemistry-II, VGS Techno Series
  Chemistry Practical Manual, Lorven Publications K. Mukkanti (2009) Practical Engineering Chemistry, B.S. Publication.

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	ENGLISH - COMMUNICATION SKILLS LAB	8 - 2			

### PRESCRIBED LAB MANUAL FOR SEMESTER II:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

#### **OBJECTIVES:**

To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

#### **OUTCOME:**

A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

#### **UNIT 1:**

**1.** Debating - Practice work

## **UNIT 2:**

1. Group Discussions -- Practice work

## **UNIT 3:**

1. Presentation Skills - Practice work

# **UNIT 4:**

1. Interview Skills - Practice work

# **UNIT 5:**

1. Email, Curriculum Vitae - Practice work

# **UNIT 6:**

- 1. Idiomatic Expressions
- 2. Common Errors in English Practice work

# **Reference Books:**

- 1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
- 2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
- 3. Unlock, Listening and speaking skills 2, Cambridge University Press
- 4. Spring Board to Success, Orient BlackSwan
- 5. A Practical Course in effective english speaking skills, PHI
- 6. Word power made handy, Dr shalini verma, Schand Company
- 7. Let us hear them speak, Jayashree Mohanraj, Sage texts
- 8. Professional Communication, Aruna Koneru, Mc Grawhill Education
- 9. Cornerstone, Developing soft skills, Pearson Education

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### **COMPUTER PROGRAMMING LAB**

#### **OBJECTIVES:**

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.

## Programming

#### Exercise - 1 Basics

- a) What is an OS Command, Familiarization of Editors vi, Emacs
- b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
- c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

## Exercise - 2 Basic Math

- a) Write a C Program to Simulate 3 Laws at Motion
- b) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise - 3 Control Flow - I

a)Write a C Program to Find Whether the Given Year is a Leap Year or not.b)Write a C Program to Add Digits & Multiplication of a number

## Exercise – 4 Control Flow - II

- a)Write a C Program to Find Whether the Given Number is
  - i) Prime Number
  - ii) Armstrong Number
- b) Write a C program to print Floyd Triangle
- c) Write a C Program to print Pascal Triangle

# Exercise – 5 Functions

a) Write a C Program demonstrating of parameter passing in Functions and returning values.

b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

# Exercise – 6 Control Flow - III

a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch...caseb) Write a C Program to convert decimal to binary and hex (using switch call function the function)

# Exercise – 7 Functions - Continued

Write a C Program to compute the values of sin x and  $\cos x$  and  $e^x$  values using Series expansion. (use factorial function)

# Exercise – 8 Arrays

Demonstration of arrays

- a) Search-Linear.
- b) Sorting-Bubble, Selection.
- c) Operations on Matrix.

# Exercises - 9 Structures

a)Write a C Program to Store Information of a Movie Using Structure

- b)Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
- c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

# Exercise - 10 Arrays and Pointers

a)Write a C Program to Access Elements of an Array Using Pointer

b) Write a C Program to find the sum of numbers with arrays and pointers.

# Exercise – 11 Dynamic Memory Allocations

- a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
- b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

Understand the difference between the above two programs

# **Exercise – 12** Strings

a) Implementation of string manipulation operations with library function.

- i) copy
- ii) concatenate
- iii) length
- iv) compare

b) Implementation of string manipulation operations without library function.

- i) copy
- ii) concatenate
- iii) length
- iv) compare

# Exercise -13 Files

a)Write a C programming code to open a file and to print it contents on screen. b)Write a C program to copy files

# Exercise - 14 Files Continued

a) Write a C program merges two files and stores their contents in another file.b)Write a C program to delete a file.

# **OUTCOMES:**

- Apply and practice logical ability to solve the problems.
- Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
- Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
- Understand and apply the in-built functions and customized functions for solving the problems.
- Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
- Document and present the algorithms, flowcharts and programs in form of user-manuals

•Identification of various computer components, Installation of software

## Note:

- a) All the Programs must be executed in the Linux Environment. (Mandatory)
- b) The Lab record must be a print of the LATEX (.tex) Format.

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# **ELECTRONIC DEVICES AND CIRCUITS**

## **Objectives:**

#### The main objectives of this course are:

- The basic concepts of semiconductor physics are to be reviewed.
- Study the physical phenomena such as conduction, transport mechanism and electrical characteristics of different diodes.
- The application of diodes as rectifiers with their operation and characteristics with and without filters are discussed.
- The principal of working and operation of Bipolar Junction Transistor and Field Effect Transistor and their characteristics are explained.
- The need of transistor biasing and its significance is explained. The quiescent point or operating point is explained.
- Small signal equivalent circuit analysis of BJT and FET transistor amplifiers in different configuration is explained.

## Syllabus:

**UNIT-I:Semi Conductor Physics :** Insulators, Semi conductors, and Metals classification using energy band diagrams, mobility and conductivity, electrons and holes in intrinsic semi conductors, extrinsic semi conductors, drift and diffusion, charge densities in semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors

**UNIT- II: Junction Diode Characteristics :** Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

**Special Semiconductor Diodes**: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, Photo diode, Tunnel Diode, SCR, UJT. Construction, operation and characteristics of all the diodes are required to be considered.

**UNIT- III: Rectifiers and Filters:** Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter, Capacitor filter, comparison of various filter circuits in terms of ripple factors.

## **UNIT- IV: Transistor Characteristics:**

**BJT:** Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.

**FET:** FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

**UNIT- V: Transistor Biasing and Thermal Stabilization :** Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in  $V_{BE}$ , Ic, and  $\beta$ , Stability factors, (S, S<sup>'</sup>, S<sup>''</sup>), Bias compensation, Thermal runaway, Thermal stability.

FET Biasing- methods and stabilization.

# UNIT- VI: Small Signal Low Frequency Transistor Amplifier Models:

**BJT:** Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

**FET:** Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

# Text Books:

- 1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, Second Edition.
- 2. Integrated Electronics- Jacob Millman, C. Halkies, C.D.Parikh, Tata Mc-Graw Hill, 2009.

# **References:**

- 1. Electronic Devices and Circuits-K. Satya Prasad, VGS Book Links.
- 2. Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, Second Edition
- 3. Electronic Devices and Circuits Bell, Oxford

# **Outcomes:**

# At the end of this course the student can able to:

- Understand the basic concepts of semiconductor physics.
- Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.
- Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons.
- Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations.
- Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions.
- Perform the analysis of small signal low frequency transistor amplifier circuits using BJT and FET in different configurations.

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#### SWITCHING THEORY AND LOGIC DESIGN

#### UNIT – I: REVIEW OF NUMBER SYSTEMS & CODES:

- i) Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members, problem solving.
- ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9's compliment code etc.,
- iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR realizations.

# **UNIT – II: MINIMIZATION TECHNIQUES**

Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 6 variables, tabular minimization, problem solving (code-converters using K-Map etc..).

### **UNIT – III: COMBINATIONAL LOGIC CIRCUITS DESIGN**

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

#### **UNIT - IV: INTRODUCTION OF PLD's**

PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, programming tables of PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

### **UNIT - V: SEQUENTIAL CIRCUITS I**

Classification of sequential circuits (synchronous and asynchronous); basic flip-flops, truth tables and excitation tables (nand RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Conversion from one flip-flop to flip-flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

#### **UNIT – VI: SEQUENTIAL CIRCUITS II**

Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Meelay to Moore conversion and vice-versa.

# **TEXT BOOKS:**

- 1. Switching Theory and Logic Design by Hill and Peterson Mc-Graw Hill TMH edition.
- 2. Switching Theory and Logic Design by A. Anand Kumar
- 3. Digital Design by Mano PHI.

# **REFERENCE BOOKS:**

- 1. Modern Digital Electronics by RP Jain, TMH
- 2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers
- 3. Micro electronics by Milliman MH edition.

II Year - I Semester		L	Т	Р	С
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	SIGNALS & SYSTEMS				

# **OBJECTIVES:**

### The main objectives of this course are given below:

- To introduce the terminology of signals and systems.
- To introduce Fourier tools through the analogy between vectors and signals.
- To introduce the concept of sampling and reconstruction of signals.
- To analyze the linear systems in time and frequency domains.
- To study z-transform as mathematical tool to analyze discrete-time signals and systems.

**UNIT- I: INTRODUCTION:** Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions.

## UNIT -- II: FOURIER SERIES AND FOURIER TRANSFORM:

Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform.

**UNIT –III: SAMPLING THEOREM** – Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

**UNIT-IV: ANALYSIS OF LINEAR SYSTEMS:** Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

Cross-correlation and auto-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

**UNIT -V: LAPLACE TRANSFORMS :** Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

**UNIT -VI: Z-TRANSFORMS :** Fundamental difference between continuous-time and discrete-time signals, discrete time signal representation using complex exponential and sinusoidal components, Periodicity of discrete time using complex exponential signal, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in

Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

# **TEXT BOOKS:**

- 1. Signals, Systems & Communications B.P. Lathi, BS Publications, 2003.
- 2. Signals and Systems A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.
- 3. Signals & Systems- Narayan Iyer and K Satya Prasad, Cenage Pub.

## **REFERENCE BOOKS:**

- 1. Signals & Systems Simon Haykin and Van Veen, Wiley, 2nd Edition.
- 2. Principles of Linear Systems and Signals BP Lathi, Oxford University Press, 2015
- 3. Signals and Systems K Raja Rajeswari, B VisweswaraRao, PHI, 2009
- 4. Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008.
- 5. Signals and Systems T K Rawat, Oxford University press, 2011

### **OUTCOMES:**

#### At the end of this course the student will able to:

- Characterize the signals and systems and principles of vector spaces, Concept of orthgonality.
- Analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform and Laplace transform.
- Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
- Understand the relationships among the various representations of LTI systems
- Understand the Concepts of convolution, correlation, Energy and Power density spectrum and their relationships.
- Apply z-transform to analyze discrete-time signals and systems.

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NETWORK ANALYSIS				

#### UNIT – I

**Introduction to Electrical Circuits** : Network elements classification, Electric charge and current, Electric energy and potential, Resistance parameter – series and parallel combination, Inductance parameter – series and parallel combination. Energy sources: Ideal, Non-ideal, Independent and dependent sources, Source transformation, Kirchoff's laws, Mesh analysis and Nodal analysis problem solving with resistances only including dependent sources also. (Text Books: 1,2,3, Reference Books: 3)

**A.C Fundamentals and Network Topology**: Definitions of terms associated with periodic functions: Time period, Angular velocity and frequency, RMS value, Average value, Form factor and peak factor- problem solving, Phase angle, Phasor representation, Addition and subtraction of phasors, mathematical representation of sinusoidal quantities, explanation with relevant theory, problem solving. Principal of Duality with examples.

**Network Topology:** Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule. (Text Books: 2,3, Reference Books: 3)

### UNIT – II

**Steady State Analysis of A.C Circuits :** Response to sinusoidal excitation - pure resistance, pure inductance, pure capacitance, impedance concept, phase angle, series R-L, R-C, R-L-C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta conversion, problem solving. (Text Books: 1,2, Reference Books: 3)

## UNIT – III

**Coupled Circuits :** Coupled Circuits: Self inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, Conductively coupled equivalent circuits- problem solving.

**Resonance:** Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance, general case-resistance present in both branches, anti resonance at all frequencies. (Text Books:2,3, Reference Books: 3)

#### UNIT – IV

**Network Theorems:** Thevinin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens- problem solving using dependent sources also. (Text Books: 1,2,3, Reference Books: 2)

#### UNIT – V

**Two-port networks** : Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h-parameters, Inverse h-parameters, Inverse Transmission line parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks, problem solving including dependent sources also. (Text Books: 1,2, Reference Books: 1,3)

# UNIT – VI

**Transients :** First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogeneous, problem solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots. Solutions using Laplace transform method. (Text Books: 1,2,3, Reference Books: 1,3)

## **TEXT BOOKS:**

- 1. Network Analysis ME Van Valkenburg, Prentice Hall of India, 3rd Edition, 2000.
- 2. Network Analysis by K.Satya Prasad and S Sivanagaraju, Cengage Learning
- 3. Electric Circuit Analysis by Hayt and Kimmarle, TMH

## **REFERENCES:**

- 1. Network lines and Fields by John. D. Ryder 2<sup>nd</sup> edition, Asia publishing house.
- 2. Basic Circuit Analysis by DR Cunninghan, Jaico Publishers.
- 3. Network Analysis and Filter Design by Chadha, Umesh Publications.

## **COURSE OBJECTIVES:**

- 1. To understand the basic concepts on RLC circuits.
- 2. To know the behavior of the steady states and transients states in RLC circuits.
- 3. To know the basic Laplace transforms techniques in periods' waveforms.
- 4. To understand the two port network parameters.
- 5. To understand the properties of LC networks and filters.

# **COUSE OUTCOME:**

- 1. gain the knowledge on basic network elements.
- 2. will analyze the RLC circuits behavior in detailed.
- 3. analyze the performance of periodic waveforms.
- 4. gain the knowledge in characteristics of two port network parameters (Z, Y, ABCD, h & g).
- 5. analyze the filter design concepts in real world applications.

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II Year - I Semester	4	0	0	3

# **RANDOM VARIABLES & STOCHASTIC PROCESSES**

## **OBJECTIVES:**

- To give students an introduction to elementary probability theory, in preparation for courses on statistical analysis, random variables and stochastic processes.
- To mathematically model the random phenomena with the help of probability theory concepts.
- To introduce the important concepts of random variables and stochastic processes.
- To analyze the LTI systems with stationary random process as input.
- To introduce the types of noise and modelling noise sources.

## UNIT I

**THE RANDOM VARIABLE :** Introduction, Review of Probability Theory, Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Conditional Density, Properties.

## UNIT II

**OPERATION ON ONE RANDOM VARIABLE – EXPECTATIONS** : Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Nonmonotonic Transformations of Continuous Random Variable.

## UNIT III

**MULTIPLE RANDOM VARIABLES**: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem: Unequal Distribution, Equal Distributions.

OPERATIONS ON MULTIPLE RANDOM VARIABLES: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variables case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

## UNIT IV

**RANDOM PROCESSES – TEMPORAL CHARACTERISTICS:** The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second-order and Wide-Sense Stationarity, N<sup>th</sup>-order and Strict-Sense Stationarity, Time Averages and Ergodicity, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

## UNIT V

**RANDOM PROCESSES – SPECTRAL CHARACTERISTICS:** The Power Density Spectrum: Properties, Relationship between Power Density Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Density Spectrum and Cross-Correlation Function.

# UNIT VI

**LINEAR SYSTEMS WITH RANDOM INPUTS :** Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, Autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectra of Input and Output, Band pass, Band-Limited and Narrowband Processes, Properties, Modeling of Noise Sources: Resistive (Thermal) Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Average Noise Figure, Average Noise Figure of cascaded networks.

## **TEXT BOOKS:**

- 1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, TMH, 4<sup>th</sup> Edition, 2001.
- 2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S.Unnikrisha, PHI, 4<sup>th</sup> Edition, 2002.

## **REFERENCE BOOKS:**

- 1. Probability Theory and Stochastic Processes B. Prabhakara Rao, BS Publications
- 2. Probability and Random Processes with Applications to Signal Processing, Henry Stark and John W. Woods, Pearson Education, 3<sup>rd</sup> Edition.
- 3. Schaum's Outline of Probability, Random Variables, and Random Processes.
- 4. An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook, 1968.
- 5. Random Process Ludeman, John Wiley
- 6. Probability Theory and Random Processes, P. Ramesh Babu, McGrawHill, 2015.

## **OUTCOMES:**

## After completion of the course, the student will be able to

- Mathematically model the random phenomena and solve simple probabilistic problems.
- Identify different types of random variables and compute statistical averages of these random variables.
- Characterize the random processes in the time and frequency domains.
- Analyze the LTI systems with random inputs.
- Apply these techniques to analyze the systems in the presence of different types of noise.

II Year - I Semester	L	Т	Р	С
	4	0	0	3
MANAGERIAL ECONOMICS AND FINANCIAL	ANALY	SIS		

### (Common to all Branches)

### • Course Objectives:

- The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

## UNIT-I

### Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects – Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting..

## UNIT – II

#### **Production and Cost Analyses:**

Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs –Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)-Managerial significance and limitations of Breakeven point.

## UNIT – III

#### Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive pricing and Priority Pricing.

#### UNIT – IV

## **Types of Business Organization and Business Cycles:**

Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of Business Cycle.

#### UNIT – V

# Introduction to Accounting & Financing Analysis:

Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)

# UNIT – VI

**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

# **Course Outcome:**

- \*The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
- \* One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
- \*The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

## **TEXT BOOKS**

- 1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi 2011
- 2. Dr. A. R. Aryasri Managerial Economics and Financial Analysis, TMH 2011
- 3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

## **REFERENCES:**

- 1. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
- 2. V. Maheswari: Managerial Economics, Sultan Chand.2014
- 3. Suma Damodaran: Managerial Economics, Oxford 2011.
- 4. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
- 5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
- 6. Maheswari: Financial Accounting, Vikas Publications.
- 7. S. A. Siddiqui& A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
- 8. Ramesh Singh, Indian Economy, 7<sup>th</sup> Edn., TMH2015
- 9. Pankaj Tandon A Text Book of Microeconomic Theory, Sage Publishers, 2015
- 10. Shailaja Gajjala and Usha Munipalle, Univerties press, 2015

II Year - I Semester	L	Т	Р	С
	0	0	3	2

## ELECTRONIC DEVICES AND CIRCUITS LAB

**Note:** The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

#### **Electronic Workshop Practice:**

- 1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
- 2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
- 3. Soldering Practice- Simple circuits using active and passive components.
- 4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO..

## List of Experiments: (Minimum of Ten Experiments has to be performed)

1. P-N Junction Diode Characteristics

Part A: Germanium Diode (Forward bias& Reverse bias)

Part B: Silicon Diode (Forward Bias only)

2. Zener Diode Characteristics

Part A: V-I Characteristics

Part B: Zener Diode as Voltage Regulator

3. Rectifiers (without and with c-filter)

Part A: Half-wave Rectifier

Part B: Full-wave Rectifier

4. BJT Characteristics(CE Configuration)

Part A: Input Characteristics

- Part B: Output Characteristics
- 5. FET Characteristics(CS Configuration)
  - Part A: Drain Characteristics

Part B: Transfer Characteristics

- 6. SCR Characteristics
- 7. UJT Characteristics
- 8. Transistor Biasing
- 9. CRO Operation and its Measurements
- 10. BJT-CE Amplifier
- 11. Emitter Follower-CC Amplifier
- 12. FET-CS Amplifier

# **Equipment required:**

- **Regulated Power supplies** 1.
- Analog/Digital Storage Oscilloscopes Analog/Digital Function Generators 2.
- 3.
- Digital Multimeters 4.
- 5. Decade Résistance Boxes/Rheostats
- Decade Capacitance Boxes 6.
- Ammeters (Analog or Digital) 7.
- Voltmeters (Analog or Digital) 8.
- Active & Passive Electronic Components 9.

II Year - I Semester	L	Т	Р	С
	0	0	3	2
<b>NETWORKS &amp; ELECTRICAL TECHNO</b>	LOGY LAB			

# Learning Objectives:

- To determine resonance frequency, Q-factor of RLC network.
- To analysis time response of first orders RC/RL network for non-sinusoidal inputs.
- To estimate parameters of two port networks
- To understand the concept network theorems in network reduction of electrical networks.
- To determine efficiency of dc shunt machine with actual loading.
- To analyse performance of 3 phase induction motor
- To understand the significance of regulation of an alternators through synchronous impedance method.

# PART – A

## Any five experiments are to be conducted from each part

- 1. Series and Parallel Resonance Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
- 2. Time response of first order RC/RL network for periodic non-sinusoidal inputs time constant and steady state error determination.
- 3. Two port network parameters Z-Y Parameters, chain matrix and analytical verification.
- 4. Verification of Superposition and Reciprocity theorems.
- 5. Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
- 6. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.

# PART – B

- 1. Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance.
- 2. Speed control of D.C. Shunt motor by Armature & flux control methods
- 3. Brake test on DC shunt motor. Determination of performance characteristics.
- 4. OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
- 5. Brake test on 3-phase Induction motor (performance characteristics).
- 6. Regulation of alternator by synchronous impedance method

# **Learning Outcomes:**

- Able to analyse RLC circuits and understand resonant frequency and Q-factor.
- Able to determine first order RC/RL networks of periodic non- sinusoidal waveforms.
- Able to apply network theorems to analyze the electrical network.
- Able to describe the performance of dc shunt machine.
- Able to investigate the performance of 1-phase transformer.
- Able to perform tests on 3-phase induction motor and alternator to determine their performance characteristic

II Year - II Semester	L	Т	Р	С
	4	0	0	3

## ELECTRONIC CIRCUIT ANALYSIS

### **Objectives:**

### The main objectives of this course are:

- Small signal high frequency BJT transistor amplifier Hybrid- $\pi$  equivalent circuit and the expressions for conductances and capacitances are derived.
- Cascading of single stage amplifiers is discussed. Expressions for overall voltage gain are derived.
- The concept of feedback is introduced. Effect of negative feedback on amplifier characteristics is explained and necessary equations are derived.
- Basic principle of oscillator circuits is explained and different oscillator circuits are given with their analysis.
- Power amplifiers Class A, Class B, Class C, Class AB and other types of amplifiers are analyzed.
- Different types of tuned amplifier circuits are analyzed.

### **Outcomes:**

### At the end of this course the student can able to:

- Design and analysis of small signal high frequency transistor amplifier using BJT and FET.
- Design and analysis of multi stage amplifiers using BJT and FET and Differential amplifier using BJT
- Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillators and their amplitude and frequency stability concept.
- Know the classification of the power and tuned amplifiers and their analysis with performance comparison.

## Syllabus:

## UNIT-I Small Signal High Frequency Transistor Amplifier models:

**BJT:** Transistor at high frequencies, Hybrid- $\pi$  common emitter transistor model, Hybrid  $\pi$  conductances, Hybrid  $\pi$  capacitances, validity of hybrid  $\pi$  model, determination of high-frequency parameters in terms of low-frequency parameters, CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.

FET: Analysis of common Source and common drain Amplifier circuits at high frequencies.

## UNIT-II

**Multistage Amplifiers :** Classification of amplifiers, methods of coupling, cascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Analysis of multi stage amplifiers using FET, Differential amplifier using BJT.

## UNIT -III

**Feedback Amplifiers :** Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

## Unit-IV

**Oscillators:** Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wein bridge oscillators with BJT and FET and their analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators with BJT and FET and their analysis, Frequency and amplitude stability of oscillators.

## UNIT-V

**Power Amplifiers:** Classification of amplifiers, Class A power Amplifiers and their analysis, Harmonic Distortions, Class B Push-pull amplifiers and their analysis, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heat sinks, Distortion in amplifiers.

## UNIT-VI

**Tuned Amplifiers** : Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, effect of cascading single tuned amplifiers on band width, effect of cascading double tuned amplifiers on band width, staggered tuned amplifiers, stability of tuned amplifiers, wideband amplifiers.

## **Text Books:**

- 1. Integrated Electronics- J. Millman and C.C. Halkias, Tata Mc Graw-Hill, 1972.
- 2. Electronic Devices and Circuits- Salivahanan, N.Suressh Kumar, A. Vallavaraj, TATA McGraw Hill, Second Edition

## **References:**

- 1. Electronic Circuit Analysis and Design Donald A. Neaman, Mc Graw Hill.
- 2. Electronic Devices and Circuits Theory Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, Tenth Edition.
- 3. Electronic Circuit Analysis-B.V.Rao,K.R.Rajeswari, P.C.R.Pantulu,K.B.R.Murthy, Pearson Publications.
- 4. Microelectronic Circuits-Sedra A.S. and K.C. Smith, Oxford University Press, Sixth Edition.

II Year - II Semester	L	Т	Р	С
	4	0	0	3

### **CONTROL SYSTEMS**

### **Course objectives**

- 1. To introduce the concepts of open loop and closed loop systems, mathematical models of mechanical and electrical systems, and concepts of feedback
- 2. To study the characteristics of the given system in terms of the transfer function and introducing various approaches to reduce the overall system for necessary analysis
- 3. To develop the acquaintance in analyzing the system response in time-domain and frequency domain in terms of various performance indices
- 4. To analyze the system in terms of absolute stability and relative stability by different approaches
- 5. To design different control systems for different applications as per given specifications
- 6. To introduce the concepts of state variable analysis, design and also the concepts of controllability and observability

## UNIT-1

#### Introduction

System Control System, Open Loop Control System, Closed loop Control System, Different Examples Mathematical models of Physical Systems

Differential equations of physical systems, Transfer functions, Block diagram Algebra, Signal flow graphs with illustrative examples

## **Effects of Feedback**

Feedback Characteristics and its advantages, Linearizing effect of feedback

## UNIT-2

## **Controller Components**

DC Servomotor (Armature Controlled and Field Controlled) with necessary derivation for transfer function, AC Servomotor and its transfer function, AC Tachometer, Potentiometer, Synchros, AC Position Control Systems

## **Time Response Analysis**

Standard test Signals, Time response of first and second order systems, steady state errors and error constants, Effect of adding a zero to a system, Design specifications of second order systems, Performance indices

## UNIT-3

## **Concepts of Stability and Algebraic Criteria**

The concept of Stability, Necessary Conditions for Stability, Routh-Hurwitz Srability Criterion, Relative stability analysis,

## The Root Locus Technique

Introduction, The Root Locus concepts, Construction of Root Loci

# UNIT-4

## **Frequency response analysis**

Introduction, Correlation between time and frequency response, Polar Plots, Bode Plots, Nyquist Stability Criterion

## UNIT-5

## **Introduction to Design**

The design problem, Preliminary consideration of classical design, Realization of basic Compensators, Cascade compensation in time domain and frequency domain, Tuning of PID Controllers

## UNIT-6

## State Variable Analysis and Design

Introduction, Concepts of State, State Variables and State models, State models for linear continuous-time systems, State variables and linear discrete-time systems, Solution of state equations and Concepts of Controllability and Observability.

## Text Book

I.J.Nagarath and M.Gopal, " Control System Engineering," New Age International Publishers, Fifth Edition

## **Reference Books**

- 1. Katsuhiko Ogata, "Modern Control Engineering," Pearson, Fifth Edition
- 2. S. Salivahanan, R. Rengaraj, and G. R. Venkata Krishnan, "Control Systems Engineering," Pearson, First Impression
- 3. Benjamin C. Kuo, Frarid Golnaraghi, "Automatic Control Systems," Wiley Student Edition, Eight Edition
- 4. PadmaRaju and Reddy, "Instrumentation and Control Systems", McGrawHill Education, 2016

## **Course Outcomes**

- 1. This course introduces the concepts of feedback and its advantages to various control systems
- 2. The performance metrics to design the control system in time-domain and frequency domain are introduced.
- 3. Control systems for various applications can be designed using time-domain and frequency domain analysis.
- 4. In addition to the conventional approach, the state space approach for the analysis of control systems is also introduced.
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|---------------------|---|---|---|---|
|                     | 4 | 0 | 0 | 3 |

# EM WAVES AND TRANSMISSION LINES

### **OBJECTIVES:**

#### The main objectives of this course are to understand:

- 1. Fundamentals of steady electric and magnetic fields using various laws
- 2. The concept of static and time varying Maxwell equations and power flow using pointing theorem
- 3. Wave characteristics in different media for normal and oblique incidence
- 4. Various concepts of transmission lines and impedance measurements

# **SYLLABUS:**

# UNIT I:

Review of Co-ordinate Systems, **Electrostatics:**, Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial Capacitors, Illustrative Problems. **[1,5]** 

**UNIT II: Magneto Statics :** Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy. Illustrative Problems. **[1,5] Maxwell's Equations (Time Varying Fields):** Faraday's Law and Transformer emf, Inconsistency of Ampere's

**Maxwell's Equations (Time Varying Fields):** Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface : Dielectric-Dielectric and Dielectric-Conductor Interfaces. Illustrative Problems. [1,2]

**UNIT III: EM Wave Characteristics - I:** Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossy dielectrics, lossless dielectrics, free space, wave propagation in good conductors, skin depth, Polarization & Types. Illustrative Problems. **[1,2,3]** 

**UNIT IV: EM Wave Characteristics – II:** Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance. Poynting Vector and Poynting Theorem – Applications, Power Loss in a Plane Conductor. Illustrative Problems. [2,3,4]

**UNIT V: Transmission Lines - I**: Types, Parameters,  $T\&\pi$  Equivalent Circuits, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line, Lossless lines, distortion less lines, Loading - Types of Loading. Illustrative Problems. [1,7]

**UNIT VI: Transmission Lines – II :** Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. Low loss radio frequency lines and UHF Transmission lines, UHF Lines as Circuit Elements; Impedance Transformations  $\lambda/4$ ,  $\lambda/2$ ,  $\lambda/8$  Lines –. Smith Chart – Construction and Applications, Quarter wave transformer, Stub Matching-single & double, Illustrative Problems. [1,7]

# **TEXT BOOKS:**

- 1. Elements of Electromagnetic Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
- 2. Electromagnetic Waves and Radiating Systems E.C. Jordan and K.G. Balmain, PHI, 2<sup>nd</sup> Edition, 2000.

# **REFERENCE BOOKS:**

- 1. Electromagnetic Fields and Wave Theory -GSN Raju, Pearson Education 2006
- 2. Engineering Electromagnetics:Nathan Ida, Springer(India)Pvt.Ltd., New Delhi, 2nd ed., 2005.
- 3. Engineering Electromagnetics William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.
- 4. Electromagnetic Field Theory and Transmission Lines: G SasiBhushana Rao, Wiley India 2013
- 5. Transmission Lines and Networks–Umesh Sinha, Satya Prakashan (Tech. India Publications), New Delhi, 2001.
- 6. Electromagnetic waves and transmission lines R S Rao, PHI, EEE edition

# **OUTCOMES:**

#### At the end of this course the student can able to:

1. Determine E and H using various laws and applications of electric & magnetic fields

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- 2. Apply the Maxwell equations to analyze the time varying behavior of EM waves
- 3. Gain the knowledge in uniform plane wave concept and characteristics of uniform plane wave in various media
- 4. Calculate Brewster angle, critical angle and total internal reflection
- 5. Derive the expressions for input impedance of transmission lines
- 6. Calculate reflection coefficient, VSWR etc. using smith chart

II Year - II Semester	L	Т	Р	С	
	4	0	0	3	
	ANALOG COMMUNICATIONS				

#### UNIT I

**AMPLITUDE MODULATION :** Introduction to communication system, Need for modulation, Frequency Division Multiplexing, Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.

#### UNIT II

**DSB & SSB MODULATION :** Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop. Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

#### **UNIT III**

**ANGLE MODULATION** : Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM.

#### UNIT IV

**TRANSMITTERS & RECEIVERS: Radio Transmitter** - Classification of Transmitter, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter. **Radio Receiver** - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting. Communication Receivers, extensions of superheterodyne principle and additional circuits.

#### UNIT V

**NOISE :** Review of noise and noise sources, noise figure, Noise in Analog communication Systems, Noise in DSB& SSB System, Noise in AM System, Noise in Angle Modulation Systems, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis

# UNIT VI

**PULSE MODULATION :** Time Division Multiplexing,, Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, TDM Vs FDM

# **TEXT BOOKS:**

- 1. Principles of Communication Systems H Taub & D. Schilling, Gautam Sahe, TMH, 2007 3<sup>rd</sup> Edition.
- 2. Communication Systems B.P. Lathi, BS Publication, 2006.

# **REFERENCES:**

- 1. Principles of Communication Systems Simon Haykin, John Wiley, 2<sup>nd</sup> Ed.,.
- 2. Electronics & Communication System George Kennedy and Bernard Davis, TMH 2004.
- 3. Communication Systems- R.P. Singh, SP Sapre, Second Edition TMH, 2007.
- 4. Fundamentals of Communication Systems John G. Proakis, Masond, Salehi PEA, 2006.
- 5. Electronic Communication systems Tomasi, Pearson.

# **Course Objectives:**

Students undergoing this course, are expected to

- 1. Familiarize with the fundamentals of analog communication systems
- 2. Familiarize with various techniques for analog modulation and demodulation of signals
- 3. Distinguish the figure of merits of various analog modulation methods
- 4. Develop the ability to classify and understand various fuctional blocks of radiao transmitters and receivers
- 5. Familiarize with basic techniques for generating and demodulating various pulse modulated signals

# **Course Outcomes:**

After undergoing the course, students will be able to

- 1. Differentiate various Analog modulation and demodulation schemes and their spectral characteristics
- 2. Analyze noise characteristics of various analog modulation methods
- 3. Analyze various functional blocks of radiao transmitters and receivers
- 4. Design simple analog systems for various modulation techniques.

II Voor II Comostor	$\mathbf{L}$	Т	Р	С
II Tear - II Semester	4	0	0	3

# PULSE AND DIGITAL CIRCUITS

# **OBJECTIVES**

The student will be made

- To understand the concept of wave shaping circuits, Switching Characteristics of diode and transistor.
- To study the design and analysis of various Multivibrators.
- To understand the functioning of different types of time-base Generators.
- To learn the working of logic families & Sampling Gates.

# UNIT I

**LINEAR WAVESHAPING:** High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square, ramp and exponential inputs. RC network as differentiator and integrator; Attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

# UNIT II

**NON-LINEAR WAVE SHAPING :** Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper; Clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

# UNIT III

**SWITCHING CHARACTERISTICS OF DEVICES :** Diode as a switch, piecewise linear diode characteristics, Design and analysis of Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

**Bistable Multivibrator:** Analysis And Design of Fixed Bias, Self Bias Bistable Multi Vibrator, Collector Catching Diodes, Commutating Capacitors, Triggering of Binary Circuits, Emitter Coupled Bistable Multivibrator (Schmitt Trigger).

# UNIT IV

**Monostable Multivibrator:** Analysis and Design of Collector Coupled Monostable Multi vibrator, Triggering of Monostable Multivibrator, Applications of Monostable Multivibrator.

Astable Multivibrator: Analysis and Design of Collector Coupled Astable Multivibrator, Application of Astable Multivibrator as a Voltage to Frequency Converter.

# UNIT V

# **VOLTAGE TIME BASE GENERATORS:**

General features of a time base signal, Methods of generating time base waveform Exponential Sweep Circuits, Negative Resistance Switches, basic principles in Miller and Bootstrap time base generators, Transistor Miller time base generator, Transistor Bootstrap time base generator.

# UNIT VI

# LOGIC FAMILIES & SAMPLING GATES:

**LOGIC FAMILIES:** Diode Logic, Transistor Logic, Diode-Transistor Logic, Transistor-Transistor Logic, Emitter Coupled Logic, AOI Logic, Comparison of Logic Families.

**SAMPLING GATES:** Basic Operating Principles of Sampling Gates, Diode Unidirectional Sampling Gate and Two-Diode Bi-Directional Sampling Gate, Four-Diode gates, Six-Diode Gates, Reduction of Pedestal in Sampling Gates, Applications of Sampling Gates.

# **TEXT BOOKS:**

- 1. Pulse, Digital and Switching Waveforms J. Millman and H. Taub, McGraw-Hill
- 2. Pulse and Digital Circuits A. Anand Kumar, PHI, 2005

# **REFERENCES:**

- 1. Pulse, Digital and Switching Waveforms J. Millman and H. Taub, Mothiki S Prakash Rao McGraw-Hill, Second Edition, 2007.
- 2. Solid State Pulse circuits David A. Bell, PHI, 4th Edn., 2002
- 3. Pulse & Digital Circuits by Venkata Rao, K, Ramasudha K, Manmadha Rao, G., Pearson, 2010

# **OUTCOMES**

After going through this course the student will be able to

- Design linear and non-linear wave shaping circuits.
- Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.
- Design different multivibrators and time base generators.
- Utilize the non sinusoidal signals in many experimental research areas.

H Veen H Comester	L	Т	Р	С
II Tear - II Semester	4	0	0	3

#### MANAGEMENT SCIENCE

**Course Objectives:** 

\*To familiarize with the process of management and to provide basic insight into select contemporary management practices

# \*To provide conceptual knowledge on functional management and strategic management.

#### UNIT I

**Introduction to Management**: Concept –nature and importance of Management –Generic Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization – Organizational typology- International Management: Global Leadership and Organizational behavior Effectiveness(GLOBE) structure

#### UNIT II

**Operations Management**: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

#### UNIT III

**Functional Management**: Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions. Operationlizing change through performance management.

#### UNIT IV

**Project Management**: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

# UNIT V

**Strategic Management**: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives. Global strategies, theories of Multinational Companies.

#### UNIT VI

**Contemporary Management Practice**: Basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management, Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

#### **Course Outcome:**

\*After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.

\*Will familiarize with the concepts of functional management project management and strategic management.

# **Text Books**

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, 'Management Science' Cengage, Delhi, 2012.

2. Dr. A. R. Aryasri, *Management Science*' TMH 2011.

# References

- 1. Koontz & Weihrich: 'Essentials of management' TMH 2011
- 2. Seth & Rastogi: Global Management Systems, Cengage learning, Delhi, 2011
- 3. Robbins: Organizational Behaviour, Pearson publications, 2011
- 4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011
- 5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
- 6. Biswajit Patnaik: Human Resource Management, PHI, 2011
- 7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning
- 8. Prem Chadha: Performance Management, Trinity Press(An imprint of Laxmi Publications Pvt. Ltd.) Delhi 2015.
- 9. Anil Bhat& Arya Kumar : Principles of Management, Oxford University Press, New Delhi, 2015.

H Voor H Somoston	L	Т	Р	С
11 Year - 11 Semester	0	0	3	2

# ELECTRONIC CIRCUIT ANALYSIS LAB

**Note:** The students are required to design the circuit and perform the simulation using Multisim/ Equivalent Industrial Standard Licensed simulation software tool. Further they are required to verify the result using necessary hardware equipment.

# List of Experiments :( Minimum of Ten Experiments has to be performed)

- 1. Determination of  $f_T$  of a given transistor.
- 2. Voltage-Series Feedback Amplifier
- 3. Current-Shunt Feedback Amplifier
- 4. RC Phase Shift/Wien Bridge Oscillator
- 5. Hartley/Colpitt's Oscillator
- 6. Two Stage RC Coupled Amplifier
- 7. Darlington Pair Amplifier
- 8. Bootstrapped Emitter Follower
- 9. Class A Series-fed Power Amplifier
- 10. Transformer-coupled Class A Power Amplifier
- 11. Class B Push-Pull Power Amplifier
- 12. Complementary Symmetry Class B Push-Pull Power Amplifier
- 13. Single Tuned Voltage Amplifier
- 14. Double Tuned Voltage Amplifier

# **Equipment required:**

# Software:

- i. Multisim/ Equivalent Industrial Standard Licensed simulation software tool.
- ii. Computer Systems with required specifications

# Hardware:

- 10. Regulated Power supplies
- 11. Analog/Digital Storage Oscilloscopes
- 12. Analog/Digital Function Generators
- 13. Digital Multimeters
- 14. Decade Résistance Boxes/Rheostats
- 15. Decade Capacitance Boxes
- 16. Ammeters (Analog or Digital)
- 17. Voltmeters (Analog or Digital)
- 18. Active & Passive Electronic Components

II Year - II Semester	L	Т	Р	С	
	0	0	3	2	
	ANALOG COMMUNICATIONS LAB				

List of Experiments (Twelve experiments to be done- **The students have to calculate the relevant parameters** ) - (a. Hardware, b. MATLAB Simulink, c. MATLAB Communication tool box)

- A. Amplitude Modulation Mod. & Demod.
- B. AM DSB SC Mod. & Demod.
- C. Spectrum Analysis of Modulated signal using Spectrum Analyser
- D. Diode Detector
- E. Pre-emphasis & De-emphasis
- F. Frequency Modulation Mod. & Demod.
- G. AGC Circuits
- H. Sampling Theorem
- I. Pulse Amplitude Modulation Mod. & Demod.
- J. PWM , PPM Mod. & Demod.
- K. PLL
- L. Radio receiver characteristics

# **Equipments & Software required:**

# Software :

- i.) Computer Systems with latest specifications
- ii) Connected in Lan (Optional)
- iii) Operating system (Windows XP)
- iv) Simulations software (Simulink & MATLAB)

# Equipment:

- 1.
   RPS
   0 30 V

   2.
   CRO
   0 20 M Hz.
- 3. Function Generators 0 1 M Hz
- 4. Components
- 5. Multimeters
- 6. Spectrum Analyser

III Year - I Semester	L	Т	Р	С
	4	0	0	3

# COMPUTER ARCHITECTURE AND ORGANIZATION

# **OBJECTIVES:**

- Understand the architecture of a modern computer with its various processing units. Also the Performance measurement of the computer system.
- In addition to this the memory management system of computer.

# UNIT -I:

**Basic Structure Of Computers:** Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.

# UNIT -II:

# **Machine Instruction and Programs:**

Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types,

Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions

# UNIT -III:

**Type of Instructions:** Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations

# UNIT -IV:

**INPUT/OUTPUT ORGANIZATION:** Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access,

Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)

# UNIT -V:

**The MEMORY SYSTEMS:** Basic memory circuits, Memory System Consideration, Read-Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory,

Cache Memories: Mapping Functions, INTERLEAVING **Secondary Storage:** Magnetic Hard Disks, Optical Disks,

# UNIT -VI:

**Processing Unit:** Fundamental Concepts: Register Transfers, Performing An Arithmetic Or Logic Operation, Fetching A Word From Memory,

Execution of Complete Instruction, Hardwired Control,

**Micro programmed Control:** Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

# **OUTCOMES:**

- Students can understand the architecture of modern computer.
- They can analyze the Performance of a computer using performance equation
- Understanding of different instruction types.
- 4. Students can calculate the effective address of an operand by addressing modes
- 5. They can understand how computer stores positive and negative numbers.
- 6. Understanding of how a computer performs arithmetic operation of positive and negative numbers.

# **TEXT BOOKS:**

1. Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, 5th Edition, McGraw Hill.

2. Computer Architecture and Organization , John P. Hayes ,3rd Edition, McGraw Hill.

# **REFERENCE BOOKS:**

- 1. Computer Organization and Architecture William Stallings Sixth Edition, Pearson/PHI
- 2. Structured Computer Organization Andrew S. Tanenbaum, 4th Edition PHI/Pearson
- 3. Fundamentals or Computer Organization and Design, Sivaraama Dandamudi Springer Int. Edition.
- 4. "Computer Organization and Design: The Hardware/Software Interface" by David A. Patterson and John L. Hennessy.
- 5. J.P. Hayes, "Computer Architecture and Organization", McGraw-Hill, 1998.

# LINEAR IC APPLICATIONS

# **OBJECTIVES**

- To understand the basic operation & performance parameters of differential amplifiers.
- To understand & learn the measuring techniques of performance parameters of OP-AMP
- To learn the linear and non-linear applications of operational amplifiers.
- To understand the analysis & design of different types of active filters using opamps
- To learn the internal structure, operation and applications of different analog ICs
- To Acquire skills required for designing and testing integrated circuits

#### UNIT I

**INTEGRATED CIRCUITS:** Differential Amplifier- DC and AC analysis of Dual input Balanced output Configuration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single Ended Input – Balanced/ Unbalanced Output), DC Coupling and Cascade Differential Amplifier Stages, Level translator.

# UNIT II

Characteristics of OP-Amps, Integrated circuits-Types, Classification, Package Types and Temperature ranges, Power supplies, Op-amp Block Diagram, ideal and practical Op-amp Specifications, DC and AC characteristics, 741 op-amp & its features, Op-Amp parameters & Measurement, Input & Out put Off set voltages & currents, slew rate, CMRR, PSRR, drift, Frequency Compensation techniques.

# UNIT III

**LINEAR and NON-LINEAR APPLICATIONS OF OP-AMPS:** Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier, V to I, I to V converters, Buffers. Non- Linear function generation, Comparators, Multivibrators, Triangular and Square wave generators, Log and Anti log Amplifiers, Precision rectifiers.

# UNIT IV

ACTIVE FILTERS, ANALOG MULTIPLIERS AND MODULATORS: Design & Analysis of Butterworth active filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters. Four Quadrant Multiplier, IC 1496, Sample & Hold circuits.

# UNIT V

**TIMERS & PHASE LOCKED LOOPS**: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger; PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of PLL – frequency multiplication, frequency translation, AM, FM & FSK demodulators. Applications of VCO (566).

# UNIT VI

**DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS:** Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC.DAC and ADC Specifications, Specifications AD 574 (12 bit ADC).

# **TEXT BOOKS:**

- 1. Linear Integrated Circuits D. Roy Choudhury, New Age International (p) Ltd, 2nd Edition, 2003.
- 2. Op-Amps & Linear ICs Ramakanth A. Gayakwad, PHI,1987.
- 3. Operational Amplifiers-C.G. Clayton, Butterworth & Company Publ. Ltd./Elsevier, 1971

# **REFERENCES**:

- 1. Operational Amplifiers & Linear Integrated Circuits –Sanjay Sharma ;SK Kataria &Sons;2<sup>nd</sup> Edition,2010
- 2. Design with Operational Amplifiers & Analog Integrated Circuits Sergio Franco, McGraw Hill, 1988.
- 3. OP AMPS and Linear Integrated Circuits concepts and Applications, James M Fiore, Cenage Learning India Ltd.
- 4. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin & Fredrick Driscoll, PHI, 6th Edition.
- 5. Operational Amplifiers & Linear ICs David A Bell, Oxford Uni. Press, 3rd Edition

# OUTCOMES

- Design circuits using operational amplifiers for various applications.
- Analyze and design amplifiers and active filters using Op-amp.
- Diagnose and trouble-shoot linear electronic circuits.
- Understand the gain-bandwidth concept and frequency response of the amplifier configurations.
- Understand thoroughly the operational amplifiers with linear integrated circuits.

III Year - I Semester	L	Т	Р	С
	4	0	0	3

# **DIGITAL IC APPLICATIONS**

#### **OBJECTIVES**

#### The main objectives of this course are:

- Introduction of digital logic families and interfacing concepts for digital design is considered.
- VHDL fundamentals were discussed to modeling the digital system design blocks.
- VHDL compilers, simulators and synthesis tools are described, which are used to verify digital systems in a technology-independent fashion.
- Design and implementation of combinational and sequential digital logic circuits is explained.

#### **Outcomes:**

#### At the end of this course the student can able to:

- Understand the structure of commercially available digital integrated circuit families.
- Learn the IEEE Standard 1076 Hardware Description Language (VHDL).
- Model complex digital systems at several levels of abstractions, behavioral, structural, simulation, synthesis and rapid system prototyping.
- Analyze and design basic digital circuits with combinatorial and sequential logic circuits using VHDL.

#### Syllabus:

#### UNIT-I

**Digital Logic Families and Interfacing**: Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families. Bipolar logic, transistor-transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic.

# (Text book-1)

#### UNIT-II

**Introduction to VHDL**: Design flow, program structure, levels of abstraction, Elements of VHDL: Data types, data objects, operators and identifiers. Packages, Libraries and Bindings, Subprograms. VHDL Programming using structural and data flow modeling.

### (Text book-2)

#### UNIT-III

**Behavioral Modeling**: Process statement, variable assignment statement, signal assignment statement, wait statement, if statement, case statement ,null statement, loop statement, exit statement, next statement ,assertion statement, more on signal assignment statement ,Inertial Delay Model, Transport Delay Model ,Creating Signal Waveforms, Signal Drivers , Other Sequential Statements , Multiple Processes. Logic Synthesis, Inside a logic Synthesizer.

(Text book-2)

### UNIT-IV

**Combinational Logic Design**: Binary Adder-Subtractor, Ripple Adder, Look Ahead Carry Generator, ALU, Decoders, encoders, multiplexers and demultiplexers, parity circuits, comparators, Barrel Shifter, Simple Floating-Point Encoder, Dual Priority Encoder, Design considerations of the above combinational logic circuits with relevant Digital ICs, modeling of above ICs using VHDL.

#### (Text book-1)

# UNIT-V

**Sequential Logic Design:** SSI Latches and flip flops, Ring Counter, Johnson Counter, Design of Modulus N Synchronous Counters, Shift Registers, Universal Shift Registers, Design considerations of the above sequential logic circuits with relevant Digital ICs, modeling of above ICs using VHDL.

# (Text book-1)

# **UNIT-VI:**

**Synchronous and Asynchronous Sequential Circuits:** Basic design steps: State diagram, state table, state assignment, choice of flip flops and derivation of next state and output expressions, timing diagram. State assignment problem: One hot encoding. Mealy and Moore type FSM for serial adder, VHDL code for the serial adder. Analysis of Asynchronous circuits, State Reduction, State Assignment. A complete design example: The vending machine controller.

#### (Reference text book- 1)

#### **Text Books:**

1. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.

2. VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

#### **References:**

1. Fundamentals of Digital Logic with VHDL Design- Stephen Brown, ZvonkoVranesic, McGrawHill, 3<sup>rd</sup> Edition.

III Voor - I Somostor	L	Т	Р	С
III I cai - I Semester	4	0	0	3

#### **DIGITAL COMMUNICATIONS**

# UNIT I

**PULSE DIGITAL MODULATION:** Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM). Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

#### UNIT II

**DIGITAL MODULATION TECHNIQUES:** Introduction, ASK, FSK, PSK, DPSK, DEPSK, QPSK, M-ary PSK, ASK, FSK, similarity of BFSK and BPSK.

#### **UNIT III**

**DATA TRANSMISSION :** Base band signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error probability of ASK, BPSK, BFSK, QPSK.

#### UNIT IV

**INFORMATION THEORY:** Discrete messages, concept of amount of information and its properties. Average information, Entropy and its properties. Information rate, Mutual information and its properties.

#### UNIT V

**SOURCE CODING:** Introductions, Advantages, Shannon's theorem, Shanon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth –S/N trade off.

#### UNIT VI

**LINEAR BLOCK CODES:** Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, BCH Codes.

**CONVOLUTION CODES:** Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm.

# **TEXT BOOKS:**

1. Digital communications - Simon Haykin, John Wiley, 2005

2. Principles of Communication Systems - H. Taub and D. Schilling, TMH, 2003

# **REFERENCES:**

1. Digital and Analog Communication Systems - Sam Shanmugam, John Wiley, 2005.

- Digital Communications John Proakis, TMH, 1983. Communication Systems Analog & Digital Singh & Sapre, TMH, 2004.
- 3. Modern Analog and Digital Communication B.P.Lathi, Oxford reprint, 3rd edition, 2004.

Students undergoing this course are expected to:

# **Course Objectives:**

- 1.Understand different pulse digital modulation techniques and their comparision
- 2. Familiarize various digital modulation techniques and calculation of their error probabilities
- 3. Understand the concept of entropy and different source coding techniques
- 4. Familirize with block codes, cyclic codes and convolutional codes

# **Course Outcomes:**

After undergoing the course students will be able to:

- 1. Determine the performance of different waveform coding techniques for the generation and digital representation of the signals.
- 2. Determine the probability of error for various digital modulation schemes
- 3. Analyze different source coding techniques
- 4. Compute and analyze different error control coding schemes for the reliable transmission of digital information over the channel.

III Veen I Connector	L	Т	Р	С
III Tear - I Semester	4	0	0	3

# ANTENNA AND WAVE PROPAGATION

#### **OBJECTIVES**

The student will be able to

- understand the applications of the electromagnetic waves in free space.
- introduce the working principles of various types of antennas
- discuss the major applications of antennas with an emphasis on how antennas are employed to meet electronic system requirements.
- understand the concepts of radio wave propagation in the atmosphere.

#### UNIT I

**ANTENNA FUNDAMENTALS:** Introduction, Radiation Mechanism – single wire, 2 wire, dipoles, Current Distribution on a thin wire antenna. Antenna Parameters - Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beamwidths, Polarization, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, illustrated Problems.

#### UNIT II

**THIN LINEAR WIRE ANTENNAS:** Retarded Potentials, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Field Components, Power Radiated, Radiation Resistance, Beamwidths, Directivity, Effective Area and Effective Height. Natural current distributions, fields and patterns of Thin Linear Center-fed Antennas of different lengths, Radiation Resistance at a point which is not current maximum. Antenna Theorems – Applicability and Proofs for equivalence of directional characteristics, Loop Antennas: Small Loops - Field Components, Comparison of far fields of small loop and short dipole, Concept of short magnetic dipole, D and  $R_r$  relations for small loops.

#### **UNIT III**

**ANTENNA ARRAYS :** 2 element arrays – different cases, Principle of Pattern Multiplication, N element Uniform Linear Arrays – Broadside, End-fire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison; Concept of Scanning Arrays. Directivity Relations (no derivations). Related Problems. Binomial Arrays, Effects of Uniform and Non-uniform Amplitude Distributions, Design Relations. Arrays with Parasitic Elements, Yagi-Uda Arrays, Folded Dipoles and their characteristics.

### UNIT IV

**NON-RESONANT RADIATORS :** Introduction, Traveling wave radiators – basic concepts, Long wire antennas – field strength calculations and patterns, Microstrip Antennas-Introduction, Features, Advantages and Limitations, Rectangular Patch Antennas –Geometry and Parameters, Impact of different parameters on characteristics. Broadband Antennas: Helical Antennas – Significance, Geometry, basic properties; Design considerations for monofilar helical antennas in Axial Mode and Normal Modes (Qualitative Treatment).

# UNIT V

**VHF, UHF AND MICROWAVE ANTENNAS :** Reflector Antennas : Flat Sheet and Corner Reflectors. Paraboloidal Reflectors – Geometry, characteristics, types of feeds, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Off-set Feeds, Cassegrain Feeds.

Horn Antennas – Types, Optimum Horns, Design Characteristics of Pyramidal Horns; Lens Antennas – Geometry, Features, Dielectric Lenses and Zoning, Applications, Antenna Measurements – Patterns Required, Set Up, Distance Criterion, Directivity and Gain Measurements (Comparison, Absolute and 3-Antenna Methods).

# UNIT VI

**WAVE PROPAGATION :** Concepts of Propagation – frequency ranges and types of propagations. Ground Wave Propagation–Characteristics, Parameters, Wave Tilt, Flat and Spherical Earth Considerations. Sky Wave Propagation – Formation of Ionospheric Layers and their Characteristics, Mechanism of Reflection and Refraction, Critical Frequency, MUF and Skip Distance – Calculations for flat and spherical earth cases, Optimum Frequency, LUHF, Virtual Height, Ionospheric Abnormalities, Ionospheric Absorption.

Fundamental Equation for Free-Space Propagation, Basic Transmission Loss Calculations. Space Wave Propagation – Mechanism, LOS and Radio Horizon. Tropospheric Wave Propagation – Radius of Curvature of path, Effective Earth's Radius, Effect of Earth's Curvature, Field Strength Calculations, M-curves and Duct Propagation, Tropospheric Scattering.

# **TEXT BOOKS**

1. Antennas for All Applications – John D. Kraus and Ronald J. Marhefka, 3<sup>rd</sup> Edition, TMH, 2003.

2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2<sup>nd</sup> Edition, 2000.

#### REFERENCES

- 1. Antenna Theory C.A. Balanis, John Wiley and Sons, 2<sup>nd</sup> Edition, 2001.
- 2. Antennas and Wave Propagation K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.
- 3. Transmission and Propagation E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
- 4. Electronic and Radio Engineering F.E. Terman, McGraw-Hill, 4<sup>th</sup> Edition, 1955.
- 5. Antennas John D. Kraus, McGraw-Hill, 2<sup>nd</sup> Edition, 1988.

# **OUTCOMES**

After going through this course the student will be able to

- Identify basic antenna parameters.
- Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and microstrip antennas
- Quantify the fields radiated by various types of antennas
- Design and analyze antenna arrays
- Analyze antenna measurements to assess antenna's performance
- Identify the characteristics of radio wave propagation

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# PULSE & DIGITAL CIRCUITS LAB

- 1. Linear wave shaping.
- 2. Non Linear wave shaping Clippers.
- 3. Non Linear wave shaping Clampers.
- 4. Transistor as a switch.
- 5. Study of Logic Gates & Some applications.
- 6. Study of Flip-Flops & some applications.
- 7. Sampling Gates.
- 8. Astable Multivibrator.
- 9. Monostable Multivibrator.
- **10. Bistable Multivibrator.**
- **11. Schmitt Trigger.**
- 12. UJT Relaxation Oscillator.
- **13.** Bootstrap sweep circuit.

**Equipment required for Laboratory:** 

- 1. RPS 0 30 V
- 2. CRO 0 20 M Hz.
- 3. Function Generators 0 1 M Hz
- 4. Components
- 5. Multi Meters

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	L IC APPLICATIONS LAB				

#### Minimum Twelve Experiments to be conducted :

- 1. Study of OP AMPs IC 741, IC 555, IC 565, IC 566, IC 1496 functioning, parameters and Specifications.
- 2. OP AMP Applications Adder, Subtractor, Comparator Circuits.
- 3. Integrator and Differentiator Circuits using IC 741.
- 4. Active Filter Applications LPF, HPF (first order)
- 5. Active Filter Applications BPF, Band Reject (Wideband) and Notch Filters.
- 6. IC 741 Oscillator Circuits Phase Shift and Wien Bridge Oscillators.
- 7. Function Generator using OP AMPs.
- 8. IC 555 Timer Monostable Operation Circuit.
- 9. IC 555 Timer Astable Operation Circuit.
- 10. Schmitt Trigger Circuits using IC 741 and IC 555.
- 11. IC 565 PLL Applications.
- 12. IC 566 VCO Applications.
- 13. Voltage Regulator using IC 723.
- 14. Three Terminal Voltage Regulators 7805, 7809, 7912.

#### **Equipment required for Laboratories:**

- 1. RPS
- 2. CRO
- 3. Function Generator
- 4. Multi Meters
- 5. IC Trainer Kits (Optional)
- 6. Bread Boards
- 7. Components:- IC741, IC555, IC565, IC1496, IC723, 7805, 7809, 7912 and other essential components.
- 8. Analog IC Tester

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<u>Note:</u> The students are required to design and draw the internal logical structure of the following Digital Integrated Circuits and to develop VHDL/Verilog HDL Source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.

All the experiments are required to verify and implement the logical operations on the latest FPGA Hardware in the Laboratory.

# List of Experiments :( Minimum of Ten Experiments has to be performed)

- 1. Realization of Logic Gates
- 2. Design of Full Adder using 3 modeling systems
- 3. 3 to 8 Decoder -74138
- 4. 8 to 3 Encoder (with and without parity)
- 5. 8 x 1 Multiplexer-74151 and 2x 4 De-multiplexer-74155
- 6. 4- Bit comparator-7485
- 7. D Flip-Flop-7474
- 8. Decade counter -7490
- 9. Shift registers-7495
- 10. 8-bit serial in-parallel out and parallel in-serial out
- 11. Fast In & Fast Out (FIFO)
- 12. MAC (Multiplier & Accumulator)
- 13. ALU Design.

# **Equipment/Software required:**

- 1. Xilinx Vivado software / Equivalent Industry Standard Software
- 2. Xilinx Hardware / Equivalent hardware
- 3. Personal computer system with necessary software to run the programs and Implement.

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# **PROFESSIONAL ETHICSAND HUMAN VALUES**

**Course Objectives:** 

\*To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.

\*Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

# **UNIT I: Human Values**:

Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value Time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

# **UNIT: II: Principles for Harmony:**

Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

# **UNIT III: Engineering Ethics and Social Experimentation:**

History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism — Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg's Theory - Gilligan's Argument –Heinz's Dilemma - Comparison with Standard Experiments — Learning from the Past –Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

# UNIT IV: Engineers' Responsibilities towards Safety and Risk:

Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/sInvoluntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/sImmediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

# **UNIT V: Engineers' Duties and Rights:**

Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality – Senses of Loyalty -Consensus and Controversy - Professional and Individual Rights –Confidential and Proprietary Information -Conflict of Interest-Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving-Occupational Crimes- Industrial Espionage- Price Fixing-Whistle Blowing.

# **UNIT VI: Global Issues:**

Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics - Environmental Ethics – Endangering Lives - Bio Ethics - Computer Ethics - War Ethics – Research Ethics - Intellectual Property Rights.

• Related Cases Shall be dealt where ever necessary.

# **Outcome:**

- \*It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.
- \*It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

# **References:**

- 1. Professional Ethics by R. Subramaniam Oxford Publications, New Delhi.
- 2. Ethics in Engineering by Mike W. Martin and Roland Schinzinger Tata McGraw-Hill 2003.
- 3. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana Maruthi Publications.
- 4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
- 5. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
- 6. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd 2009.
- 7. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman and M. Jayakumaran University Science Press.
- 8. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill 2013
- 9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications

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# MICROPROCESSORS AND MICROCONTROLLERS

# UNIT-I:

**8086 ARCHITECTURE**: Main features, pin diagram/description, 8086 microprocessor family, 8086 internal architecture, bus interfacing unit, execution unit, interrupts and interrupt responses, 8086 system timing, minimum mode and maximum mode configuration.

# UNIT-II:

**8086 PROGRAMMING**: Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

# UNIT-III:

**8086 INTERFACING** : Semiconductor memories interfacing (RAM,ROM), 8254 software programmable timer/counter, Intel 8259 programmable interrupt controller, software and hardware interrupt applications, Intel 8237a DMA controller, Intel 8255 programmable peripheral interface, keyboard interfacing, alphanumeric displays (LED,7-segment display, multiplexed 7-segment display, LCD), Intel 8279 programmable keyboard/display controller, stepper motor, A/D and D/A converters.

# **UNIT-IV:**

**80386 AND 80486 MICROPROCESSORS:** Introduction, programming concepts, special purpose registers, memory organization, moving to protected mode, virtual mode, memory paging mechanism, architectural differences between 80386 and 80486 microprocessors.

# **UNIT-V:**

**Intel 8051 MICROCONTROLLER:** Architecture, hardware concepts, input/output ports and circuits, external memory, counters/timers, serial data input/output, interrupts.

Assembly language programming: Instructions, addressing modes, simple programs.

Interfacing: keyboard, displays (LED, 7-segment display unit), A/D and D/A converters.

# UNIT-VI:

**PIC MICROCONTROLLER:** Introduction, characteristics of PIC microcontroller, PIC microcontroller families, memory organization, parallel and serial input and output, timers, Interrupts, PIC 16F877 architecture, instruction set of the PIC 16F877.

# **Text Books:**

- 1. Microprocessors and Interfacing Programming and Hard ware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3<sup>rd</sup> Edition.
- 2. The 8051 Microcontroller & Embedded Systems Using Assembly and C by Kenneth J.Ayala, Dhananjay V.Gadre, Cengage Learninbg, India Edition.

# **References:**

- 1. The Intel Microprocessors-Architecture, Programming, and Interfacing by Barry B.Brey, Pearson, Eighth Edition-2012.
- 2. Microprocessors and Microcontrollers-Architecture, Programming and System Design by Krishna Kant, PHI Learning Private Limited, Second Edition, 2014.
- 3. Microprocessors and Microcontrollers by N.Senthil Kumar, M.Saravanan and S.Jeevananthan, Oxford University Press, Seventh Impression 2013

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### **MICROWAVE ENGINEERING**

### **OBJECTIVES**

The student will

- Understand fundamental characteristics of waveguides and Microstrip lines through electromagnetic field analysis.
- Understand the basic properties of waveguide components and Ferrite materials composition
- Understand the function, design, and integration of the major microwave components oscillators, power amplifier.
- Understand a Microwave test bench setup for measurements.

#### UNIT I

**MICROWAVE TRANSMISSION LINES:** Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides – TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations; Power Transmission and Power Losses in Rectangular Guide, Impossibility of TEM mode. Related Problems.

# UNIT II

**CIRCULAR WAVEGUIDES**: Introduction, Nature of Fields, Characteristic Equation, Dominant and Degenerate Modes.

Cavity Resonators- Introduction, Rectangular and Cylindrical Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients, Excitation techniques- waveguides and cavities, Related Problems.

MICROSTRIP LINES- Introduction, Zo Relations, Effective Dielectric Constant, Losses, Q factor.

# UNIT III

**MICROWAVE TUBES** :Limitations and Losses of conventional tubes at microwave frequencies. Re-entrant Cavities, Microwave tubes – O type and M type classifications. O-type tubes :2 Cavity Klystrons – Structure, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory –Expressions for o/p Power and Efficiency, Applications, Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Mathematical Theory of Bunching, Power Output, Efficiency, Electronic Admittance; Oscillating Modes and o/p Characteristics, Electronic and Mechanical Tuning, Applications, Related Problems.

# UNIT - IV

**HELIX TWTS:** Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and Suppression of Oscillations, Nature of the four Propagation Constants(Qualitative treatment).

# **M-type Tubes**

Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave Magnetron – Hull Cut-off Condition, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.

# UNIT V

**WAVEGUIDE COMPONENTS AND APPLICATIONS - I** :Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities – Waveguide irises, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Resistive Card, Rotary Vane types; Waveguide Phase Shifters – Dielectric, Rotary Vane types. Scattering Matrix– Significance, Formulation and Properties. S-Matrix Calculations for – 2 port Junction, E-plane and H-plane Tees, Magic Tee, Hybrid Ring; Directional Couplers – 2Hole, Bethe Hole types, Ferrite Components– Faraday Rotation, S-Matrix Calculations for Gyrator, Isolator, Circulator, Related Problems.

# UNIT VI

**MICROWAVE SOLID STATE DEVICES:** Introduction, Classification, Applications. TEDs – Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation, Oscillation Modes. Avalanche Transit Time Devices – Introduction, IMPATT and TRAPATT Diodes – Principle of Operation and Characteristics. **MICROWAVE MEASUREMENTS:** Description of Microwave Bench – Different Blocks and their Features, Precautions; Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, Qfactor, Phase shift, VSWR, Impedance Measurement.

# **TEXT BOOKS:**

1. Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3rd Edition, 1994.

2.Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.

# **REFERENCES:**

- 1. Microwave Principles Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004
- 2. Microwave Engineering- Annapurna Das and Sisir K.Das, Mc Graw Hill Education, 3<sup>rd</sup> Edition.
- 3. Microwave and Radar Engineering-M.Kulkarni, Umesh Publications, 3<sup>rd</sup> Edition.
- 4. Microwave Engineering G S N Raju, I K International
- 5. Microwave and Radar Engineering G Sasibhushana Rao Pearson

OUTCOMES : After going through this course the student will be able to

- Design different modes in waveguide structures
- Calculate S-matrix for various waveguide components and splitting the microwave energy in a desired direction
- Distinguish between Microwave tubes and Solid State Devices, calculation of efficiency of devices.
- Measure various microwave parameters using a Microwave test bench

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#### VLSI DESIGN

# **Objectives:**

#### The main objectives of this course are:

- Basic characteristics of MOS transistor and examines various possibilities for configuring inverter circuits and aspects of latch-up are considered.
- Design processes are aided by simple concepts such as stick and symbolic diagrams but the key element is a set of design rules, which are explained clearly.
- Basic circuit concepts are introduced for MOS processes we can set out approximate circuit parameters which greatly ease the design process.

#### **Outcomes:**

#### At the end of this course the student can able to:

- Understand the properties of MOS active devices and simple circuits configured when using them and the reason for such encumbrances as ratio rules by which circuits can be interconnected in silicon.
- Know three sets of design rules with which nMOS and CMOS designs may be fabricated.
- Understand the scaling factors determining the characteristics and performance of MOS circuits in silicon.

### Syllabus:

# UNIT-I:

**Introduction and Basic Electrical Properties of MOS Circuits:** Introduction to IC technology, Fabrication process: nMOS, pMOS and CMOS.  $I_{ds}$  versus  $V_{ds}$  Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. nMOS Inverter, Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, and through one or more pass transistors. Alternative forms of pull-up, The CMOS Inverter, Latch-up in CMOS circuits, Bi-CMOS Inverter, Comparison between CMOS and BiCMOS technology.

#### (Text Book-1)

# UNIT-II:

**MOS and Bi-CMOS Circuit Design Processes:** MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2µm Double Metal, Double Poly, CMOS/BiCMOS rules, 1.2µm Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic Diagrams-Translation to Mask Form.

#### (Text Book-1)

# UNIT-III:

**Basic Circuit Concepts:** Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, Some area Capacitance Calculations, The Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances, Choice of layers.

**Scaling of MOS Circuits:** Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling, Limits due to sub threshold currents, Limits on logic levels and supply voltage due to noise and current density. Switch logic, Gate logic.

(Text Book-1)

# UNIT-IV:

**Chip Input and Output circuits:** ESD Protection, Input Circuits, Output Circuits and L(di/dt) Noise, On-Chip clock Generation and Distribution.

**Design for Testability**: Fault types and Models, Controllability and Observability, Ad Hoc Testable Design Techniques, Scan Based Techniques and Built-In Self Test techniques.

# (Text Book-2)

# **UNIT-V:**

**FPGA Design:** FPGA design flow, Basic FPGA architecture, FPGA Technologies, FPGA families- Altera Flex 8000FPGA, Altera Flex 10FPGA, Xilinx XC4000 series FPGA, Xilinx Spartan XL FPGA, Xilinx Spartan II FPGAs, Xilinx Vertex FPGA. Case studies: FPGA Implementation of Half adder and full adder.

# Introduction to synthesis: Logic synthesis, RTL synthesis, High level Synthesis.

# (Reference Text Book-1)

# UNIT-VI:

**Introduction to Low Power VLSI Design:** Introduction to Deep submicron digital IC design, Low Power CMOS Logic Circuits: Over view of power consumption, Low –power design through voltage scaling, Estimation and optimisation of switching activity, Reduction of switching capacitance. Interconnect Design, Power Grid and Clock Design.

# (Text Book-2)

# **Text Books:**

- 1. Essentials of VLSI Circuits and Systems Kamran Eshraghian, Douglas and A. Pucknell and Sholeh Eshraghian, Prentice-Hall of India Private Limited, 2005 Edition.
- 2. CMOS Digital Integrated Circuits Analysis and Design- <u>Sung-Mo Kang</u>, <u>Yusuf Leblebici</u>, Tata McGraw-Hill Education, 2003.

# **References:**

- 1. Advanced Digital Design with the Verilog HDL, Michael D.Ciletti, Xilinx Design Series, Pearson Education
- 2. Analysis and Design of Digital Integrated Circuits in Deep submicron Technology, 3'rd edition, David Hodges.

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# DIGITAL SIGNAL PROCESSING

### **OBJECTIVES**

The student will be able to

- Analyze the Discrete Time Signals and Systems
- Know the importance of FFT algorithm for computation of Discrete Fourier Transform
- Understand the various implementations of digital filter structures
- Learn the FIR and IIR Filter design procedures
- Know the need of Multirate Processing
- Learn the concepts of DSP Processors

**UNIT I INTRODUCTION:** Introduction to Digital Signal Processing: Discrete time signals & sequences, Classification of Discrete time systems, stability of LTI systems, Invertability, Response of LTI systems to arbitrary inputs. Solution of Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems. Review of Z-transforms, solution of difference equations using Z-transforms, System function.

**UNIT II DISCRETE FOURIER SERIES & FOURIER TRANSFORMS:** Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear filtering methods based on DFT, Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

**UNIT III. DESIGN OF IIR DIGITAL FILTERS& REALIZATIONS:** Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples, Analog and Digital frequency transformations. Basic structures of IIR systems, Transposed forms.

# UNIT IV DESIGN OF FIR DIGITAL FILTERS & REALIZATIONS:

Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques

and Frequency Sampling technique, Comparison of IIR & FIR filters.

Basic structures of FIR systems, Lattice structures, Lattice-ladder structures

**UNIT V MULTIRATE DIGITAL SIGNAL PROCESSING:** Introduction, Decimation, Interpolation Sampling rate conversion, Implementation of sampling rate converters, *Applications – Sub-band Coding of Speech Signals*, *Implementation of Digital Filter Banks*, *Trans-multiplexers*.

**UNIT VI INTRODUCTION TO DSP PROCESSORS:** Introduction to programmable DSPs: Multiplier and Multiplier Accumulator, Modified bus structures and memory access schemes in P-DSPs ,Multiple Access Memory, Multiported memory, VLIW architecture, Pipelining, Special addressing modes, On-Chip Peripherals. Architecture of TMS320C5X: Introduction, Bus Structure, Central Arithmetic Logic Unit, Auxiliary Register ALU, Index Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, some flags in the status registers, On- chip memory, On-chip peripherals.

#### **TEXT BOOKS:**

- 1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G.Manolakis, Pearson Education / PHI, 2007.
- 2. Discrete Time Signal Processing A.V.Oppenheim and R.W. Schaffer, PHI
- Digital Signal Processors Architecture, Programming and Applications, B.Venkataramani, M.Bhaskar, TATA McGraw Hill, 2002
- 4. Digital Signal Processing K Raja Rajeswari, I.K. International Publishing House

### **Reference Books:**

- 1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
- 2. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
- 3. DSP Primer C. Britton Rorabaugh, Tata McGraw Hill, 2005.
- 4. Fundamentals of Digital Signal Processing using Matlab Robert J. Schilling, Sandra
- L. Harris, Thomson, 2007.
- 5. Digital Signal Processing Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006
- 6. Digital Signal Processing Ramesh babu, Sci Tech publications

# OUTCOMES

After going through this course the student will be able to

- Apply the difference equations concept in the anayziation of Discrete time systems
- Use the FFT algorithm for solving the DFT of a given signal
- Design a Digital filter (FIR&IIR) from the given specifications
- Realize the FIR and IIR structures from the designed digital filter.
- Use the Multirate Processing concepts in various applications(eg: Design of phase shifters, Interfacing of digital systems...)
- Apply the signal processing concepts on DSP Processor.

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# OOPS THROUGH JAVA OPEN ELECTIVE

# **OBJECTIVES:**

- Understanding the OOP's concepts, classes and objects, threads, files, applets, swings and act.
- This course introduces computer programming using the JAVA programming language with objectoriented programming principles.
- Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using Java for network level programming and middleware development

# UNIT-I:

Introduction to OOP, procedural programming language and object oriented language, principles of OOP, applications of OOP, history of java, java features, JVM, program structure.

Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

# UNIT-II:

Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

# **UNIT-III:**

Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, importance of CLASSPATH and java.lang package. Exception handling, importance of try, catch, throw, throws and finally block, user-defined exceptions, Assertions.

# UNIT-IV:

Multithreading: introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file,

# UNIT-V:

Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

# UNIT-VI:

AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

# **OUTCOMES:**

- Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
- Write, compile, execute and troubleshoot Java programming for networking concepts.
- Build Java Application for distributed environment.
- Design and Develop multi-tier applications.

• Identify and Analyze Enterprise applications.

# **TEXT BOOKS:**

- 1. The complete Reference Java, 8<sup>th</sup> edition, Herbert Schildt, TMH.
- 2. Programming in JAVA, Sachin Malhotra, Saurabh Choudary, Oxford.
- 3. Introduction to java programming, 7<sup>th</sup> edition by Y Daniel Liang, Pearson.

# **REFERENCE BOOKS:**

- 1. Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managers in
- 2. Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.

# DATA MINING OPEN ELECTIVE

# **OBJECTIVES:**

- Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.
- They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
- They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

# UNIT –I

**Introduction**: Why Data Mining? What Is Data Mining?1.3 What Kinds of Data Can Be Mined?1.4 What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted? Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity

# UNIT –II

**Data Pre-processing:** Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

# UNIT –III

**Classification:** Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

# UNIT –IV

Classification: Alterative Techniques, Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

# UNIT –V

Association Analysis: Basic Concepts and Algorithms: Problem Defecation, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. (Tan & Vipin)

# UNIT –VI

**Cluster Analysis: Basic Concepts and Algorithms: Overview:** What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. (Tan & Vipin)

# **OUTCOMES:**

- Understand stages in building a Data Warehouse
- Understand the need and importance of preprocessing techniques
- Understand the need and importance of Similarity and dissimilarity techniques
- Analyze and evaluate performance of algorithms for Association Rules.
- Analyze Classification and Clustering algorithms

# **TEXT BOOKS:**

- 1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
- 2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

# **REFERENCE BOOKS:**

- 1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
- 2. Data Mining : Vikram Pudi and P. Radha Krishna, Oxford.
- 3. Data Mining and Analysis Fundamental Concepts and Algorithms; Mohammed J. Zaki, Wagner Meira, Jr, Oxford
- 4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
# INDUSTRIAL ROBOTICS OPEN ELECTIVE

# **Course Objectives:**

- 1. To give students practice in applying their knowledge of mathematics, science, and Engineering and to expand this knowledge into the vast area of robotics.
- 2. The students will be exposed to the concepts of robot kinematics, Dynamics, Trajectory planning.
- 3. Mathematical approach to explain how the robotic arm motion can be described.
- 4. The students will understand the functioning of sensors and actuators.

# UNIT-I

**INTRODUCTION:** Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system.

# UNIT – II

**COMPONENTS OF THE INDUSTRIAL ROBOTICS:** Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

# UNIT – III

**MOTION ANALYSIS:** Homogeneous transformations as applicable to rotation and translation – problems.

**MANIPULATOR KINEMATICS:** Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

# UNIT – IV

Differential transformation and manipulators, Jacobians – problems Dynamics: Lagrange – Euler and Newton – Euler formulations – Problems.

# UNIT V

General considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language.

# UNIT VI

# **ROBOT ACTUATORS AND FEED BACK COMPONENTS:**

Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.

Feedback components: position sensors - potentiometers, resolvers, encoders - Velocity sensors.

**ROBOT APPLICATIONS IN MANUFACTURING:** Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

# **TEXT BOOKS:**

- 1. Industrial Robotics / Groover M P /Pearson Edu.
- 2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

# **REFERENCES:**

- 1. Robotics / Fu K S/ McGraw Hill.
- 2. Robotic Engineering / Richard D. Klafter, Prentice Hall
- 3. Robot Analysis and Control / H. Asada and J.J.E. Slotine / BSP Books Pvt.Ltd.
- 4. Introduction to Robotics / John J Craig / Pearson Edu.

# **Course outcomes:**

Upon successful completion of this course you should be able to:

- 1. Identify various robot configuration and components,
- 2. Select appropriate actuators and sensors for a robot based on specific application
- 3. Carry out kinematic and dynamic analysis for simple serial kinematic chains
- 4. Perform trajectory planning for a manipulator by avoiding obstacles.

# POWER ELECTRONICS (Open Elective)

# **Preamble:**

The usage of power electronics in day to day life has increased in recent years. It is important for student to understand the fundamental principles behind all these converters. This course covers characteristics of semiconductor devices, ac/dc, dc/dc, ac/ac and dc/ac converters. The importance of using pulse width modulated techniques to obtain high quality power supply (dc/ac converter) is also discussed in detail in this course.

# **Learning Objectives:**

- To study the characteristics of various power semiconductor devices and to design firing circuits for SCR.
- To understand the operation of single phase half wave and full-wave converters
- To understand the operation of different types of DC-DC converters.
- To understand the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- To understand the operation of AC-AC converters and switch mode power supplies operation.

# UNIT-I

# **Power Semi-Conductor Devices**

Thyristors–Silicon controlled rectifiers (SCR's) – Characteristics of power MOSFET and power IGBT – Basic theory of operation of SCR–Static characteristics – Turn on and turn off methods–Dynamic characteristics of SCR – Snubber circuit design – Firing circuits for SCR

# UNIT-II

## **AC-DC Single-Phase Converters**

Single phase half wave controlled rectifiers - R load and RL load with and without freewheeling diode - Single Phase full wave controlled rectifiers - center tapped configuration and bridge configuration - R load and RL load with and without freewheeling diode - Effect of source inductance in 1-phase fully controlled bridge rectifier.

# UNIT-III

# **DC–DC Converters**

Buck Converter operation – Time ratio control and current limit control strategies–Voltage and current waveforms– Derivation of output voltage –Boost converter operation –Voltage and current waveforms–Derivation of output voltage – Buck-Boost converter operation –Voltage and current waveforms – Principle operation of forward and fly back converters

## UNIT – IV

## **DC-AC** Converters

Single phase inverters–Unipolar and bipolar switching – Single phase half bridge and full bridge inverters with R and RL loads – PWM techniques– Sine triangular PWM technique– amplitude and frequency modulation Indices – Harmonic analysis.

## UNIT – V

## **AC – AC Single-Phase Converters**

Static V-I characteristics of TRIAC and modes of operation – Single phase AC-AC regulator phase angle control and integrated cycle control with R and RL load – For continuous and discontinuous conduction – Principle of operation of Cyclo-Converters

## UNIT – VI

## **Switch Mode Power Supplies**

Overview of Switching Power Supplies – Linear Power Supplies – DC to DC converters with electrical isolation – Control of Switch Mode DC Supplies – PWM duty ratio control – Current mode control – Power Supply Protection

# **Learning Outcomes:**

Student should be able to

- Explain the characteristics of various power semiconductor devices and analyse the static and dynamic characteristics of SCR's.
- Design firing circuits for SCR.
- Able to explain the operation of single phase half wave and full–wave converters
- Analyse the operation of different types of DC-DC converters.
- Explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- Analyse the operation of AC-AC converters.
- Able to explain switch mode power supplies operation and control

# **Text Books:**

- 1. Power Electronics: Circuits, Devices and Applications by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
- 2. Power Electronics: Essentials & Applications by L.Umanand, Wiley, Pvt. Limited, India, 2009

# **Reference Books:**

- 1. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd.
- 2. Elements of Power Electronics-Philip T.Krein.oxford.
- 3. Power Electronics by P.S.Bhimbra, Khanna Publishers.
- 4. Power Electronics handbook by Muhammad H.Rashid, Elsevier.
- 5. Power Converter Circuits -by William Shepherd, Li zhang, CRC Taylor & Francis Group.

# BIO-MEDICAL ENGINEERING (OPEN ELECTIVE)

# UNIT-I:

**INTRODUCTION TO BIOMEDICAL INSTRUMENTATION:** Age of Biomedical Engineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and Action Potentials, Propagation of Action Potential, Bioelectric Potentials-ECG, EEG and EMG, Envoked Responses.

# **UNIT-II:**

**ELECTRODES AND TRANSDUCERS:** Introduction, Electrode Theory, Biopotential Electrodes, Examples of Electrodes, Basic Transducer Principles, Biochemical Transducers, The Transducer and Transduction Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output.

# UNIT-III:

**CARDIOVASCULAR SYSTEM AND MEASUREMENTS:** The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sound, Plethysmography.

MEASUREMENTS IN THE RESPIRATORY SYSTEM: The Physiology of The

Respiratory System, Tests and Instrumentation for The Mechanics of Breathing, Respiratory Therapy Equipment.

# **UNIT-IV:**

**PATIENT CARE AND MONITORING:** Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators, Radio Frequency Applications of Therapeutic use.

THERAPEUTIC AND PROSTHETIC DEVICES: Audiometers and Hearing Aids,

Myoelectric Arm, Laparoscope, Ophthalmology Instruments, Anatomy of Vision, Electrophysiological Tests, Ophthalmoscope, Tonometer for Eye Pressure Measurement, Diathermy, Clinical Laboratory Instruments, Biomaterials, Stimulators.

# **UNIT-V:**

**DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY:** Principles of Ultrasonic Measurement, Ultrasonic Imaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X-Ray and Radio-Isotope Instrumentations, CAT Scan, Emission Computerized Tomography, MRI, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise, Telemetry for Emergency Patient Monitoring

# UNIT-VI:

**MONITORS, RECORDERS AND SHOCK HAZARDS:** Biopotential Amplifiers, Monitors, Recorders, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention, Isolated Power Distribution System.

# **Text Books:**

- 1. "Bio-Medical Electronics and Instrumentation", Onkar N. Pandey, Rakesh Kumar, Katson Books.
- 2. "Bio-Medical Instrumentation", Cromewell, Wiebell, Pfeiffer

# **References:**

- 1. "Introduction to Bio-Medical Equipment Technology", 4<sup>th</sup> Edition, Joseph J. Carr, John M. Brown, Pearson Publications.
- 2. "Hand Book of Bio-Medical Instrumentation", Khandapur. McGrawHill

## **ARTIFICIAL NEURAL NETWORKS**

# **OPEN ELECTIVE**

#### **Course Objectives:**

- 1. To Introduce the concept of Artificial Neural Networks , Characteristics, Models of Neuron, Learning Rules, Learning Methods, Stability and Convergence
- 2. To study the basics of Pattern Recognition and Feed forward Neural Networks
- 3. To study the basics of Feedback neural networks and Boltzmann machine
- 4. To introduce the Analysis of Feedback layer for different output functions, Pattern Clustering and Mapping networks
- 5. To study the Stability, Plasticity, Neocognitron and Different applications of Neural Networks

#### UNIT-I : Basics of Artificial Neural Networks

Introduction: Biological Neural Networks, Characteristics of Neural Networks, Models of Neuron, Topology, Basic Learning Rules

Activation and Synaptic Dynamics: Activation Dynamic Models, Synaptic Dynamic Models, Learning Methods, Stability & Convergence, Recall in Neural Networks

**UNIT-II:** Functional Units of ANN for Pattern Recognition Tasks: Pattern Recognition problem Basic Fundamental Units, Pattern Recognition Tasks by the Functional Units

Feed forward Neural Networks: Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of Pattern Mapping Networks

## **UNIT-III:**

Feedback Neural Networks: Analysis of linear auto adaptive feed forward networks, Analysis of pattern storage Networks, Stochastic Networks & Stimulated Annealing, Boltzmann machine

#### **UNIT-IV:**

Competitive Learning Neural Networks: Components of a Competitive Learning Network, Analysis of Feedback layer for Different Output Functions, Analysis of Pattern Clustering Networks and Analysis of Feature Mapping Network

#### UNIT-V:

Architectures for Complex Pattern Recognition Tasks: Associative memory, Pattern mapping Stability – Plasticity dilemma: ART, temporal patterns, Pattern visibility: Neocognitron

## UNIT-VI:

Applications of Neural Networks: Pattern classification, Associative memories, Optimization, Applications in Image Processing, Applications in decision making

# **Text Book**

1. B.Yagnanarayana"Artificial Neural Networks", PHI

# **Reference Book**

- 1. Laurene Fausett ,"Fundamentals of Neural Networks", Pearson Education
- 2. Simon Haykin , "Neural Networks", Second Edition

# **Course Outcomes**

- 1. This Course introduces Artificial Neural Networks and Learning Rules and Learning methods
- 2. Feed forward and Feedback Neural Networks are introduced
- 3. Applications of Neural Networks in different areas are introduced

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# MICROPROCESSORS AND MICROCONTROLLERS LAB

## **LIST OF EXPERIMENTS**

# **<u>PART-A:</u>** (Minimum of 5 Experiments has to be performed)

# 8086 Assembly Language Programming using Assembler Directives

- 15. Sorting.
- 16. Multibyte addition/subtraction
- 17. Sum of squares/cubes of a given n-numbers
- 18. Addition of n-BCD numbers
- 19. Factorial of given n-numbers
- 20. Multiplication and Division operations
- 21. Stack operations
- 22. BCD to Seven segment display codes

# **<u>PART-B</u>**: (Minimum of 3 Experiments has to be performed)

# **8086 Interfacing**

- 1. Hardware/Software Interrupt Application
- 2. A/D Interface through Intel 8255
- 3. D/A Interface through Intel 8255
- 4. Keyboard and Display Interface through Intel 8279
- 5. Generation of waveforms using Intel 8253/8254

# **<u>PART-C</u>**: (Minimum of 3 Experiments has to be performed)

# 8051 Assembly Language Programs

- 1. Finding number of 1's and number of 0's in a given 8-bit number
- 2. Addition of even numbers from a given array
- 3. Ascending / Descending order
- 4. Average of n-numbers

# **<u>PART-D</u>**: (Minimum of 3 Experiments has to be performed)

# **8051 Interfacing**

- 1. Switches and LEDs
- 2. 7-Segment display (multiplexed)
- 3. Stepper Motor Interface
- 4. Traffic Light Controller

# **Equipment Required:**

- 1.
- Regulated Power supplies Analog/Digital Storage Oscilloscopes 8086 Microprocessor kits 2.
- 3.
- 8051 microcontroller kits 4.
- 5. ADC module
- 6. DAC module
- 7. Stepper motor module
- Keyboard module
  LED, 7-Segemt Units
  Digital Multimeters
- 11. ROM/RAM Interface module
- 12. Bread Board etc.

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# VLSI LABORATORY

<u>Note:</u> The students are required to design the schematic diagrams using CMOS logic and to draw the layout diagrams to perform the following experiments using 130nm technology with the Industry standard EDA Tools.

#### List of Experiments:

- i. Design and Implementation of an Universal Gates
- ii. Design and Implementation of an Inverter
- iii. Design and Implementation of Full Adder
- iv. Design and Implementation of Full Subtractor
- v. Design and Implementation of Decoder
- vi. Design and Implementation of RS-Latch
- vii. Design and Implementation of D-Latch
- viii. Design and Implementation asynchronous counter
- ix. Design and Implementation of static RAM cell
- x. Design and Implementation of 8 bit DAC using R-2R latter network

#### Software Required:

- i. Mentor Graphics Software / Equivalent Industry Standard Software.
- ii. Personal computer system with necessary software to run the programs and to implement.

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# **DIGITAL COMMUNICATIONS LAB**

- 1. Time division multiplexing.
- 2. Pulse code modulation.
- 3. Differential pulse code modulation.
- 4. Delta modulation.
- 5. Frequency shift keying.
- 6. Phase shift keying .
  7. Differential phase shift keying.
- 8. Companding
- 9. Source Encoder and Decoder
- 10. Linear Block Code-Encoder and Decoder
- 11. Binary Cyclic Code Encoder and Decoder
- 12. Convolution Code Encoder and Decoder

## **Equipment required for Laboratories:**

- 1. RPS 0 30 V
- 2. CRO 0 20 M Hz.
- 3. Function Generators -0 1 M Hz
- 4. RF Generators 0 1000 M Hz./0 100 M Hz.
- 5. Multimeters
- 6. Lab Experimental kits for Digital Communication
- 7. Components

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#### INTELLECTUAL PROPERTY RIGHTS AND PATENTS

#### UNIT I: Introduction to Intellectual Property Rights (IPR)

Concept of Property - Introduction to IPR – International Instruments and IPR - WIPO - TRIPS – WTO -Laws Relating to IPR - IPR Tool Kit - Protection and Regulation - Copyrights and Neighboring Rights – Industrial Property – Patents - Agencies for IPR Registration – Traditional Knowledge –Emerging Areas of IPR - Layout Designs and Integrated Circuits – Use and Misuse of Intellectual Property Rights.

## **UNIT II: Copyrights and Neighboring Rights**

Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Subject Matters of Copyright – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works – Rights of Distribution – Rights of Performers – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Case Law - Semiconductor Chip Protection Act.

#### **UNIT III: Patents**

Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Search - Patent Registration and Granting of Patent - Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Double Patenting — Patent Cooperation Treaty – New developments in Patents – Software Protection and Computer related Innovations.

## **UNIT IV: Trademarks**

Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – Distinction between Trademark and Property Mark – Marks Covered under Trademark Law - Trade Mark Registration – Trade Mark Maintenance – Transfer of rights - Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

#### **UNIT V: Trade Secrets**

Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract – Law of Unfair Competition – Trade Secret Litigation – Applying State Law.

## **UNIT VI: Cyber Law and Cyber Crime**

Introduction to Cyber Law – Information Technology Act 2000 - Protection of Online and Computer Transactions - E-commerce - Data Security – Authentication and Confidentiality - Privacy - Digital Signatures – Certifying Authorities - Cyber Crimes - Prevention and Punishment – Liability of Network Providers.

• Relevant Cases Shall be dealt where ever necessary.

#### **References:**

- 1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
- 2. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
- 3. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw -Hill, New Delhi
- 4. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
- 5. Kompal Bansal & Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
- 6. Cyber Law Texts & Cases, South-Western's Special Topics Collections.
- 7. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
- 8. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

IV Year - I Semester	L	Т	Р	С	
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	RADAR SYSTEMS				

## **OBJECTIVES**

## The student will be introduced to:

- 1. The Basic Principle of radar and radar range equation.
- 2. Different types of radars; CW, FM-CW, MTI and pulse Doppler radars.
- 3. Understand the different tracking techniques for radar.
- 4. Understand the characteristics of a matched filter receiver and its performance.
- 5. Understand the different types of displays, duplexers and antennas used in radar systems.

## UNIT-I:

**Basics of Radar** : Introduction, Maximum Unambiguous Range, simple Radar range Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Illustrative Problems.

**Radar Equation :** Modified Radar Range Equation, SNR, probability of detection, probability of False Alarm, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Creeping Wave, Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

#### UNIT-II:

**CW and Frequency Modulated Radar :** Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar. Illustrative Problems

**FM-CW Radar:** Range and Doppler Measurement, Block Diagram and Characteristics, FM-CW altimeter, Multiple Frequency CW Radar.

## UNIT-III:

**MTI and Pulse Doppler Radar:** Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, N<sup>th</sup> Cancellation Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler Radar.

## UNIT –IV:

**Tracking Radar:** Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono pulse (one- and two- coordinates), Phase Comparison Mono pulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

## UNIT –V:

**Detection of Radar Signals in Noise :** Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation detection and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise, Noise Figure and Noise Temperature.

# UNIT –VI:

**Radar Receivers** –Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus parallel feeds, Applications, Advantages and Limitations. Radomes.

# **TEXT BOOKS:**

1. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2<sup>nd</sup> Ed., 2007.

# **REFERENCE BOOKS:**

- 1. Introduction to Radar Systems, 3<sup>rd</sup> edition M.I. Skolnik, TMH Ed., 2005
- 2. Radar: Principles, Technology, Applications Byron Edde, Pearson Education, 2004.
- 3. Radar Principles Peebles, Jr., P.Z., Wiley, New York, 1998.
- 4. Principles of Modern Radar: Basic Principles Mark A. Richards, James A. Scheer, William A. Holm, Yesdee,
- 5. Radar Engineering GSN Raju, IK International.

## **OUTCOMES**

## After going through this course the student will be able to:

- 1. Derive the radar range equation and to solve some analytical problems.
- 2. Understand the different types of radars and its applications.
- 3. Understand the concept of tracking and different tracking techniques.
- 4. Understand the various components of radar receiver and its performanc.

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#### DIGITAL IMAGE PROCESSING

#### UNIT-1

**Introduction:** Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.

**Image Transforms:** Need for image transforms, Discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform, Importance of Phase, Walsh Transform. Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform, KL Transform, SVD and Radon Transform, Comparison of different image transforms

#### UNIT-2

**Intensity Transformations and Spatial Filtering:** Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters, Combining spatial enhancement methods

**Filtering in the Frequency Domain:** Preliminary concepts, The Basics of filtering in the frequency domain, image smoothing using frequency domain filters, Image Sharpening using frequency domain filters, Selective filtering.

# UNIT-3

**Image Restoration and Reconstruction:** A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimating the degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering, constrained least squares filtering ,geometric mean filter ,image reconstruction from projections.

#### UNIT-4

**Image compression:** Fundamentals, Basic compression methods: Huffman coding, Golomb coding, Arithmetic coding, LZW coding, Run-Length coding, Symbol-Based coding, Bit-Plane coding, Block Transform coding, Predictive coding

**Wavelets and Multiresolution Processing:** Image pyramids, subband coding, Multiresolution expansions, wavelet transforms in one dimensions & two dimensions, Wavelet coding.

#### UNIT-5

Image segmentation: Fundamentals, point, line, edge detection, thresholding, region –based segmentation.

**Morphological Image Processing:** Preliminaries, Erosion and dilation, opening and closing, basic morphological algorithms for boundary extraction, thinning, gray-scale morphology, Segmentation using morphological watersheds.

#### UNIT-6

**Color image processing:** color fundamentals, color models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

# **Text Books**

- 1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3<sup>rd</sup> edition, Prentice Hall, 2008.
- 2. Jayaraman, S. Esakkirajan, and T. Veerakumar," Digital Image Processing", Tata McGraw-Hill Education, 2011.

## **Reference Books**

- 1. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9<sup>th</sup> Edition, Indian Reprint, 2002.
- 2. B.Chanda, D.Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2009.

# **Course Objectives:**

Students undergoing this course are expected to:

- 1. Familiarize with basic concepts of digital image processing and different image transforms
- 2. Learn various image processing techniques like image enhancement, restoration, segmentation and compression
- 3. Understand color fundamentals and different color models
- 4. Understand wavelets and morphological image processing

# **Course Outcomes:**

After undergoing the course students will be able to

- 1. Perform image manipulations and different digital image processing techniques
- 2. Perform basic operations like Enhancement, segmentation, compression, Image transforms and restoration techniques on image.
- 3. Analyze pseudo and fullcolor image processing techniques.
- 4. Apply various morphological operators on images

IV Year - I Semester	L	Т	Р	С	
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	<b>COMPUTER NETWORKS</b>				

# **OBJECTIVES:**

- Understand state-of-the-art in network protocols, architectures, and applications.
- Process of networking research
- Constraints and thought processes for networking research
- Problem Formulation—Approach—Analysis—

# UNIT – I

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models

## UNIT – II

Physical Layer – Fourier Analysis – Bandwidth Limited Signals – The Maximum Data Rate of a Channel - Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols

## UNIT – III

The Data Link Layer - Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols- A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One Bit Sliding Window Protocol-A Protocol Using Go-Back-N- A Protocol Using Selective Repeat

## UNIT – IV

The Medium Access Control Sublayer-The Channel Allocation Problem-Static Channel Allocation-Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Carrier Sense Multiple Multiple Access Protocols-Collision-Free Protocols-Limited Contention Protocols-Wireless LAN Protocols, Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sublayer Protocol-Ethernet Performance-Fast Ethernet Gigabit Ethernet-10-Gigabit Ethernet-Retrospective on Ethernet, Wireless Lans-The 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer-The802.11 MAC Sublayer Protocol-The 805.11 Frame Structure-Services

#### UNIT – V

Design Issues-The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service-Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path Algorithm, Congestion Control Algorithms-Approaches to Congestion Control-Traffic Aware Routing-Admission Control-Traffic Throttling-Load Shedding.

## UNIT – VI

Transport Layer – The Internet Transport Protocols: Udp, the Internet Transport Protocols: Tcp Application Layer – The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery

# **OUTCOMES:**

- Understand OSI and TCP/IP models
- Analyze MAC layer protocols and LAN technologies
- 3 .Design applications using internet protocols
- 4 .Understand routing and congestion control algorithms
- 5 .Understand how internet works

# **TEXT BOOKS:**

- 1. Computer Networks, Tanenbaum and David J Wetherall, 5th Edition, Pearson Edu, 2010
- 2. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education

# **REFERENCE BOOKS:**

1. Larry L. Peterson and Bruce S. Davie, "Computer Networks - A Systems Approach" (5th ed), Morgan Kaufmann/ Elsevier, 2011

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#### **OPTICAL COMMUNICATIONS**

#### **OBJECTIVES**

The student will be introduced to the functionality of each of the components that comprise a fiber-optic communication system

- the properties of optical fiber that affect the performance of a communication link and types of fiber materials with their properties and the losses occur in fibers.
- the principles of single and multi-mode optical fibers and their characteristics
- working of semiconductor lasers, and differentiate between direct modulation and external electro-optic modulation.

• Analyze the operation of LEDs, laser diodes, and PIN photo detectors (spectral

properties, bandwidth, and circuits) and apply in optical systems.

- Analyze and design optical communication and fiber optic sensor systems.
- the models of analog and digital receivers.

#### UNIT I

Overview of optical fiber communication - Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Cylindrical fibers- Modes, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index, Related problems.

## UNIT II

Fiber materials:- Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in optical fibers-Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses, Information capacity determination, Group delay, Types of Dispersion:- Material dispersion, Wave-guide dispersion, Polarization-Mode dispersion, Intermodal dispersion, Pulse broadening in Graded index fiber, Related problems.

## UNIT III

. Optical fiber Connectors-Connector types, Single mode fiber connectors, Connector return loss, Fiber Splicing Splicing techniques, Splicing single mode fibers, Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

#### UNIT IV

Optical sources- LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency, Laser diode rate equations, Resonant frequencies, Reliability of LED&ILD, Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors, Related problems.

#### UNIT V

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling, Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of Error, Quantum limit, Analog receivers.

# UNIT VI

Optical system design - Point-to- point links- Component choice and considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, WDM, Necessity, Principles, Measurement of Attenuation and Dispersion, Eye pattern.

# **TEXT BOOKS :**

- 1. Optical Fiber Communications Gerd Keiser, Mc Graw-Hill International edition, 3rd Edition, 2000.
- 2. Optical Fiber Communications John M. Senior, PHI, 2nd Edition, 2002.

# **RERFERENCES :**

- 1. Fiber Optic Communications D.K. Mynbaev, S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
- 2. Text Book on Optical Fiber Communication and its Applications S.C.Gupta, PHI, 2005.
- 3. Fiber Optic Communication Systems Govind P. Agarwal, John Wiley, 3rd Ediition, 2004.
- 4. Fiber Optic Communications Joseph C. Palais, 4th Edition, Pearson Education, 2004.

# OUTCOMES

After going through this course the student will be able to

- Choose necessary components required in modern optical communications systems .
- Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers.
- Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems.
- Choose the optical cables for better communication with minimum losses

Design, build, and demonstrate optical fiber experiments in the laboratory.

IV Year - I Semester	L	Т	Р	С
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# TELEVISION ENGINEERING (Elective- I)

# UNIT I

**INTRODUCTION:** TV transmitter and receivers, synchronization. Television Pictures: Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution, Composite video signal: Horizontal and vertical sync, scanning sequence, Colour signal generation and Encoding: Perception of brightness and colours, additive colour mixing, video signals for colours, luminance signal, colour difference signals, encoding of colour difference signals, formation of chrominance signals, PAL encoder.

UNIT II

**TV SIGNAL TRANSMISSION AND PROPAGATION:** Picture signal transmission, positive and negative modulation, VSB transmission, sound signal transmission, standard channel BW, TV transmitter, TV signal propagation, interference, TV broadcast channels.

**MONOCHROME TV RECEIVER:** RF tuner, IF subsystem, video amplifier, sound section, sync separation and processing, deflection circuits, scanning circuits.

PAL–D colour receiver: Electron tuners, IF subsystem, Y-signal channel, chroma decoder, separation of U & V Colour phasors, synchronous demodulators, subcarrier generation, raster circuits. **UNIT III** 

**VISION IF SUBSYSTEM:** AGC, noise cancellation, video and intercarrier sound signal detection, Colour receiver IF subsystem, Receiver sound system: FM detection, FM Sound detectors, typical applications.TV Receiver Tuners: Tuner operation, VHF and UHF tuners.

**COLOUR SIGNAL DECODING:**PAL-D decoder, chroma signal amplifiers, separation of U and V signals, Color burst separation, Burst phase discriminator, Reference oscillator, Indent and color killer circuits, RO phase shift and 180 degrees PAL-SWITCH circuitry, U & V demodulators, Colour signal mixing.

# UNIT-IV

**HISTORY OF HDTV:** Analog and Digital TV Compared, Going HD, Broadcast Engineering and Information Technology, The Road to HDTV, The Grand Alliance, A DTV Standard at Last, Producing HDTV, HD Goes Coast-to-Coast, DTV Conversion.

**COMPRESSION TECHNIQUES:** Compression, MPEG-2 Video Compression, MPEG-4, H.264, Motion – JPEG (M-JPEG) compression, Audio Compression, Compressed Data Streams, Packetized Transport. **UNIT V** 

**DTV TRANSMITTER AND RECIEVER:** Engineering Basics, Presentation, Transmission, Reception and Demodulation, Transport Stream Demultiplexing, Decoding and Decompression, Program Assembly and Presentation, Receiver Issues, Presentation Concerns.

**HDTV AND DTV STANDARDS:** Standards Bodies, The ATSC Standards, SMPTE Standards, The Audio Engineering Society, Cable DTV Standards, Institute of Electronic and Electrical Engineers, The Consumer Electronics Association, Other Societies and Organizations.

# UNIT VI

**EMERGING TECHNOLOGIES AND STANDARDS:** Technology and Standards Development, Presentation, Delivery and Distribution, MPEG and Metadata, Enhanced, Interactive and Personalized, Virtual Product Placement, Multiplatform Emergency Alert System.

# **TEXT BOOKS**

- 1. Modern Television Practice Principles, Technology and Service R.R.Gulati, New Age International Publication, 2002
- 2. Television and Video Engineering A.M.Dhake, 2<sup>nd</sup> Edition,
- 3. "HDTV and the Transition to Digital Broadcasting: Understanding New Television Technologies" by Philip J. Cianci, Focal Press, 2007.
- 4. "Digital Video and HDTV Algorithms and Interfaces" by Charles Poynton, Morgan Kaufman publishers, 2007.

#### REFERENCES

- 1. Basic Television and Video Systems B.Grob and C.E.Herndon, McGrawHill, 1999
- 2. "Newnes Guide to Television and Video Technology" by Ibrahim.K.F, Newnes Publishers, 4<sup>th</sup> edition, 2007.
- 3. "H.264 and MPEG-4 and Video compression video coding for Next-generation Multimedia" by Iain E. G. Richardson, John Wiley & Sons Ltd., 2003.

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# ELECTRONIC SWITCHING SYSTEMS (Elective- I)

# **OBJECTIVES :**

The student will

- Understand the means of measuring traffic.
- Understand the implication of the traffic level on system design.

# UNIT -I:

**Introduction:** Evolution of Telecommunications, Simple Telephone Communication, Basics of Switching System, Manual Switching System, Major Telecommunication Networks.

**Crossbar Switching:** Principles of Common Control, Touch Tone Dial Telephone, Principles of Crossbar Switching, Crossbar Switch Configurations, Cross point Technology, Crossbar Exchange Organization.

# UNIT -II:

**Electronic Space Division Switching:** Stored Program Control, Centralized SPC: Stand by mode, Synchronous duplex mode, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-Stage Networks, Three-Stage Networks, n- Stage Networks.

## UNIT -III

**Time Division Switching:** Basic Time Division Space Switching, Basic Time Division Time Switching, Generalised time division Space switch, Basic Time division time switching: modes of operation, simple problems, Time Multiplexed Space Switching, Time Multiplexed Time division space Switch, Time Multiplexed Time Switching, Combination Switching: Time Space (TS) Switching, Space-time (ST) Switching, Three-Stage Combination Switching, n- Stage Combination Switching.

## UNIT IV

**Telephone Networks:** Subscriber Loop System, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan, Signaling Techniques, In-channel Signaling, Common Channel Signaling, CCITT Signaling System no.6, CCITT Signaling System no.7, **Packet Switching:** Statistical Multiplexing, Local- Area and Wide- Area Networks, Large-scale Networks, Broadband Networks.

## UNIT -V:

**Switching Networks:** Single- Stage Networks, Grading, Link Systems, Grades of service of link systems, Application of Graph Theory to link Systems, Use of Expansion, Call Packing,

Rearrange-able Networks, Strict- Sense non-blocking Networks, Sectionalized Switching Networks

**Telecommunications Traffic:** The Unit of Traffic, Congestion, Traffic Measurement, A Mathematical Model, Lost-call Systems, Queuing Systems. Problems

## UNIT -VI:

**Integrated Services Digital Network:** Motivation for ISDN, New Services, Network and Protocol Architecture, Transmission Channels, User- Network Interfaces, Signaling, Numbering and Addressing, Service Characterization, Interworking, ISDN Standards, Expert Systems in ISDN, Broadband ISDN, Voice Data Integration.

## **TEXT BOOKS:**

1. Telecommunication Switching Systems and Networks- Thiagarajan Viswanathan, 2000, PHI.

2. Telecommunications Switching, Traffic and Networks- J. E. Flood, 2006, Pearson Education.

# **REFERENCES:**

- 1. Digital Telephony- J. Bellamy, 2nd Edition, 2001, John Wiley.
- 2. Data Communications and Networks- Achyut S. Godbole, 2004, TMH.
- 3. Principles of Communication Ststems- H. Taub & D. Schilling, 2nd Edition, 2003, TMH.
- 4. Data Communication & Networking- B. A. Forouzan, 3rd Edition, 2004, TMH.
- 5. Telecommunication System Engineering Roger L. Freeman, 4th Ed., Wiley-Inter Science, John Wiley & Sons, 2004.

# Outcomes

The student will be able to

- Evaluate the time and space parameters of a switched signal
- Establish the digital signal path in time and space, between two terminals
- Evaluate the inherent facilities within the system to test some of the SLIC, CODEC and digital switch functions.
- Investigate the traffic capacity of the system.
- Evaluate methods of collecting traffic data.
- Evaluate the method of interconnecting two separate digital switches.

# SYSTEM DESIGN THROUGH VERILOG (Elective- I)

# UNIT-I

# **INTRODUCTION TO VERILOG:**

Verilog as HDL, Levels of design description, concurrency, simulation and synthesis, functional verification, system tasks, programming language interface(PLI), module, simulation and synthesis tools, test benches.

# LANGUAGE CONSTRUCTS AND CONVENTIONS:

Introduction, keywords, identifiers, whitespace characters, comments, numbers, strings, logic values, data types, scalars and vectors, parameters, memory, operators, system tasks.

# UNIT-II

# GATE LEVEL MODELLING:

Introduction, AND gate primitive, module structure, other gate primitives, illustrative examples, tristate gates, array of instances of primitives, design of Flip flops with gate primitives, delays, strengths and contention resolution, net types, design of basic circuits.

## UNIT-III

# **BEHAVIORAL MODELLING:**

Introduction, operations and assignments, functional Bifurcation, initial construct, always construct, examples, assignments with delays, wait construct, multiple always blocks, designs at behavioral level, blocking and nonblocking assignments, the case statement, simulation flow, if and if else constructs, assign-De assign construct, repeat construct, FOR loop, the disable construct, While loop, Forever loop, parallel blocks, force-release construct, event.

## **UNIT-IV**

# DATAFLOW LEVEL AND SWITCH LEVEL MODELLING:

Introduction, continuous assignment structures, delays and continuous assignments, assignment to vectors, basic transistor switches, CMOS switch, Bidirectional gates and time delays with switch primitives, instantiations with strengths and delays, strength contention with trireg nets.

## UNIT-V

**SYNTHSIS OF COMBINATIONAL AND SEQUENTIAL LOGIC USING VERILOG:** Synthesis of combinational logic: Net list of structured primitives, a set of continuous assignment statements and level sensitive cyclic behavior with examples, Synthesis of priority structures, Exploiting logic don't care conditions. Synthesis of sequential logic with latches: Accidental synthesis of latches and Intentional synthesis of latches, Synthesis of sequential logic with flip-flops, Synthesis of explicit state machines.

## UNIT-VI

# **VERILOG MODELS:**

Static RAM Memory, A simplified 486 Bus Model, Interfacing Memory to a Microprocessor Bus, UART Design and Design of Microcontroller CPU.

## **TEXT BOOKS:**

- 1. Design through Verilog HDL T.R. Padmanabhan and B. Bala Tripura Sundari, WSE, IEEE Press, 2004.
- 2. Advanced Digital Design with Verilog HDL Michael D. Ciletti, PHI, 2005.

## **REFERENCES:**

- 1. Fundamentals of Logic Design with Verilog Stephen. Brown and Zvonko Vranesic, TMH, 2005.
- 2. A Verilog Primier J. Bhasker, BSP, 2003.

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# EMBEDDED SYSTEMS ELECTIVE - II

# **OBJECTIVES:**

#### The main objectives of this course are given below:

- The basic concepts of an embedded system are introduced.
- The various elements of embedded hardware and their design principles are explained.
- Different steps involved in the design and development of firmware for embedded systems is elaborated.
- Internals of Real-Time operating system and the fundamentals of RTOS based embedded firmware design is discussed.
- Fundamental issues in hardware software co-design were presented and explained.
- Familiarise with the different IDEs for firmware development for different family of processors/controllers and embedded operating systems.
- Embedded system implementation and testing tools are introduced and discussed.

#### **Outcomes:**

## At the end of this course the student can able to:

- Understand the basic concepts of an embedded system and able to know an embedded system design approach to perform a specific function.
- The hardware components required for an embedded system and the design approach of an embedded hardware.
- The various embedded firmware design approaches on embedded environment.
- Understand how to integrate hardware and firmware of an embedded system using real time operating system.

## **Syllabus**

## UNIT-I

**INTRODUCTION:** Embedded system-Definition, history of embedded systems, classification of embedded systems, major application areas of embedded systems, purpose of embedded systems, the typical embedded system-core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific and Domain-Specific examples of an embedded system.

## UNIT-II

**EMBEDDED HARDWARE DESIGN:** Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

# UNIT-III

**EMBEDDED FIRMWARE DESIGN:** Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

# UNIT-IV

**REAL TIME OPERATING SYSTEM:** Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling, Task communication, Task synchronisation, Device Drivers.

**HARDWARE SOFTWARE CO-DESIGN:** Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE.

# UNIT-V

**EMBEDDED SYSTEM DEVELOPMENT:** The integrated development environment, Types of files generated on cross-compilation, Deassembler/Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools.

# UNIT-VI

**EMBEDDED SYSTEM IMPLEMENTATION AND TESTING:** The main software utility tool, CAD and the hardware, Translation tools-Pre-processors, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools.

# **Text Books:**

- 1. Embedded Systems Architecture- By Tammy Noergaard, Elsevier Publications, 2013.
- 2. Embedded Systems-By Shibu.K.V-Tata McGraw Hill Education Private Limited, 2013.

# **References:**

- 1. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications, 2013.
- 2. Embedded Systems-Lyla B.Das-Pearson Publications, 2013.

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# ANALOG IC DESIGN ELECTIVE - II

# **OBJECTIVES**

The student will be introduced to

- The student will be able to understand the behavior of MOS Devices and Small-Signal & Large-Signal Modeling of MOS Transistor and Analog Sub-Circuits.
- In this course, students can study CMOS Amplifiers like Differential Amplifiers, Cascode Amplifiers, Output Amplifiers, and Operational Amplifiers.
- Another main object of this course is to motivate the graduate students to design and to develop the Analog CMOS Circuits for different Analog operations.
- The concepts of Open-Loop Comparators and Different Types of Oscillators like Ring Oscillator, LC Oscillator etc.

# UNIT -I:

**MOS Devices and Modeling:** The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

# UNIT -II:

**Analog CMOS Sub-Circuits:** MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

# UNIT -III:

**CMOS Amplifiers:** Inverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.

# UNIT -IV:

**CMOS Operational Amplifiers:** Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps, Cascode Op Amps, Measurement Techniques of OP Amp.

# UNIT -V:

**Comparators:** Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators.

# UNIT -VI:

**Oscillators & Phase-Locked Loops:** General Considerations, Ring Oscillators, LC Oscillators, Voltage Controlled Oscillators.

Simple PLL, Charge Pump PLLs, Non-Ideal Effects in PLLs, Delay Locked Loops, Applications.

# **Text Books**:

- 1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition.
- 2. CMOS Analog Circuit Design Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

# **References**:

- 1. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, Wiley India, Fifth Edition, 2010.
- 2. Analog Integrated Circuit Design- David A.Johns, Ken Martin, Wiley Student Edn, 2013.

# OUTCOMES

After going through this course the student will be able to

- Understand the concepts of MOS Devices and Modeling.
- Design and analyze any Analog Circuits in real time applications.
- Extend the Analog Circuit Design to Different Applications in Real Time.
- Understand of Open-Loop Comparators and Different Types of Oscillators.

# NETWORK SECURITY AND CRYPTOGRAPHY ELECTIVE - II

# **OBJECTIVES:**

- In this course the following principles and practice of cryptography and network security are covered:
- Classical systems, symmetric block ciphers (DES, AES, other contemporary symmetric ciphers)
- Public-key cryptography (RSA, discrete logarithms),
- Algorithms for factoring and discrete logarithms, cryptographic protocols, hash functions, authentication, key management, key exchange, signature schemes,
- Email and web security, viruses, firewalls, digital right management, and other topics.

# UNIT- I:

# **Basic Principles**

Security Goals, Cryptographic Attacks, Services and Mechanisms, Mathematics of Cryptography.

# UNIT-II:

# Symmetric Encryption

Mathematics of Symmetric Key Cryptography, Introduction to Modern Symmetric Key Ciphers, Data Encryption Standard, Advanced Encryption Standard.

## **UNIT-III:**

## **Asymmetric Encryption**

Mathematics of Asymmetric Key Cryptography, Asymmetric Key Cryptography

## **UNIT-IV:**

# Data Integrity, Digital Signature Schemes & Key Management

Message Integrity and Message Authentication, Cryptographic Hash Functions, Digital Signature, Key Management.

## UNIT -V:

## Network Security-I

Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS

## UNIT -VI:

# Network Security-II

Security at the Network Layer: IPSec, System Security

## **OUTCOMES:**

- To be familiarity with information security awareness and a clear understanding of its importance.
- To master fundamentals of secret and public cryptography
- To master protocols for security services
- To be familiar with network security threats and countermeasures
- To be familiar with network security designs using available secure solutions (such asPGP,
- SSL, IPSec, etc)

## **TEXT BOOKS:**

- 1. Cryptography and Network Security, Behrouz A Forouzan, DebdeepMukhopadhyay, (3e) Mc Graw Hill.
- 2. Cryptography and Network Security, William Stallings, (6e) Pearson.
- 3. Everyday Cryptography, Keith M.Martin, Oxford.

## **REFERENCE BOOKS:**

1. Network Security and Cryptography, Bernard Meneges, Cengage Learning.

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## **MICROWAVE ENGINEERING & OPTICAL LAB**

#### Minimum Twelve Experiments to be conducted:

#### Part – A (Any 7 Experiments (8 & 9 compulsory)) :

- 1. Reflex Klystron Characteristics.
- 2. Gunn Diode Characteristics.
- 3. Attenuation Measurement.
- 4. Directional Coupler Characteristics.
- 5. Impedance and Frequency Measurement.
- 6. Scattering parameters of Circulator.
- 7. Scattering parameters of Magic Tee.
- 8. Radiation Pattern of Horn and Parabolic Antennas.
- 9. Synthesis of Microstip antennas (Rectangular Structure) Using HFSS.

#### Part – B (Any 5 Experiments) :

- 10. Characterization of LED.
- 11. Characterization of Laser Diode.
- 12. Intensity modulation of Laser output through an optical fiber.
- 13. Measurement of Data rate for Digital Optical link.
- 14. Measurement of NA.
- 15. Measurement of losses for Analog Optical link.

# **Equipment required for Laboratories:**

- 1. Regulated Klystron Power Supply, Klystron mount
- 2. VSWR Meter
- 3. Micro Ammeter
- 4. Multi meter
- 5. CRO
- 6. GUNN Power Supply, Pin Modulator
- 7. Crystal Diode detector
- 8. Micro wave components (Attenuation)
- 9. Frequency Meter
- 10. Slotted line carriage
- 11. Probe detector
- 12. Wave guide shorts
- 13. SS Tuner
- 14. Directional Coupler
- 15. E, H, Magic Tees
- 16. Circulators, Isolator
- 17. Matched Loads
- 18. Pyramidal Horn and Parabolic Antennas
- 19. Turntable for Antenna Measurements
- 20. HFSS Software
- 21. Fiber Optic Analog Trainer based LED
- 22. Fiber Optic Analog Trainer based laser
- 23. Fiber Optic Digital Trainer
- 24. Fiber cables (Plastic, Glass)

IV Year - I Semester	L	Т	Р	С
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DIGITAL SIGNAL PROCESSING LABORA	ATORY			

# List of the Experiments / programs

To Student has to perform at least FOUR Experiments in each part

# PART-1( SIGNALS )

- 1) Generation of discrete time signals for discrete signals
- 2) To verify the Linear Convolution
  - a) Using MATLAB
  - b) Using Code Composer Studio(CCS)
- 3) To verify the Circular Convolution for discrete signals
  - a) Using MATLAB
  - b) Using Code Composer Studio(CCS)
- 4) To Find the addition of Sinusoidal Signals
- 5) To verify Discrete Fourier Transform(DFT) and Inverse Discrete Fourier Transform(IDFT)
  - a) Using MATLAB
  - b) Using Code Composer Studio(CCS)
- 6) Transfer Function Stability Analysis: using pole-zero plot, bode plot, Nyquist plot, z-plane plot.

## PART-2 (FILTERS)

- 7) Frequency Response of IIR low pass Butterworth Filter
- 8) Frequency Response of IIR high pass Butterworth Filter
- 9) Frequency Response of IIR low pass Chebyshev Filter
- 10) Frequency Response of IIR high pass Chebyshev Filter
- 11) Frequency Response of FIR low pass Filter using Rectangle Window
- 12) Frequency Response of FIR low pass Filter using Triangle Window

# PART – 3( IMAGE PROCESSING )

- 13) An image processing in a false contouring system
- 14) To generate the histogram equalization to the image
- 15) To verify the Normalized Cross Correlation to the addition of noise and removal of noise using filters to an image.
- 16) Compute the edge of an image using spatial filters.
- 17) Perform the image motion blur and calculate PSNR to the noise image and also noise free image.
- 18) To verify the PSNR to the Second order Decomposition of Discrete Wavelet transforms and to the reconstructed image using inverse Discrete Wavelet transform

IV Year - II Semester	L	Т	Р	С
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# CELLULAR AND MOBILE COMMUNICATIONS

#### **OBJECTIVES**

#### The student will be introduced to:

- 1. Understand the basic cellular concepts like frequency reuse, cell splitting, cell sectoring etc., and various cellular systems.
- 2. Understand the different types of interference s influencing cellular and mobile communications.
- 3. Understand the frequency management, channel assignment and various propagation effects in cellular environment.
- 4. Understand the different types antennas used at cell site and mobile.
- 5. Understand the concepts of handoff and types of handoffs.
- 6. Understand the architectures of GSM and 3G cellular systems.

## UNIT I

**CELLULAR MOBILE RADIO SYSTEMS:** Introduction to Cellular Mobile System, uniqueness of mobile radio environment, operation of cellular systems, consideration of the components of Cellular system, Hexagonal shaped cells, Analog and Digital Cellular systems.

**CELLULAR CONCEPTS:** Evolution of Cellular systems, Concept of frequency reuse, frequency reuse ratio, Number of channels in a cellular system, Cellular traffic: trunking and blocking, Grade of Service; Cellular structures: macro, micro, pico and femto cells; Cell splitting, Cell sectoring.

#### UNIT II

**INTERFERENCE:** Types of interferences, Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni directional Antenna system, design of Antenna system, antenna parameters and their effects, diversity receiver, non-cochannel interference-different types.

#### UNIT III

**FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT:** Numbering and grouping, setup access and paging channels, channel assignments to cell sites and mobile units: fixed channel and non-fixed channel assignment, channel sharing and borrowing, overlaid cells.

**CELL COVERAGE FOR SIGNAL AND TRAFFIC:** Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation, antenna height gain, form of a point to point model.

#### UNIT IV

**CELL SITE AND MOBILE ANTENNAS :** Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

# UNIT V HANDOFF STRATEGIES

Concept of Handoff, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assigned handoff, intersystem handoff, vehicle locating methods, dropped call rates and their evaluation.

# UNIT VI

**DIGITAL CELLULAR NETWORKS:** GSM architecture, GSM channels, multiple access schemes; TDMA, CDMA, OFDMA; architecture of 3G cellular systems.

# **TEXTBOOKS** :

- 1. Mobile Cellular Telecommunications W.C.Y. Lee, Tata McGraw Hill, 2rd Edn., 2006.
- 2. Principles of Mobile Communications Gordon L. Stuber, Springer International 2<sup>nd</sup> Edition, 2007.

# **REFERENCES**:

1. Wireless Communications – Theodore. S. Rapport, Pearson education, 2<sup>nd</sup> Edn., 2002.

- 2. Wireless and Mobile Communications Lee McGraw Hills, 3<sup>rd</sup> Edition, 2006.
- 3. Mobile Cellular Communication G Sasibhushana Rao Pearson
- 3. Wireless Communication and Networking Jon W. Mark and Weihua Zhqung, PHI, 2005.
- 4. Wireless Communication Technology R. Blake, Thompson Asia Pvt. Ltd., 2004.

## **Outcomes:**

# At the end of this course the student can able to:

- 1. Identify the limitations of conventional mobile telephone systems; understand the concepts of cellular systems.
- 2. Understand the frequency management, channel assignment strategies and antennas in cellular systems.
- 3. Understand the concepts of handoff and architectures of various cellular systems.
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| ELECTRONIC MEASUREMENTS AND INSTRUM | ENTAT | TION |   |   |

#### UNIT I

Performance characteristics of instruments, Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity. Errors in Measurement, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamic error. DC Voltmeters- Multi-range, Range extension/Solid state and differential voltmeters, AC voltmeters- multi range, range extension, shunt. Thermocouple type RF ammeter, Ohmmeters series type, shunt type, Multi-meter for Voltage, Current and resistance measurements.

#### UNIT II

Signal Generator- fixed and variable, AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

#### UNIT III

Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO, . Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO, probes for CRO- Active & Passive, attenuator type.

#### **UNIT IV**

AC Bridges Measurement of inductance- Maxwell's bridge, Anderson bridge. Measurement of capacitance - Schearing Bridge. Wheat stone bridge. Wien Bridge, Errors and precautions in using bridges. Q-meter.

#### UNIT V

Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors.

#### UNIT VI

Measurement of physical parameters force, pressure, velocity, humidity, moisture, speed, proximity and displacement. Data acquisition systems.

#### **TEXTBOOKS**:

1. Electronic instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill, 2004.

2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.

#### **REFERENCES**:

- 1. Electronic Instrumentation & Measurements David A. Bell, PHI, 2nd Edition, 2003.
- 2. Electronic Test Instruments, Analog and Digital Measurements Robert A.Witte, Pearson Education, 2<sup>nd</sup> Ed., 2004.
- 3. Electronic Measurements & Instrumentations by K. Lal Kishore, Pearson Education 2005.

#### OUTCOMES

The student will be able to

- Select the instrument to be used based on the requirements.
- Understand and analyze different signal generators and analyzers.
- Understand the design of oscilloscopes for different applications.
- Design different transducers for measurement of different parameters.

	$\mathbf{L}$	Т	Р	С
IV Year - II Semester	4	0	0	3

#### SATELLITE COMMUNICATIONS

#### **OBJECTIVES**

#### The student will be introduced to:

- 1. Understand the basic concepts, applications, frequencies used and types of satellite communications.
- 2. Understand the concept of look angles, launches and launch vehicles and orbital effects in satellite communications.
- 3. Understand the various satellite subsystems and its functionality.
- 4. Understand the concepts of satellite link design and calculation of C/N ratio.
- 5. Understand the concepts of multiple access and various types of multiple access techniques in satellite systems.
- 6. Understand the concepts of satellite navigation, architecture and applications of GPS.

#### UNIT I

**INTRODUCTION [2] :** Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

**ORBITAL MECHANICS AND LAUNCHERS**[1] : Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

#### UNIT II

**SATELLITE SUBSYSTEMS[1]**: Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

#### **UNIT III**

**SATELLITE LINK DESIGN[1] :** Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

#### **UNIT IV**

**MULTIPLE ACCESS[1][2] :** Frequency division multiple access (FDMA) Intermodulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple access (CDMA),Spread spectrum transmission and reception.

#### UNIT V

**EARTH STATION TECHNOLOGY[3] :** Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power test methods.

LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS[1] : Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations, Operational NGSO constellation Designs

#### UNIT VI

**SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM** [1] : Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

#### **TEXT BOOKS:**

- Satellite Communications Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
- Satellite Communications Engineering Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

#### **REFERENCES :**

- 1. Satellite Communications : Design Principles M. Richharia, BS Publications, 2nd Edition, 2003.
- 2. Satellite Communication D.C Agarwal, Khanna Publications, 5th Ed.
- 3. Fundamentals of Satellite Communications K.N. Raja Rao, PHI, 2004
- 4. Satellite Communications Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

#### **Outcomes:**

#### At the end of this course the student can able to:

- 1. Understand the concepts, applications and subsystems of Satellite communications.
- 2. Derive the expression for G/T ratio and to solve some analytical problems on satellite link design.
- 3. Understand the various types of multiple access techniques and architecture of earth station design.
- 4. Understand the concepts of GPS and its architecture.

IV Voon II Somoston	L	Т	Р	С
IV Year - II Semester	4	0	0	3

#### WIRELESS SENSORS AND NETWORKS ELECTIVE-III

#### UNIT I

#### **OVERVIEW OF WIRELESS SENSOR NETWORKS:**

Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints an challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks.

#### **ARCHITECTURES**:

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

#### UNIT II

#### **NETWORKING Technologies:**

Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs, WANETs.

#### UNIT-III

#### MAC Protocols for Wireless Sensor Networks:

Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

# UNIT-IV

#### **ROUTING PROTOCOLS**:

Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols, Proactive Routing

#### UNIT-V

#### TRANSPORT LAYER AND SECURITY PROTOCOLS:

Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks,

#### UNIT- VI

#### **SECURITY IN WSNs**:

Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

# SENSOR NETWORK PLATFORMS AND TOOLS:

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

#### **APPLICATIONS of WSN:**

S Ultra wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications

#### **TEXT BOOKS:**

- 1. Ad Hoc Wireless Networks: Architectures and Protocols C. Siva Ram Murthy and B.S.Manoj, 2004, PHI
- 2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control Jagannathan Sarangapani, CRC Press
- 3. Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.

#### **REFERENCES:**

- 1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, and Applications", John Wiley, 2007.
- 2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.
- 3. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh ,1 ed. Pearson Education.
- 4. Wireless Sensor Networks C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer
- 5. Wireless Sensor Networks S Anandamurugan, Lakshmi Publications

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# DIGITAL IC DESIGN ELECTIVE-III

#### **OBJECTIVES**

- The student will be able to understand the MOS Design.
- In this course, students can study Combinational MOS Logic Circuits and Sequential MOS Logic Circuits.
- Another main object of this course is to motivate the graduate students to design and to develop the Digital Integreated Circuits for different Applications.
- The concepts of Semiconductor Memories, Flash Memory, RAM array organization.

#### UNIT-I:

**MOS Design:** Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

#### UNIT-II:

**Combinational MOS Logic Circuits**: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates, AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

## UNIT-III:

**Sequential MOS Logic Circuits:** Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

## **UNIT-IV:**

**Dynamic Logic Circuits:** Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

#### UNIT-V:

Interconnect: Capacitive Parasitics, Resistive Parasitics, Inductive Parasitics, Advanced Interconnect Techniques.

#### UNIT-VI:

**Semiconductor Memories:** Memory Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory-NOR flash and NAND flash.

#### **Text Books:**

- 1. Digital Integrated Circuits A Design Perspective, Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, 2<sup>nd</sup> Ed., PHI.
- 2. Digital Integrated Circuit Design Ken Martin, Oxford University Press, 2011.

#### **References:**

- CMOS Digital Integrated Circuits Analysis and Design Sung-Mo Kang, Yusuf Leblebici, TMH, 3<sup>rd</sup> Ed., 2011.
- 2. CMOS VLSI Design Neil H.E Weste, David harris, Ayan Banerjee 3<sup>rd</sup> Edition, Pearson

#### **OUTCOMES**

After going through this course the student will be able to

- Understand the concepts of MOS Design.
- Design and analysis of Combinational and Sequential MOS Circuits.
- Extend the Digital IC Design to Different Applications.
- Understand the Concepts of Semiconductor Memories, Flash Memory, RAM array organization.

#### OPERATING SYSTEMS ELECTIVE-III

#### **OBJECTIVES:**

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.
- Learn the basics of Linux system and perform administrative tasks on Linux Servers.

#### UNIT I

**Introduction to Operating System Concept:** Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

#### UNIT-II:

**Process Management** – Process concept, The process, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Interprocess Communication, Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

#### UNIT-III:

Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation

#### **Virtual Memory Management:**

Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

#### **UNIT-IV:**

**Concurrency:** ProcessSynchronization, The Critical- Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples

**Principles of deadlock** – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock

#### UNIT-V:

File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management

Mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers,

#### UNIT VI:

Linux System: Components of LINUX, Interprocess Communication, Synchronisation, Interrupt, Exception and System Call.

Android Software Platform: Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure, Application Process management

#### **OUTCOMES:**

- Design various Scheduling algorithms.
- Apply the principles of concurrency.
- Design deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Design and Implement a prototype file systems.
- Perform administrative tasks on Linux Servers
- Introduction to Android Operating System Internals

## **TEXT BOOK:**

- 1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012.
- 2. Operating Systems Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011.
- 3. Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016 .

## **REFERENCES:**

- 1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley, 2001.
- 2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata Mc Graw Hill Education", 1996.
- 3. Operating Systems: A Concept-Based Approach, D M Dhamdhere, Second Edition, Tata Mc Graw-Hill Education, 2007.

# COURSE STRUCTURE AND SYLLABUS

For

**COMPUTER SCIENCE AND ENGINEERING** 

(Applicable for batches admitted from 2016-2017)



# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA KAKINADA - 533 003, Andhra Pradesh, India

Ι	Year	-	I	Semester	
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S. No.	Subjects	L	Т	Р	Credits
1-HS	English – I	4			3
2-BS	Mathematics - I	4			3
3-BS	Mathematics – II (Mathematical Methods)	4			3
4-BS	Applied Physics	4			3
5	Computer Programming	4			3
6-ES	Engineering Drawing	4			3
7-HS	English - Communication Skills Lab - 1			3	2
8-BS	Applied / Engineering Physics Lab			3	2
9-ES	Applied / Engineering Physics – Virtual Labs – Assignments			2	
10	Computer Programming Lab			3	2
	Total Credits				24

# I Year - II SEMESTER

S. No.	Subjects	L	Т	Р	Credits
1-HS	English – II	4			3
2-BS	Mathematics - III	4			3
3-BS	Applied Chemistry	4			3
4	Object Oriented Programming through C++	4			3
5-HS	Environmental Studies	4			3
6-ES	Engineering Mechanics	4			3
7-BS	Applied / Engineering Chemistry Laboratory			3	2
8-HS	English - Communication Skills Lab – 2			3	2
9	Object Oriented Programming Lab			3	2
	Total Credits				24

# II Year - I Semester

S. No.	Subjects	L	Т	Р	Credits
1-HS	Statistics with R Programming	4			3
2	Mathematical Foundations of Computer Science	4			3
3	Digital Logic Design	4			3
4	Python Programming	4			3
5	Data Structures through C++	4			3
6	Computer Graphics	4			3
7	Data Structures through C++Lab			3	2
8	Python Programming Lab			3	2
	Total Credits				22

# II Year - II Semester

S. No.	Subjects	L	Т	Р	Credits
1	Software Engineering	4			3
2	Java Programming	4			3
3	Advanced Data Structures	4			3
4	Computer Organization	4			3
5	Formal Languages and Automata Theory	4			3
6	Principles of Programming Languages	4			3
7	Advanced Data Structures Lab			3	2
8	Java Programming Lab			3	2
	Total Credits				22

S. No.	Subjects	L	Т	Р	Credits
1	Compiler Design	4			3
2	Unix Programming	4			3
3	Object Oriented Analysis and Design using UML	4			3
4	Database Management Systems	4			3
5	Operating Systems	4			3
6	Unified Modeling Lab			3	2
7	Operating System & Linux Programming Lab			3	2
8	Database Management System Lab			3	2
MC	Professional Ethics & Human Values		3		
	Total Credits				21

# III Year - II Semester

S. No.	Subjects	L	Т	Р	Credits
1	Computer Networks	4	2		3
2	Data Warehousing and Mining	4			3
3	Design and Analysis of Algorithms	4			3
4	Software Testing Methodologies	4			3
5	Open Elective: i. Artificial Intelligence ii. Internet of Things iii Cyber Security iv.Digital Signal Processing v.Embbeded Systems vi. Robotics	4			3
6	Network Programming Lab			3	2
7	Software Testing Lab			3	2
8	Data Warehousing and Mining Lab			3	2
9	IPR & Patents		2		
	Total Credits				21

# IV Year - I Semester

S. No.	Subjects	L	Т	Р	Credits
1	Cryptography and Network Security	4			3
2	Software Architecture & Design Patterns	4			3
3	Web Technologies	4			3
4- HS	Managerial Economics and Financial Analysis	4			3
5	<b>Elective-I</b> i. Big Data Analytics ii. Information Retrieval Systems iii. Mobile Computing	4			3
6	Elective-II i. Cloud Computing ii. Software Project Management iii. Scripting Languages	4			3
7	Software Architecture & Design Patterns Lab			3	2
8	Web Technologies Lab			3	2
	Total Credits				22

# **IV Year - II Semester**

S. No.	Subjects	L	Т	Р	Credits
1	Distributed Systems	4			3
2- HS	Management Science	4			3
3	Machine Learning	4			3
4	<b>Elective-III</b> i.Concurrent and Parallel Programming ii.Artificial Neural Networks iii. Operations Research	4			3
5	Seminar		3		2
6	Project				10
Total Credits					24

#### **SYLLABUS**

#### I Year - I Semester

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#### **ENGLISH - I**

#### Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

#### **Objectives:**

- 1. To imporve the language proficiency of the students in English with emphasis on LSRW skills.
- 2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theorotical and practical components.
- 3. To develop the communication skills of the students in both formal and informal situations.

#### **LISTENING SKILLS:**

#### **Objectives:**

- 1. To enable the students to appreciate the role of listening skill and improve their pronounciation.
- 2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
- 3. To enable the students to listen for general content, to fill up information and for specific information.

#### **SPEAKING SKILLS:**

#### **Objectives:**

- 1. To make the students aware of the importance of speaking for their personal and professional communication.
- 2. To enable the students to express themselves fluently and accurately in social and professional success.
- 3. To help the students describe objects, situations and people.
- 4. To make the students participate in group activities like roleplays, discussions and debates.
- 5. To make the students particiapte in Just a Minute talks.

#### **READING SKILLS:**

#### **Objectives:**

- 1. To enable the students to comprehend a text through silent reading.
- 2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
- 3. To enable the students to skim and scan a text.
- 4. To enable the students to identify the topic sentence.
- 5. To enable the students to identify discourse features.
- 6. To enable the students to make intensive and extensive reading.

#### WRITING SKILLS:

#### **Objectives:**

- 1. To make the students understand that writing is an exact formal skills.
- 2. To enable the students to write sentences and paragraphs.
- 3. To make the students identify and use appropriate vocabulary.
- 4. To enable the students to narrate and describe.
- 5. To enable the students capable of note-making.
- 6. To enable the students to write coherently and cohesively.
- 7. To make the students to write formal and informal letters.
- 8. To enable the students to describe graphs using expressions of comparision.
- 9. To enable the students to write techincal reports.

#### Methodology:

- 1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
- 2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
- 3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher interventionis perimitted as per the complexity of the task/exercise.
- 4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.

5. The teacher is perimitted to use lecture method when a completely new concept is introduced in the class.

#### **Assessment Procedure: Theory**

- 1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
- 2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the langauge skills learnt in the unit are to be tested.
- 3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats— emails, letters and reports-- are to be tested along with appropriate langauge and expressions.
- 4. Examinations:

I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%

(80% for the best of two and 20% for the other)

Assignments= 5%

End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech I Semester (Common for all branches) and I B.Pharma I Sem of JNTU Kakinada from the academic year 2016-17

(R-16 Regulations)

#### **DETAILED TEXTBOOK:**

# ENGLISH FOR ENGINEERS AND TECHNOLOGISTS, Published by Orient Blackswan Pvt Ltd

#### **NON-DETAILED TEXTBOOK:**

#### PANORAMA: A COURSE ON READING, Published by Oxford University Press India

The course content along with the study material is divided into six units.

#### **UNIT I:**

1. 'Human Resources' from English for Engineers and Technologists.

#### **OBJECTIVE:**

To develop human resources to serve the society in different ways.

#### **OUTCOME:**

The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly.

2. 'An Ideal Family' from Panorama: A Course on Reading

#### **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

#### **OUTCOME:**

Acquisition of writing skills

#### **UNIT 2:**

1. 'Transport: Problems and Solutions' from English for Engineers and Technologists.

#### **OBJECTIVE:**

To highlight road safety measures whatever be the mode of transport.

#### **OUTCOME:**

The lesson motivates the public to adopt road safety measures.

2. 'War' from 'Panorama : A Course on Reading'

#### **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

#### **OUTCOME:**

Acquisition of writing skills

#### **UNIT 3:**

1. 'Evaluating Technology' from English for Engineers and Technologists.

#### **OBJECTIVE:**

To highlight the advantages and disadvantages of technology.

#### **OUTCOME:**

The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival.

2. 'The Verger' from 'Panorama : A Course on Reading'

#### **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

#### **OUTCOME:**

Acquisition of writing skills

#### **UNIT 4:**

1. 'Alternative Sources of Energy' from English for Engineers and Technologists.

#### **OBJECTIVE:**

To bring into focus different sources of energy as alternatives to the depleting sources.

#### **OUTCOME:**

The lesson helps to choose a source of energy suitable for rural India.

2. 'The Scarecrow' from Panorama : A Course on Reading

#### **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

#### **OUTCOME:**

Acquisition of writing skills

#### **UNIT 5:**

1. 'Our Living Environment' from English for Engineers and Technologists.

#### **OBJECTIVE:**

To highlight the fact that animals must be preserved beacuase animal life is precious.

#### **OUTCOME:**

The lesson creates an awareness in the reader as to the usefulness of animals for the human society.

2. 'A Village Host to Nation' from Panorama : A Course on Reading

#### **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

#### **OUTCOME:**

Acquisition of writing skills

#### **UNIT 6:**

1. 'Safety and Training' from English for Engineers and Technologists.

#### **OBJECTIVE:**

To highlight the possibility of accidents in laboratories, industries and other places and to follow safety measures.

#### **OUTCOME:**

The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.

2. 'Martin Luther King and Africa' from Panorama : A Course on Reading

#### **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

#### **OUTCOME:**

Acquisition of writing skills

#### NOTE:

All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

#### **OVERALL COURSE OUTCOME:**

- 1. Using English languages, both written and spoken, competently and correctly.
- 2. Improving comprehension and fluency of speech.
- **3.** Gaining confidence in using English in verbal situations.

#### MODEL QUESTION PAPER FOR THEORY

#### PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

#### PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks

- B from non-detailed text: 3 marks
- C on grammar and Vocabulary: 6 marks

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r rear - i Semester	4	0	0	3

#### **MATHEMATICS-I**

#### (Common to ALL branches of First Year B.Tech.)

#### **Course Objectives:**

- 1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
- 2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

#### Course Outcomes: At the end of the Course, Student will be able to:

- 1. Solve linear differential equations of first, second and higher order.
- 2. Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
- 3. Calculate total derivative, Jocobian and minima of functions of two variables.

#### **UNIT I: Differential equations of first order and first degree:**

Linear-Bernoulli-Exact-Reducible to exact.

Applications: Newton's Law of cooling-Law of natural growth and decay-Orthogonal trajectories- Electrical circuits- Chemical reactions.

#### UNIT II: Linear differential equations of higher order:

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type  $e^{ax}$ , sin ax, cos ax, polynomials in x,  $e^{ax} V(x)$ , xV(x)- Method of Variation of parameters. Applications: LCR circuit, Simple Harmonic motion.

#### **UNIT III: Laplace transforms:**

Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

#### **UNIT IV: Partial differentiation:**

Introduction- Homogeneous function-Euler's theorem-Total derivative-Chain rule-Generalized Mean value theorem for single variable (without proof)-Taylor's and Mc Laurent's series expansion of functions of two variables– Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

#### **UNIT V: First order Partial differential equations:**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

#### **UNIT VI: Higher order Partial differential equations:**

Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type  $e^{ax+by}$ ,  $\sin(ax+by)$ ,  $\cos(ax+by)$ ,  $x^m y^n$ . Classification of second order partial differential equations.

#### **Text Books:**

- 1. B.S.Grewal, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

#### **Reference Books:**

- 1. Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India
- 2. Micheael Greenberg, Advanced Engineering Mathematics, 9<sup>th</sup> edition, Pearson edn
- 3. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
- 4. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
- 5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
- 6. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

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#### MATHEMATICS-II (Mathematical Methods) (Common to ALL branches of First Year B.Tech.)

#### **Course Objectives:**

- 1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
- 2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
- 3. Understand the most basic numerical methods to solve simultaneous linear equations.

#### Course Outcomes: At the end of the Course, Student will be able to:

- 1. Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators.
- 2. Compute interpolating polynomial for the given data.
- 3. Solve ordinary differential equations numerically using Euler's and RK method.
- 4. Find Fourier series and Fourier transforms for certain functions.
- 5. Identify/classify and solve the different types of partial differential equations.

#### **UNIT I: Solution of Algebraic and Transcendental Equations:**

Introduction- Bisection method – Method of false position – Iteration method – Newton-Raphson method (One variable and simultaneous Equations).

#### **UNIT II: Interpolation:**

Introduction- Errors in polynomial interpolation – Finite differences- Forward differences-Backward differences –Central differences – Symbolic relations and separation of symbols -Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.

# UNIT III: Numerical Integration and solution of Ordinary Differential equations:

Trapezoidal rule- Simpson's 1/3<sup>rd</sup> and 3/8<sup>th</sup> rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations-Euler's method - Runge-Kutta method (second and fourth order).

#### **UNIT IV: Fourier Series:**

Introduction- Periodic functions – Fourier series of -periodic function - Dirichlet's conditions – Even and odd functions –Change of interval– Half-range sine and cosine series.

#### **UNIT V: Applications of PDE:**

Method of separation of Variables- Solution of One dimensional Wave, Heat and twodimensional Laplace equation.

#### **UNIT VI: Fourier Transforms:**

Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

#### **Text Books:**

- 1. **B.S.Grewal**, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

#### **Reference Books:**

- 1. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
- 2. V.Ravindranath and P.Vijayalakshmi, Mathematical Methods, Himalaya Publishing House.
- 3. Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India
- 4. **David Kincaid, Ward Cheney**, Numerical Analysis-Mathematics of Scientific Computing, 3<sup>rd</sup> Edition, Universities Press.
- 5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
- 6. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

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#### **APPLIED PHYSICS** (CSE, ECE, EEE, IT, EIE, E.Com.E)

<u>**OBJECTIVES:**</u> Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by JNTUniv.Kkd. that serves as a transit to understand the branch specific advanced topics. The courses are designed to:

- Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.
- Teach Concepts of coherent sources, its realization and utility optical instrumentation.
- Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.
- Understand the physics of Semiconductors and their working mechanism for their utility in sensors.

## UNIT-I

**INTERFERENCE:** Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings – construction and basic principle of Interferometers.

# UNIT-II

**DIFFRACTION:** Fraunhofer diffraction at single slit - Cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscopes.

# UNIT-III

**POLARIZATION:** Types of Polarization – Methods of production - Nicol Prism - Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter).

**LASERS:** Characteristics– Stimulated emission – Einstein's Transition Probabilities-Pumping schemes - Ruby laser – Helium Neon laser.

# UNIT-IV

**ELECTROMAGNETIC FIELDS:** Scalar and Vector Fields – Electric Potential-Gradient, Divergence of fields – Gauss and Stokes theorems-Propagation of EM waves through dielectric medium.

# UNIT-V

**QUANTUM MECHANICS:** Introduction - Matter waves – Schröedinger Time Independent and Time Dependent wave equations – Particle in a box. **FREE ELECTRON THEORY:** Defects of Classical free electron theory –Quantum Free electron theory - concept of Fermi Energy.

# UNIT-VI

**BAND THEORY OF SOLIDS:** Bloch's theorem (qualitative) – Kronig – Penney model – energy bands in crystalline solids – classification of crystalline solids– effective mass of electron & concept of hole.

**SEMICONDUCTOR PHYSICS:** Conduction – Density of carriers in Intrinsic and Extrinsic semiconductors – Drift & Diffusion – relevance of Einstein's equation- Hall effect in semiconductors

**Outcome**: Construction and working details of instruments, ie., Interferometer, Diffractometer and Polarimeter are learnt. Study EM-fields and semiconductors under the concepts of Quantum mechanics paves way for their optimal utility.

# **Text Books:**

- 1. A Text book of Engineering Physics by Dr. M.N.Avadhanulu and Dr.P.G.Kshira sagar, S.Chand & Company Ltd., (2014)
- 2. 'Solid State Physics' by A.J.Dekker, Mc Millan Publishers (2011)
- 3. Engineering Physics by D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

# **Reference Books:**

- 1. Applied Physics by P.K.Palanisamy, Scitech publications (2014)
- 2. Lasers and Non-Linear optics by B.B.Laud, New Age International Publishers (2008).
- 3. Engineering Physics by M. Arumugam, Anuradha Publication (2014)

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1 Year - 1 Semester	4	0	0	3

#### COMPUTER PROGRAMMING

#### Learning objectives:

Formulating algorithmic solutions to problems and implementing algorithms in C.

- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

#### **UNIT-I:**

**History and Hardware** - Computer Hardware, Bits and Bytes, Components, Programming Languages - Machine Language, Assembly Language, Low- and High-Level Languages, Procedural and Object-Oriented Languages, Application and System Software, The Development of C Algorithms The Software Development Process.

#### **UNIT-II:**

Introduction to C Programming- Identifiers, The main () Function, The printf () Function

**Programming Style** - Indentation, Comments, Data Types, Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization.

**Assignment** - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

#### UNIT -III:

#### **Control Flow-Relational Expressions - Logical Operators:**

**Selection**: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples. **Repetition**: Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, The while Statement, The for Statement, Nested Loops, The dowhile Statement.

#### UNIT-IV

**Modular Programming:** Function and Parameter Declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Storing Addresses, Using Addresses, Declaring and Using Pointers, Passing Addresses to a Function.

Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

#### **UNIT-V:**

#### Arrays & Strings

**Arrays:** One-DimensionalArrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, LargerDimensionalArrays- Matrices **Strings:** String Fundamentals, String Input and Output, String Processing, Library Functions

#### UNIT-VI:

#### Pointers, Structures, Files

**Pointers**: Concept of a Pointer, Initialisation of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.

**Structures**: Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.

**Data Files**: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

#### **Outcomes:**

- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers
- Use different data structures and create/update basic data files.

#### **Text Books:**

- 1. ANSI C Programming, Gary J. Bronson, Cengage Learning.
- 2. Programming in C, Bl Juneja Anita Seth, Cengage Learning.
- 3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

#### **Reference Books:**

- 1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
- 2. Programming with C, Bichkar, Universities Press.
- 3. Programming in C, ReemaThareja, OXFORD.
- 4. C by Example, Noel Kalicharan, Cambridge.

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#### **ENGINEERING DRAWING**

**Objective**: Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

- To introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.
- To introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.
- To make the students draw the projections of the lines inclined to both the planes.
- To make the students draw the projections of the plane inclined to both the planes.
- To make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
- To represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

**UNIT I** Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

**UNIT II** Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

**UNIT III** Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

**UNIT IV** Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

**UNIT V** Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

**UNIT VI** Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

# **Text Books:**

- 1. Engineering Drawing, N. D. Butt, Chariot Publications
- 2. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers.
- 3. Engineering Graphics, P.I. Varghese, McGraw Hill Publishers

# **Reference Books:**

- 1. Engineering Graphics for Degree, K. C. John, PHI Publishers
- 2. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers
- 3. Engineering Drawing + AutoCad K Venugopal, V. Prabhu Raja, New Age

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1 Year - 1 Semester	0	0	3	2

#### **ENGLISH - COMMUNICATION SKILLS LAB - I**

#### **PRESCRIBED LAB MANUAL FOR SEMESTER I:**

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

#### **OBJECTIVES:**

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

#### **OUTCOME:**

A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

#### **UNIT 1:**

- 1. WHY study Spoken English?
- 2. Making Inqueries on the phone, thanking and responding to Thanks Practice work.

#### **UNIT 2:**

1. Responding to Requests and asking for Directions Practice work.

#### **UNIT 3:**

- 1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
- 2. Apologising, Advising, Suggesting, Agreeing and Disagreeing Practice work.

#### **UNIT 4:**

1. Letters and Sounds Practice work.

#### **UNIT 5:**

1. The Sounds of English Practice work.

#### **UNIT 6:**

- 1. Pronunciation
- 2. Stress and Intonation Practice work.

#### **Assessment Procedure: Laboratory**

- 1. Every lab session (150 minutes) should be handled by not less than two teachers (three would be ideal) where each faculty has to conduct a speaking activity for 20/30 students.
- 2. The teachers are to assess each learner in the class for not less than 10 speaking activities, each one to be assessed for 10 marks or 10%. The average of 10 day-to-day activity assessments is to be calculated for 10 marks for internal assessment.

The rubric given below has to be filled in for all the students for all activities.

#### The rubric to assess the learners:

Body language		Fluency & Audibility	Clarity in Speech	Neutralia ation accent	z of	Appropr Languag	iate e	Total 10 marks	Remarks
Gesture s & Posture s	Eye Conta ct					Gramm ar	Vocabu lary & expressi ons		

#### • Lab Assessment: Internal (25 marks)

1. Day-to-Day activities: 10 marks

- 2. Completing the exercises in the lab manual: 5 marks
- 3. Internal test (5 marks written and 5 marks oral)

#### • Lab Assessment: External (50 marks)

- 1. Written test: 20 marks (writing a dialogue, note-taking and answering questions on listening to an audio recording.
- 2. Oral: Reading aloud a text or a dialogue- 10 marks
- 3. Viva-Voce by the external examiner: 20 marks

#### **Reference Books:**

- 1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
- 2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
- 3. Unlock, Listening and speaking skills 2, Cambridge University Press
- 4. Spring Board to Success, Orient BlackSwan
- 5. A Practical Course in effective english speaking skills, PHI
- 6. Word power made handy, Dr shalini verma, Schand Company
- 7. Let us hear them speak, Jayashree Mohanraj, Sage texts
- 8. Professional Communication, Aruna Koneru, Mc Grawhill Education
- 9. Cornerstone, Developing soft skills, Pearson Education

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# **APPLIED/ENGINEERING PHYSICS LAB**

## (Any 10 of the following listed experiments)

**Objective:** Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.

#### LIST OF EXPERIMENTS:

- 1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
- 2. Newton's rings Radius of Curvature of Plano Convex Lens.
- 3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
- 4. Determination of Rigidity modulus of a material- Torsional Pendulum.
- 5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
- 6. Melde's experiment Transverse and Longitudinal modes.
- 7. Verification of laws of vibrations in stretched strings Sonometer.
- 8. Determination of velocity of sound Volume Resonator.
- 9. L- C- R Series Resonance Circuit.
- 10. Study of I/V Characteristics of Semiconductor diode.
- 11. I/V characteristics of Zener diode.
- 12. Characteristics of Thermistor Temperature Coefficients.
- 13. Magnetic field along the axis of a current carrying coil Stewart and Gee's apparatus.
- 14. Energy Band gap of a Semiconductor p n junction.
- 15. Hall Effect in semiconductors.
- 16. Time constant of CR circuit.
- 17. Determination of wavelength of laser source using diffraction grating.
- 18. Determination of Young's modulus by method of single cantilever oscillations.
- 19. Determination of lattice constant lattice dimensions kit.
- 20. Determination of Planck's constant using photocell.
- 21. Determination of surface tension of liquid by capillary rise method.

# **Outcome:** *Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements*

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1 Tear - I Semester	0	0	2	0

# APPLIED/ENGINEERING PHYSICS - VIRTUAL LABS – ASSIGNMENTS (Constitutes 5% marks of 30marks of Internal-component)

**Objective:** *Training Engineering students to prepare a technical document and improving their writing skills.* 

# LIST OF EXPERIMENTS

- 1. Hall Effect
- 2. Crystal Structure
- 3. Hysteresis
- 4. Brewster's angle
- 5. Magnetic Levitation / SQUID
- 6. Numerical Aperture of Optical fiber
- 7. Photoelectric Effect
- 8. Simple Harmonic Motion
- 9. Damped Harmonic Motion
- 10. LASER Beam Divergence and Spot size
- 11. B-H curve
- 12. Michelson's interferometer
- 13. Black body radiation

URL: <u>www.vlab.co.in</u>

**Outcome:** *Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.*
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1 Tear - I Semester	0	0	3	2

#### COMPUTER PROGRAMMING LAB

#### **OBJECTIVES:**

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.

## Programming

**Exercise - 1** Basics

- a) What is an OS Command, Familiarization of Editors vi, Emacs
- b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
- c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

Exercise - 2 Basic Math

- a) Write a C Program to Simulate 3 Laws at Motion
- b) Write a C Program to convert Celsius to Fahrenheit and vice versa

**Exercise - 3** Control Flow - I

- a)Write a C Program to Find Whether the Given Year is a Leap Year or not.
- b)Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II

a)Write a C Program to Find Whether the Given Number is

- i) Prime Number
- ii) Armstrong Number
- b) Write a C program to print Floyd Triangle
- c) Write a C Program to print Pascal Triangle

#### Exercise – 5 Functions

- a) Write a C Program demonstrating of parameter passing in Functions and returning values.
- b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

#### **Exercise – 6** Control Flow - III

a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch...case

b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

#### **Exercise – 7** Functions - Continued

Write a C Program to compute the values of sin x and  $\cos x$  and  $e^x$  values using Series expansion. (use factorial function)

**Exercise – 8** Arrays

Demonstration of arrays

- a) Search-Linear.
- b) Sorting-Bubble, Selection.
- c) Operations on Matrix.

## Exercises - 9 Structures

a)Write a C Program to Store Information of a Movie Using Structure

b)Write a C Program to Store Information Using Structures with Dynamically Memory Allocation

c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

## Exercise - 10 Arrays and Pointers

a)Write a C Program to Access Elements of an Array Using Pointer

b) Write a C Program to find the sum of numbers with arrays and pointers.

## Exercise – 11 Dynamic Memory Allocations

- a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
- b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function. Understand the difference between the above two programs

## Exercise – 12 Strings

a) Implementation of string manipulation operations with library function.

- i) copy
- ii) concatenate
- iii) length
- iv) compare

b) Implementation of string manipulation operations without library function.

- i) copy
- ii) concatenate
- iii) length
- iv) compare

## Exercise -13 Files

a)Write a C programming code to open a file and to print it contents on screen. b)Write a C program to copy files

## **Exercise - 14** Files Continued

a) Write a C program merges two files and stores their contents in another file.

b) Write a C program to delete a file.

#### Exercise - 15

a) System Assembling, Disassembling and identification of Parts / Peripherals. b) Operating System Installation-Install Operating Systems like Windows, Linux along with necessary Device Drivers.

## Exercise - 16

- a) MS-Office / Open Office
  - i) Word Formatting, Page Borders, Reviewing, Equations, symbols.ii) Spread Sheet - organize data, usage of formula, graphs, charts.

iii) Powerpoint - features of power point, guidelines for preparing an effective presentation.

b) Network Configuration & Software Installation-Configuring TCP/IP, Proxy, and firewall settings. Installing application software, system software & tools.

## **OUTCOMES:**

- Apply and practice logical ability to solve the problems.
- Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
- Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
- Understand and apply the in-built functions and customized functions for solving the problems.
- Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
- Document and present the algorithms, flowcharts and programs in form of user-manuals
- •Identification of various computer components, Installation of software

#### Note:

a) All the Programs must be executed in the Linux Environment. (Mandatory)

b) The Lab record must be a print of the LATEX (.tex) Format.

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1 Tear - 11 Semester	4	0	0	3

#### **ENGLISH -II**

#### **Introduction:**

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

#### **Objectives:**

- 1. To imporve the language proficiency of the students in English with emphasis on LSRW skills.
- 2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theorotical and practical components.
- 3. To develop the communication skills of the students in both formal and informal situations.

#### **LISTENING SKILLS:**

#### **Objectives:**

- 1. To enable the students to appreciate the role of listening skill and improve their pronounciation.
- 2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
- 3. To enable the students to listen for general content, to fill up information and for specific information.

#### **SPEAKING SKILLS:**

## **Objectives:**

- 1. To make the students aware of the importance of speaking for their personal and professional communication.
- 2. To enable the students to express themselves fluently and accurately in social and professional success.
- 3. To help the students describe objects, situations and people.
- 4. To make the students participate in group activities like roleplays, discussions and debates.
- 5. To make the students particiapte in Just a Minute talks.

## **READING SKILLS:**

## **Objectives:**

- 1. To enable the students to comprehend a text through silent reading.
- 2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
- 3. To enable the students to skim and scan a text.
- 4. To enable the students to identify the topic sentence.
- 5. To enable the students to identify discourse features.
- 6. To enable the students to make intensive and extensive reading.

## WRITING SKILLS:

## **Objectives:**

- 1. To make the students understand that writing is an exact formal skills.
- 2. To enable the students to write sentences and paragraphs.
- 3. To make the students identify and use appropriate vocabulary.
- 4. To enable the students to narrate and describe.
- 5. To enable the students capable of note-making.
- 6. To enable the students to write coherently and cohesively.
- 7. To make the students to write formal and informal letters.
- 8. To enable the students to describe graphs using expressions of comparision.
- 9. To enable the students to write techincal reports.

## Methodology:

- 1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
- 2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
- 3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher interventionis perimitted as per the complexity of the task/exercise.
- 4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.

5. The teacher is perimitted to use lecture method when a completely new concept is introduced in the class.

## **Assessment Procedure: Theory**

- 1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
- 2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the langauge skills learnt in the unit are to be tested.
- 3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails,letters and reports-- are to be tested along with appropriate langauge and expressions.
- 4. Examinations:

I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%

(80% for the best of two and 20% for the other)

Assignments= 5%

End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech II Semester (Common for all branches) and I B.Pharma II Sem of JNTU Kakinada from the academic year 2016-17 (**R-16 Regulations**)

DETAILED TEXTBOOK: ENGLISH ENCOUNTERS Published by Maruthi Publishers.

# DETAILED NON-DETAIL: THE GREAT INDIAN SCIENTISTS Published by Cenguage learning

The course content along with the study material is divided into six units.

# UNIT 1:

1. 'The Greatest Resource- Education' from English Encounters

# **OBJECTIVE:**

Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts.

# **OUTCOME:**

The lesson underscores that the ultimate aim of Education is to enhance wisdom.

2. ' A P J Abdul Kalam' from The Great Indian Scientists.

## **OBJECTIVE:**

The lesson highlights Abdul Kalam's contributions to Indian science and the awards he received.

## **OUTCOME:**

Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.

## **UNIT 2:**

1. ' A Dilemma' from English Encounters

**OBJECTIVE:** The lesson centres on the pros and cons of the development of science and technology.

**OUTCOME:** The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.

2. 'C V Raman' from The Great Indian Scientists.

## **OBJECTIVE:**

The lesson highlights the dedicated research work of C V Raman and his achievements in Physics.

## **OUTCOME:**

The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists.

#### **UNIT 3:**

1. 'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.

#### **OBJECTIVE:**

The lesson depicts of the symptoms of Cultural Shock and the aftermath consequences.

**OUTCOME:** The lesson imparts the students to manage different cultural shocks due to globalization.

2. 'Homi Jehangir Bhabha' from The Great Indian Scientists.

## **OBJECTIVE:**

The lesson highlights Homi Jehangir Bhabha's contributions to Indian nuclear programme as architect.

#### **OUTCOME:**

The seminal contributions of Homi Jehangir Bhabha to Indian nuclear programme provide an aspiration to the readers to serve the nation and sterngthen it.

#### **UNIT 4:**

1. 'The Lottery' from English Encounters.

#### **OBJECTIVE:**

The lesson highlights insightful commentary on cultural traditions.

#### **OUTCOME:**

The theme projects society's need to re examine its traditions when they are outdated.

2. 'Jagadish Chandra Bose' from The Great Indian Scientists.

#### **OBJECTIVE:**

The lesson gives an account of the unique discoveries and inventions of Jagadish Chandra Bose in Science.

**OUTCOME:** The Scientific discoveries and inventions of Jagadish Chandra Bose provide inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.

#### **UNIT 5:**

1. 'The Health Threats of Climate Change' from English Encounters.

#### **OBJECTIVE:**

The essay presents several health disorders that spring out due to environmental changes

#### **OUTCOME:**

The lesson offers several inputs to protect environment for the sustainability of the future generations.

2. ' Prafulla Chandra Ray' from The Great Indian Scientists.

# **OBJECTIVE:**

The lesson given an account of the experiments and discoveries in Pharmaceuticals of Prafulla Chandra Ray.

## **OUTCOME:**

Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader.

## **UNIT 6:**

1. ' The Chief Software Architect' from English Encounters

## **OBJECTIVE:**

The lesson supports the developments of technology for the betterment of human life.

## **OUTCOME:**

Pupil get inspired by eminent personalities who toiled for the present day advancement of software development.

2. 'Srinivasa Ramanujan' from The Great Indian Scientists.

## **OBJECTIVE:**

The lesson highlights the extraordinary achievements of Srinivasa Ramanujan, a great mathematician and the most romantic figure in mathematics.

## **OUTCOME:**

The lesson provides inspiration to the readers to think and tap their innate talents.

## NOTE:

All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

# MODEL QUESTION PAPER FOR THEORY

# PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

# PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks

B from non-detailed text: 3 marks

C on grammar and Vocabulary: 6 marks

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I Year - II Semester	4	0	0	3

## MATHEMATICS-III

## (Common to ALL branches of First Year B.Tech.)

#### **Course Objectives:**

- 1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
- 2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
- 3. Understand the most basic numerical methods to solve simultaneous linear equations.

#### **Course Outcomes: At the end of the Course, Student will be able to:**

- 1. Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations.
- 2. Solve simultaneous linear equations numerically using various matrix methods.
- 3. Determine double integral over a region and triple integral over a volume.
- 4. Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

#### **UNIT I: Linear systems of equations:**

Rank-Echelon form-Normal form – Solution of linear systems – Gauss elimination - Gauss Jordon- Gauss Jacobi and Gauss Seidal methods. Applications: Finding the current in electrical circuits.

#### UNIT II: Eigen values - Eigen vectors and Quadratic forms:

Eigen values - Eigen vectors- Properties - Cayley-Hamilton theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Diagonalization- Quadratic forms- Reduction of quadratic form to canonical form - Rank - Positive, negative and semi definite - Index - Signature.

Applications: Free vibration of a two-mass system.

#### **UNIT III: Multiple integrals:**

Curve tracing: Cartesian, Polar and Parametric forms.

Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration.

Applications: Finding Areas and Volumes.

#### **UNIT IV: Special functions:**

Beta and Gamma functions- Properties - Relation between Beta and Gamma functions-Evaluation of improper integrals.

Applications: Evaluation of integrals.

## **UNIT V: Vector Differentiation:**

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities. Applications: Equation of continuity, potential surfaces

## **UNIT VI: Vector Integration:**

Line integral - Work done - Potential function - Area- Surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.

Applications: Work done, Force.

#### **Text Books:**

- 1. **B.S.Grewal,** Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

#### **Reference Books:**

- Greenberg, Advanced Engineering Mathematics, 2<sup>nd</sup> edition, Pearson edn
  Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India
- 3. **Peter O'Neil**, Advanced Engineering Mathematics, 7<sup>th</sup> edition, Cengage Learning.
- 4. D.W. Jordan and T.Smith, Mathematical Techniques, Oxford University Press.
- 5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
- 6. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

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## APPLIED CHEMISTRY (EEE, ECE, CSE, IT, EIE, E. Com. E.)

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

## Learning Objectives:

- Plastics are nowadays used in household appliances; also they are used as composites (FRP) in aerospace industries.
- Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
- The basics for the construction of galvanic cells as well as some of the sensors used in instruments are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory.
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.
- Understanding of crystal structures will help to understand the conductivity, semiconductors and superconductors. Magnetic properties are also studied.
- With the increase in demand for power and also with depleting sources of fossil fuels, the demand for alternative sources of fuels is increasing. Some of the prospective fuel sources are introduced.

## UNIT I: HIGH POLYMERS AND PLASTICS

Polymerisation : Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties – Plastics as engineering materials : advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4/5 techniques)- Preparation, properties and applications of polyethene, PVC, Bakelite Teflon and polycarbonates

Elastomers – Natural rubber- compounding and vulcanization – Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers.

Composite materials & Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

## UNIT II: FUEL TECHNOLOGY

*Fuels*:- Introduction – Classification – Calorific value – HCV and LCV – Dulong's formula – Bomb calorimeter – Numerical problems – Coal — Proximate and ultimate analysis – Significance of the analyses – Liquid fuels – Petroleum- Refining – Cracking – Synthetic petrol –Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knock agents – Power alcohol – Bio-diesel – Gaseous fuels – Natural gas. LPG and CNG – Combustion – Calculation of air for the combustion of a fuel – Flue gas analysis – Orsat apparatus – Numerical problems on combustion.

*Explosives:-* Introduction, classification, examples: RDX, TNT and ammonium nitrite - rocket fuels.

# UNIT III: ELECTROCHEMICAL CELLS AND CORROSION

Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc – air cells.

*Corrosion:-* Definition – Theories of Corrosion (electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Design and material selection – Cathodic protection -Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating)

# **UNIT IV: CHEMISTRY OF ADVANCED MATERIALS**

*Nano materials:* Introduction – Sol-gel method & chemical reduction method of preparation – Characterization by BET method and TEM methods - Carbon nano tubes and fullerenes: Types, preparation, properties and applications

*Liquid crystals:*- Introduction – Types – Applications

Superconductors :- Type-I & Type-2, properties & applications

Green synthesis:- Principles - 3or 4 methods of synthesis with examples - R<sub>4</sub>M<sub>4</sub> principles

# **UNIT V: SOLID STATE CHEMISTRY**

Types of solids - close packing of atoms and ions - BCC, FCC, structures of rock salt - cesium chloride- spinel - normal and inverse spinels,

Non-elemental *semiconducting Materials:*- Stoichiometric, controlled valency & Chalcogen photo/semiconductors, Preparation of Semiconductors - Semiconductor Devices:- p-n junction diode as rectifier – junction transistor.

*Insulators* (electrical and electronic applications)

Magnetic materials:- Ferro and ferri magnetism. Hall effect and its applications.

# UNIT VI: NON CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES

*Solar Energy:* - Introduction, application of solar energy, conversion of solar energy (Thermal conversion & photo conversion) – photovoltaic cell: design, working and its importance *Non-conventional energy sources:* 

- (i) Hydropower include setup a hydropower plant (schematic diagram)
- (ii) Geothermal energy: Introduction-schematic diagram of a geothermal power plant
- (iii) Tidal and wave power: Introduction- Design and working-movement of tides and their effect on sea level.
- (iv) Ocean thermal energy: Introduction, closed-cycle, ocean thermal energy conversion (OTEC), open cycle OTEC, hybrid OTEC, schematic diagram and explanation.
- (v) Biomass and biofuels

*Fuel cells:* - Introduction - cell representation,  $H_2$ - $O_2$  fuel cell: Design and working, advantages and limitations. Types of fuel cells: Alkaline fuel cell - methanol-oxygen - phosphoric acid fuel cells - molten carbonate fuel cells.

**Outcomes:** The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano-materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. Conductance phenomenon is better understood. The students are exposed to some of the alternative fuels and their advantages and limitations.

## **Standard Books:**

- 1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.
- 2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

## **Reference Books:**

- 1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
- 2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
- 3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
- 4. Applied Chemistry by H.D. Gesser, Springer Publishers
- 5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

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#### **OBJECT-ORIENTED PROGRAMMING THROUGH C++**

#### **OBJECTIVES:**

- This course is designed to provide a comprehensive study of the C programming language. It stresses the strengths of C, which provide students with the means of writing efficient, maintainable and portable code. The nature of C language is emphasized in the wide variety of examples and applications. To learn and acquire art of computer programming. To know about some popular programming languages and how to choose
- Programming language for solving a problem.

#### **UNIT-I: Introduction to C++**

Difference between C and C++- Evolution of C++- The Object Oriented Technology-Disadvantage of Conventional Programming- Key Concepts of Object Oriented Programming-Advantage of OOP- Object Oriented Language.

#### UNIT-II: Classes and Objects & Constructors and Destructor

Classes in C++-Declaring Objects- Access Specifiers and their Scope- Defining Member Function-Overloading Member Function- Nested class, Constructors and Destructors, Introduction- Constructors and Destructor- Characteristics of Constructor and Destructor-Application with Constructor- Constructor with Arguments (parameterized Constructor-Destructors- Anonymous Objects.

#### **UNIT-III: Operator Overloading and Type Conversion & Inheritance**

The Keyword Operator- Overloading Unary Operator- Operator Return Type- Overloading Assignment Operator (=)- Rules for Overloading Operators, Inheritance, Reusability- Types of Inheritance- Virtual Base Classes- Object as a Class Member- Abstract Classes- Advantages of Inheritance,

#### **UNIT-IV: Pointers & Binding Polymorphisms and Virtual Functions**

Pointer, Features of Pointers- Pointer Declaration- Pointer to Class- Pointer Object- The this Pointer- Pointer to Derived Classes and Base Class, Binding Polymorphisms and Virtual Functions, Introduction- Binding in C++- Virtual Functions- Rules for Virtual Function- Virtual Destructor.

# **UNIT-V: Generic Programming with Templates & Exception Handling**

Generic Programming with Templates, Need for Templates- Definition of class Templates-Normal Function Templates- Over Loading of Template Function-Bubble Sort Using Function Templates- Difference Between Templates and Macros- Linked Lists with Templates, Exception Handling- Principles of Exception Handling- The Keywords try throw and catch- Multiple Catch Statements –Specifying Exceptions.

# **UNIT-VI: Overview of Standard Template Library**

Overview of Standard Template Library- STL Programming Model- Containers- Sequence Containers- Associative Containers- Algorithms- Iterators- Vectors- Lists- Maps.

## **OUTCOMES:**

- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language. Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference

## **Text Books:**

- 1. A First Book of C++, Gary Bronson, Cengage Learing.
- 2. The Complete Reference C++, Herbert Schildt, TMH.
- 3. Programming in C++, Ashok N Kamathane, Pearson 2<sup>nd</sup> Edition.

## **Reference Books:**

- 1. Object Oriented Programming C++, Joyce Farrell, Cengage.
- 2. C++ Programming: from problem analysis to program design, DS Malik, Cengage Learing.

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#### **ENVIRONMENTAL STUDIES**

#### **Course Learning Objectives:**

The objectives of the course is to impart

- Overall understanding of the natural resources
- Basic understanding of the ecosystem and its diversity
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- An understanding of the environmental impact of developmental activities
- Awareness on the social issues, environmental legislation and global treaties

#### **Course Outcomes:**

The student should have knowledge on

- The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
- The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
- The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
- Social issues both rural and urban environment and the possible means to combat the challenges
- The environmental legislations of India and the first global initiatives towards sustainable development.
- About environmental assessment and the stages involved in EIA and the environmental audit.
- Self Sustaining Green Campus with Environment Friendly aspect of Energy, Water and Wastewater reuse Plantation, Rain water Harvesting, Parking Curriculum.

#### Syllabus:

**UNIT – I Multidisciplinary nature of Environmental Studies:** Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, Carbon Credits, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT - II Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Literate, Coal, Sea and River sands.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT – III Biodiversity and its conservation:** Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

**UNIT – IV Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

**Solid Waste Management:** Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

**UNIT – V Social Issues and the Environment:** Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act - Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

**UNIT – VI Environmental Management**: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

#### **Text Books:**

- 1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
- 2. Environmental Studies, R. Rajagopalan, 2<sup>nd</sup> Edition, 2011, Oxford University Press.
- 3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

#### **Reference:**

- 1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
- 2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
- 3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
- 4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014

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#### **ENIGINEERING MECHANICS**

**Objectives:** The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

## UNIT – I

Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.

Introduction to Engg. Mechanics - Basic Concepts.

**Systems of Forces:** Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

**Friction:** Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction

#### UNIT II

**Objectives:** The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.

**Equilibrium of Systems of Forces:** Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium, analysis of plane trusses.

#### UNIT – III

**Objectives :** The students are to be exposed to concepts of centre of gravity.

**Centroid:** Centroids of simple figures (from basic principles ) – Centroids of Composite Figures

**Centre of Gravity:** Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems.

#### UNIT IV

**Objective:** The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.

**Area moments of Inertia:** Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia:** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

# UNIT – V

**Objectives:** The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion. Kinematics: Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

## UNIT – VI

**Objectives:** The students are to be exposed to concepts of work, energy and particle motion Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

## **Text Books :**

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4<sup>th</sup> Edn - , Mc Graw Hill publications.

## **References:**

- 1. Engineering Mechanics statics and dynamics R.C.Hibbeler, 11<sup>th</sup> Edn Pearson Publ.
- 2. Engineering Mechanics, statics J.L.Meriam, 6<sup>th</sup> Edn Wiley India Pvt Ltd.
- 3. Engineering Mechanics, statics and dynamics I.H.Shames, Pearson Publ.
- 4. Mechanics For Engineers, statics F.P.Beer & E.R.Johnston 5<sup>th</sup> Edn Mc Graw Hill Publ.
- 5. Mechanics For Engineers, dynamics F.P.Beer & E.R.Johnston –5<sup>th</sup> Edn Mc Graw Hill Publ.
- 6. Theory & Problems of engineering mechanics, statics & dynamics E.W.Nelson, C.L.Best & W.G. McLean, 5<sup>th</sup> Edn Schaum's outline series Mc Graw Hill Publ.
- 7. Singer's Engineering Mechanics: Statics And Dynamics, K. Vijay Kumar Reddy, J. Suresh Kumar, Bs Publications
- 8. Engineering Mechanics, Fedinand . L. Singer, Harper Collins.
- 9. Engineering Mechanics statics and dynamics, A Nelson, Mc Graw Hill publications

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#### **APPLIED / ENGINEERING CHEMISTRY LABORATORY (***Common to all branches*)

- 1. Introduction to Chemistry laboratory Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.
- 2. Trial experiment Determination of HCl using standard Na<sub>2</sub>CO<sub>3</sub> solution.
- 3. Determination of alkalinity of a sample containing Na<sub>2</sub>CO<sub>3</sub> and NaOH.
- 4. Determination of KMnO<sub>4</sub> using standard Oxalic acid solution.
- 5. Determination of Ferrous iron using standard  $K_2Cr_2O_7$  solution.
- 6. Determination of Copper using standard  $K_2Cr_2O_7$  solution.
- 7. Determination of temporary and permanent hardness of water using standard EDTA solution.
- 8. Determination of Copper using standard EDTA solution.
- 9. Determination of Iron by a Colorimetric method using thiocynate as reagent.
- 10. Determination of pH of the given sample solution using pH meter.
- 11. Conductometric titration between strong acid and strong base.
- 12. Conductometric titration between strong acid and weak base.
- 13. Potentiometric titration between strong acid and strong base.
- 14. Potentiometric titration between strong acid and weak base.
- 15. Determination of Zinc using standard EDTA solution.
- 16. Determination of Vitamin C.

**Outcomes**: The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

#### **Reference Books**

- 1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
- 2. Dr. Jyotsna Cherukuris (2012) *Laboratory Manual of engineering chemistry-II*, VGS Techno Series
- 3. Chemistry Practical Manual, Lorven Publications
- 4. K. Mukkanti (2009) Practical Engineering Chemistry, B.S. Publication

I Year - II Semester	<b>ENGLISH - COMMUNICATION SKILLS</b>	L	Т	Р	С
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## PRESCRIBED LAB MANUAL FOR SEMESTER II:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

#### **OBJECTIVES:**

To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

## **OUTCOME:**

A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

## **UNIT 1:**

1. Debating Practice work

#### **UNIT 2:**

1. Group Discussions Practice work

#### **UNIT 3:**

1. Presentation Skills Practice work

#### **UNIT 4:**

1. Interview Skills Practice work

## **UNIT 5:**

- 1. Email,
- 2. Curriculum Vitae Practice work

## **UNIT 6:**

- 1. Idiomatic Expressions
- 2. Common Errors in English Practice work

## **Reference Books:**

- 1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
- 2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
- 3. Unlock, Listening and speaking skills 2, Cambridge University Press
- 4. Spring Board to Success, Orient BlackSwan
- 5. A Practical Course in effective english speaking skills, PHI
- 6. Word power made handy, Dr shalini verma, Schand Company
- 7. Let us hear them speak, Jayashree Mohanraj, Sage texts
- 8. Professional Communication, Aruna Koneru, Mc Grawhill Education
- 9. Cornerstone, Developing soft skills, Pearson Education

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#### **OBJECT-ORIENTED PROGRAMMING LAB**

#### **OBJECTIVE**

- To strengthen their problem solving ability by applying the characteristics of an object- oriented approach.
- To introduce object oriented concepts in C++ and Java.

#### **Programmig:**

#### Exercise – 1 (Basics)

Write a Simple Program on printing "Hello World" and "Hello Name" where name is the input from the user

- a) Convert any two programs that are written in C into C++
- b) Write a description of using g++ (150 Words)

#### **Exercise – 2** (Expressions Control Flow)

- a) Write a Program that computes the simple interest and compound interest payable on principalamount(inRs.)ofloanborrowedbythecustomerfromabankforagiverperiodof time (in years) at specific rate of interest. Further determine whether the bank will benefit by charging simple interest or compound interest.
- b) WriteaProgramtocalculatethefareforthepassengerstravelinginabus. WhenaPassenger enters the bus, the conductor asks "What distance will you travel?" On knowing distance from passenger (as an approximate integer), the conductor mentions the fare to the passenger according to following criteria.

**Exercise – 3** (Variables, Scope, Allocation)

a) Write a program to implement call by value and call by reference using reference variable.

b) Write a program to illustrate scope resolution, new and delete Operators. (Dyanamic Memory

Allocation)

- c) Write a program to illustrate Storage classes
- d) Write a program to illustrate Enumerations

# Exercises -4 (Functions)

Write a program illustrating Inline Functions

- a) Write a program illustrate function overloading. Write 2 overloading functions for power.
- b) Write a program illustrate the use of default arguments for simple interest function.

# Exercise -5 (Functions – Exercise Continued)

- a) Write a program to illustrate function overloading. Write 2 overloading functions for adding two numbers
- b) Write a program illustrate function template for power of a number.
- c) Write a program to illustrate function template for swapping of two numbers.

# Exercise -6 (Classes Objects)

Create a Distance class with:

- feet and inches as data members
- member function to input distance
- member function to output distance
- member function to add two distance objects
- a). Write a main function to create objects of DISTANCE class. Input two distances and output the sum.
- b). Write a C++ Program to illustrate the use of Constructors and Destructors (use the above program.)
- c) Write a program for illustrating function overloading in adding the distance between objects (use the above problem)
- d). Write a C++ program demonstrating a BankAccount with necessary methods and variables

## Exercise – 7 (Access)

Write a program for illustratingAccess Specifiers public, private, protected

- a) Write a program implementing Friend Function
- b) Write a program to illustrate this pointer
- c) Write a Program to illustrate pointer to a class

d)

# **Exercise -8** (Operator Overloading)

a). Write a program to Overload Unary, and Binary Operators as Member Function, and Non Member Function.

- i. Unary operator as member function
- ii. Binary operator as nonmember function

- b). Write a c ++ program to implement the overloading assignment = operator
- c).Write a case study on Overloading Operators and Overloading Functions (150 Words)

## **Exercise -9** (Inheritance)

- a) Write C++ Programs and incorporating various forms of Inheritance
  - i) Single Inheritance
  - ii) Hierarchical Inheritance
  - iii) Multiple Inheritances
  - iv) Multi-level inheritance
  - v) Hybrid inheritance

b) Write a program to show Virtual Base Class

c) Write a case study on using virtual classes (150 Words)

# Exercise-10 (Inheritance –Continued)

a) Write a Program in C++ to illustrate the order of execution of constructors and destructors in inheritance

b) Write a Program to show how constructors are invoked in derived class

# Exercise -11 (Polymorphism)

- a) Write a program to illustrate runtime polymorphism
- b) Write a program to illustrate this pointer
- c) Write a program illustrates pure virtual function and calculate the area of different shapes by using abstract class.
- d) Write a case study on virtual functions (150 Words)

## Exercise -12(Templates)

- a) Write a C++ Program to illustrate template class
- b) Write a Program to illustrate class templates with multiple parameters
- c) Write a Program to illustrate member function templates

## Exercise -13 (Exception Handling)

a).Write a Program for Exception Handling Divide by zero

b). Write a Program to rethrow an Exception

## Exercise -14 (STL)

- a) Write a Program to implement List and List Operations
- b) Write a Program to implementVector andVector Operations

## Exercise -15 (STLContinued)

- a) Write a Program to implement Deque and Deque Operations
- b) Write a Program to implement Map and Map Operations

# **OUTCOMES:**

- •Explain what constitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.
- Apply an object-oriented approach to developing applications of varying complexities

# STATISTICS WITH R PROGRAMMING

#### **OBJECTIVE:**

After taking the course, students will be able to

- ▶ Use R for statistical programming, computation, graphics, and modeling,
- ➢ Write functions and use R in an efficient way,
- ➢ Fit some basic types of statistical models
- ▶ Use R in their own research,
- > Be able to expand their knowledge of R on their own.

#### UNIT-I:

Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

## **UNIT-II:**

R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.

#### **UNIT-III:**

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability-Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /out put, Accessing the Keyboard and Monitor, Reading and writer Files,

#### **UNIT-IV:**

Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files.

## **UNIT-V:**

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.

# **UNIT-VI:**

Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests,

## **OUTCOMES:**

At the end of this course, students will be able to:

- List motivation for learning a programming language
- > Access online resources for R and import new function packages into the R workspace
- > Import, review, manipulate and summarize data-sets in R
- > Explore data-sets to create testable hypotheses and identify appropriate statistical tests
- > Perform appropriate statistical tests using R Create and edit visualizations with

## **TEXT BOOKS:**

- 1) The Art of R Programming, A K Verma, Cengage Learning.
- 2) R for Everyone, Lander, Pearson
- 3) The Art of R Programming, Norman Matloff, No starch Press.

## **REFERENCE BOOKS:**

- 1) R Cookbook, Paul Teetor, Oreilly.
- 2) R in Action, Rob Kabacoff, Manning

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## MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

#### **OBJECTIVES:**

- To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
- To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

## UNIT -I:

**Mathematical Logic**: Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof. Predicate Calculus:Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

## UNIT -II:

**Set Theory:** Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion, *Relations:* Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, *Functions:* Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.

#### UNIT-III:

Algebraic Structures and Number Theory: *Algebraic Structures*: Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism, *Number Theory*: Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)

## UNIT -IV:

**Combinatorics:** Basic of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Generating Functions of Permutations and Combinations, Binomial and Multinomial Coefficients, Binomial and Multinomial Theorems, The Principles of Inclusion–Exclusion, Pigeonhole Principle and its Application.

# UNIT -V:

**Recurrence Relations:** Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

# UNIT -VI:

**Graph Theory:** Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

## **OUTCOMES:**

- Student will be able to demonstrate skills in solving mathematical problems
- Student will be able to comprehend mathematical principles and logic
- Student will be able to demonstrate knowledge of mathematical modeling and proficiency in using mathematical software
- Student will be able to manipulate and analyze data numerically and/or graphically using appropriate Software
- Student will be able to communicate effectively mathematical ideas/results verbally or in writing

## **TEXT BOOKS:**

1.Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.

2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3<sup>rd</sup>Edition, Tata McGraw Hill.

3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7<sup>th</sup> Edition, Tata McGraw Hill.

#### **REFERENCE BOOKS:**

- Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2<sup>nd</sup> Edition, Prentice Hall of India.
- 2. Discrete Mathematical Structures, BernandKolman, Robert C. Busby, Sharon Cutler Ross, PHI.
- 3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.

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#### **DIGITAL LOGIC DESIGN**

#### **OBJECTIVE:**

- To introduce the basic tools for design with combinational and sequential digital logic and state machines.
- To learn simple digital circuits in preparation for computer engineering.

## **UNIT- I: Digital Systems and Binary Numbers**

Digital Systems, Binary Numbers, Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers, Complements of Numbers, Signed Binary Numbers, Arithmetic addition and subtraction

## **UNIT -II: Concept of Boolean algebra**

Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical and Standard Forms, Minterms and Maxterms,

## **UNIT- III: Gate level Minimization**

Map Method, Two-Variable K-Map, Three-Variable K-Map, Four Variable K-Maps. Products of Sum Simplification, Sum of Products Simplification, Don't – Care Conditions, NAND and NOR Implementation, Exclusive-OR Function

#### **UNIT- IV:Combinational Logic**

Introduction, Analysis Procedure, Design Procedure, Binary Adder–Subtractor, Decimal Adder, Binary Multiplier, Decoders, Encoders, Multiplexers, HDL Models of Combinational Circuits

## **UNIT- V: Synchronous Sequential Logic**

Introduction to Sequential Circuits, Storage Elements: Latches, Storage Elements: Flip-Flops, Analysis of Clocked **Sequential** Circuits, Mealy and Moore Models of Finite State Machines

## **UNIT -VI: Registers and Counters**

Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter, Johnson Counter, Ripple Counter

## **OUTCOMES:**

A student who successfully fulfills the course requirements will have demonstrated:

- An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.
- An ability to understand the different switching algebra theorems and apply them for logic functions.
- An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
- An ability to define the other minimization methods for any number of variables Variable Entered Mapping (VEM) and Quine-MeCluskey (QM) Techniques and perform an algorithmic reduction of logic functions.

## **TEXT BOOKS:**

- 1. Digital Design, 5/e, M.Morris Mano, Michael D Ciletti, PEA.
- 2. Fundamentals of Logic Design, 5/e, Roth, Cengage.

## **REFERENCE BOOKS:**

- 1. Digital Logic and Computer Design, M.Morris Mano, PEA.
- 2. Digital Logic Design, Leach, Malvino, Saha, TMH.
- 3. Modern Digital Electronics, R.P. Jain, TMH.
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## **PYTHON PROGRAMMING**

## **OBJECTIVES:**

- Introduction to Scripting Language
- Exposure to various problems solving approaches of computer science

## UNIT – I:

**Introduction:**History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

## UNIT – II:

**Types, Operators and Expressions:** Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass

## UNIT – III:

**Data Structures** Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

## UNIT – IV:

**Functions** - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions(Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

Modules: Creating modules, import statement, from. Import statement, name spacing,

Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages

## UNIT – V:

**Object Oriented Programming OOP in Python**: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Datahiding,

**Error and Exceptions:** Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions

# UNIT – VI:

**Brief Tour of the Standard Library** - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics

**Testing:** Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

## **OUTCOMES:**

- Making Software easily right out of the box.
- Experience with an interpreted Language.
- To build software for real needs.
- Prior Introduction to testing software

## **TEXT BOOKS**

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson

2. Learning Python, Mark Lutz, Orielly

## **Reference Books:**

1. Think Python, Allen Downey, Green Tea Press

- 2. Core Python Programming, W.Chun, Pearson.
- 3. Introduction to Python, Kenneth A. Lambert, Cengage

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## DATA STRUCTURES THROUGH C++

## **OBJECTIVES:**

- To be familiar with basic techniques of object oriented principles and exception handling using C++
- To be familiar with the concepts like Inheritance, Polymorphism
- Solve problems using data structures such as linear lists, stacks, queues, hash tables
- Be familiar with advanced data structures such as balanced search trees, AVLTrees, and B Trees.

## **UNIT-I: ARRAYS**

Abstract Data Types and the C++ Class, An Introduction to C++ Class- Data Abstraction and Encapsulation in C++- Declaring Class Objects and Invoking Member Functions- Special Class Operations- Miscellaneous Topics- ADTs and C++Classes, The Array as an Abstract Data Type, The Polynomial Abstract Data type- Polynomial Representation- Polynomial Addition. Spares Matrices, Introduction- Sparse Matrix Representation- Transposing a Matrix- Matrix Multiplication, Representation of Arrays.

## **UNIT-II: STACKS AND QUEUES**

Templates in C++, Template Functions- Using Templates to Represent Container Classes, The Stack Abstract Data Type, The Queue Abstract Data Type, Subtyping and Inheritance in C++, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

## **UNIT-III: LINKED LISTS**

Single Linked List and Chains, Representing Chains in C++, Defining a Node in C++- Designing a Chain Class in C++- Pointer manipulation in C++- Chain Manipulation Operations, The Template Class Chain, Implementing Chains with Templates- Chain Iterators- Chain Operations-Reusing a Class, Circular Lists, Available Space Lists, Linked Stacks and Queues, Polynomials, Polynomial Representation- Adding Polynomials- Circular List Representation of Polynomials, Equivalence Classes, Sparse Matrices, Sparse Matrix Representation- Sparse Matrix Input-Deleting a Sparse Matrix, Doubly Linked Lists, Generalized Lists, Representation of Generalized Lists- Recursive Algorithms for Lists- Reference Counts, Shared and Recursive Lists

#### **UNIT-IV: TREES**

Introduction, Terminology, Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Tress, Binary Tree Representations, Binary Tree Traversal and Tree Iterators, Introduction, Inorder Traversal Preorder Traversal, Postorder Traversal, Thread Binary Trees, Threads, Inorder Traversal of a Threaded Binary Tree, Inserting a Node into a Threaded Binary Tree, Heaps, Priority Queues, Definition of a Max Heap, Insertion into a Max Heap, Deletion from a Max Heap, Binary Search Trees, Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree, Height of Binary Search Tree.

## **UNIT-V: GRAPHS**

The Graph Abstract Data Type, Introduction, Definition, Graph Representation, Elementary Graph Operation, Depth First Search, Breadth First Search, Connected Components, Spanning Trees, Biconnected Components, Minimum Cost Spanning Trees, Kruskal S Algorithm, Prim s Algorithm Sollin's Algorithm, Shortest Paths and Transitive Closure, Single Source/All Destination: Nonnegative Edge Cost, Single Source/All Destination: General Weights, All-Pairs Shortest Path, Transitive Closure.

## **UNIT-VI: SORTING**

Insertion Sort, Quick Sort, Merge Sort Merging, Iterative Merge Sort, Recursive Merge Sort, Heap Sort.

# **OUTCOMES:**

- Distinguish between procedures and object oriented programming.
- Apply advanced data structure strategies for exploring complex data structures.
- Compare and contrast various data structures and design techniques in the area of Performance.
- Implement data structure algorithms through C++. Incorporate data structures into the applications such as binary search trees, AVL and B Trees
- Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs

# **TEXT BOOKS:**

- 1. Fundamentals of Data Structures in C++, Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, 2<sup>nd</sup> Edition, Universities Press (India) Pvt. Ltd.
- 2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
- 3. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.

- 1. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
- 2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
- 3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education

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#### **COMPUTER GRAPHICS**

#### **OBJECTIVES:**

- To develop, design and implement two and three dimensional graphical structures
- To enable students to acquire knowledge Multimedia compression and animations
- To learn Creation, Management and Transmission of Multimedia objects.

#### **UNIT-I:**

**2D Primitives** Output primitives – Line, Circle and Ellipse drawing algorithms - Attributes of output primitives – Two dimensional Geometric transformations - Two dimensional viewing – Line, Polygon, Curve and Text clipping algorithms

#### **UNIT-II:**

**3D Concepts** Parallel and Perspective projections - Three dimensional object representation – Polygons, Curved lines, Splines, Quadric Surfaces, - Visualization of data sets - 3Dtransformations – Viewing -Visible surface identification.

#### **UNIT-III:**

**Graphics Programming**Color Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Keyframe - Graphics programming using OPENGL – Basic graphics primitives –Drawing three dimensional objects - Drawing three dimensional scenes

#### **UNIT-IV:**

**Rendering** Introduction to Shading models – Flat and Smooth shading – Adding texture to faces –Adding shadows of objects – Building a camera in a program – Creating shaded objects– Rendering texture – Drawing Shadows.

#### UNIT-V:

**Fractals**Fractals and Self similarity – Peano curves – Creating image by iterated functions – Mandelbrot sets – Julia Sets – Random Fractals

## UNIT-VI:

**Overview of Ray Tracing** Intersecting rays with other primitives – Adding Surface texture – Reflections and Transparency – Boolean operations on Objects.

## **OUTCOMES:**

- Know and be able to describe the general software architecture of programs that use 3D computer graphics.
- Know and be able to discuss hardware system architecture for computer graphics. This Includes, but is not limited to: graphics pipeline, frame buffers, and graphic accelerators/co-processors.
- Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).

## **TEXT BOOKS:**

- 1. Donald Hearn, Pauline Baker, Computer Graphics C Version, second edition Pearson Education, 2004.
- 2. F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003.

## **REFERENCE BOOKS:**

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics- Principles and practice, Second Edition in C, Pearson Education, 2007.

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## DATASTRUCTURES THROUGH C++ LAB

## **OBJECTIVES:**

- To develop skills to design and analyze simple linear and non linear data structures
- To Strengthen the ability to identify and apply the suitable data structure for the given real world problem
- To Gain knowledge in practical applications of data structures

## List of Experiments:

- 1. Implementation of Singly linked list.
- 2. Implementation of Doubly linked list.
- 3. Implementation of Multistack in a Single Array.
- 4. Implementation of Circular Queue
- 5. Implementation of Binary Search trees.
- 6. Implementation of Hash table.
- 7. Implementation of Heaps.
- 8. Implementation of Breadth First Search Techniques.
- 9. Implementation of Depth First Search Techniques.
- 10. Implementation of Prim's Algorithm.
- 11. Implementation of Dijkstra's Algorithm.
- 12. Implementation of Kruskal's Algorithm
- 13. Implementation of MergeSort
- 14. Implementation of Quick Sort
- 15. Implementation of Data Searching using divide and conquer technique

## **OUTCOMES:**

At the end of this lab session, the student will

- Be able to design and analyze the time and space efficiency of the data structure
- Be capable to identity the appropriate data structure for given problem

Have practical knowledge on the application of data structures

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#### PYTHON PROGRAMMING LAB

#### **Exercise 1 - Basics**

- a) Running instructions in Interactive interpreter and a Python Script
- b) Write a program to purposefully raise Indentation Error and Correct it

#### **Exercise 2 - Operations**

- a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)
- b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

#### **Exercise - 3 Control Flow**

- a) Write a Program for checking whether the given number is a even number or not.
- b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, ..., 1/10
- c) Write a program using a for loop that loops over a sequence. What is sequence ?
- d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

#### **Exercise 4 - Control Flow - Continued**

- a) Find the sum of all the primes below two million.
   Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:
- 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...
- b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

#### Exercise - 5 - DS

- a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure
- b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

## Exercise - 6 DS - Continued

- a) Write a program combine\_lists that combines these lists into a dictionary.
- b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

## **Exercise - 7 Files**

- a) Write a program to print each line of a file in reverse order.
- b) Write a program to compute the number of characters, words and lines in a file.

## **Exercise - 8 Functions**

a) Write a function ball\_collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

## **Exercise - 9 Functions - Continued**

- a) Write a function nearly\_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
- b) Write a function dups to find all duplicates in the list.
- c) Write a function unique to find all the unique elements of a list.

## **Exercise - 10 - Functions - Problem Solving**

- a) Write a function cumulative\_product to compute cumulative product of a list of numbers.
- b) Write a function reverse to reverse a list. Without using the reverse function.
- c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

## **Exercise 11 - Multi-D Lists**

- a) Write a program that defines a matrix and prints
- b) Write a program to perform addition of two square matrices
- c) Write a program to perform multiplication of two square matrices

## **Exercise - 12 - Modules**

- a) Install packages requests, flask and explore them. using (pip)
- b) Write a script that imports requests and fetch content from the page. Eg. (Wiki)
- c) Write a simple script that serves a simple HTTPResponse and a simple HTML Page

## Exercise - 13 OOP

- a) Class variables and instance variable and illustration of the self variable
  - i) Robot
  - ii) ATM Machine

## **Exercise - 14 GUI, Graphics**

- 1. Write a GUI for an Expression Calculator using tk
- 2. Write a program to implement the following figures using turtle



## **Exercise - 15 - Testing**

- a) Write a test-case to check the function even\_numbers which return True on passing a list of all even numbers
- b) Write a test-case to check the function reverse\_string which returns the reversed string

## Exercise - 16 - Advanced

- a) Build any one classical data structure.
- b) Write a program to solve knapsack problem.

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## **SOFTWARE ENGINEERING**

## **OBJECTIVES**

- > To understand the software life cycle models.
- > To understand the software requirements and SRS document.
- > To understand the importance of modeling and modeling languages.
- > To design and develop correct and robust software products.
- > To understand the quality control and how to ensure good quality software.
- > To understand the planning and estimation of software projects.
- > To understand the implementation issues, validation and verification procedures.
- > To understand the maintenance of software

## UNIT-I:

**Software and Software Engineering:** The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

**Process Models:** A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

## **UNIT-II:**

**Requirements Analysis And Specification:** Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification.

**Software Design:** Overview of the Design Process, How to Characterise of a Design?, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design

## UNIT – III:

**Function-Oriented Software Design:** Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, over view of Object Oriented design.

**User Interface Design**: Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology.

## UNIT – IV:

**Coding And Testing:** Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing,

Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing

# UNIT – V:

**Software Reliability And Quality Management:** Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model.

**Computer Aided Software Engineering:** Case and its Scope, Case Environment, Case Support in Software Life Cycle, Other Characteristics of Case Tools, Towards Second Generation CASE Tool, Architecture of a Case Environment

# UNIT – VI

**Software Maintenance:** Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management.

**Software Reuse**: what can be Reused? Why almost No Reuse So Far? Basic Issues in Reuse Approach, Reuse at Organization Level.

## OUTCOMES

- > Define and develop a software project from requirement gathering to implementation.
- > Obtain knowledge about principles and practices of software engineering.
- > Focus on the fundamentals of modeling a software project.
- Obtain knowledge about estimation and maintenance of software systems

# **TEXT BOOKS:**

- 1. Software Engineering Concepts and Practices: Ugrasen Suman, Cengage Learning
- 2. Software Engineering A Practitioner's Approach, Roger S. Pressman, Seventh Edition McGrawHill International Edition.
- 3. Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.
- 4. Software Engineering, Ian Sommerville, Ninth edition, Pearson education

- 1. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
- 2. Software Engineering, A Precise Approach, PankajJalote, Wiley India, 2010.
- 3. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
- 4. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.

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## JAVA PROGRAMMING

## **OBJECTIVES:**

- Understanding the OOP's concepts, classes and objects, threads, files, applets, swings and act.
- This course introduces computer programming using the JAVA programming language with object-oriented programming principles.
- Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using Java for network level programming and middleware development

## **UNIT-I:**

Introduction to OOP, procedural programming language and object oriented language, principles of OOP, applications of OOP, history of java, java features, JVM, program structure.

Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

## **UNIT-II:**

Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

## UNIT-III:

Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, importance of CLASSPATH and java.lang package. Exception handling, importance of try, catch, throw, throws and finally block, user-defined exceptions, Assertions.

## **UNIT-IV:**

Multithreading: introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file,

## UNIT-V:

Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

## **UNIT-VI:**

AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

## **OUTCOMES:**

- Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
- Write, compile, execute and troubleshoot Java programming for networking concepts.
- Build Java Application for distributed environment.
- Design and Develop multi-tier applications.
- Identify and Analyze Enterprise applications.

## **TEXT BOOKS:**

- 1. The complete Reference Java, 8<sup>th</sup> edition, Herbert Schildt, TMH.
- 2. Programming in JAVA, Sachin Malhotra, SaurabhChoudary, Oxford.
- 3. Introduction to java programming, 7<sup>th</sup> edition by Y Daniel Liang, Pearson.

## **REFERENCE BOOKS:**

1. Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managers in

2. Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.

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## **ADVANCED DATA STRUCTURES**

## **OBJECTIVES:**

- Describe and implement a variety of advanced data structures (hash tables, priority queues, balanced search trees, graphs).
- Analyze the space and time complexity of the algorithms studied in the course.
- Identify different solutions for a given problem; analyze advantages and disadvantages to different solutions.
- Demonstrate an understanding of external memory and external search and sorting algorithms.
- Demonstrate an understanding of simple Entity-Relationship models for databases.

## **UNIT-I: SORTING**

External Sorting, Introduction, K-way Merging - Buffer Handling for parallel Operation- Run Generation- Optimal Merging of Runs.

## **UNIT-II: HASHING**

Introduction-Static Hashing- Hash Table- Hash Functions- Secure Hash Function- Overflow Handling- Theoretical Evaluation of Overflow Techniques, Dynamic Hashing- Motivation for Dynamic Hashing -Dynamic Hashing Using Directories- Directory less Dynamic, Hashing,

## **UNIT-III: PRIORITY QUEUES (HEAPS)**

Model, Simple Implementation, Binary Heap-Structure Property-Heap-Order Property-Basic Heap Operations- Other Heap Operation, Applications of Priority Queues- The Selection Problem Event Simulation Problem, Binomial Queues- Binomial Queue Structure – Binomial Queue Operation- Implementation of Binomial Queues

## **UNIT-IV: EFFICIENT BINARY SEARCH TREES**

Optimal Binary Search Trees, AVL Trees, Red-Black Trees, Definition- Representation of a Red-Black Tree- Searching a Red-Black Tree- Inserting into a Red Black Tree- Deletion from a Red-Black Tree- Joining Red-Black Trees, Splitting a Red-Black tree.

## **UNIT-V: MULTIWAY SEARCH TREES**

M-Way Search Trees, Definition and Properties- Searching an M-Way Search Tree, B-Trees, Definition and Properties- Number of Elements in a B-tree- Insertion into B-Tree- Deletion from a B-Tree- B+-Tree Definition- Searching a B+-Tree- Insertion into B+-tree- Deletion from a B+-Tree.

## **UNIT-VI: DIGITAL SEARCH STRUCTURES**

Digital Search Trees, Definition- Search, Insert and Delete- Binary tries and Patricia, Binary Tries, Compressed Binary Tries- Patricia, Multiway Tries- Definitions- Searching a Trie-Sampling Strategies- Insertion into a Trie- Deletion from a Trie- Keys with Different Length-Height of a Trie-Space Required and Alternative Node Structure- Prefix Search and Applications- Compressed Tries- Compressed Tries With Skip Fields- Compressed Tries With Labeled Edges- Space Required by a Compressed Tries, Tries and Internet Packet Forwarding, -IP Routing- 1-Bit Tries- Fixed-Stride Tries-Variable-Stride Tries.

# **OUTCOMES:**

- Be able to understand and apply amortised analysis on data structures, including binary search trees, mergable heaps, and disjoint sets.
- Understand the implementation and complexity analysis of fundamental algorithms such as RSA, primality testing, max flow, discrete Fourier transform.
- Have an idea of applications of algorithms in a variety of areas, including linear programming and duality, string matching, game-theory

## **TEXT BOOKS:**

- 1. Data Structures, a Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage.
- Fundamentals of Data Structures in C++, Ellis Horowitz, Sartaj Sahni and Dinesh Mehta, 2<sup>nd</sup> Edition, Universities Press (India) Pvt. Ltd
- 3. Data structures and Algorithm Analysis in C++, 2<sup>nd</sup> Edition, Mark Allen Weiss, Pearson

- 1. Web : http://lcm.csa.iisc.ernet.in/dsa/dsa.html
- 2. http://utubersity.com/?page\_id=878
- 3. http://freevideolectures.com/Course/2519/C-Programming-and-Data-Structures
- 4. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms
- 5. File Structures :An Object oriented approach with C++, 3<sup>rd</sup> ed, Michel J Folk, Greg Riccardi, Bill Zoellick
- 6. C and Data Structures: A Snap Shot oriented Treatise with Live examples from Science and Engineering, NB Venkateswarlu & EV Prasad, S Chand, 2010

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COMPUTER ORGANIZATION

## **OBJECTIVES:**

- Understand the architecture of a modern computer with its various processing units. Also the Performance measurement of the computer system.
- In addition to this the memory management system of computer.

## UNIT -I:

**Basic Structure Of Computers:** Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.

## UNIT -II:

## **Machine Instruction and Programs:**

Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types,

Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions

## UNIT -III:

**Type of Instructions:** Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations

## UNIT -IV:

**INPUT/OUTPUT ORGANIZATION:** Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access,

Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)

## UNIT -V:

**The MEMORY SYSTEMS:** Basic memory circuits, Memory System Consideration, Read-Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: Mapping Functions, INTERLEAVING **Secondary Storage:** Magnetic Hard Disks, Optical Disks,

## UNIT -VI:

**Processing Unit:** Fundamental Concepts: Register Transfers, Performing An Arithmetic Or Logic Operation, Fetching A Word From Memory,

Execution of Complete Instruction, Hardwired Control,

**Micro programmed Control:** Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

## **OUTCOMES:**

- Students can understand the architecture of modern computer.
- They can analyze the Performance of a computer using performance equation
- Understanding of different instruction types.
- Students can calculate the effective address of an operand by addressing modes
- They can understand how computer stores positive and negative numbers.
- Understanding of how a computer performs arithmetic operation of positive and negative numbers.

## **TEXT BOOKS:**

- 1. Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, 5th Edition, McGraw Hill.
- 2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill.

- 1. Computer Organization and Architecture William Stallings Sixth Edition, Pearson/PHI
- 2. Structured Computer Organization Andrew S. Tanenbaum, 4th Edition PHI/Pearson
- 3. Fundamentals or Computer Organization and Design, Sivaraama Dandamudi Springer Int. Edition.
- 4. "Computer Organization and Design: The Hardware/Software Interface" by David A. Patterson and John L. Hennessy.
- 5. J.P. Hayes, "Computer Architecture and Organization", McGraw-Hill, 1998.

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FORMAL LANGUAGE AND AUTOMATA THEORY

#### **OBJECTIVE:**

- Introduce the student to the concepts of Theory of computation in computer science
- The students should acquire insights into the relationship among formal languages, formal Grammars and automat.

## UNIT – I: Finite Automata

Why Study Automata Theory? The Central Concepts of Automata Theory, Automation, Finite Automation, Transition Systems, Acceptance of a String by a Finite Automation, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with E-Transition, Minimization of Finite Automata, Mealy and Moore Machines, Applications and Limitation of Finite Automata.

#### **UNIT – II: Regular Expressions**

Regular Expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Manipulations of Regular Expressions, Finite Automata, and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closers Properties, Applications of Regular Expressions, Finite Automata and Regular Grammars, Regular Expressions and Regular Grammars.

## **UNIT – III: Context Free Grammars**

Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, E-Productions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

#### **UNIT – IV: Pushdown Automata**

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.

## **UNIT – V: Turning Machine**

Turing Machine, Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a Turing Machine, Design of Turing Machines, Techniques for Turing Machine Construction, Types of Turing Machines, Church's Thesis, Universal Turing Machine, Restricted Turing Machine.

## **UNIT – VI: Computability**

Decidable and Un-decidable Problems, Halting Problem of Turing Machines, Post's Correspondence Problem, Modified Post's Correspondence Problem, Classes of P and NP, NP-Hard and NP-Complete Problems.

## **OUTCOMES:**

- Classify machines by their power to recognize languages,
- Employ finite state machines to solve problems in computing,
- Explain deterministic and non-deterministic machines,
- Comprehend the hierarchy of problems arising in the computer science

## **TEXT BOOKS:**

- 1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwani and J.D.Ullman, 3<sup>rd</sup> Edition, Pearson, 2008.
- 2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekharan, 3<sup>rd</sup> Edition, PHI, 2007.

- 1. Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
- 2. Introduction to Automata Theory, Formal Languages and Computation, Shyamalendu Kandar, Pearson, 2013.
- Theory of Computation, V.Kulkarni, Oxford University Press, 2013.
   Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014.

## PRINCIPLES OF PROGRAMMING LANGUAGES

#### **OBJECTIVES:**

- To understand and describe syntax and semantics of programming languages
- To understand data, data types, and basic statements
- To understand call-return architecture and ways of implementing them
- To understand object-orientation, concurrency, and event handling in programming languages
- To develop programs in non-procedural programming paradigms

## UNIT-I:

**Syntax and semantics:** Evolution of programming languages, describing syntax, context, free grammars, attribute grammars, describing semantics, lexical analysis, parsing, recursive - decent bottom - up parsing

## UNIT-II:

**Data, data types, and basic statements:** Names, variables, binding, type checking, scope, scope rules, lifetime and garbage collection, primitive data types, strings, array types, associative arrays, record types, union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and boolean expressions, assignment statements, mixed mode assignments, control structures – selection, iterations, branching, guarded Statements

## UNIT-III:

**Subprograms and implementations:** Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping

## UNIT-IV:

**Object- orientation, concurrency, and event handling:** Object – orientation, design issues for OOP languages, implementation of object, oriented constructs, concurrency, semaphores, Monitors, message passing, threads, statement level concurrency, exception handling, event handling

## UNIT -V:

**Functional programming languages:** Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, – Programming with ML,

## UNIT -VI:

**Logic programming languages:** Introduction to logic and logic programming, – Programming with Prolog, multi - paradigm languages

## **OUTCOMES:**

- Describe syntax and semantics of programming languages
- Explain data, data types, and basic statements of programming languages
- Design and implement subprogram constructs, Apply object oriented, concurrency, and event handling programming constructs
- Develop programs in Scheme, ML, and Prolog
- Understand and adopt new programming languages

## **TEXT BOOKS:**

- 1. Robert W. Sebesta, "Concepts of Programming Languages", Tenth Edition, Addison Wesley, 2012.
- 2. Programming Langugaes, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan, TMH

- 1. R. Kent Dybvig, "The Scheme programming language", Fourth Edition, MIT Press, 2009.
- 2. Jeffrey D. Ullman, "Elements of ML programming", Second Edition, Prentice Hall, 1998.
- 3. Richard A. O'Keefe, "The craft of Prolog", MIT Press, 2009.
- 4. W. F. Clocksin and C. S. Mellish, "Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003

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## ADVANCED DATA STRUCTURES LAB

## **OBJECTIVES:**

- To understand heap and various tree structures like AVL, Red-black, B and Segment trees
- To understand the problems such as line segment intersection, convex shell and Voronoi diagram

## **Programming:**

- 1. To perform various operations i.e., insertions and deletions on AVL trees.
- 2. To implement operations on binary heap.
  - i) Vertex insertion
  - ii) Vertex deletion
  - iii) Finding vertex
  - iv) Edge addition and deletion
- 3. To implement Prim's algorithm to generate a min-cost spanning tree.
- 4. To implement Krushkal's algorithm to generate a min-cost spanning tree.
- 5. To implement Dijkstra's algorithm to find shortest path in the graph.
- 6. To implementation of Static Hashing (Use Linear probing for collision resolution)
- 7. To implement of Huffmann coding.
- 8. To implement of B-tree.

## **OUTCOMES:**

- Implement heap and various tree structure like AVL, Red-black, B and Segment trees
- Solve the problems such as line segment intersection, convex shell and Voronoi diagram

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## JAVA PROGRAMMING LAB

Exercise - 1 (Basics)

- a). Write a JAVA program to display default value of all primitive data type of JAVA
- b). Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.

c). Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.

d) Write a case study on public static void main(250 words)

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

- a). Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
- b). Write a JAVA program to sort for an element in a given list of elements using bubble sort
  - (c). Write a JAVA program to sort for an element in a given list of elements using merge sort.
  - (d) Write a JAVA program using StringBufferto delete, remove character.

## Exercise - 3 (Class, Objects)

a). Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.

b). Write a JAVA program to implement constructor.

## Exercise - 4 (Methods)

a). Write a JAVA program to implement constructor overloading.

b). Write a JAVA program implement method overloading.

## Exercise - 5 (Inheritance)

- a). Write a JAVA program to implement Single Inheritance
  - b). Write a JAVA program to implement multi level Inheritance
  - c). Write a java program for abstract class to find areas of different shapes

#### **Exercise - 6** (Inheritance - Continued)

- a). Write a JAVA program give example for "super" keyword.
  - b). Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

## Exercise - 7 (Exception)

a).Write a JAVA program that describes exception handling mechanism

b).Write a JAVA program Illustrating Multiple catch clauses

## **Exercise – 8** (Runtime Polymorphism)

a). Write a JAVA program that implements Runtime polymorphism

b). Write a Case study on run time polymorphism, inheritance that implements in above problem

## **Exercise – 9** (User defined Exception)

- a). Write a JAVA program for creation of Illustrating throw
- b). Write a JAVA program for creation of Illustrating finally
- c). Write a JAVA program for creation of Java Built-in Exceptions
- d).Write a JAVA program for creation of User Defined Exception

## Exercise – 10 (Threads)

a). Write a JAVA program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable)

b). Write a program illustrating isAlive and join ()

c). Write a Program illustrating Daemon Threads.

## Exercise - 11 (Threads continuity)

a).Write a JAVA program Producer Consumer Problem

b).Write a case study on thread Synchronization after solving the above producer consumer problem

## Exercise – 12 (Packages)

a). Write a JAVA program illustrate class path

b). Write a case study on including in class path in your os environment of your package.

c). Write a JAVA program that import and use the defined your package in the previous Problem

## Exercise - 13 (Applet)

a).Write a JAVA program to paint like paint brush in applet.

- b) Write a JAVA program to display analog clock using Applet.
- c). Write a JAVA program to create different shapes and fill colors using Applet.

## Exercise - 14 (Event Handling)

a).Write a JAVA program that display the x and y position of the cursor movement using

## Mouse.

b).Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

# **Exercise - 15** (Swings)

a).Write a JAVA programto build a Calculator in Swings

b). Write a JAVA program to display the digital watch in swing tutorial.

# **Exercise – 16 (Swings - Continued)**

a). Write a JAVA program that to create a single ball bouncing inside a JPanel.

b). Write a JAVA program JTree as displaying a real tree upside down

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#### **COMPILER DESIGN**

#### **OBJECTIVES:**

• Understand the basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC, etc.

## UNIT – I

Introduction Language Processing, Structure of a compiler the evaluation of Programming language, The Science of building a Compiler application of Compiler Technology. Programming Language Basics.

Lexical Analysis-: The role of lexical analysis buffing, specification of tokens. Recognitions of tokens the lexical analyzer generator lexical

## UNIT –II

Syntax Analysis -: The Role of a parser, Context free Grammars Writing A grammar, top down passing bottom up parsing Introduction to Lr Parser.

## UNIT –III

More Powerful LR parser (LR1, LALR) Using Armigers Grammars Equal Recovery in Lr parser Syntax Directed Transactions Definition, Evolution order of SDTS Application of SDTS. Syntax Directed Translation Schemes.

## UNIT – IV

Intermediated Code: Generation Variants of Syntax trees 3 Address code, Types and Deceleration, Translation of Expressions, Type Checking. Canted Flow Back patching?

## UNIT – V

Runtime Environments, Stack allocation of space, access to Non Local date on the stack Heap Management code generation – Issues in design of code generation the target Language Address in the target code Basic blocks and Flow graphs. A Simple Code generation.

#### UNIT –VI

Machine Independent Optimization. The principle sources of Optimization peep hole Optimization, Introduction to Date flow Analysis.

## **OUTCOMES:**

- Acquire knowledge in different phases and passes of Compiler, and specifying different types of tokens by lexical analyzer, and also able to use the Compiler tools like LEX, YACC, etc.
- Parser and its types i.e. Top-down and Bottom-up parsers.
- Construction of LL, SLR, CLR and LALR parse table.
- Syntax directed translation, synthesized and inherited attributes.
- Techniques for code optimization.

## **TEXT BOOKS:**

- 1. Compilers, Principles Techniques and Tools.Alfred V Aho, Monical S. Lam, Ravi Sethi Jeffery D. Ullman,2<sup>nd</sup> edition,pearson,2007
- 2. Compiler Design K.Muneeswaran, OXFORD
- 3. Principles of compiler design,2<sup>nd</sup> edition,Nandhini Prasad,Elsebier.

- 1. Compiler Construction, Principles and practice, Kenneth C Louden, CENGAGE
- 2. Implementations of Compiler, A New approach to Compilers including the algebraic methods, Yunlinsu ,SPRINGER

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## **UNIX PROGRAMMING**

#### **OBJECTIVES:**

- Written technical communication and effective use of concepts and terminology.
- Facility with UNIX command syntax and semantics.
- Ability to read and understand specifications, scripts and programs.
- Individual capability in problem solving using the tools presented within the class. Students will demonstrate a mastery of the course materials and concepts within in class discussions.

## UNIT-I

Introduction to unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

## UNIT-II

The File system –The Basics of Files-What's in a File-Directories and File Names-Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

## UNIT-III

Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs.

## **UNIT-IV**

Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

## UNIT-V

Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The \$? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command.

## UNIT-VI

The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control.

## **OUTCOMES:**

- Documentation will demonstrate good organization and readability.
- File processing projects will require data organization, problem solving and research.
- Scripts and programs will demonstrate simple effective user interfaces.
- Scripts and programs will demonstrate effective use of structured programming.
- Scripts and programs will be accompanied by printed output demonstrating completion of a test plan.
- Testing will demonstrate both black and glass box testing strategies.
- Project work will involve group participation.

# **TEXT BOOKS:**

- 1. The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
- 2. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

## **REFERENCE BOOKS:**

1. Unix and shell programmingby B.M. Harwani, OXFORD university press.

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## **OBJECT ORIENTED ANALYSIS & DESIGN USING UML**

## **OBJECTIVE:**

- To understand how to solve complex problems
- Analyze and design solutions to problems using object oriented approach
- Study the notations of Unified Modeling Language

#### UNIT-I:

**Introduction**: The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, Designing Complex Systems, Evolution of Object Model, Foundation of Object Model, Elements of Object Model, Applying the Object Model.

#### UNIT-II:

**Classes and Objects**: Nature of object, Relationships among objects, Nature of a Class, Relationship among Classes, Interplay of Classes and Objects, Identifying Classes and Objects, Importance of Proper Classification, Identifying Classes and Objects, Key abstractions and Mechanisms.

#### UNIT-III:

**Introduction to UML**: Why we model, Conceptual model of UML, Architecture, Classes, Relationships, Common Mechanisms, Class diagrams, Object diagrams.

## **UNIT-IV:**

Basic Behavioral Modeling: Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams.

## UNIT-V:

Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

## UNIT-VI:

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

Case Study: The Unified Library application.

## **OUTCOME:**

- Ability to find solutions to the complex problems using object oriented approach
- Represent classes, responsibilities and states using UML notation
- Identify classes and responsibilities of the problem domain

## **TEXT BOOKS:**

- 1. "Object- Oriented Analysis And Design with Applications", Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, 3<sup>rd</sup> edition, 2013, PEARSON.
  2. "The Unified Modeling Language User Guide", Grady Booch, James Rumbaugh, Ivar
- Jacobson, 12<sup>th</sup> Impression, 2012, PEARSON.

- 1. "Object-oriented analysis and design using UML", Mahesh P. Matha, PHI
- 2. "Head first object-oriented analysis and design", Brett D. McLaughlin, Gary Pollice, Dave West, O"Reilly
- 3. "Object-oriented analysis and design with the Unified process", John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning
- "The Unified modeling language Reference manual", James Rumbaugh, Ivar 1. Jacobson, Grady Booch, Addison-Wesley

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	DATA BASE MANAGEMENT SYSTEMS				

# OBJECTIVES

• To learn the principles of systematically designing and using large scale Database Management Systems for various applications.

**UNIT-I:** An Overview of Database Management, Introduction- What is Database System-What is Database-Why Database- Data Independence- Relation Systems and Others- Summary, **Database system architecture, Introduction-** The Three Levels of Architecture-The External Level- the Conceptual Level- the Internal Level- Mapping- the Database Administrator-The Database Management Systems- Client/Server Architecture.

## UNIT-II:

The E/R Models, The Relational Model, Relational Calculus, Introduction to Database Design, Database Design and Er Diagrams-Entities Attributes, and Entity Sets-Relationship and Relationship Sets-Conceptual Design With the Er Models, The Relational Model Integrity Constraints Over Relations- Key Constraints –Foreign Key Constraints-General Constraints, Relational Algebra and Calculus, Relational Algebra- Selection and Projection- Set Operation, Renaming – Joins- Division- More Examples of Queries, Relational Calculus, Tuple Relational Calculus.

## **UNIT-III:**

**Queries, Constraints, Triggers**: The Form of Basic SQL Query, Union, Intersect, and Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database.

#### **UNIT-IV:**

**Schema Refinement** (Normalization) : Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

# UNIT-V: Transaction Management and Concurrency Control:

Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and save point.

Concurrency control for lost updates, uncommitted data, inconsistent retrievals and the Scheduler. Concurrency control with locking methods : lock granularity, lock types, two phase locking for ensuring serializability, deadlocks, Concurrency control with time stamp ordering : Wait/Die and Wound/Wait Schemes, Database Recovery management : Transaction recovery.

## UNIT-VI:

Overview of Storages and Indexing, Data on External Storage- File Organization and Indexing – Clustered Indexing – Primary and Secondary Indexes, Index Data Structures, Hash-Based Indexing – Tree-Based Indexing, Comparison of File Organization

## **OUTCOMES**

- Describe a relational database and object-oriented database.
- Create, maintain and manipulate a relational database using SQL
- Describe ER model and normalization for database design.
- Examine issues in data storage and query processing and can formulate appropriate solutions.
- Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.
- Design and build database system for a given real world problem

# **TEXT BOOKS:**

## 1. Introduction to Database Systems, CJ Date, Pearson

- 2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGraw Hill 3rd Edition
- 3. Database Systems The Complete Book, H G Molina, J D Ullman, J Widom Pearson

- 1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
- 2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
  - 3. Introduction to Database Systems, C.J.Date Pearson Education

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## **OPERATING SYSTEMS**

#### **OBJECTIVES:**

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.
- Learn the basics of Linux system and perform administrative tasks on Linux Servers.

#### UNIT I

**Introduction to Operating System Concept:** Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

## **UNIT-II:**

**Process Management** – Process concept, The process, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Interprocess Communication, Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

## **UNIT-III:**

**Memory Management:** Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation

## Virtual Memory Management:

Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

## UNIT-IV:

**Concurrency:** ProcessSynchronization, The Critical- Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples

**Principles of deadlock** – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock

## **UNIT-V:**

**File system Interface-** the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management Mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers,

## **UNIT VI:**

**Linux System**: Components of LINUX, Interprocess Communication, Synchronisation, Interrupt, Exception and System Call.

Android Software Platform: Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure, Application Process management

## **OUTCOMES:**

- Design various Scheduling algorithms.
- Apply the principles of concurrency.
- Design deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Design and Implement a prototype file systems.
- Perform administrative tasks on Linux Servers
- Introduction to Android Operating System Internals

## **TEXT BOOK:**

- 1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012.
- 2.Operating Systems Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011.
- 3. Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016.

## **REFERENCES:**

- 1. Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley, 2001.
- 2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata Mc Graw Hill Education", 1996.
- 3. Operating Systems: A Concept-Based Approach, D M Dhamdhere, Second Edition, Tata Mc Graw-Hill Education, 2007.
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# UNIFIED MODELING LAB

# **OBJECTIVES:**

- Construct UML diagrams for static view and dynamic view of the system.
- Generate creational patterns by applicable patterns for given context.
- Create refined model for given Scenario using structural patterns.
- Construct behavioral patterns for given applications.

#### Week 1:

Familiarization with Rational Rose or Umbrello

#### For each case study:

#### Week 2, 3 & 4:

#### For each case study:

- a) Identify and analyze events
- b) Identify Use cases
- c) Develop event table
- d) Identify & analyze domain classes
- e) Represent use cases and a domain class diagram using Rational Rose
- f) Develop CRUD matrix to represent relationships between use cases and problem domain classes

### Week 5 & 6:

- For each case study:
- a) Develop Use case diagrams
- b) Develop elaborate Use case descriptions & scenarios
- c) Develop prototypes (without functionality)
- d) Develop system sequence diagrams

# Week 7, 8, 9 & 10:

### For each case study:

- a) Develop high-level sequence diagrams for each use case
- b) Identify MVC classes / objects for each use case
- c) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects
- d) Develop detailed design class model (use GRASP patterns for responsibility assignment)
- e) Develop three-layer package diagrams for each case study

### Week 11 & 12:

- For each case study:
- a) Develop Use case Packages
- b) Develop component diagrams
- c) Identify relationships between use cases and represent them
- d) Refine domain class model by showing all the associations among classes
- Week 13 onwards:
- For each case study:

• a) Develop sample diagrams for other UML diagrams - state chart diagrams, activity diagrams and deployment diagrams

# **OUTCOMES:**

- Understand the Case studies and design the Model.
- Understand how design patterns solve design problems.
- Develop design solutions using creational patterns.

Construct design solutions by using structural and behavioral patterns

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### **OPERATING SYSEMS AND LINUX PROGRAMMING LAB**

### **OBJECTIVES:**

- To understand the design aspects of operating system.
- To study the process management concepts & Techniques.
- To study the storage management concepts.
- To familiarize students with theLinux environment
- To learn the fundamentals of shell scripting/programming
- To conceptualize Data Mining and the need for pre-processing.
- To learn the algorithms used for various types of Data Mining Problem

### **OPERATING SYSTEMS**

- Simulate the following CPU scheduling algorithms
  a) Round Robin b) SJF c) FCFS d) Priority
- 2. Multiprogramming-Memory management- Implementation of fork (), wait (), exec() and exit (), System calls
- 3. Simulate the following
  - a) Multiprogramming with a fixed number of tasks (MFT)
  - b) Multiprogramming with a variable number of tasks (MVT)
- 4. Simulate Bankers Algorithm for Dead Lock Avoidance
- 5. Simulate Bankers Algorithm for Dead Lock Prevention.
- 6. Simulate the following page replacement algorithms.a) FIFO b) LRU c) LFU
- 7. Simulate the following File allocation strategiesa) Sequenced b) Indexed c) Linked

### LINUX PROGRAMMING

- a) Study of Unix/Linux general purpose utility command list man,who,cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown.
  - b) Study of vi editor.
  - c) Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
  - d) Study of Unix/Linux file system (tree structure).
  - e) Study of .bashrc, /etc/bashrc and Environment variables.

- 2.Write a C program that makes a copy of a file using standard I/O, and system calls
- 3. Write a C program to emulate the UNIX ls –l command.
- 4. Write a C program that illustrates how to execute two commands concurrently with a command pipe.

Ex: - ls  $-l \mid sort$ 

- 5. Write a C program that illustrates two processes communicating using sharedmemory
- 6. Write a C program to simulate producer and consumer problem usingsemaphores
- 7. Write C program to create a thread using pthreads library and let it run its function.
- 8. Write a C program to illustrate concurrent execution of threads using pthreads library.

# **OUTCOMES:**

- To use Unix utilities and perform basic shell control of the utilities
- To use the Unix file system and file access control.
- To use of an operating system to develop software
- Students will be able to use Linux environment efficiently
- Solve problems using bash for shell scripting
- Will be able to implement algorithms to solve data mining problems using weka tool

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#### DATA BASE MANAGEMENT SYSTEM LAB

#### **OBJECTIVES:**

- To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product-specific tools.
- To familiarize the participant with the nuances of database environments towards an information-oriented data-processing oriented framework
- To give a good formal foundation on the relational model of data
- To present SQL and procedural interfaces to SQL comprehensively
- To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design

#### List of Experiments:

SQL

- 1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
- 2. Queries using operators in SQL
- 3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update
- 4. Queries using Group By, Order By, and Having Clauses
- 5. Queries on Controlling Data: Commit, Rollback, and Save point
- 6. Queries to Build Report in SQL \*PLUS
- 7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints
- 8. Queries on Joins and Correlated Sub-Queries
- 9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features

PL/SQL

10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of

Assignment Operation

- 11. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL
- 12. Write a PL/SQL block using SQL and Control Structures in PL/SQL
- 13. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types
- 14. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS
- 15. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc. 18
- 16. Demonstration of database connectivity

# **OUTCOMES:**

- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain
- Normalize a database
- Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-artRDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- Design and build a GUI application using a 4GL

**Note:** The creation of sample database for the purpose of the experiments is expected to be predecided by the instructor.

### **Text Books/Suggested Reading:**

- 1. Oracle: The Complete Reference by Oracle Press
- 2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007.
- 3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007

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### **PROFESSIONAL ETHICSAND HUMAN VALUES**

#### **Course Objectives:**

\*To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.

\*Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

#### **UNIT I: Human Values**:

Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value Time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality-Character.

### **UNIT: II: Principles for Harmony:**

Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

### **UNIT III: Engineering Ethics and Social Experimentation:**

History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism —Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg's Theory - Gilligan's Argument – Heinz's Dilemma - Comparison with Standard Experiments — Learning from the Past – Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

### UNIT IV: Engineers' Responsibilities towards Safety and Risk:

Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/sInvoluntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/sImmediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

# **UNIT V: Engineers' Duties and Rights:**

Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality – Senses of Loyalty - Consensus and Controversy - Professional and Individual Rights – Confidential and Proprietary Information - Conflict of Interest-Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving-Occupational Crimes-Industrial Espionage- Price Fixing-Whistle Blowing.

# **UNIT VI: Global Issues:**

Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics - Environmental Ethics – Endangering Lives - Bio Ethics - Computer Ethics - War Ethics – Research Ethics -Intellectual Property Rights.

• Related Cases Shall be dealt where ever necessary.

# **Outcome:**

\*It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.

\*It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

# **<u>References</u>**:

- 1. Professional Ethics by R. Subramaniam Oxford Publications, New Delhi.
- 2. Ethics in Engineering by Mike W. Martin and Roland Schinzinger Tata McGraw-Hill 2003.
- 3. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana Maruthi Publications.
- 4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
- 5. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
- 6. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd 2009.
- 7. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman and M. Jayakumaran University Science Press.
- 8. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill 2013
- 9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications

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### **COMPUTER NETWORKS**

### **OBJECTIVES:**

- Understand state-of-the-art in network protocols, architectures, and applications.
- Process of networking research
- Constraints and thought processes for networking research
- Problem Formulation—Approach—Analysis—

#### UNIT – I:

**Introduction:** Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models

#### UNIT – II:

**Physical Layer – Fourier Analysis** – Bandwidth Limited Signals – The Maximum Data Rate of a Channel - Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing

**Data Link Layer Design Issues**, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols

### UNIT – III:

**The Data Link Layer -** Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols- A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One Bit Sliding Window Protocol-A Protocol Using Go-Back-N-A Protocol Using Selective Repeat

### UNIT – IV:

**The Medium Access Control Sublayer-**The Channel Allocation Problem-Static Channel Allocation-Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Carrier Sense Multiple Access Protocols-Collision-Free Protocols-Limited Contention Protocols-Wireless LAN Protocols, Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sublayer Protocol-Ethernet Performance-Fast Ethernet Gigabit Ethernet-10-Gigabit Ethernet-Retrospective on Ethernet, Wireless Lans-The 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer-The802.11 MAC Sublayer Protocol-The 805.11 Frame Structure-Services

#### UNIT – V:

Design Issues-The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service-Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path Algorithm, Congestion Control Algorithms-Approaches to Congestion Control-Traffic Aware Routing-Admission Control-Traffic Throttling-Load Shedding.

# UNIT – VI:

**Transport Layer –** The Internet Transport Protocols: Udp, the Internet Transport Protocols: Tcp **Application Layer –**The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery

# **OUTCOMES:**

- Understand OSI and TCP/IP models
- Analyze MAC layer protocols and LAN technologies
- Design applications using internet protocols
- Understand routing and congestion control algorithms
- Understand how internet works

# **TEXT BOOKS:**

- 1. Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010
- 2. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education

# **REFERENCE BOOKS:**

1. Larry L. Peterson and Bruce S. Davie, "Computer Networks - A Systems Approach" (5th ed), Morgan Kaufmann/ Elsevier, 2011

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DATA WARE HOUSING AND DATA MINING

# **OBJECTIVES:**

- Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.
- They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
- They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

# UNIT –I:

**Introduction**: Why Data Mining? What Is Data Mining?1.3 What Kinds of Data Can Be Mined?1.4 What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted? Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity

# UNIT –II:

**Data Pre-processing:** Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

### UNIT –III:

**Classification:** Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

### UNIT –IV:

**Classification: Alterative Techniques,** Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

### UNIT –V

Association Analysis: Basic Concepts and Algorithms: Problem Defecation, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. (Tan &Vipin)

# UNIT –VI

**Cluster Analysis: Basic Concepts and Algorithms:Overview:** What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. (Tan &Vipin)

# **OUTCOMES:**

- Understand stages in building a Data Warehouse
- Understand the need and importance of preprocessing techniques
- Understand the need and importance of Similarity and dissimilarity techniques
- Analyze and evaluate performance of algorithms for Association Rules.
- Analyze Classification and Clustering algorithms

# **TEXT BOOKS:**

- 1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
- 2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

# **REFERENCE BOOKS:**

- 1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
- 2. Data Mining : VikramPudi and P. Radha Krishna, Oxford.
- 3. Data Mining and Analysis Fundamental Concepts and Algorithms; Mohammed J. Zaki, Wagner Meira, Jr, Oxford
- 4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.

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# DESIGN AND ANALYSIS OF ALGORITHMS

# **OBJECTIVES:**

Upon completion of this course, students will be able to do the following:

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations

# UNIT-I:

**Introduction:** What is an Algorithm, Algorithm Specification, Pseudocode Conventions Recursive Algorithm, Performance Analysis, Space Complexity, Time Complexity, Amortized Complexity, Amortized Complexity, Asymptotic Notation, Practical Complexities, Performance Measurement.

# UNIT-II:

**Dived and Conquer:** General Method, Defective Chessboard, Binary Search, Finding the Maximum and Minimum, Merge Sort, Quick Sort, Performance Measurement, Randomized Sorting Algorithms.

# **UNIT-III:**

**The Greedy Method**: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-cost Spanning Trees, Prim's Algorithm, Kruskal's Algorithms, An Optimal Randomized Algorithm, Optimal Merge Patterns, Single Source Shortest Paths.

# UNIT-IV:

**Dynamic Programming:** All - Pairs Shortest Paths, Single – Source Shortest paths General Weights, String Edition, 0/1 Knapsack, Reliability Design,

# UNIT-V:

**Backtracking:** The General Method, The 8-Queens Problem, Sum of Subsets, Graph Coloring, Hamiltonian Cycles.

# **UNIT-VI:**

**Branch and Bound:** The Method, Least cost (LC) Search, The 15-Puzzle: an Example, Control Abstraction for LC-Search, Bounding, FIFO Branch-and-Bound, LC Branch and Bound, 0/1 Knapsack Problem, LC Branch-and Bound Solution, FIFO Branch-and-Bound Solution, Traveling Salesperson.

# **OUTCOMES:**

Students who complete the course will have demonstrated the ability to do the following:

- Argue the correctness of algorithms using inductive proofs and invariants.
- Analyze worst-case running times of algorithms using asymptotic analysis.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.

# **TEXT BOOKS:**

- 1. Fundamentals of computer algorithms E. Horowitz S. Sahni, University Press
- 2. Introduction to AlgorithmsThomas H. Cormen, PHI Learning

# **REFERENCE BOOKS**

- 1. The Design and Analysis of Computer Algorithms, Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman
- 2. Algorithm Design, Jon Kleinberg, Pearson.

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# SOFTWARE TESTING METHODOLOGIES

#### **OBJECTIVE:**

Fundamentals for various testing methodologies.

- Describe the principles and procedures for designing test cases.
- Provide supports to debugging methods.
- Acts as the reference for software testing techniques and strategies.

#### UNIT-I:

**Introduction:** Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs.

Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

#### UNIT-II:

**Transaction Flow Testing:** Transaction Flows, Transaction Flow Testing Techniques. **Dataflow testing:** Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

#### UNIT-III:

**Domain Testing:** Domains and Paths, Nice & Ugly Domains, Domain testing, Domains andInterfaces Testing, Domain and Interface Testing, Domains and Testability.

**Paths, Path products and Regular expressions:** Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

#### **UNIT-IV:**

**Syntax Testing:** Why, What and How, A Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips.

Logic Based Testing: Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.

### UNIT – V:

**State, State Graphs and Transition Testing:** State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips.

**Graph Matrices and Application:-**Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

# UNIT -VI:

**Software Testing Tools**: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner, Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

# **OUTCOME:**

- Understand the basic testing procedures.
- Able to support in generating test cases and test suites.
- Able to test the applications manually by applying different testing methods and automation tools.
- Apply tools to resolve the problems in Real time environment.

# **TEXT BOOKS:**

- 1. Software testing techniques Boris Beizer, Dreamtech, second edition.
- 2. Software Testing- Yogesh Singh, Camebridge

# **REFERENCE BOOKS:**

- 1. The Craft of software testing Brian Marick, Pearson Education.
- 2. Software Testing, 3<sup>rd</sup> edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).
- 3. Software Testing, N.Chauhan, Oxford University Press.
- 4. Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge Univ.Press.
- 5. Effective methods of Software Testing, Perry, John Wiley, <sup>2nd</sup> Edition, 1999.
- 6. Software Testing Concepts and Tools, P.NageswaraRao, dreamtech Press
- 7. Win Runner in simple steps by Hakeem Shittu, 2007Genixpress.
- 8. Foundations of Software Testing, D.Graham& Others, Cengage Learning.

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ARTIFICIAL INTELLIGENCE (Open Elective)

# **OBJECTIVES:**

- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
- To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning

### **UNIT-I:**

**Introduction to artificial intelligence:** Introduction ,history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of ai languages, current trends in AI

# UNIT-II:

**Problem solving: state-space search and control strategies :**Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening a\*, constraint satisfaction

**Problem reduction and game playing:** Introduction, problem reduction, game playing, alphabeta pruning, two-player perfect information games

### **UNIT-III:**

**Logic concepts:** Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

### UNIT-IV:

**Knowledge representation:** Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames **advanced knowledge representation techniques:** Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

# UNIT-V:

**Expert system and applications:** Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

# **UNIT-VI:**

**Uncertainty measure: probability theory:** Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory

**Fuzzy sets and fuzzy logic:** Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

# **OUTCOMES:**

- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
- Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
- Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

# **TEXT BOOKS:**

- 1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
- 2. Artificial intelligence, A modern Approach , 2<sup>nd</sup>ed, Stuart Russel, Peter Norvig, PEA
- 3. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3<sup>rd</sup>ed, TMH
- 4. Introduction to Artificial Intelligence, Patterson, PHI

# **REFERNCE BOOKS:**

- 1. Atificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5<sup>th</sup>ed, PEA
- 2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
- 3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

# INTERNET OF THINGS (Open Elective)

### **OBJECTIVES:**

- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
- Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
- Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

### UNIT - I:

The Internet of Things: An Overview of Internet of things, Internet of Things Technology, behind IoTs Sources of the IoTs, M2M Communication, Examples OF IoTs, Design Principles For Connected Devices

# UNIT – II:

Business Models for Business Processes in the Internet of Things ,IoT/M2M systems LAYERS AND designs standardizations ,Modified OSI Stack for the IoT/M2M Systems ,ETSI M2M domains and High-level capabilities ,Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

### UNIT – III:

Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

### UNIT-IV:

Internet Connectivity Principles, Internet connectivity, Application Layer Protocols: HTTP, HTTPS, FTP, Telnet.

### UNIT-V:

Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/Services/Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in

the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

# UNIT – VI

Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology , Sensing the World.

# **OUTCOMES:**

- Demonstrate knowledge and understanding of the security and ethical issues of the Internet of Things
- Conceptually identify vulnerabilities, including recent attacks, involving the Internet of Things
- Develop critical thinking skills
- Compare and contrast the threat environment based on industry and/or device type

# **TEXTBOOKS:**

- Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education
- Internet of Things, A.Bahgya and V.Madisetti, University Press, 2015

# **REFERNCE BOOKS:**

- 1. Designing the Internet of Things, Adrian McEwen and Hakim Cassimally, Wiley
- 2. Getting Started with the Internet of Things CunoPfister, Oreilly

# **CYBER SECURITY**

#### (Open Elective)

### **OBJECTIVES:**

- The Cyber security Course will provide the students with foundational Cyber Security principles, Security architecture, risk management, attacks, incidents, and emerging IT and IS technologies.
- Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.

# **UNIT- I: Introduction to Cybercrime:**

Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security ,Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens

# **UNIT -II: Cyber offenses:**

How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

# UNIT -III: Cybercrime Mobile and Wireless Devices:

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

# UNIT -IV: Tools and Methods Used in Cybercrime:

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity Theft:Introduction,Phishing,IdentityTheft(IDTheft)

# UNIT -V: Cybercrimes and Cyber security:

Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information Security Blueprint, Security education, Training and awareness program, Continuing Strategies.

# **UNIT -VI: Understanding Computer Forensics:**

Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Antiforensics

# **OUTCOMES:**

- Cyber Security architecture principles
- Identifying System and application security threats and vulnerabilities
- Identifying different classes of attacks
- Cyber Security incidents to apply appropriate response
- Describing risk management processes and practices
- Evaluation of decision making outcomes of Cyber Security scenarios

# **TEXT BOOKS:**

- 1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, SunitBelapure, Wiley.
- 2. Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, Cengage Learning.

# **REFERENCES:**

1. Information Security, Mark Rhodes, Ousley, MGH.

### DIGITAL SIGNAL PROCESSING

(Open Elective)

### **OBJECTIVES:**

- To study DFT and its computation
- To study the design techniques for digital filters
- To study the finite word length effects in signal processing
- To study the non-parametric methods of power spectrum estimations
- To study the fundamentals of digital signal processors.

# UNIT -I

# **Discrete Fourier Transform**

DFT and its properties, Relation between DTFT and DFT, FFT computations using Decimation in time and Decimation in frequency algorithms, Overlap-add and save methods

# UNIT -II

# **Infinite Impulse Response Digital Filters**

Review of design of analogue Butterworth and Chebyshev Filters, Frequency transformation in analogue domain - Design of IIR digital filters using impulse invariance technique - Design of digital filters using bilinear transform - pre warping - Realization using direct, cascade and parallel forms.

### UNIT-III

### **Finite Impulse Response Digital Filters**

Symmetric and Ant symmetric FIR filters - Linear phase FIR filters - Design using Hamming, Henning and Blackman Windows - Frequency sampling method - Realization of FIR filters - Transversal, Linear phase and Polyphasestructures.

# UNIT -IV

# **Finite Word Length Effects**

Fixed point and floating point number representations - Comparison - Truncation and Rounding errors - Quantization noise - derivation for quantization noise power - coefficient quantization error - Product quantization error -

### UNIT -V

Overflow error - Round off noise power - limit cycle oscillations due to product round off and overflow errors - signal scaling

### UNIT -VI

### **Multirate Signal Processing**

Introduction to Multirate signal processing-Decimation-Interpolation-Polyphase implementation of FIR filters for interpolator and decimator -Multistage implementation of sampling rate conversion- Design of narrow band filters - Applications of Multirate signal processing.

# **OUTCOMES:**

- an ability to apply knowledge of Mathematics, science, and engineering
- an ability to design and conduct experiments and interpret data
- an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- an ability to function as part of a multi-disciplinary team

# **TEXT BOOKS:**

- 1. John G Proakis and Manolakis, "Digital Signal Processing Principles, Algorithms and Applications", Pearson, Fourth Edition, 2007.
- 2. S.Salivahanan, A. Vallavaraj, C. Gnanapriya, Digital Signal Processing, TMH/McGraw HillInternational, 2007

# **REFERENCE BOOKS:**

- 1. E.C. Ifeachor and B.W. Jervis, "Digital signal processing A practical approach", Second edition, Pearson, 2002.
- 2. S.K. Mitra, Digital Signal Processing, A Computer Based approach, Tata Mc GrawHill, 1998.
- 3. P.P.Vaidyanathan, Multirate Systems & Filter Banks, Prentice Hall, Englewood cliffs, NJ, 1993.
- 4. Johny R. Johnson, Introduction to Digital Signal Processing, PHI, 2006.

### **EMBEDDED SYSTEMS**

(Open Elective)

### **OBJECTIVES:**

- Technology capabilities and limitations of the hardware, software components
- Methods to evaluate design tradeoffs between different technology choices.
- Design Methodologies

### UNIT-I:

**Introduction to Embedded systems:** What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

### UNIT-II:

**8—bit microcontrollers architecture:** Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.

### UNIT-III:

RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

### **UNIT-IV:**

Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem.

### UNIT-V:

The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

#### **UNIT-VI:**

Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

# **OUTCOMES:**

Understand the basics of an embedded system

- Program an embedded system
- Design, implement and test an embedded system.

Identify the unique characteristics of real-time systems

- Explain the general structure of a real-time system
- Define the unique design problems and challenges of real-time systems

# **TEXT BOOK:**

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.

# **REFERENCE BOOKS:**

- 1. Ayala &Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE
- 2. Embedded Systems, Rajkamal, TMH, 2009.
- 3. Embedded Software Primer, David Simon, Pearson.
- 4. The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson,.

# ROBOTICS

### (Open Elective)

### **OBJECTIVES**:

- To introduce the basic concepts, parts of robots and types of robots.
- To make the student familiar with the various drive systems for robot, sensors and their applications in robots and programming of robots.
- To discuss about the various applications of robots, justification and implementation of robot.

# UNIT-I:

### Introduction

Specifications of Robots- Classifications of robots – Work envelope - Flexible automation versus Robotic technology – Applications of Robots ROBOT KINEMATICS AND DYNAMICS Positions,

# **UNIT-II:**

# **Orientations and frames, Mappings**

Changing descriptions from frame to frame, Operators: Translations, Rotations and Transformations - Transformation Arithmetic - D-H Representation - Forward and inverse Kinematics Of Six Degree of Freedom Robot Arm – Robot Arm dynamics

### UNIT-III:

### **Robot Drives and Power Transmission Systems**

Robot drive mechanisms, hydraulic – electric – servomotor- stepper motor - pneumatic drives, Mechanical transmission method - Gear transmission, Belt drives, cables, Roller chains, Link -Rod systems - Rotary-to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearing screws,

### UNIT -IV:

### Manipulators

Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators

### UNIT- V:

### **Robot End Effectors**

Classification of End effectors – Tools as end effectors. Drive system for grippers-Mechanical adhesive-vacuum-magnetic-grippers. Hooks&scoops. Gripper force analysis and gripper design. Active and passive grippers.

# UNIT -VI:

# Path planning & Programming

Trajectory planning and avoidance of obstacles, path planning, skew motion, joint integrated motion – straight line motion-Robot languages-computer control and Robot software.

# **OUTCOMES:**

- The Student must be able to design automatic manufacturing cells with robotic control using
- The principle behind robotic drive system, end effectors, sensor, machine vision robot Kinematics and programming.

# **TEXT BOOKS**:

- 1. Deb S. R. and Deb S., "Robotics Technology and Flexible Automation", Tata McGraw HillEducation Pvt. Ltd, 2010.
- 2. John J.Craig, "Introduction to Robotics", Pearson, 2009.
- 3. Mikell P. Grooveret. al., "Industrial Robots Technology, Programming and Applications", McGraw Hill, New York, 2008.

# **REFERENCE BOOKS:**

- Richard D Klafter, Thomas A Chmielewski, Michael Negin, "Robotics Engineering An Integrated Approach", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd., 2006.
- 2. Fu K S, Gonzalez R C, Lee C.S.G, "Robotics: Control, Sensing, Vision and Intelligence", McGraw Hill, 1987

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# NETWORK PROGRAMMING LAB

### **OBJECTIVES:**

- To write, execute and debug c programs which use Socket API.
- To understand the use of client/server architecture in application development
- To understand how to use TCP and UDP based sockets and their differences.
- To get acquainted with unix system internals like Socket files, IPC structures.
- To Design reliable servers using both TCP and UDP sockets

### **Prerequisites:**

Knowledge of C Programming, Basic commands of UNIX.

### **List of Programs**

- 1. Understanding and using of commands like ifconfig, netstat, ping, arp, telnet, ftp, finger, traceroute, whoisetc. Usage of elementary socket system calls (socket (), bind(), listen(), accept(),connect(),send(),recv(),sendto(),recvfrom()).
- 2. Implementation of Connection oriented concurrent service (TCP).
- 3. Implementation of Connectionless Iterative time service (UDP).
- 4. Implementation of Select system call.
- 5. Implementation of gesockopt (), setsockopt () system calls.
- 6. Implementation of getpeername () system call.
- 7. Implementation of remote command execution using socket system calls.
- 8. Implementation of Distance Vector Routing Algorithm.
- 9. Implementation of SMTP.

10. Implementation of FTP.

- 11. Implementation of HTTP.
- 12. Implementation of RSA algorithm.

Note: Implement programs 2 to 7 in C and 8 to 12 in JAVA.

# **OUTCOMES:**

- Understand and explain the basic concepts of Grid Computing;
- Explain the advantages of using Grid Computing within a given environment;
- Prepare for any upcoming Grid deployments and be able to get started with a potentially available Grid setup.
- Discuss some of the enabling technologies e.g. high-speed links and storage area networks.
- Build computer grids.

# **SUGGESTED READING:**

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# SOFTWARE TESTING LAB

### **OBJECTIVES:**

- Demonstrate the UML diagrams with ATM system descriptions.
- Demonstrate the working of software testing tools with c language.
- Study of testing tools- win runner, selenium etc.
- Writing test cases for various applications
- 1 Write programs in 'C' Language to demonstrate the working of the following constructs:
  - i) do...while
  - ii) while....do
  - iii) if...else
  - iv) switch
  - v) for
- 2 "A program written in 'C' language for Matrix Multiplication fails" Introspect the causes for its failure and write down the possible reasons for its failure.
- 3 Take any system (e.g. ATM system) and study its system specifications and report the various bugs.
- 4 Write the test cases for any known application (e.g. Banking application)
- 5 Create a test plan document for any application (e.g. Library Management System)
- 6 Study of Win Runner Testing Tool and its implementation
  - a) Win runner Testing Process and Win runner User Interface.
  - b) How Win Runner identifies GUI(Graphical User Interface) objects in an application and describes the two modes for organizing GUI map files.
  - c) How to record a test script and explains the basics of Test Script Language (TSL).
  - d) How to synchronize a test when the application responds slowly.
  - e) How to create a test that checks GUI objects and compare the behaviour of GUI objects in different versions of the sample application.
  - f) How to create and run a test that checks bitmaps in your application and run the test on different versions of the sample application and examine any differences, pixel by pixel.

- g) How to Create Data-Driven Tests which supports to run a single test on several sets of data from a data table.
- h) How to read and check text found in GUI objects and bitmaps.
- i) How to create a batch test that automatically runs the tests.
- j) How to update the GUI object descriptions which in turn supports test scripts as the application changes.
- 7 Apply Win Runner testing tool implementation in any real time applications.

# **OUTCOMES:**

- Find practical solutions to the problems
- Solve specific problems alone or in teams
- Manage a project from beginning to end
- Work independently as well as in teams

Define, formulate and analyze a problem

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DATA WARE HOUSING AND DATA MINING	LAB			

#### **OBJECTIVES:**

- Practical exposure on implementation of well known data mining tasks.
- Exposure to real life data sets for analysis and prediction.
- Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.
- Handling a small data mining project for a given practical domain.

#### System/Software Requirements:

- Intel based desktop PC
- WEKA TOOL
- 1. Demonstration of preprocessing on dataset student.arff
- 2. Demonstration of preprocessing on dataset labor.arff
- 3. Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm
- 4. Demonstration of Association rule process on dataset test.arff using apriori algorithm
- 5. Demonstration of classification rule process on dataset student.arff using j48 algorithm
- 6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm
- 7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm
- 8. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm
- 9. Demonstration of clustering rule process on dataset iris.arff using simple k-means
- 10. Demonstration of clustering rule process on dataset student.arff using simple k- means.

# **OUTCOMES:**

- The data mining process and important issues around data cleaning, pre-processing and integration.
- The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction..

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### INTELLECTUAL PROPERTY RIGHTS AND PATENTS

#### **Objectives:**

\*To know the importance of Intellectual property rights, which plays a vital role in advanced Technical and Scientific disciplines.

\*Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latest developments.

### **Unit I: Introduction to Intellectual Property Rights (IPR)**

Concept of Property - Introduction to IPR – International Instruments and IPR - WIPO - TRIPS – WTO -Laws Relating to IPR - IPR Tool Kit - Protection and Regulation - Copyrights and Neighboring Rights – Industrial Property – Patents - Agencies for IPR Registration – Traditional Knowledge –Emerging Areas of IPR - Layout Designs and Integrated Circuits – Use and Misuse of Intellectual Property Rights.

### Unit II: Copyrights and Neighboring Rights

Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights -Subject Matters of Copyright – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of Performers – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Case Law - Semiconductor Chip Protection Act.

### **UNIT III: Patents**

Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Search - Patent Registration and Granting of Patent -Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing — Patent Cooperation Treaty – New developments in Patents – Software Protection and Computer related Innovations.

#### **UNIT IV: Trademarks**

Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – Distinction between Trademark and Property Mark – Marks Covered under Trademark Law - Trade Mark Registration – Trade Mark Maintenance – Transfer of rights - Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

### **UNIT V: Trade Secrets**

Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law.

# UNIT VI: Cyber Law and Cyber Crime

Introduction to Cyber Law – Information Technology Act 2000 - Protection of Online and Computer Transactions - E-commerce - Data Security – Authentication and Confidentiality -Privacy - Digital Signatures – Certifying Authorities - Cyber Crimes - Prevention and Punishment – Liability of Network Providers.

• Relevant Cases Shall be dealt where ever necessary.

# **Outcome:**

\* IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.

\*Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.

# **References:**

- 1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
- 2. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
- 3. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
- 4. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
- 5. Kompal Bansal & Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
- 6. Cyber Law Texts & Cases, South-Western's Special Topics Collections.
- 7. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
- 8. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.
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## **CRYPTOGRAPHY AND NETWORK SECURITY**

### **OBJECTIVES:**

- In this course the following principles and practice of cryptography and network security are covered:
- Classical systems, symmetric block ciphers (DES, AES, other contemporary symmetric ciphers)
- Public-key cryptography (RSA, discrete logarithms),
- Algorithms for factoring and discrete logarithms, cryptographic protocols, hash functions, authentication, key management, key exchange, signature schemes,
- Email and web security, viruses, firewalls, digital right management, and other topics.

# UNIT-I:

# **Basic Principles**

Security Goals, Cryptographic Attacks, Services and Mechanisms, Mathematics of Cryptography

# UNIT-II:

# Symmetric Encryption

Mathematics of Symmetric Key Cryptography, Introduction to Modern Symmetric Key Ciphers, Data Encryption Standard, Advanced Encryption Standard.

# **UNIT-III:**

# **Asymmetric Encryption**

Mathematics of Asymmetric Key Cryptography, Asymmetric Key Cryptography

# **UNIT-IV:**

# Data Integrity, Digital Signature Schemes & Key Management

Message Integrity and Message Authentication, Cryptographic Hash Functions, Digital Signature, Key Management.

# UNIT -V:

# **Network Security-I**

Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS

# UNIT -VI:

**Network Security-II** 

Security at the Network Layer: IPSec, System Security

- To be familiarity with information security awareness and a clear understanding of its importance.
- To master fundamentals of secret and public cryptography
- To master protocols for security services
- To be familiar with network security threats and countermeasures
- To be familiar with network security designs using available secure solutions (such asPGP,
- SSL, IPSec, etc)

# **TEXT BOOKS:**

- Cryptography and Network Security, Behrouz A Forouzan, DebdeepMukhopadhyay, (3e) Mc Graw Hill.
- 2) Cryptography and Network Security, William Stallings, (6e) Pearson.
- 3) Everyday Cryptography, Keith M.Martin, Oxford.

# **REFERENCE BOOKS:**

1) Network Security and Cryptography, Bernard Meneges, Cengage Learning.

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### SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

# **OBJECTIVES:**

The course should enable the student:

- To understand interrelationships, principles and guidelines governing architecture and evolution over time.
- To understand various architectural styles of software systems.
- To understand design patterns and their underlying object oriented concepts.
- To understand implementation of design patterns and providing solutions to real world software design problems.
- To understand patterns with each other and understanding the consequences of combining patterns on the overall quality of a system.

### **UNIT-I:**

### **Envisioning Architecture**

The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views.

**Creating and Architecture** Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

### UNIT-II:

### Analyzing Architectures

Architecture Evaluation, Architecture design decision making, ATAM, CBAM

### Moving from One System to Many

Software Product Lines, Building systems from off the shelf components, Software architecture in future.

### UNIT-III:

### Patterns

Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage.

# **Creational Patterns**

Abstract factory, Builder, Factory method, Prototype, Singleton

**UNIT-IV:** 

# **Structural Patterns**

Adapter, Bridge, Composite, Decorator, Façade, Flyweight, PROXY.

UNIT-V: Behavioral Patterns Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy, template method, visitor.

# UNIT-VI:

# **Case Studies**

A-7E - A case study in utilizing architectural structures, The World Wide Web - a case study in Interoperability, Air Traffic Control – a case study in designing for high availability, Celsius Tech – a case study in product line development.

A Case Study (Designing a Document Editor): Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation.

# **TEXT BOOKS:**

- 1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.
- 2. Design Patterns, Erich Gamma, Pearson Education, 1995.

# **REFERENCE BOOKS:**

- 1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.
- 2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall

PTR, 2001

- 3. Software Design, David Budgen, second edition, Pearson education, 2003
- 4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.
- 5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education,

2006

- 6. J2EE Patterns, Deepak Alur, John Crupi & Dan Malks, Pearson education, 2003.
- 7. Design Patterns in C#, Steven John metsker, Pearson education, 2004.
- 8. Pattern Oriented Software Architecture, F.Buschmann & others, John Wiley & Sons.

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### WEB TECHNOLOGIES

## **OBJECTIVES:**

• This course is designed to introduce students with no programming experience to the programming languages and techniques associated with the World Wide Web. The course will introduce web-based media-rich programming tools for creating interactive web pages.

### UNIT-I: HTML, CSS

Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5

CSS: Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model, Conflict Resolution

# UNIT-II:

### Java script

The Basic of Java script: Objects, Primitives Operations and Expressions, Screen Output and Keyboard Input, Control Statements, Object Creation and Modification, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions DHTML: Positioning Moving and Changing Elements

# UNIT-III:

**XML:** Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches,

AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX.

# **UNIT-IV:**

**PHP Programming: Introducing PHP:** Creating PHP script, Running PHP script. **Working with variables and constants:** Using variables, Using constants, Data types,Operators.**Controlling program flow:** Conditional statements,Control statements,Arrays,functions.Working with forms and Databases such as MySQL.

# **UNIT-V:**

*Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashs and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.* 

# UNIT-VI:

Introduction to Ruby, Variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching. Overview of Rails.

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Styles sheets.
- Build dynamic web pages.
- Build web applications using PHP.
- Programming through PERL and Ruby
- Write simple client-side scripts using AJAX

# **TEXT BOOKS:**

- 1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
- 2. Web Technologies, Uttam K Roy, Oxford
- 3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, MacIntyre, Morrissey, Cengage

# **REFERENCE BOOKS:**

- 1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)
- 2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
- 3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
- 4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning
- 5. http://www.upriss.org.uk/perl/PerlCourse.html

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MANAGERIAL ECONOMICS AND FINANCIAL	ANALY	<b>SIS</b>		

# (Common to all Branches)

### • Course Objectives:

- The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

# UNIT-I

# Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

# UNIT – II:

### **Production and Cost Analyses:**

Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs –Cost – Volume-Profit analysis-Determination of Breakeven point(simple problems)-Managerial significance and limitations of Breakeven point.

# UNIT – III:

# Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing.

### UNIT – IV:

# Types of Business Organization and Business Cycles:

Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of a Business Cycle.

### Unit – V:

## Introduction to Accounting & Financing Analysis:

Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)

# UNIT – VI:

**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

### **Course Outcome:**

- \*The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
- \* One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
- \*The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

# **TEXT BOOKS**

- 1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi 2011
- 2. Dr. A. R. Aryasri Managerial Economics and Financial Analysis, TMH 2011
- 3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

# **REFERENCES:**

- 1.Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
- 2. V. Maheswari: Managerial Economics, Sultan Chand.2014
- 3. Suma Damodaran: Managerial Economics, Oxford 2011.
- 4. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
- 5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
- 6. Maheswari: Financial Accounting, Vikas Publications.
- 7. S. A. Siddiqui& A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
- 8. Ramesh Singh, Indian Economy, 7<sup>th</sup> Edn., TMH2015
- 9. Pankaj Tandon A Text Book of Microeconomic Theory, Sage Publishers, 2015
- 10. Shailaja Gajjala and Usha Munipalle, Univerties press, 2015

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# **BIG DATA ANALYTICS**

(Elective - 1)

# **OBJECTIVES:**

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
- To introduce programming tools PIG & HIVE in Hadoop echo system.

# UNIT-I

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

# UNIT-II

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

# UNIT-III

Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner

# UNIT-IV

Hadoop I/O: The Writable Interface, WritableComparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections, Implementing a Custom Writable: Implementing a RawComparator for speed, Custom comparators

# UNIT-V

# Pig: Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

# UNIT-VI

Applying Structure to Hadoop Data with Hive:

Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data

- Preparing for data summarization, query, and analysis.
- Applying data modeling techniques to large data sets
- Creating applications for Big Data analytics
- Building a complete business data analytic solution

# **TEXT BOOKS:**

- 1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
- 2. Hadoop: The Definitive Guide by Tom White, 3<sup>rd</sup> Edition, O'reilly
- 3. Hadoop in Action by Chuck Lam, MANNING Publ.
- 4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

# **REFERENCE BOOKS:**

- 1. Hadoop in Practice by Alex Holmes, MANNING Publ.
- 2. Hadoop MapReduce Cookbook, SrinathPerera, ThilinaGunarathne

# **SOFTWARE LINKS:**

- 1. Hadoop:<u>http://hadoop.apache.org/</u>
- 2. Hive: https://cwiki.apache.org/confluence/display/Hive/Home
- 3. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

# INFORMATION RETRIEVAL SYSTEMS

(Elective - 1)

# **OBJECTIVES**

- To provide the foundation knowledge in information retrieval.
- To equip students with sound skills to solve computational search problems.
- To appreciate how to evaluate search engines.
- To appreciate the different applications of information retrieval techniques in the Internet or Web environment.
- To provide hands-on experience in building search engines and/or hands-on experience in evaluating search engines.

# UNIT - I:

**Introduction to Information Storage and Retrieval System:** Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation.

Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms

# UNIT-II:

**Inverted files:** Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques.

# UNIT -III:

**Signature Files:** Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.

# UNIT-IV:

**New Indices for Text:** PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.

# UNIT-V:

**Stemming Algorithms:** Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files

# UNIT-VI:

**Thesaurus Construction:** Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri

- Identify basic theories in information retrieval systems
- Identify the analysis tools as they apply to information retrieval systems
- Understands the problems solved in current IR systems
- Describes the advantages of current IR systems
- Understand the difficulty of representing and retrieving documents.
- Understand the latest technologies for linking, describing and searching the web.

### **TEXT BOOK:**

- 1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
- 2 Modern Information Retrieval by Yates Pearson Education.
- 3 Information Storage & Retrieval by Robert Korfhage John Wiley & Sons.

### **REFERENCES:**

- 1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.
- 2. Information retrieval Algorithms and Heuristics, 2ed, Springer

# MOBILE COMPUTING (Elective - 1)

## **OBJECTIVE:**

- To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
- To understand the typical mobile networking infrastructure through a popular GSM protocol
- To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
- To understand the database issues in mobile environments & data delivery models.
- To understand the ad hoc networks and related concepts.
- To understand the platforms and protocols used in mobile environment.

### UNIT- I

**Introduction:** Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

# UNIT –II

(Wireless) Medium Access Control (MAC) :Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

# UNIT –III

**Mobile Network Layer:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

# UNIT –IV

**Mobile Transport Layer:** Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

**Database Issues:** Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

### UNIT- V

**Data Dissemination and Synchronization :** Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols.

# UNIT- VI

Mobile Ad hoc Networks (MANETs) : Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , Mobile Agents, Service Discovery.

**Protocols and Platforms for Mobile Computing :**WAP, Bluetooth, XML, J2ME, Java Card, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices, Android.

## **OUTCOMES:**

- Able to think and develop new mobile application.
- Able to take any new technical issue related to this new paradigm and come up with a solution(s).
- Able to develop new ad hoc network applications and/or algorithms/protocols.
- Able to understand & develop any existing or new protocol related to mobile environment

### **TEXT BOOKS:**

- 1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2009.
- 2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772

### **REFERENCE BOOKS:**

- 1. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, "Mobile Computing, Technology Applications and Service Creation" Second Edition, Mc Graw Hill.
- 2. UWE Hansmann, LotherMerk, Martin S. Nocklous, Thomas Stober, "Principles of Mobile Computing," Second Edition, Springer.

### **CLOUD COMPUTING**

(Elective - 2)

### **OBJECTIVES:**

• The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud based software applications on top of cloud platforms.

### UNIT -I: Systems modeling, Clustering and virtualization

Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency

# UNIT- II: Virtual Machines and Virtualization of Clusters and Data Centers

Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

# **UNIT- III: Cloud Platform Architecture**

Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

### **UNIT -IV: Cloud Programming and Software Environments**

Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

### **UNIT- V: Cloud Resource Management and Scheduling**

Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling MapReduce Applications Subject to Deadlines.

### **UNIT- VI: Storage Systems**

Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore, Amazon Simple Storage Service (S3)

- Understanding the key dimensions of the challenge of Cloud Computing
- Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization
- Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
- Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas

# **TEXT BOOKS:**

- 1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
- 2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
- 3. Cloud Computing, A Hands on approach, ArshadeepBahga, Vijay Madisetti, University Press

### **REFERNCE BOOKS:**

- 1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
- 2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi, TMH

#### SOFTWARE PROJECT MANAGEMENT

(Elective - 2)

#### **OBJECTIVES:**

- To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
- To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
- To understand successful software projects that support organization's strategic goals

### **UNIT -I:Introduction**

Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals

Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure

### **UNIT -II:Project Approach**

Lifecycle models, Choosing Technology, Prototyping

Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows (Book 2)

### **UNIT -III:Effort estimation & activity Planning**

Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation, Activity Identification Approaches, Network planning models, Critical path analysis

### **UNIT -IV: Risk Management**

Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

### **UNIT -V:Project Monitoring & Control, Resource Allocation**

Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling

### **UNIT -VI:Software Quality**

Planning Quality, Defining Quality - ISO 9016, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality

Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality (Book3)

- To match organizational needs to the most effective software development model
- To understand the basic concepts and issues of software project management
- To effectively Planning the software projects
- To implement the project plans through managing people, communications and change
- To select and employ mechanisms for tracking the software projects
- To conduct activities necessary to successfully complete and close the Software projects
- To develop the skills for tracking and controlling software deliverables
- To create project plans that address real-world management challenges

## **TEXT BOOKS:**

- 1. Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill
- 2. Software Project Management, Walker Royce: Pearson Education, 2005.
- 3. Software Project Management in practice, Pankaj Jalote, Pearson.

### **REFERENCE BOOKS:**

1. Software Project Management, Joel Henry, Pearson Education.

### SCRIPTING LANGUAGES

(Elective - 2)

#### **OBJECTIVES:**

- The course demonstrates an in depth understanding of the tools and the scripting languages necessary for design and development of applications dealing with Bio-information/Bio-data.
- The instructor is advised to discuss examples in the context of Bio-data/ Bio-information application development.

### UNIT - I

Introduction to PERL and Scripting Scripts and Programs, Origin of Scripting, Scripting Today, Characteristics of Scripting Languages, Uses for Scripting Languages, Web Scripting, and the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines.

#### UNIT - II

Advanced perl Finer points of looping, pack and unpack, file system, eval, data structures, packages, modules, objects, interfacing to the operating system, Creating Internet ware applications, Dirty Hands Internet Programming, security Issues.

#### UNIT-III

PHP Basics PHP Basics- Features, Embedding PHP Code in your Web pages, Outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures, Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

### UNIT - IV

Advanced PHP Programming PHP and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded, File Based, Database Based, IP Based, Login Administration, Uploading Files with PHP, Sending Email using PHP, PHP Encryption Functions, the Mcrypt package, Building Web sites for the World.

#### UNIT -V

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings, patterns, files, Advance TCL- eval, source, exec and uplevel commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. Tk-Visual Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

### UNIT- VI

Python Introduction to Python language, python-syntax, statements, functions, Built-in-functions and Methods, Modules in python, Exception Handling. Integrated Web Applications in Python – Building Small, Efficient Python Web Systems, Web Application Framework.

- To master the theory behind scripting and its relationship to classic programming.
- To survey many of the modern and way cool language features that show up frequently in scripting languages.
- To gain some fluency programming in Ruby, JavaScript, Perl, Python, and related languages.
- To design and implement one's own scripting language.

# **TEXT BOOKS**:

- 1. The World of Scripting Languages, David Barron, Wiley Publications.
- 2. Python Web Programming, Steve Holden and David Beazley, New Riders Publications.
- 3. Beginning PHP and MySQL, 3rd Edition, Jason Gilmore, Apress Publications (Dream tech)

# **REFERENCE BOOKS:**

- 1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education.
- 2. Programming Python, M.Lutz, SPD.
- 3. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.
- 4. PHP 5.1, I.Bayross and S.Shah, The X Team, SPD.
- 5. Core Python Programming, Chun, Pearson Education.
- 6. Guide to Programming with Python, M.Dawson, Cengage Learning.
- 7. Perl by Example, E.Quigley, Pearson Education.

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#### SOFTWARE ARCHITECTURE AND DESIGN PATTERNS LAB

#### Software Architecture Lab

The course project is divided in 6 small components that will be performed during the different lab sessions; there are, in principle, 7 lab sessions. The project consists of the design and implementation of the software architecture of a Weather Mapping System (WMS). Implementation will take place both in Java and C++ (combination of both languages). Each lab assignment consists of a theoretical part and a practical part, which are defined in specific lab assignment statements that are posted at least one or two weeks before the session.

Report and demo (if applicable) for each assignment is due for the following session.

### **1. Tool Presentation**

This session is an introductory session; there is no lab assignment for this session.

Introduction to working with an industrial strength software development environment, namely Rational Rose: how to write and maintain a UML specification; configuration management; architecture design; CORBA-IDL document generation; Java code generation from a UML model etc.

Presentation of the Project: Weather Mapping System.

### 2. Use Case View

Design of the Use Case View. Risk Analysis.

### **3: Logical View**

Design of the Logical View of the Weather Mapping System (WMS).

### 4: Integrating Patterns in the Architecture

Integration of selected architectural and design patterns in the logical view obtained previously.

# 5: Implementation, Process, and Deployment Views

Design of the implementation, process, and deployment views for the Weather Mapping System.

### 6: Component and Interprocess Communication Design

Generation from the previous architecture design of CORBA Interfaces and Components Definitions.

## **7: Implementation of WMS**

Implementation of the Weather Mapping System (Java & C++), with a particular emphasis on the Interprocess communication mechanism and the software components identified.

## Lab Reports:

Lab reports should include:

- The answers to the questions included in the assignment statement. The answers should motivate briefly your design choices.
- The printout of the diagrams and related documents (e.g. class, use cases, operations descriptions etc.) produced using Rational Rose.

Reference: http://www.ece.uvic.ca/~itraore/seng422-06/eng422-06.html

### **Design Patterns Lab**

### S. No

### Programs

- 1. Use case Diagram for Librarian Scenario
- 2. Using UML design Abstract factory design pattern
- 3. Using UML design Adapter-class Design pattern
- 4. Using UML design Adapter-object Design pattern
- 5. Using UML design Strategy Design pattern
- 6. Using UML design Builder Design pattern
- 7. Using UML design Bridge Design pattern
- 8. Using UML design Decorator Design pattern
- 9. User gives a print command from a word document. Design to represent this chain of responsibility Design pattern
- 10. Design a Flyweight Design pattern
- 11. Using UML design Facade Design pattern

- 12. Using UML design Iterator Design pattern
- 13. Using UML design Mediator Design pattern

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- 14. Using UML design Proxy Design pattern
- 15. Using UML design Visitor Design pattern

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WEB TECHNOLOGIES LAB

### **OBJECTIVES:**

- To acquire knowledge of XHTML, Java Script and XML to develop web applications
- Ability to develop dynamic web content using Java Servlets and JSP
- To understand JDBC connections and Java Mail API
- To understand the design and development process of a complete web application

1. Design the following static web pages required for an online book store web site.

### 1) HOME PAGE:

The static home page must contain three **frames**.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

Left frame: At least four links for navigation, which will display the catalogue of respective links.

For e.g.: When you click the link "MCA" the catalogue for MCABooks should be displayed in the Right frame.

Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site.

Logo		Web Site	Name	
Home	Login	Registration	Catalogue	Cart
mca mba BCA		Description of	the Web Site	

# 2)login page

1.000		Web Site Name		
Home	Login	Registration	Catalogue	Cart
MCA MBA BCA		Login : 11a51f0003 Password: ****** Submit F	Reset	

# 3) CATOLOGUE PAGE:

The catalogue page should contain the details of all the books available in the web site in a table. The details should contain the following:

- 1. Snap shot of Cover Page.
- 2. Author Name.
- 3. Publisher.
- 4. Price.
- 5. Add to cart button.

Logo		Web Site Na	ame	
Home	Login	Registration	Catalogue	Cart
MCA MBA	ML Bible	Book : XML Bible Author : Winston Publication : Wiel	e \$ 40.5 y	Add to cart
BCA	Anter An	Book : Al Author : S.Russe Publication : Prin hall	\$ 63 I ceton	Add to cart
	例發口2007年8日	Book : Java 2 Author : Watson Publication : BPB publications	\$ 35.5	Add to cart
	HTML 4	Book : HTML in Author : Sam Pet Publication : Sam	24 hours \$50 er	Add to cart

# 4. REGISTRATION PAGE:

Create a "registration form "with the following fields

- 1) Name (Text field)
- 2) Password (password field)
- 3) E-mail id (text field)
- 4) Phone number (text field)
- 5) Sex (radio button)
- 6) Date of birth (3 select boxes)
- 7) Languages known (check boxes English, Telugu, Hindi, Tamil)
- 8) Address (text area)

5. Design a web page using CSS (Cascading Style Sheets) which includes the following:

1) Use different font, styles:

In the style definition you define how each selector should work (font, color etc.).

Then, in the body of your pages, you refer to these selectors to activate the styles

6. Write an XML file which will display the Book information which includes the following:

- 1) Title of the book
- 2) Author Name
- 3) ISBN number
- 4) Publisher name
- 5) Edition
- 6) Price

Write a Document Type Definition (DTD) to validate the above XML file.

- 7. Write Ruby program reads a number and calculates the factorial value of it and prints the Same.
- 8. Write a Ruby program which counts number of lines in a text files using its regular Expressions facility.
- 9.Write a Ruby program that uses iterator to find out the length of a string.
- 10. Write simple Ruby programs that uses arrays in Ruby.
- 11. Write programs which uses associative arrays concept of Ruby.
- 12. Write Ruby program which uses Math module to find area of a triangle.
- 13. Write Ruby program which uses tk module to display a window
- 14. Define complex class in Ruby and do write methods to carry operations on complex objects.
- 15. Write a program which illustrates the use of associative arrays in perl.
- 16.Write perl program takes set names along the command line and prints whether they are regular files or special files
- 17. Write a perl program to implement UNIX `passed' program
- 18. An example perl program to connect to a MySQl database table and executing simple commands.
- 19. Example PHP program for cotactus page.
- 20. User Authentication:

Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.

1. Create a Cookie and add these four user id's and passwords to this Cookie.

2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.

If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user ". Use init-parameters to do this.

21. Example PHP program for registering users of a website and login.

22. Install a database(Mysql or Oracle).

Create a table which should contain at least the following fields: name, password, email-id, phone number(these should hold the data from the registration form).

Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.

Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

23. Write a PHP which does the following job:

Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).

24.Create tables in the database which contain the details of items (books in our case like Book name, Price, Quantity, Amount) of each category. Modify your catalogue page (week 2)in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP

25.HTTP is a stateless protocol. Session is required to maintain the state.

The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time(i.e., from different systems in the LAN using the ip-address instead of local host). This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method session. Invalidate ().

Modify your catalogue and cart PHP pages to achieve the above mentioned functionality using sessions.

# **OUTCOMES:**

- Students will be able to develop static web sites using XHTML and Java Scripts
- To implement XML and XSLT for web applications
- Develop Dynamic web content using Java Servlets and JSP
- To develop JDBC connections and implement a complete Dynamic web application

	$\mathbf{L}$	Т	Р	С
IV Year – II Semester	4	0	0	3

#### DISTRIBUTED SYSTEMS

#### **OBJECTIVES:**

- Provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission, IPC mechanisms in distributed systems, Remote procedure calls.
- Expose students to current technology used to build architectures to enhance distributed Computing infrastructures with various computing principles

#### UNIT-I:

**Characterization of Distributed Systems:** Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

**System Models:** Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

#### **UNIT-II:**

**Interprocess Communication:** Introduction, The API for the Internet Protocols- The Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.

#### **UNIT-III:**

**Distributed Objects and Remote Invocation:** Introduction, Communication between Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

### **UNIT-IV:**

**Operating System Support:** Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

### **UNIT-V:**

**Distributed File Systems:** Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.

**Coordination and Agreement:** Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

### **UNIT-VI:**

**Transactions & Replications:** Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

- Develop a familiarity with distributed file systems.
- Describe important characteristics of distributed systems and the salient architectural features of such systems.
- Describe the features and applications of important standard protocols which are used in distributed systems.
- Gaining practical experience of inter-process communication in a distributed environment

# **TEXT BOOKS:**

- 1. Ajay D Kshemkalyani, MukeshSighal, "Distributed Computing, Principles, Algorithms and Systems", Cambridge
- 2. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems- Concepts and Design", Fourth Edition, Pearson Publication

# **REFERENCE BOOKS**

1. Distributed-Systems-Principles-Paradigms-Tanenbaum PHI

IV Voor II Somostor	L	Т	Р	С
iv i ear – ii Semester	4	0	0	3

#### MANAGEMENT SCIENCE

**Course Objectives:** 

\*To familiarize with the process of management and to provide basic insight into select contemporary management practices

\*To provide conceptual knowledge on functional management and strategic management.

### UNIT I

**Introduction to Management**: Concept –nature and importance of Management –Generic Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization – Organizational typology- International Management: Global Leadership and Organizational behavior Effectiveness(GLOBE) structure

### UNIT II

**Operations Management**: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

### UNIT III

**Functional Management**: Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management-Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions. Operationlizing change through performance management.

### UNIT IV

**Project Management**: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

### Unit V

**Strategic Management**: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives. Global strategies, theories of Multinational Companies.

### UNIT VI

**Contemporary Management Practice**: Basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management, Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

#### **Course Outcome:**

- \*After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
- \*Will familiarize with the concepts of functional management project management and strategic management.

#### **Text Books**

- 1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, 'Management Science' Cengage, Delhi, 2012.
- 2. Dr. A. R. Aryasri, Management Science' TMH 2011.

#### **References:**

- 1. Koontz & Weihrich: 'Essentials of management' TMH 2011
- 2. Seth & Rastogi: Global Management Systems, Cengage learning, Delhi, 2011
- 3. Robbins: Organizational Behaviour, Pearson publications, 2011
- 4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011
- 5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
- 6. Biswajit Patnaik: Human Resource Management, PHI, 2011
- 7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning
- 8. Prem Chadha: Performance Management, Trinity Press(An imprint of Laxmi Publications Pvt. Ltd.) Delhi 2015.
- 9. Anil Bhat& Arya Kumar : Principles of Management, Oxford University Press, New Delhi, 2015.

IV Voor II Somostor	L	Т	Р	С
iv iear – II Semester	4	0	0	3

#### MACHINE LEARNING

#### **OBJECTIVES:**

- Familiarity with a set of well-known supervised, unsupervised and semi-supervised
- learning algorithms.
- The ability to implement some basic machine learning algorithms
- Understanding of how machine learning algorithms are evaluated

**UNIT -I:The ingredients of machine learning, Tasks:** the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. **Binary classification and related tasks:** Classification, Scoring and ranking, Class probability estimation

**UNIT- II:Beyond binary classification:**Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning**: The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts

**UNIT- III: Tree models:** Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:**Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

**UNIT -IV:Linear models:** The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods.**Distance Based Models:** Introduction, Neighbours and exemplars, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering.

**UNIT- V:Probabilistic models:** The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihoodProbabilistic models with hidden variables.**Features:** Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

**UNIT- VI: Dimensionality Reduction:** Principal Component Analysis (PCA), Implementation and demonstration. **Artificial Neural Networks:**Introduction, Neural network representation, appropriate problems for neural network learning, Multilayer networks and the back propagation algorithm.

- Recognize the characteristics of machine learning that make it useful to real-world
- Problems.
- Characterize machine learning algorithms as supervised, semi-supervised, and
- Unsupervised.
- Have heard of a few machine learning toolboxes.
- Be able to use support vector machines.
- Be able to use regularized regression algorithms.
- Understand the concept behind neural networks for learning non-linear functions.

# **TEXT BOOKS:**

1. Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.

2. Machine Learning, Tom M. Mitchell, MGH.

# **REFERENCE BOOKS:**

1. UnderstandingMachine Learning: From Theory toAlgorithms, Shai Shalev-Shwartz, Shai Ben-

David, Cambridge.

2. Machine Learning in Action, Peter Harington, 2012, Cengage.

# CONCURRENT AND PARALLEL PROGRAMMING

(Elective - 3)

# **OBJECTIVES:**

- Improvement of students comprehension of CPP, new programming concepts, paradigms and idioms
- Change of 'mood' regarding Concurrency counter-intuitiveness
- Proactive attitude: theoretical teaching shouldn't be so dull
- Multipath, individually paced, stop-and-replay, personalized learning process
- Frequent assessment of learning advances on the subject

# UNIT-1

Concurrent versus sequential programming. Concurrent programming constructs and race condition. Synchronization primitives.

# UNIT-II

Processes and threads. Interprocess communication. Livelock and deadlocks, starvation, and deadlock prevention. Issues and challenges in concurrent programming paradigm and current trends.

# UNIT-III

Parallel algorithms - sorting, ranking, searching, traversals, prefix sum etc.,

# UNIT- IV

Parallel programming paradigms – Data parallel, Task parallel, Shared memory and message passing, Parallel Architectures, GPGPU, pthreads, STM,

# UNIT-V

OpenMP, OpenCL, Cilk++, Intel TBB, CUDA

# UNIT-VI

Heterogeneous Computing: C++AMP, OpenCL

- Understanding improvement of CPP concepts presented
- The number of reinforcement-exercises assigned
- The time required for the resolution of exercises
- Compliance level with the new model of theoretical teaching

# **TEXT BOOKS:**

- 1. Mordechai Ben-Ari. Principles of Concurrent and Distributed Programming, Prentice-Hall International.
- 2. Greg Andrews. Concurrent Programming: Principles and Practice, Addison Wesley.
- 3. GadiTaubenfeld. Synchronization Algorithms and Concurrent Programming, Pearson.
- 4. M. Ben-Ari. Principles of Concurrent Programming, Prentice Hall.
- 5. Fred B. Schneider. On Concurrent Programming, Springer.
- 6. Brinch Hansen. The Origins of Concurrent Programming: From Semaphor

# ARTIFICIAL NEURAL NETWORKS (Elective-3)

#### **OBJECTIVES:**

- Understand the role of neural networks in engineering, artificial intelligence, and cognitive modeling.
- Provide knowledge of supervised learning in neural networks
- Provide knowledge of computation and dynamical systems using neural networks
- Provide knowledge of reinforcement learning using neural networks.
- Provide knowledge of unsupervised learning using neural networks.
- Provide hands-on experience in selected applications

### **UNIT-I: Introduction and ANN Structure.**

Biological neurons and artificial neurons. Model of an ANN. Activation functions used in ANNs. Typical classes of network architectures.

### UNIT-II

Mathematical Foundations and Learning mechanisms.Re-visiting vector and matrix algebra. State-space concepts. Concepts of optimization. Error-correction learning. Memory-based learning. Hebbian learning. Competitive learning.

### UNIT-III

Single layer perceptrons. Structure and learning of perceptrons. Pattern classifier - introduction and Bayes' classifiers. Perceptron as a pattern classifier. Perceptron convergence. Limitations of a perceptrons.

### **UNIT-IV: Feed forward ANN.**

Structures of Multi-layer feed forward networks. Back propagation algorithm. Back propagation - training and convergence. Functional approximation with back propagation. Practical and design issues of back propagation learning.

### **UNIT-V: Radial Basis Function Networks.**

Pattern separability and interpolation. Regularization Theory. Regularization and RBF networks.RBF network design and training. Approximation properties of RBF.

### **UNIT-VI:** Support Vector machines.

Linear separability and optimal hyperplane.Determination of optimal hyperplane. Optimal hyperplane for nonseparable patterns.Design of an SVM.Examples of SVM.
# **OUTCOMES:**

- This course has been designed to offer as a graduate-level/ final year undergraduate level elective subject to the students of any branch of engineering/ science, having basic foundations of matrix algebra, calculus and preferably (not essential) with a basic knowledge of optimization.
- Students and researchers desirous of working on pattern recognition and classification, regression and interpolation from sparse observations; control and optimization are expected to find this course useful. The course covers theories and usage of artificial neural networks (ANN) for problems pertaining to classification (supervised/ unsupervised) and regression.
- The course starts with some mathematical foundations and the structures of artificial neurons, which mimics biological neurons in a grossly scaled down version. It offers mathematical basis of learning mechanisms through ANN. The course introduces perceptrons, discusses its capabilities and limitations as a pattern classifier and later develops concepts of multilayer perceptrons with back propagation learning.

# **TEXT BOOKS:**

- 1. Simon Haykin, "Neural Networks: A comprehensive foundation", Second Edition, Pearson Education Asia.
- 2. Satish Kumar, "Neural Networks: A classroom approach", Tata McGraw Hill, 2004.

# **REFERENCE BOOKS:**

1. Robert J. Schalkoff, "Artificial Neural Networks", McGraw-Hill International Editions, 1997.

#### **OPERATION RESEARCH**

(Elective - 3)

## **OBJECTIVE:**

- Identify and develop operational research models from the verbal description of the real system.
- Understand the mathematical tools that are needed to solve optimisation problems.
- Use mathematical software to solve the proposed models.
- Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes in Management Engineering

### UNIT-I:

Introduction to Operations Research: Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem – Formulation of LPP, Graphical solution of LPP. Simplex Method, Artificial variables, big-M method, two-phase method, degeneracy and unbound solutions.

### UNIT-II:

Transportation Problem. Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: the stepping stone method and MODI method

# UNIT-III:

Assignment model. Formulation. Hungarian method for optimal solution. Solving unbalanced problem. Traveling salesman problem and assignment problem Sequencing models. Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines – Processing 2 Jobs through m machines – Processing n Jobs through m Machines

# UNIT-IV:

Dynamic programming. Characteristics of dynamic programming. Dynamic programming approach for Priority Management employment smoothening, capital budgeting, Stage Coach/Shortest Path, cargo loading and Reliability problems Games Theory. Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy for 2 X 2 games

# UNIT-V:

Replacement Models. Replacement of Items that Deteriorate whose maintenance costs increase with time without change in the money value. Replacement of items that fail suddenly: individual replacement policy, group replacement policy

# **UNIT-VI:**

Inventory models. Inventory costs. Models with deterministic demand – model (a) demand rate uniform and production rate infinite, model (b) demand rate non-uniform and production rate infinite, model (c) demand rate uniform and production rate finite.

# **OUTCOME:**

- Methodology of Operations Research.
- Linear programming: solving methods, duality, and sensitivity analysis.
- Integer Programming.
- Network flows.
- Multi-criteria decision techniques.
- Decision making under uncertainty and risk.
- Game theory. Dynamic programming.

# **TEXT BOOKS:**

- 1. P. Sankara Iyer," Operations Research", Tata McGraw-Hill, 2008.
- 2. A.M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education, 2005.

# **REFERENCE BOOKS:**

- 1. J K Sharma. "Operations Research Theory & Applications, 3e", Macmillan India Ltd, 2007.
- 2. P. K. Gupta and D. S. Hira, "Operations Research", S. Chand & co., 2007.
- 3. J K Sharma., "Operations Research, Problems and Solutions, 3e", Macmillan India Ltd
- 4. N.V.S. Raju, "Operations Research", HI-TECH, 2002

N/ Vacan II Composition		L	Т	Р	С
Iv Tear – II Semester		0	3	0	2
SEMIN	AR				

IV Voor II Comostor		L	Т	Р	С
IV Tear – II Semester		0	0	0	10
	PROJECT				

# COURSE STRUCTURE AND SYLLABUS

# FOR

# **INFORMATION TECHNOLOGY**

(Applicable for batches admitted from 2016-2017)



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA KAKINADA - 533 003, Andhra Pradesh, India

Ι	Year	-	I	Semester
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S. No.	Subjects	L	Т	Р	Credits
1-HS	English – I	4			3
2-BS	Mathematics - I	4			3
3-BS	Mathematics – II (Mathematical Methods)	4			3
4-BS	Applied Physics	4			3
5	Computer Programming	4			3
6-ES	Engineering Drawing	4	-		3
7-HS	English - Communication Skills Lab - 1			3	2
8-BS	Applied / Engineering Physics Lab			3	2
9-ES	Applied / Engineering Physics – Virtual Labs – Assignments			2	
10	Computer Programming Lab			3	2
	Total Credits				24

# I Year - II SEMESTER

S. No.	Subjects	L	Т	Р	Credits
1-HS	English – II	4			3
2-BS	Mathematics - III	4			3
3-BS	Applied Chemistry	4			3
4	Object Oriented Programming through C++	4			3
5-HS	Environmental Studies	4			3
6-ES	Engineering Mechanics	4			3
7-BS	Applied / Engineering Chemistry Laboratory			3	2
8-HS	English - Communication Skills Lab – 2			3	2
9	Object Oriented Programming Lab			3	2
	Total Credits				24

# II Year - I Semester

S. No.	Subjects	L	Т	Р	Credits
1-HS	Statistics with R Programming	4			3
2	Mathematical Foundations of Computer	4			3
	Science	•			-
3	Digital Logic Design	4			3
4	Python Programming	4			3
5	Data Structures through C++	4			3
6	Software Engineering	4			3
7	Data Structures through C++ Lab			3	2
8	Python Programming Lab			3	2
	Total Credits				22

# II Year - II Semester

S. No.	Subjects	L	Т	Р	Credits
1	Computer Graphics	4			3
2	Java Programming	4			3
3	E-Commerce	4			3
4	Computer Organization	4			3
5	Object Oriented Analysis and Design using UML	4			3
6	Principles of Programming Languages	4			3
7	Unified Modeling Languages Lab			3	2
8	Java Programming Lab			3	2
	Total Credits				22

S. No.	Subjects	L	Т	Р	Credits
1	Human Computer Interaction	4			3
2	Unix and Shell Programming	4			3
3	Advanced Java Programming	4			3
4	Database Management Systems	4			3
5	Operating Systems	4			3
6	Advanced Java Programming Lab				2
7	Unix and Operating Systems Lab			3	2
8	Database Management System Lab			3	2
MC	Professional Ethics & Human Values		3		
	Total Credits				21

# III Year - II Semester

S. No.	Subjects	L	Т	Р	Credits
1	Computer Networks	4			3
2	Data Mining	4			3
3	Web Technologies	4			3
4	Software Testing Methodologies	4			3
5	Open Elective: i. Artificial Intelligence ii. Social Networks and Semantic Web iii.Digital Signal Processing iv.Embbeded Systems v. Robotics vi.Operations Research	4			3
6	Web Technologies Lab			3	2
7	Software Testing Lab			3	2
8	Data Mining Lab			3	2
9	IPR & Patents		2		
	Total Credits				21

# IV Year - I Semester

S. No.	Subjects	L	Т	Р	Credits
1	Cryptography and Network Security	4			3
2	Mobile Computing	4			3
3	Data Ware Housing and Business Intelligence	4			3
4- HS	Managerial Economics and Financial Analysis	4			3
5	Elective-I i. Big Data Analytics ii. Information Retrieval Systems iii. Internet of Things iv. Multimedia Programming	4			3
6	Elective-II i. Cloud Computing ii. Software Project Management iii. Machine Learning iv. Decision Support System	4			3
7	Mobile Computing Lab			3	2
8	Cryptography and Network Security Lab			3	2
	Total Credits				22

# IV Year - II Semester

S. No.	Subjects	L	Т	Р	Credits
1	Distributed Systems	4			3
2- HS	Management Science	4			3
3	Management Information System	4			3
4	Elective-III i. Concurrent and Parallel Programming ii. Cyber Security iii. Artificial Neural Networks iv. Software Quality Assurance	4			3
5	Seminar		3	-	2
6	Project				10
	Total credits				24

Total Course Credits = 48+44 + 42 + 46 = 180

#### **SYLLABUS**

#### I Year - I Semester

L T P C 4 0 0 3

#### **ENGLISH - I**

#### Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

#### **Objectives:**

- 1. To imporve the language proficiency of the students in English with emphasis on LSRW skills.
- 2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theorotical and practical components.
- 3. To develop the communication skills of the students in both formal and informal situations.

#### **LISTENING SKILLS:**

#### **Objectives:**

- 1. To enable the students to appreciate the role of listening skill and improve their pronounciation.
- 2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
- 3. To enable the students to listen for general content, to fill up information and for specific information.

## **SPEAKING SKILLS:**

#### **Objectives:**

- 1. To make the students aware of the importance of speaking for their personal and professional communication.
- 2. To enable the students to express themselves fluently and accurately in social and professional success.
- 3. To help the students describe objects, situations and people.
- 4. To make the students participate in group activities like roleplays, discussions and debates.
- 5. To make the students particiapte in Just a Minute talks.

# **READING SKILLS:**

# **Objectives:**

- 1. To enable the students to comprehend a text through silent reading.
- 2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
- 3. To enable the students to skim and scan a text.
- 4. To enable the students to identify the topic sentence.
- 5. To enable the students to identify discourse features.
- 6. To enable the students to make intensive and extensive reading.

# WRITING SKILLS:

# **Objectives:**

- 1. To make the students understand that writing is an exact formal skills.
- 2. To enable the students to write sentences and paragraphs.
- 3. To make the students identify and use appropriate vocabulary.
- 4. To enable the students to narrate and describe.
- 5. To enable the students capable of note-making.
- 6. To enable the students to write coherently and cohesively.
- 7. To make the students to write formal and informal letters.
- 8. To enable the students to describe graphs using expressions of comparision.
- 9. To enable the students to write techincal reports.

#### Methodology:

- 1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
- 2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.

- 3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher interventionis perimitted as per the complexity of the task/exercise.
- 4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
- 5. The teacher is perimitted to use lecture method when a completely new concept is introduced in the class.

# **Assessment Procedure: Theory**

- 1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
- 2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the langauge skills learnt in the unit are to be tested.
- 3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails,letters and reports-- are to be tested along with appropriate langauge and expressions.
- 4. Examinations: I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%

(80% for the best of two and 20% for the other)

Assignments= 5%

End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech I Semester (Common for all branches) and I B.Pharma I Sem of JNTU Kakinada from the academic year 2016-17

(R-16 Regulations)

# **DETAILED TEXTBOOK:**

# ENGLISH FOR ENGINEERS AND TECHNOLOGISTS, Published by Orient Blackswan Pvt Ltd

# **NON-DETAILED TEXTBOOK:**

# PANORAMA: A COURSE ON READING, Published by Oxford University Press India

The course content along with the study material is divided into six units.

# UNIT I:

1. 'Human Resources' from English for Engineers and Technologists.

# **OBJECTIVE:**

To develop human resources to serve the society in different ways.

# **OUTCOME:**

The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly.

2. 'An Ideal Family' from Panorama: A Course on Reading

# **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

# **OUTCOME:**

Acquisition of writing skills

# **UNIT 2:**

1. 'Transport: Problems and Solutions' from English for Engineers and Technologists.

# **OBJECTIVE:**

To highlight road safety measures whatever be the mode of transport.

# **OUTCOME:**

The lesson motivates the public to adopt road safety measures.

2. 'War' from 'Panorama : A Course on Reading'

# **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

# **OUTCOME:**

Acquisition of writing skills

# **UNIT 3:**

1. 'Evaluating Technology' from English for Engineers and Technologists.

# **OBJECTIVE:**

To highlight the advantages and disadvantages of technology.

# **OUTCOME:**

The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival.

2. 'The Verger' from 'Panorama : A Course on Reading'

# **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

# **OUTCOME:**

Acquisition of writing skills

# **UNIT 4:**

1. 'Alternative Sources of Energy' from English for Engineers and Technologists.

# **OBJECTIVE:**

To bring into focus different sources of energy as alternatives to the depleting sources.

# **OUTCOME:**

The lesson helps to choose a source of energy suitable for rural India.

2. ' The Scarecrow' from Panorama : A Course on Reading

# **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

# **OUTCOME:**

Acquisition of writing skills

# **UNIT 5:**

1. 'Our Living Environment' from English for Engineers and Technologists.

# **OBJECTIVE:**

To highlight the fact that animals must be preserved beacuase animal life is precious.

# **OUTCOME:**

The lesson creates an awareness in the reader as to the usefulness of animals for the human society.

2. 'A Village Host to Nation' from Panorama : A Course on Reading

# **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

# **OUTCOME:**

Acquisition of writing skills

# **UNIT 6:**

1. 'Safety and Training' from English for Engineers and Technologists.

# **OBJECTIVE:**

To highlight the possibility of accidents in laboratories, industries and other places and to follow safety measures.

# **OUTCOME:**

The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.

2. 'Martin Luther King and Africa' from Panorama : A Course on Reading

# **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

# **OUTCOME:**

Acquisition of writing skills

# NOTE:

All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

# **OVERALL COURSE OUTCOME:**

- 1. Using English languages, both written and spoken, competently and correctly.
- 2. Improving comprehension and fluency of speech.
- **3.** Gaining confidence in using English in verbal situations.

# MODEL QUESTION PAPER FOR THEORY

# PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

# PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

- A will be from the main text: 5 marks
- B from non-detailed text: 3 marks
- C on grammar and Vocabulary: 6 marks

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#### **MATHEMATICS-I**

#### (Common to ALL branches of First Year B.Tech.)

#### **Course Objectives:**

- 1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
- 2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

#### **Course Outcomes: At the end of the Course, Student will be able to:**

- 1. Solve linear differential equations of first, second and higher order.
- 2. Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
- 3. Calculate total derivative, Jocobian and minima of functions of two variables.

#### UNIT I: Differential equations of first order and first degree:

Linear-Bernoulli-Exact-Reducible to exact.

Applications: Newton's Law of cooling-Law of natural growth and decay-Orthogonal trajectories- Electrical circuits- Chemical reactions.

#### UNIT II: Linear differential equations of higher order:

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type  $e^{ax}$ , sin ax, cos ax, polynomials in x,  $e^{ax} V(x)$ , xV(x)- Method of Variation of parameters. Applications: LCR circuit, Simple Harmonic motion.

#### **UNIT III: Laplace transforms:**

Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

#### **UNIT IV: Partial differentiation:**

Introduction- Homogeneous function-Euler's theorem-Total derivative-Chain rule-Generalized Mean value theorem for single variable (without proof)-Taylor's and Mc Laurent's series expansion of functions of two variables– Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

# **UNIT V: First order Partial differential equations:**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

### **UNIT VI: Higher order Partial differential equations:**

Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type  $e^{ax+by}$ ,  $\sin(ax+by)$ ,  $\cos(ax+by)$ ,  $x^m y^n$ . Classification of second order partial differential equations.

#### **Text Books:**

- 1. B.S.Grewal, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

#### **Reference Books:**

- 1. Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India
- 2. Micheael Greenberg, Advanced Engineering Mathematics, 9<sup>th</sup> edition, Pearson edn
- 3. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
- 4. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
- 5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
- 6. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

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#### MATHEMATICS-II (Mathematical Methods) (Common to ALL branches of First Year B.Tech.)

### **Course Objectives:**

- 1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
- 2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
- 3. Understand the most basic numerical methods to solve simultaneous linear equations.

# **Course Outcomes: At the end of the Course, Student will be able to:**

- 1. Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators.
- 2. Compute interpolating polynomial for the given data.
- 3. Solve ordinary differential equations numerically using Euler's and RK method.
- 4. Find Fourier series and Fourier transforms for certain functions.
- 5. Identify/classify and solve the different types of partial differential equations.

#### **UNIT I: Solution of Algebraic and Transcendental Equations:**

Introduction- Bisection method – Method of false position – Iteration method – Newton-Raphson method (One variable and simultaneous Equations).

#### **UNIT II: Interpolation:**

Introduction- Errors in polynomial interpolation – Finite differences- Forward differences-Backward differences –Central differences – Symbolic relations and separation of symbols -Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.

### **UNIT III: Numerical Integration and solution of Ordinary Differential equations:**

Trapezoidal rule- Simpson's 1/3<sup>rd</sup> and 3/8<sup>th</sup> rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations-Euler's method - Runge-Kutta method (second and fourth order).

#### **UNIT IV: Fourier Series:**

Introduction- Periodic functions – Fourier series of -periodic function - Dirichlet's conditions – Even and odd functions –Change of interval– Half-range sine and cosine series.

#### **UNIT V: Applications of PDE:**

Method of separation of Variables- Solution of One dimensional Wave, Heat and twodimensional Laplace equation.

#### **UNIT VI: Fourier Transforms:**

Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

#### **Text Books:**

- 1. B.S.Grewal, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

# **Reference Books:**

- 1. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
- 2. V.Ravindranath and P.Vijayalakshmi, Mathematical Methods, Himalaya Publishing House.
- 3. Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India
- **4. David Kincaid, Ward Cheney**, Numerical Analysis-Mathematics of Scientific Computing, 3<sup>rd</sup> Edition, Universities Press.
- 5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
- 6. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

#### **APPLIED PHYSICS**

### (CSE, ECE, EEE, IT, EIE, E.Com.E)

<u>**OBJECTIVES:**</u> Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by JNTUniv.Kkd. that serves as a transit to understand the branch specific advanced topics. The courses are designed to:

- Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.
- Teach Concepts of coherent sources, its realization and utility optical instrumentation.
- Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.
- Understand the physics of Semiconductors and their working mechanism for their utility in sensors.

#### UNIT-I

**INTERFERENCE:** Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings – construction and basic principle of Interferometers.

# UNIT-II

**DIFFRACTION:** Fraunhofer diffraction at single slit - Cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscopes.

#### UNIT-III

**POLARIZATION:** Types of Polarization – Methods of production - Nicol Prism -Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter).

**LASERS:** Characteristics– Stimulated emission – Einstein's Transition Probabilities- Pumping schemes - Ruby laser – Helium Neon laser.

#### UNIT-IV

**ELECTROMAGNETIC FIELDS:** Scalar and Vector Fields – Electric Potential- Gradient, Divergence of fields – Gauss and Stokes theorems-Propagation of EM waves through dielectric medium.

#### UNIT-V

QUANTUM MECHANICS: Introduction - Matter waves – Schröedinger Time Independent and Time Dependent wave equations – Particle in a box. FREE ELECTRON THEORY: Defects of Classical free electron theory –Quantum Free electron theory - concept of Fermi Energy.

# UNIT-VI

**BAND THEORY OF SOLIDS:** Bloch's theorem (qualitative) – Kronig – Penney model – energy bands in crystalline solids – classification of crystalline solids – effective mass of electron & concept of hole.

**SEMICONDUCTOR PHYSICS:** Conduction – Density of carriers in Intrinsic and Extrinsic semiconductors – Drift & Diffusion – relevance of Einstein's equation- Hall effect in semiconductors

**Outcome**: Construction and working details of instruments, i.e., Interferometer, Diffractometer and Polarimeter are learnt. Study EM-fields and semiconductors under the concepts of Quantum mechanics paves way for their optimal utility.

# **Text Books**

- 1. A Text book of Engineering Physics by Dr. M.N.Avadhanulu and Dr.P.G.Kshira sagar, S.Chand & Company Ltd., (2014)
- 2. 'Solid State Physics' by A.J.Dekker, Mc Millan Publishers (2011)
- 3. Engineering Physics by D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

# **Reference Books**

- 1. Applied Physics by P.K.Palanisamy, Scitech publications (2014)
- 2. Lasers and Non-Linear optics by B.B.Laud, New Age International Publishers (2008).
- 3. Engineering Physics by M. Arumugam, Anuradha Publication (2014)

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## **COMPUTER PROGRAMMING**

### Learning objectives:

Formulating algorithmic solutions to problems and implementing algorithms in C.

- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

#### **UNIT-I:**

**History and Hardware** - Computer Hardware, Bits and Bytes, Components, Programming Languages - Machine Language, Assembly Language, Low- and High-Level Languages, Procedural and Object-Oriented Languages, Application and System Software, The Development of C Algorithms The Software Development Process.

#### UNIT-II:

Introduction to C Programming- Identifiers, The main () Function, The printf () Function

**Programming Style** - Indentation, Comments, Data Types, Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization.

**Assignment** - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

#### UNIT -III:

#### **Control Flow-Relational Expressions - Logical Operators:**

**Selection**: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples. **Repetition**: Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, The while Statement, The for Statement, Nested Loops, The dowhile Statement.

#### UNIT-IV

**Modular Programming:** Function and Parameter Declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Storing Addresses, Using Addresses, Declaring and Using Pointers, Passing Addresses to a Function.

Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

### UNIT-V:

# Arrays & Strings

**Arrays:** One-DimensionalArrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, LargerDimensionalArrays- Matrices **Strings:** String Fundamentals, String Input and Output, String Processing, Library Functions

### **UNIT-VI:**

#### **Pointers, Structures, Files**

**Pointers**: Concept of a Pointer, Initialisation of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.

**Structures**: Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.

**Data Files**: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

#### **Outcomes:**

- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers
- Use different data structures and create/update basic data files.

# **Text Books:**

- 1. ANSI C Programming, Gary J. Bronson, Cengage Learning.
- 2. Programming in C, Bl Juneja Anita Seth, Cengage Learning.
- 3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

# **Reference Books:**

- 1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
- 2. Programming with C, Bichkar, Universities Press.
- 3. Programming in C, ReemaThareja, OXFORD.
- 4. C by Example, Noel Kalicharan, Cambridge.

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#### **ENGINEERING DRAWING**

**Objective**: Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

- To introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.
- To introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.
- To make the students draw the projections of the lines inclined to both the planes.
- To make the students draw the projections of the plane inclined to both the planes.
- To make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
- To represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

**UNIT I** Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

**UNIT II** Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

**UNIT III** Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

**UNIT IV** Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

**UNIT V** Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

**UNIT VI** Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

# **Text Books:**

- 1. Engineering Drawing, N. D. Butt, Chariot Publications
- 2. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers.
- 3. Engineering Graphics, P.I. Varghese, McGraw Hill Publishers

## **Reference Books:**

- 1. Engineering Graphics for Degree, K. C. John, PHI Publishers
- 2. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers
- 3. Engineering Drawing + AutoCad K Venugopal, V. Prabhu Raja, New Age

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### **ENGLISH - COMMUNICATION SKILLS LAB - I**

#### PRESCRIBED LAB MANUAL FOR SEMESTER I:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

#### **OBJECTIVES:**

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

#### **OUTCOME:**

A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

#### **UNIT 1:**

- 1. WHY study Spoken English?
- 2. Making Inqueries on the phone, thanking and responding to Thanks Practice work.

#### **UNIT 2:**

1. Responding to Requests and asking for Directions Practice work.

#### **UNIT 3:**

- 1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
- 2. Apologising, Advising, Suggesting, Agreeing and Disagreeing Practice work.

#### **UNIT 4:**

1. Letters and Sounds Practice work.

#### **UNIT 5:**

1. The Sounds of English Practice work.

# UNIT 6:

- 1. Pronunciation
- 2. Stress and Intonation Practice work.

# **Assessment Procedure: Laboratory**

- 1. Every lab session (150 minutes) should be handled by not less than two teachers (three would be ideal) where each faculty has to conduct a speaking activity for 20/30 students.
- 2. The teachers are to assess each learner in the class for not less than 10 speaking activities, each one to be assessed for 10 marks or 10%. The average of 10 day-to-day activity assessments is to be calculated for 10 marks for internal assessment.

The rubric given below has to be filled in for all the students for all activities.

# The rubric to assess the learners:

Body lar	nguage	Fluency & Audibility	Clarity in Speech	Neutrali ation accent	z of	Appropriate Language		Total 10 marks	Remarks
Gesture s & Posture s	Eye Conta ct					Gramm ar	Vocabu lary & expressi ons		
							<u>.</u>		

# • Lab Assessment: Internal (25 marks)

1. Day-to-Day activities: 10 marks

- 2. Completing the exercises in the lab manual: 5 marks
- 3. Internal test (5 marks written and 5 marks oral)

# • Lab Assessment: External (50 marks)

- 1. Written test: 20 marks (writing a dialogue, note-taking and answering questions on listening to an audio recording.
- 2. Oral: Reading aloud a text or a dialogue- 10 marks
- 3. Viva-Voce by the external examiner: 20 marks

#### **Reference Books:**

- 1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
- 2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
- 3. Unlock, Listening and speaking skills 2, Cambridge University Press
- 4. Spring Board to Success, Orient BlackSwan
- 5. A Practical Course in effective english speaking skills, PHI
- 6. Word power made handy, Dr shalini verma, Schand Company
- 7. Let us hear them speak, Jayashree Mohanraj, Sage texts
- 8. Professional Communication, Aruna Koneru, Mc Grawhill Education
- 9. Cornerstone, Developing soft skills, Pearson Education

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# **APPLIED/ENGINEERING PHYSICS LAB**

### (Any 10 of the following listed experiments)

**Objective:** *Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.* 

# LIST OF EXPERIMENTS:

- 1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
- 2. Newton's rings Radius of Curvature of Plano Convex Lens.
- 3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
- 4. Determination of Rigidity modulus of a material- Torsional Pendulum.
- 5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
- 6. Melde's experiment Transverse and Longitudinal modes.
- 7. Verification of laws of vibrations in stretched strings Sonometer.
- 8. Determination of velocity of sound Volume Resonator.
- 9. L- C- R Series Resonance Circuit.
- 10. Study of I/V Characteristics of Semiconductor diode.
- 11. I/V characteristics of Zener diode.
- 12. Characteristics of Thermistor Temperature Coefficients.
- 13. Magnetic field along the axis of a current carrying coil Stewart and Gee's apparatus.
- 14. Energy Band gap of a Semiconductor p n junction.
- 15. Hall Effect in semiconductors.
- 16. Time constant of CR circuit.
- 17. Determination of wavelength of laser source using diffraction grating.
- 18. Determination of Young's modulus by method of single cantilever oscillations.
- 19. Determination of lattice constant lattice dimensions kit.
- 20. Determination of Planck's constant using photocell.

21. Determination of surface tension of liquid by capillary rise method.

**Outcome:** *Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements.* 

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# APPLIED/ENGINEERING PHYSICS - VIRTUAL LABS – ASSIGNMENTS (Constitutes 5% marks of 30marks of Internal-component)

**Objective:** *Training Engineering students to prepare a technical document and improving their writing skills.* 

# LIST OF EXPERIMENTS

- 1. Hall Effect
- 2. Crystal Structure
- 3. Hysteresis
- 4. Brewster's angle
- 5. Magnetic Levitation / SQUID
- 6. Numerical Aperture of Optical fiber
- 7. Photoelectric Effect
- 8. Simple Harmonic Motion
- 9. Damped Harmonic Motion
- 10. LASER Beam Divergence and Spot size
- 11. B-H curve
- 12. Michelson's interferometer
- 13. Black body radiation

URL: <u>www.vlab.co.in</u>

**Outcome:** *Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.* 

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#### **COMPUTER PROGRAMMING LAB**

#### **OBJECTIVES:**

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.

#### Programming

Exercise - 1 Basics

- a) What is an OS Command, Familiarization of Editors vi, Emacs
- b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
- c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

Exercise - 2 Basic Math

- a) Write a C Program to Simulate 3 Laws at Motion
- b) Write a C Program to convert Celsius to Fahrenheit and vice versa

#### Exercise - 3 Control Flow - I

a)Write a C Program to Find Whether the Given Year is a Leap Year or not.b)Write a C Program to Add Digits & Multiplication of a number

**Exercise – 4** Control Flow - II

a)Write a C Program to Find Whether the Given Number is

- i) Prime Number
- ii) Armstrong Number
- b) Write a C program to print Floyd Triangle
- c) Write a C Program to print Pascal Triangle

### **Exercise – 5** Functions

- a) Write a C Program demonstrating of parameter passing in Functions and returning values.
- b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

# Exercise – 6 Control Flow - III

- a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch...case
- b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

Exercise – 7 Functions - Continued

Write a C Program to compute the values of sin x and  $\cos x$  and  $e^x$  values using Series expansion. (use factorial function)

#### **Exercise – 8** Arrays

Demonstration of arrays

- a) Search-Linear.
- b) Sorting-Bubble, Selection.
- c) Operations on Matrix.

### **Exercises - 9** Structures

a)Write a C Program to Store Information of a Movie Using Structure

- b)Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
- c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

# Exercise - 10 Arrays and Pointers

a)Write a C Program to Access Elements of an Array Using Pointer

b) Write a C Program to find the sum of numbers with arrays and pointers.

# Exercise – 11 Dynamic Memory Allocations

- a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
- b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

Understand the difference between the above two programs

#### Exercise – 12 Strings

a) Implementation of string manipulation operations with library function.

- i) copy
- ii) concatenate
- iii) length
- iv) compare

b) Implementation of string manipulation operations without library function.

i) copy

ii) concatenateiii) lengthiv) compare

# Exercise -13 Files

a)Write a C programming code to open a file and to print it contents on screen. b)Write a C program to copy files

## **Exercise - 14** Files Continued

a) Write a C program merges two files and stores their contents in another file. b)Write a C program to delete a file.

### Exercise - 15

a) System Assembling, Disassembling and identification of Parts / Peripherals.b) Operating System Installation-Install Operating Systems like Windows, Linux along with necessary Device

Drivers.

# Exercise - 16

- a) MS-Office / Open Office
  - i) Word Formatting, Page Borders, Reviewing, Equations, symbols.ii) Spread Sheet - organize data, usage of formula, graphs, charts.
  - iii) Powerpoint features of power point, guidelines for preparing an effective presentation.
- b) Network Configuration & Software Installation-Configuring TCP/IP, Proxy, and firewall settings. Installing application software, system software & tools.

# **OUTCOMES:**

- Apply and practice logical ability to solve the problems.
- Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
- Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
- Understand and apply the in-built functions and customized functions for solving the problems.
- Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
- Document and present the algorithms, flowcharts and programs in form of user-manuals
•Identification of various computer components, Installation of software

Note:

# a) All the Programs must be executed in the Linux Environment. (Mandatory)

b) The Lab record must be a print of the LATEX (.tex) Format.

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ENGLISH -II					

#### **Introduction:**

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

#### **Objectives:**

- 1. To imporve the language proficiency of the students in English with emphasis on LSRW skills.
- 2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theorotical and practical components.
- 3. To develop the communication skills of the students in both formal and informal situations.

#### **LISTENING SKILLS:**

#### **Objectives:**

- 4. To enable the students to appreciate the role of listening skill and improve their pronounciation.
- 5. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
- 6. To enable the students to listen for general content, to fill up information and for specific information.

## **SPEAKING SKILLS:**

#### **Objectives:**

- 1. To make the students aware of the importance of speaking for their personal and professional communication.
- 2. To enable the students to express themselves fluently and accurately in social and professional success.
- 3. To help the students describe objects, situations and people.
- 4. To make the students participate in group activities like roleplays, discussions and debates.
- 5. To make the students particiapte in Just a Minute talks.

# **READING SKILLS:**

## **Objectives:**

- 1. To enable the students to comprehend a text through silent reading.
- 2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
- 3. To enable the students to skim and scan a text.
- 4. To enable the students to identify the topic sentence.
- 5. To enable the students to identify discourse features.
- 6. To enable the students to make intensive and extensive reading.

## WRITING SKILLS:

## **Objectives:**

- 1. To make the students understand that writing is an exact formal skills.
- 2. To enable the students to write sentences and paragraphs.
- 3. To make the students identify and use appropriate vocabulary.
- 4. To enable the students to narrate and describe.
- 5. To enable the students capable of note-making.
- 6. To enable the students to write coherently and cohesively.
- 7. To make the students to write formal and informal letters.
- 8. To enable the students to describe graphs using expressions of comparision.
- 9. To enable the students to write techincal reports.

#### Methodology:

- 1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
- 2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.

- 3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher interventionis perimitted as per the complexity of the task/exercise.
- 4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
- 5. The teacher is perimitted to use lecture method when a completely new concept is introduced in the class.

## **Assessment Procedure: Theory**

- 6. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
- 7. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the langauge skills learnt in the unit are to be tested.
- 8. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails,letters and reports-- are to be tested along with appropriate langauge and expressions.
- 9. Examinations:

I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%

(80% for the best of two and 20% for the other)

Assignments= 5%

End semester exams=70%

10. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech II Semester (Common for all branches)and I B.Pharma II Sem of JNTU Kakinada from the academic year 2016-17 (**R-16 Regulations**)

## DETAILED TEXTBOOK: ENGLISH ENCOUNTERS Published by Maruthi Publishers.

# **DETAILED NON-DETAIL:THE GREAT INDIAN SCIENTISTS** Published by **Cenguage** learning

The course content along with the study material is divided into six units.

## **UNIT 1:**

1. 'The Greatest Resource- Education' from English Encounters

## **OBJECTIVE:**

Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts.

#### **OUTCOME:**

The lesson underscores that the ultimate aim of Education is to enhance wisdom.

2. ' A P J Abdul Kalam' from The Great Indian Scientists.

## **OBJECTIVE:**

The lesson highlights Abdul Kalam's contributions to Indian science and the awards he received.

## **OUTCOME:**

Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.

## **UNIT 2:**

1. ' A Dilemma' from English Encounters

**OBJECTIVE:** The lesson centres on the pros and cons of the development of science and technology.

**OUTCOME:** The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.

2. 'C V Raman' from The Great Indian Scientists.

#### **OBJECTIVE:**

The lesson highlights the dedicated research work of C V Raman and his achievements in Physics.

#### **OUTCOME:**

The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists.

#### **UNIT 3:**

1. 'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.

## **OBJECTIVE:**

The lesson depicts of the symptoms of Cultural Shock and the aftermath consequences.

**OUTCOME:** The lesson imparts the students to manage different cultural shocks due to globalization.

2. 'Homi Jehangir Bhabha' from The Great Indian Scientists.

## **OBJECTIVE:**

The lesson highlights Homi Jehangir Bhabha's contributions to Indian nuclear programme as architect.

## **OUTCOME:**

The seminal contributions of Homi Jehangir Bhabha to Indian nuclear programme provide an aspiration to the readers to serve the nation and sterngthen it.

#### **UNIT 4:**

1. 'The Lottery' from English Encounters.

## **OBJECTIVE:**

The lesson highlights insightful commentary on cultural traditions.

#### **OUTCOME:**

The theme projects society's need to re examine its traditions when they are outdated.

2. 'Jagadish Chandra Bose' from The Great Indian Scientists.

#### **OBJECTIVE:**

The lesson gives an account of the unique discoveries and inventions of Jagadish Chandra Bose in Science.

**OUTCOME:** The Scientific discoveries and inventions of Jagadish Chandra Bose provide inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.

#### **UNIT 5:**

1. 'The Health Threats of Climate Change' from English Encounters.

#### **OBJECTIVE:**

The essay presents several health disorders that spring out due to environmental changes

## **OUTCOME:**

The lesson offers several inputs to protect environment for the sustainability of the future generations.

2. ' Prafulla Chandra Ray' from The Great Indian Scientists.

## **OBJECTIVE:**

The lesson given an account of the experiments and discoveries in Pharmaceuticals of Prafulla Chandra Ray.

## **OUTCOME:**

Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader.

#### **UNIT 6:**

1. 'The Chief Software Architect' from English Encounters

## **OBJECTIVE:**

The lesson supports the developments of technology for the betterment of human life.

#### **OUTCOME:**

Pupil get inspired by eminent personalities who toiled for the present day advancement of software development.

2. 'Srinivasa Ramanujan' from The Great Indian Scientists.

#### **OBJECTIVE:**

The lesson highlights the extraordinary achievements of Srinivasa Ramanujan, a great mathematician and the most romantic figure in mathematics.

#### **OUTCOME:**

The lesson provides inspiration to the readers to think and tap their innate talents.

#### NOTE:

All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

# MODEL QUESTION PAPER FOR THEORY

# PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

# PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks

B from non-detailed text: 3 marks

C on grammar and Vocabulary: 6 marks

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# MATHEMATICS-III

# (Common to ALL branches of First Year B.Tech.)

## **Course Objectives:**

- 1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
- 2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
- 3. Understand the most basic numerical methods to solve simultaneous linear equations.

## **Course Outcomes: At the end of the Course, Student will be able to:**

- 1. Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations.
- 2. Solve simultaneous linear equations numerically using various matrix methods.
- 3. Determine double integral over a region and triple integral over a volume.
- 4. Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

## **UNIT I: Linear systems of equations:**

Rank-Echelon form-Normal form – Solution of linear systems – Gauss elimination - Gauss Jordon- Gauss Jacobi and Gauss Seidal methods. Applications: Finding the current in electrical circuits.

## UNIT II: Eigen values - Eigen vectors and Quadratic forms:

Eigen values - Eigen vectors- Properties - Cayley-Hamilton theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Diagonalization- Quadratic forms- Reduction of quadratic form to canonical form - Rank - Positive, negative and semi definite - Index - Signature.

Applications: Free vibration of a two-mass system.

## **UNIT III: Multiple integrals:**

Curve tracing: Cartesian, Polar and Parametric forms.

Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration.

Applications: Finding Areas and Volumes.

## **UNIT IV: Special functions:**

Beta and Gamma functions- Properties - Relation between Beta and Gamma functions-Evaluation of improper integrals.

Applications: Evaluation of integrals.

#### **UNIT V: Vector Differentiation:**

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities. Applications: Equation of continuity, potential surfaces

## **UNIT VI: Vector Integration:**

Line integral – Work done – Potential function – Area- Surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.

Applications: Work done, Force.

## **Text Books:**

- 1. **B.S.Grewal**, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

## **Reference Books:**

- 1. **Greenberg**, Advanced Engineering Mathematics, 2<sup>nd</sup> edition, Pearson edn
- 2. Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India
- 3. **Peter O'Neil**, Advanced Engineering Mathematics,7<sup>th</sup> edition, Cengage Learning.
- 4. D.W. Jordan and T.Smith, Mathematical Techniques, Oxford University Press.
- 5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
- 6. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

## APPLIED CHEMISTRY (EEE, ECE, CSE, IT, EIE, E. Com. E.)

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

## Learning Objectives:

- Plastics are nowadays used in household appliances; also they are used as composites (FRP) in aerospace industries.
- Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
- The basics for the construction of galvanic cells as well as some of the sensors used in instruments are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory.
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.
- Understanding of crystal structures will help to understand the conductivity, semiconductors and superconductors. Magnetic properties are also studied.
- With the increase in demand for power and also with depleting sources of fossil fuels, the demand for alternative sources of fuels is increasing. Some of the prospective fuel sources are introduced.

# UNIT I: HIGH POLYMERS AND PLASTICS

Polymerisation : Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties – Plastics as engineering materials : advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4/5 techniques)- Preparation, properties and applications of polyethene, PVC, Bakelite Teflon and polycarbonates

Elastomers – Natural rubber- compounding and vulcanization – Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers.

Composite materials & Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

## **UNIT II: FUEL TECHNOLOGY**

*Fuels*:- Introduction – Classification – Calorific value – HCV and LCV – Dulong's formula – Bomb calorimeter – Numerical problems – Coal — Proximate and ultimate analysis – Significance of the analyses – Liquid fuels – Petroleum- Refining – Cracking – Synthetic petrol –Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knock agents – Power alcohol – Bio-diesel – Gaseous fuels – Natural gas. LPG and CNG – Combustion – Calculation of air for the combustion of a fuel – Flue gas analysis – Orsat apparatus – Numerical problems on combustion. *Explosives:-* Introduction, classification, examples: RDX, TNT and ammonium nitrite - rocket fuels.

# UNIT III: ELECTROCHEMICAL CELLS AND CORROSION

Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc – air cells.

*Corrosion:*- Definition – Theories of Corrosion (electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Design and material selection – Cathodic protection -Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating)

# **UNIT IV: CHEMISTRY OF ADVANCED MATERIALS**

*Nano materials:-* Introduction – Sol-gel method & chemical reduction method of preparation – Characterization by BET method and TEM methods - Carbon nano tubes and fullerenes: Types, preparation, properties and applications

*Liquid crystals:-* Introduction – Types – Applications

Superconductors :- Type-I & Type-2, properties & applications

Green synthesis:- Principles - 3or 4 methods of synthesis with examples - R<sub>4</sub>M<sub>4</sub> principles

## **UNIT V: SOLID STATE CHEMISTRY**

Types of solids - close packing of atoms and ions - BCC, FCC, structures of rock salt - cesium chloride- spinel - normal and inverse spinels,

Non-elemental *semiconducting Materials:*- Stoichiometric, controlled valency & Chalcogen photo/semiconductors, Preparation of Semiconductors - Semiconductor Devices:- p-n junction diode as rectifier – junction transistor.

*Insulators* (electrical and electronic applications)

Magnetic materials:- Ferro and ferri magnetism. Hall effect and its applications.

## UNIT VI: NON CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES

*Solar Energy:* - Introduction, application of solar energy, conversion of solar energy (Thermal conversion & photo conversion) – photovoltaic cell: design, working and its importance *Non-conventional energy sources:* 

- (i) Hydropower include setup a hydropower plant (schematic diagram)
- (ii) Geothermal energy: Introduction-schematic diagram of a geothermal power plant
- (iii) Tidal and wave power: Introduction- Design and working-movement of tides and their effect on sea level.
- (iv)Ocean thermal energy: Introduction, closed-cycle, ocean thermal energy conversion (OTEC), open cycle OTEC, hybrid OTEC, schematic diagram and explanation.
- (v) Biomass and biofuels

*Fuel cells:*- Introduction - cell representation,  $H_2$ - $O_2$  fuel cell: Design and working, advantages and limitations. Types of fuel cells: Alkaline fuel cell - methanol-oxygen - phosphoric acid fuel cells - molten carbonate fuel cells.

**Outcomes:** The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood.

The students would be now aware of materials like nano-materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. Conductance phenomenon is better understood. The students are exposed to some of the alternative fuels and their advantages and limitations.

#### **Standard Books:**

- 1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.
- 2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

#### **Reference Books:**

- 1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
- 2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
- 3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
- 4. Applied Chemistry by H.D. Gesser, Springer Publishers
- 5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

## **OBJECT-ORIENTED PROGRAMMING THROUGH C++**

#### **OBJECTIVES:**

- This course is designed to provide a comprehensive study of the C programming language. It stresses the strengths of C, which provide students with the means of writing efficient, maintainable and portable code. The nature of C language is emphasized in the wide variety of examples and applications. To learn and acquire art of computer programming. To know about some popular programming languages and how to choose
- Programming language for solving a problem.

## **UNIT-I: Introduction to C++**

Difference between C and C++- Evolution of C++- The Object Oriented Technology-Disadvantage of Conventional Programming- Key Concepts of Object Oriented Programming-Advantage of OOP- Object Oriented Language.

#### UNIT-II: Classes and Objects & Constructors and Destructor

Classes in C++-Declaring Objects- Access Specifiers and their Scope- Defining Member Function-Overloading Member Function- Nested class, Constructors and Destructors, Introduction- Constructors and Destructor- Characteristics of Constructor and Destructor-Application with Constructor- Constructor with Arguments (parameterized Constructor-Destructors- Anonymous Objects.

#### **UNIT-III: Operator Overloading and Type Conversion & Inheritance**

The Keyword Operator- Overloading Unary Operator- Operator Return Type- Overloading Assignment Operator (=)- Rules for Overloading Operators, Inheritance, Reusability- Types of Inheritance- Virtual Base Classes- Object as a Class Member- Abstract Classes- Advantages of Inheritance-Disadvantages of Inheritance,

#### **UNIT-IV: Pointers & Binding Polymorphisms and Virtual Functions**

Pointer, Features of Pointers- Pointer Declaration- Pointer to Class- Pointer Object- The this Pointer- Pointer to Derived Classes and Base Class, Binding Polymorphisms and Virtual Functions, Introduction- Binding in C++- Virtual Functions- Rules for Virtual Function- Virtual Destructor.

## **UNIT-V: Generic Programming with Templates & Exception Handling**

Generic Programming with Templates, Need for Templates- Definition of class Templates-Normal Function Templates- Over Loading of Template Function-Bubble Sort Using Function Templates- Difference Between Templates and Macros- Linked Lists with Templates, Exception Handling- Principles of Exception Handling- The Keywords try throw and catch- Multiple Catch Statements –Specifying Exceptions.

# **UNIT-VI: Overview of Standard Template Library**

Overview of Standard Template Library- STL Programming Model- Containers- Sequence Containers- Associative Containers- Algorithms- Iterators- Vectors- Lists- Maps.

# **OUTCOMES:**

- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language. Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference

## **Text Books:**

- 1. A First Book of C++, Gary Bronson, Cengage Learing.
- 2. The Complete Reference C++, Herbert Schildt, TMH.
- 3. Programming in C++, Ashok N Kamathane, Pearson 2<sup>nd</sup> Edition.

## **Reference Books:**

- 1. Object Oriented Programming C++, Joyce Farrell, Cengage.
- 2. C++ Programming: from problem analysis to program design, DS Malik, Cengage Learing.

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#### **ENVIRONMENTAL STUDIES**

#### **Course Learning Objectives:**

The objectives of the course is to impart

- Overall understanding of the natural resources
- Basic understanding of the ecosystem and its diversity
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- An understanding of the environmental impact of developmental activities
- Awareness on the social issues, environmental legislation and global treaties

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## **Course Outcomes:**

The student should have knowledge on

- The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
- The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
- The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
- Social issues both rural and urban environment and the possible means to combat the challenges
- The environmental legislations of India and the first global initiatives towards sustainable development.
- About environmental assessment and the stages involved in EIA and the environmental audit.
- Self Sustaining Green Campus with Environment Friendly aspect of Energy, Water and Wastewater reuse Plantation, Rain water Harvesting, Parking Curriculum.

#### Syllabus:

**UNIT – I Multidisciplinary nature of Environmental Studies:** Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, Carbon Credits, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT - II Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Literate, Coal, Sea and River sands.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT – III Biodiversity and its conservation:** Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

**UNIT – IV Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

**Solid Waste Management:** Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

**UNIT – V Social Issues and the Environment:** Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act - Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

**UNIT – VI Environmental Management**: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

#### **TEXT BOOKS:**

- 1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
- 2. Environmental Studies, R. Rajagopalan, 2<sup>nd</sup> Edition, 2011, Oxford University Press.
- 3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

## **REFERENCE:**

- 1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
- 2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
- 3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
- 4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014

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#### **ENIGINEERING MECHANICS**

**Objectives:** The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

## UNIT – I

Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.

Introduction to Engg. Mechanics - Basic Concepts.

**Systems of Forces:** Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

**Friction:** Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction

#### UNIT II

**Objectives:** The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.

**Equilibrium of Systems of Forces:** Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium, analysis of plane trusses.

#### UNIT – III

#### **Objectives :** The students are to be exposed to concepts of centre of gravity.

**Centroid:** Centroids of simple figures (from basic principles ) – Centroids of Composite Figures

**Centre of Gravity:** Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems.

#### UNIT IV

# **Objective:** The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.

**Area moments of Inertia:** Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia:** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

## UNIT – V

**Objectives:** The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion. Kinematics: Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

## UNIT – VI

**Objectives:** The students are to be exposed to concepts of work, energy and particle motion Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

## **TEXT BOOKS :**

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4<sup>th</sup> Edn - , Mc Graw Hill publications.

## **REFERENCES**:

- 1. Engineering Mechanics statics and dynamics R.C.Hibbeler, 11<sup>th</sup> Edn Pearson Publ.
- 2. Engineering Mechanics, statics J.L.Meriam, 6<sup>th</sup> Edn Wiley India Pvt Ltd.
- 3. Engineering Mechanics, statics and dynamics I.H.Shames, Pearson Publ.
- 4. Mechanics For Engineers, statics F.P.Beer & E.R.Johnston 5<sup>th</sup> Edn Mc Graw Hill Publ.
- 5. Mechanics For Engineers, dynamics F.P.Beer & E.R.Johnston –5<sup>th</sup> Edn Mc Graw Hill Publ.
- 6. Theory & Problems of engineering mechanics, statics & dynamics E.W.Nelson, C.L.Best & W.G. McLean, 5<sup>th</sup> Edn Schaum's outline series Mc Graw Hill Publ.
- 7. Singer's Engineering Mechanics: Statics And Dynamics, K. Vijay Kumar Reddy, J. Suresh Kumar, Bs Publications
- 8. Engineering Mechanics, Fedinand . L. Singer, Harper Collins.
- 9. Engineering Mechanics statics and dynamics, A Nelson, Mc Graw Hill publications

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#### APPLIED / ENGINEERING CHEMISTRY LABORATORY (Common to all branches)

- 1. Introduction to Chemistry laboratory Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.
- 2. Trial experiment Determination of HCl using standard Na<sub>2</sub>CO<sub>3</sub> solution.
- 3. Determination of alkalinity of a sample containing Na<sub>2</sub>CO<sub>3</sub> and NaOH.
- 4. Determination of KMnO<sub>4</sub> using standard Oxalic acid solution.
- 5. Determination of Ferrous iron using standard  $K_2Cr_2O_7$  solution.
- 6. Determination of Copper using standard  $K_2Cr_2O_7$  solution.
- 7. Determination of temporary and permanent hardness of water using standard EDTA solution.
- 8. Determination of Copper using standard EDTA solution.
- 9. Determination of Iron by a Colorimetric method using thiocynate as reagent.
- 10. Determination of pH of the given sample solution using pH meter.
- 11. Conductometric titration between strong acid and strong base.
- 12. Conductometric titration between strong acid and weak base.
- 13. Potentiometric titration between strong acid and strong base.
- 14. Potentiometric titration between strong acid and weak base.
- 15. Determination of Zinc using standard EDTA solution.
- 16. Determination of Vitamin C.

**Outcomes**: The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

## **Reference Books**

- 1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
- 2. Dr. Jyotsna Cherukuris (2012) Laboratory Manual of engineering chemistry-II, VGS Techno Series
- 3. Chemistry Practical Manual, Lorven Publications
- 4. K. Mukkanti (2009) Practical Engineering Chemistry, B.S. Publication

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	LAB- II		0 3		2

#### PRESCRIBED LAB MANUAL FOR SEMESTER II:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

#### **OBJECTIVES:**

To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

## **OUTCOME:**

A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

#### **UNIT 1:**

1. Debating Practice work

#### **UNIT 2:**

1. Group Discussions Practice work

#### **UNIT 3:**

1. Presentation Skills Practice work

#### **UNIT 4:**

1. Interview Skills Practice work

## **UNIT 5:**

- 1. Email,
- 2. Curriculum Vitae Practice work

## **UNIT 6:**

- 1. Idiomatic Expressions
- 2. Common Errors in English Practice work

#### **Reference Books:**

- 1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
- 2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
- 3. Unlock, Listening and speaking skills 2, Cambridge University Press
- 4. Spring Board to Success, Orient BlackSwan
- 5. A Practical Course in effective english speaking skills, PHI
- 6. Word power made handy, Dr shalini verma, Schand Company
- 7. Let us hear them speak, Jayashree Mohanraj, Sage texts
- 8. Professional Communication, Aruna Koneru, Mc Grawhill Education
- 9. Cornerstone, Developing soft skills, Pearson Education

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## **OBJECT-ORIENTED PROGRAMMING LAB**

#### **OBJECTIV:**

- To strengthen their problem solving ability by applying the characteristics of an object- oriented approach.
- To introduce object oriented concepts in C++ and Java.

## **Programmi:**

## Exercise - 1 (Basics)

Write a Simple Program on printing "Hello World" and "Hello Name" where name is the input from the user

- a) Convert any two programs that are written in C into C++
- b) Write a description of using g++ (150 Words)

## **Exercise – 2** (Expressions Control Flow)

- a) Write a Program that computes the simple interest and compound interest payable on principalamount(inRs.)ofloanborrowedbythecustomerfromabankforagiverperiodof time (in years) at specific rate of interest. Further determine whether the bank will benefit by charging simple interest or compound interest.
- b) WriteaProgramtocalculatethefareforthepassengerstravelinginabus. WhenaPassenger enters the bus, the conductor asks "What distance will you travel?" On knowing distance from passenger (as an approximate integer), the conductor mentions the fare to the passenger according to following criteria.

## Exercise – 3 (Variables, Scope, Allocation)

- a) Write a program to implement call by value and call by reference using reference variable.
- b) Write a program to illustrate scope resolution, new and delete Operators. (Dyanamic Memory Allocation)
- c) Write a program to illustrate Storage classes
- d) Write a program to illustrate Enumerations

## Exercises -4 (Functions)

Write a program illustrating Inline Functions

- a) Write a program illustrate function overloading. Write 2 overloading functions for power.
- b) Write a program illustrate the use of default arguments for simple interest function.

## Exercise -5 (Functions – Exercise Continued)

- a) Write a program to illustrate function overloading. Write 2 overloading functions for adding two numbers
- b) Write a program illustrate function template for power of a number.
- c) Write a program to illustrate function template for swapping of two numbers.

## Exercise -6 (Classes Objects)

Create a Distance class with:

- feet and inches as data members
- member function to input distance
- member function to output distance
- member function to add two distance objects

a). Write a main function to create objects of DISTANCE class. Input two distances and output the sum.

- b). Write a C++ Program to illustrate the use of Constructors and Destructors (use the above program.)
- c) Write a program for illustrating function overloading in adding the distance between objects (use the above problem)
- d). Write a C++ program demonstrating a BankAccount with necessary methods and variables

#### Exercise – 7 (Access)

Write a program for illustratingAccess Specifiers public, private, protected

- a) Write a program implementing Friend Function
- b) Write a program to illustrate this pointer
- c) Write a Program to illustrate pointer to a class

#### Exercise -8 (Operator Overloading)

a). Write a program to Overload Unary, and Binary Operators as Member Function, and Non Member Function.

- i. Unary operator as member function
- ii. Binary operator as nonmember function
- b). Write a c ++ program to implement the overloading assignment = operator
- c).Write a case study on Overloading Operators and Overloading Functions (150 Words)

## Exercise -9 (Inheritance)

- a) Write C++ Programs and incorporating various forms of Inheritance
  - i) Single Inheritance
  - ii) Hierarchical Inheritance
  - iii) Multiple Inheritances
  - iv) Multi-level inheritance
  - v) Hybrid inheritance
- b) Write a program to show Virtual Base Class
- c) Write a case study on using virtual classes (150 Words)

# Exercise-10 (Inheritance –Continued)

- a) Write a Program in C++ to illustrate the order of execution of constructors and destructors in inheritance
- b) Write a Program to show how constructors are invoked in derived class

# Exercise -11 (Polymorphism)

- a) Write a program to illustrate runtime polymorphism
- b) Write a program to illustrate this pointer
- c) Write a program illustrates pure virtual function and calculate the area of different shapes by using abstract class.
- d) Write a case study on virtual functions (150 Words)

## Exercise -12(Templates)

- a) Write a C++ Program to illustrate template class
- b) Write a Program to illustrate class templates with multiple parameters
- c) Write a Program to illustrate member function templates

## Exercise -13 (Exception Handling)

a).Write a Program for Exception Handling Divide by zero

b). Write a Program to rethrow an Exception

# Exercise -14 (STL)

- a) Write a Program to implement List and List Operations
- b) Write a Program to implement Vector and Vector Operations

# Exercise -15 (STLContinued)

- a) Write a Program to implement Deque and Deque Operations
- b) Write a Program to implement Map and Map Operations

# **OUTCOMES:**

- Explain whatconstitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.
- Apply an object-oriented approach to developing applications of varying complexities

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## STATISTICS WITH R PROGRAMMING

#### **OBJECTIVE:**

After taking the course, students will be able to

- Use R for statistical programming, computation, graphics, and modeling,
- Write functions and use R in an efficient way,
- Fit some basic types of statistical models
- Use R in their own research,
- Be able to expand their knowledge of R on their own.

## UNIT-I:

Introduction, How to run R, R Sessions and Functions, Basic Math, Variables, Data Types, Vectors, Conclusion, Advanced Data Structures, Data Frames, Lists, Matrices, Arrays, Classes.

## **UNIT-II:**

R Programming Structures, Control Statements, Loops, - Looping Over Nonvector Sets,- If-Else, Arithmetic and Boolean Operators and values, Default Values for Argument, Return Values, Deciding Whether to explicitly call return- Returning Complex Objects, Functions are Objective, No Pointers in R, Recursion, A Quicksort Implementation-Extended Extended Example: A Binary Search Tree.

## **UNIT-III:**

Doing Math and Simulation in R, Math Function, Extended Example Calculating Probability-Cumulative Sums and Products-Minima and Maxima- Calculus, Functions Fir Statistical Distribution, Sorting, Linear Algebra Operation on Vectors and Matrices, Extended Example: Vector cross Product- Extended Example: Finding Stationary Distribution of Markov Chains, Set Operation, Input /out put, Accessing the Keyboard and Monitor, Reading and writer Files,

## **UNIT-IV:**

Graphics, Creating Graphs, The Workhorse of R Base Graphics, the plot() Function – Customizing Graphs, Saving Graphs to Files.

## UNIT-V:

Probability Distributions, Normal Distribution- Binomial Distribution- Poisson Distributions Other Distribution, Basic Statistics, Correlation and Covariance, T-Tests,-ANOVA.

## **UNIT-VI:**

Linear Models, Simple Linear Regression, -Multiple Regression Generalized Linear Models, Logistic Regression, - Poisson Regression- other Generalized Linear Models-Survival Analysis, Nonlinear Models, Splines- Decision- Random Forests,

## **OUTCOMES:**

At the end of this course, students will be able to:

- List motivation for learning a programming language
- Access online resources for R and import new function packages into the R workspace
- Import, review, manipulate and summarize data-sets in R
- Explore data-sets to create testable hypotheses and identify appropriate statistical tests
- Perform appropriate statistical tests using R Create and edit visualizations with

# **TEXT BOOKS:**

- 1) The Art of R Programming, Norman Matloff, Cengage Learning
- 2) R for Everyone, Lander, Pearson

# **REFERENCE BOOKS:**

- 1) R Cookbook, PaulTeetor, Oreilly.
- 2) R in Action, Rob Kabacoff, Manning

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## MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

## **OBJECTIVES:**

- To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
- To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

## UNIT -I:

**Mathematical Logic**: Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof. Predicate Calculus:Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

## UNIT -II:

**Set Theory:** Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion, *Relations:* Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, *Functions:* Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions, Lattice and its Properties.

#### UNIT-III:

Algebraic Structures and Number Theory: *Algebraic Structures*: Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism, *Number Theory*: Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler's Theorem)

## UNIT -IV:

**Combinatorics:** Basic of Counting, Permutations, Permutations with Repetitions, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Generating Functions of Permutations and Combinations, Binomial and Multinomial Coefficients, Binomial and Multinomial Theorems, The Principles of Inclusion–Exclusion, Pigeonhole Principle and its Application.

## UNIT -V:

**Recurrence Relations:** Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relations

## UNIT -VI:

**Graph Theory:** Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

## **OUTCOMES:**

- Student will be able to demonstrate skills in solving mathematical problems
- Student will be able to comprehend mathematical principles and logic
- Student will be able to demonstrate knowledge of mathematical modeling and proficiency in using mathematical software
- Student will be able to manipulate and analyze data numerically and/or graphically using appropriate Software
- Student will be able to communicate effectively mathematical ideas/results verbally or in writing

#### **TEXT BOOKS:**

1.Discrete Mathematical Structures with Applications to Computer Science, J. P. Tremblay and P. Manohar, Tata McGraw Hill.

2. Elements of Discrete Mathematics-A Computer Oriented Approach, C. L. Liu and D. P. Mohapatra, 3<sup>rd</sup>Edition, Tata McGraw Hill.

3. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7<sup>th</sup> Edition, Tata McGraw Hill.

#### **REFERENCE BOOKS:**

- 1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2<sup>nd</sup> Edition, Prentice Hall of India.
- 2. Discrete Mathematical Structures, BernandKolman, Robert C. Busby, Sharon Cutler Ross, PHI.
- 3. Discrete Mathematics, S. K. Chakraborthy and B.K. Sarkar, Oxford, 2011.

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## **DIGITAL LOGIC DESIGN**

#### **OBJECTIVE:**

- To introduce the basic tools for design with combinational and sequential digital logic and state machines.
- To learn simple digital circuits in preparation for computer engineering.

## **UNIT- I: Digital Systems and Binary Numbers**

Digital Systems, Binary Numbers, Binary Numbers, Octal and Hexadecimal Numbers, Complements of Numbers, Complements of Numbers, Signed Binary Numbers, Arithmetic addition and subtraction

## **UNIT -II: Concept of Boolean algebra**

Basic Theorems and Properties of Boolean algebra, Boolean Functions, Canonical and Standard Forms, Minterms and Maxterms,

## **UNIT- III: Gate level Minimization**

Map Method, Two-Variable K-Map, Three-Variable K-Map, Four Variable K-Maps. Products of Sum Simplification, Sum of Products Simplification, Don't – Care Conditions, NAND and NOR Implementation, Exclusive-OR Function

## **UNIT- IV:Combinational Logic**

Introduction, Analysis Procedure, Design Procedure, Binary Adder–Subtractor, Decimal Adder, Binary Multiplier, Decoders, Encoders, Multiplexers, HDL Models of Combinational Circuits

## **UNIT- V: Synchronous Sequential Logic**

Introduction to Sequential Circuits, Storage Elements: Latches, Storage Elements: Flip-Flops, Analysis of Clocked **Sequential** Circuits, Mealy and Moore Models of Finite State Machines

## **UNIT -VI: Registers and Counters**

Registers, Shift Registers, Ripple Counters, Synchronous Counters, Ring Counter, Johnson Counter, Ripple Counter

#### **OUTCOMES:**

A student who successfully fulfills the course requirements will have demonstrated:

- An ability to define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.
- An ability to understand the different switching algebra theorems and apply them for logic functions.
- An ability to define the Karnaugh map for a few variables and perform an algorithmic reduction of logic functions.
- An ability to define the other minimization methods for any number of variables Variable Entered Mapping (VEM) and Quine-MeCluskey (QM) Techniques and perform an algorithmic reduction of logic functions.

## **TEXT BOOKS:**

- 1. Digital Design, 5/e, M.Morris Mano, Michael D Ciletti, PEA.
- 2. Fundamentals of Logic Design, 5/e, Roth, Cengage.

#### **REFERENCE BOOKS:**

- 1. Digital Logic and Computer Design, M.Morris Mano, PEA.
- 2. Digital Logic Design, Leach, Malvino, Saha, TMH.
- 3. Modern Digital Electronics, R.P. Jain, TMH.

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## PYTHON PROGRAMMING

# **OBJECTIVES:**

- Introduction to Scripting Language
- Exposure to various problems solving approaches of computer science

# UNIT – I:

**Introduction:**History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation.

# UNIT – II:

**Types, Operators and Expressions:** Types - Integers, Strings, Booleans; Operators- Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while, break, continue, pass

## UNIT – III:

**Data Structures** Lists - Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

# UNIT – IV:

**Functions** - Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions(Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

Modules: Creating modules, import statement, from. Import statement, name spacing,

Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages

# UNIT – V:

**Object Oriented Programming OOP in Python**: Classes, 'self variable', Methods, Constructor Method, Inheritance, Overriding Methods, Datahiding,

**Error and Exceptions:** Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions
## UNIT – VI:

**Brief Tour of the Standard Library** - Operating System Interface - String Pattern Matching, Mathematics, Internet Access, Dates and Times, Data Compression, Multithreading, GUI Programming, Turtle Graphics

**Testing:** Why testing is required ?, Basic concepts of testing, Unit testing in Python, Writing Test cases, Running Tests.

## **OUTCOMES:**

- Making Software easily right out of the box.
- Experience with an interpreted Language.
- To build software for real needs.
- Prior Introduction to testing software

# **TEXT BOOKS**

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson

2. Learning Python, Mark Lutz, Orielly

# **Reference Books:**

- 1. Think Python, Allen Downey, Green Tea Press
- 2. Core Python Programming, W.Chun, Pearson.
- 3. Introduction to Python, Kenneth A. Lambert, Cengage

# DATA STRUCTURES THROUGH C++

#### **OBJECTIVES:**

• To be familiar with basic techniques of object oriented principles and exception handling using C++

- To be familiar with the concepts like Inheritance, Polymorphism
- Solve problems using data structures such as linear lists, stacks, queues, hash tables
- Be familiar with advanced data structures such as balanced search trees, AVLTrees, and B Trees.

## **UNIT-I: ARRAYS**

Abstract Data Types and the C++ Class, An Introduction to C++ Class- Data Abstraction and Encapsulation in C++- Declaring Class Objects and Invoking Member Functions- Special Class Operations- Miscellaneous Topics- ADTs and C++Classes, The Array as an Abstract Data Type, The Polynomial Abstract Data type- Polynomial Representation- Polynomial Addition. Spares Matrices,Introduction- Sparse Matrix Representation- Transposing a Matrix- Matrix Multiplication, Representation of Arrays.

#### **UNIT-II: STACKS AND QUEUES**

Templates in C++, Template Functions- Using Templates to Represent Container Classes, The Stack Abstract Data Type, The Queue Abstract Data Type, Subtyping and Inheritance in C++, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

#### **UNIT-III: LINKED LISTS**

Single Linked List and Chains, Representing Chains in C++, Defining a Node in C++- Designing a Chain Class in C++- Pointer manipulation in C++- Chain Manipulation Operations, The Template Class Chain, Implementing Chains with Templates- Chain Iterators- Chain Operations-Reusing a Class, Circular Lists, Available Space Lists, Linked Stacks and Queues, Polynomials, Polynomial Representation- Adding Polynomials- Circular List Representation of Polynomials, Equivalence Classes, Sparse Matrices, Sparse Matrix Representation- Sparse Matrix Input-Deleting a Sparse Matrix, Doubly Linked Lists, Generalized Lists, Representation of Generalized Lists- Recursive Algorithms for Lists- Reference Counts, Shared and Recursive Lists

#### **UNIT-IV: TREES**

Introduction, Terminology, Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Tress, Binary Tree Representations, Binary Tree Traversal and Tree Iterators, Introduction, Inorder Traversal Preorder Traversal, Postorder Traversal, Thread Binary Trees, Threads, Inorder Traversal of a Threaded Binary Tree, Inserting a Node into a Threaded Binary Tree, Heaps, Priority Queues, Definition of a Max Heap, Insertion into a Max Heap, Deletion from a Max Heap, Binary Search Trees, Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree, Height of Binary Search Tree.

## **UNIT-V: GRAPHS**

The Graph Abstract Data Type, Introduction, Definition, Graph Representation, Elementary Graph Operation, Depth First Search, Breadth First Search, Connected Components, Spanning Trees, Biconnected Components, Minimum Cost Spanning Trees, Kruskal S Algorithm, Prim s Algorithm Sollin's Algorithm, Shortest Paths and Transitive Closure, Single Source/All Destination: Nonnegative Edge Cost, Single Source/All Destination: General Weights, All-Pairs Shortest Path, Transitive Closure.

## **UNIT-VI: SORTING**

Insertion Sort, Quick Sort, Merge Sort Merging, Iterative Merge Sort, Recursive Merge Sort, Heap Sort.

## **OUTCOMES:**

- Distinguish between procedures and object oriented programming.
- Apply advanced data structure strategies for exploring complex data structures.
- Compare and contrast various data structures and design techniques in the area of Performance.
- Implement data structure algorithms through C++. Incorporate data structures into the applications such as binary search trees, AVL and B Trees
- Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs

## **TEXT BOOKS:**

- 1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press, Pvt. Ltd.
- 2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
- 3. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.

## **REFERENCE BOOKS:**

- 1. Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
- 2. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
- 3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

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## SOFTWARE ENGINEERING

## **OBJECTIVES**

- To understand the software life cycle models.
- To understand the software requirements and SRS document.
- To understand the importance of modeling and modeling languages.
- To design and develop correct and robust software products.
- To understand the quality control and how to ensure good quality software.
- To understand the planning and estimation of software projects.
- To understand the implementation issues, validation and verification procedures.
- To understand the maintenance of software

## **UNIT-I:**

**Software and Software Engineering:** The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

**Process Models:** A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

#### **UNIT-II:**

**Requirements Analysis And Specification:** Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification.

**Software Design:** Overview of the Design Process, How to Characterise of a Design?, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design

## UNIT – III:

**Function-Oriented Software Design:** Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, over view of Object Oriented design.

**User Interface Design**: Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology.

# UNIT – IV:

**Coding And Testing:** Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing

# UNIT – V:

**Software Reliability And Quality Management:** Software Reliability, Statistical Testing, Software Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model.

**Computer Aided Software Engineering:** Case and its Scope, Case Environment, Case Support in Software Life Cycle, Other Characteristics of Case Tools, Towards Second Generation CASE Tool, Architecture of a Case Environment

# UNIT – VI

**Software Maintenance:** Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management.

**Software Reuse**: what can be Reused? Why almost No Reuse So Far? Basic Issues in Reuse Approach, Reuse at Organization Level.

# OUTCOMES

- Define and develop a software project from requirement gathering to implementation.
- Obtain knowledge about principles and practices of software engineering.
- Focus on the fundamentals of modeling a software project.
- Obtain knowledge about estimation and maintenance of software systems

# **TEXT BOOKS:**

- 1. Software Engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition McGrawHill International Edition.
- 2. Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.
- 3. Software Engineering, Ian Sommerville, Ninth edition, Pearson education

# **REFERENCE BOOKS:**

- 1. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
- 2. Software Engineering, A Precise Approach, PankajJalote, Wiley India, 2010.
- 3. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
  - 1. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.

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## DATA STRUCTURES THROUGH C++ LAB

#### **OBJECTIVES**:

- To develop skills to design and analyze simple linear and non linear data structures
- To Strengthen the ability to identify and apply the suitable data structure for the given real world problem
- To Gain knowledge in practical applications of data structures

#### List of Experiments:

- 1. Implementation of Singly linked list.
- 2. Implementation of Doubly linked list.
- 3. Implementation of Multistack in a Single Array.
- 4. Implementation of Circular Queue
- 5. Implementation of Binary Search trees.
- 6. Implementation of Hash table.
- 7. Implementation of Heaps.
- 8. Implementation of Breadth First Search Techniques.
- 9. Implementation of Depth First Search Techniques.
- 10. Implementation of Prim's Algorithm.
- 11. Implementation of Dijkstra's Algorithm.
- 12. Implementation of Kruskal's Algorithm
- 13. Implementation of MergeSort
- 14. Implementation of Quick Sort
- 15. Implementation of Data Searching using divide and conquer technique

## **OUTCOMES:**

At the end of this lab session, the student will

- Be able to design and analyze the time and space efficiency of the data structure
- Be capable to identity the appropriate data structure for given problem
- Have practical knowledge on the application of data structures

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#### PYTHON PROGRAMMING LAB

#### **Exercise 1 - Basics**

- a) Running instructions in Interactive interpreter and a Python Script
- b) Write a program to purposefully raise Indentation Error and Correct it

#### **Exercise 2 - Operations**

- a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)
- b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

#### **Exercise - 3 Control Flow**

- a) Write a Program for checking whether the given number is a even number or not.
- b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, ..., 1/10
- c) Write a program using a for loop that loops over a sequence. What is sequence ?
- d) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.

#### **Exercise 4 - Control Flow - Continued**

a) Find the sum of all the primes below two million.

Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:

1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

#### Exercise - 5 - DS

- a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure
- b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

## Exercise - 6 DS - Continued

- a) Write a program combine\_lists that combines these lists into a dictionary.
- b) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

#### Exercise - 7 Files

- a) Write a program to print each line of a file in reverse order.
- b) Write a program to compute the number of characters, words and lines in a file.

#### **Exercise - 8 Functions**

a) Write a function ball\_collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding.

Hint: Represent a ball on a plane as a tuple of (x, y, r), r being the radius

If (distance between two balls centers) <= (sum of their radii) then (they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.

#### **Exercise - 9 Functions - Continued**

- a) Write a function nearly\_equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
- b) Write a function dups to find all duplicates in the list.
- c) Write a function unique to find all the unique elements of a list.

#### **Exercise - 10 - Functions - Problem Solving**

- a) Write a function cumulative\_product to compute cumulative product of a list of numbers.
- b) Write a function reverse to reverse a list. Without using the reverse function.
- c) Write function to compute gcd, lcm of two numbers. Each function shouldn't exceed one line.

#### **Exercise 11 - Multi-D Lists**

- a) Write a program that defines a matrix and prints
- b) Write a program to perform addition of two square matrices
- c) Write a program to perform multiplication of two square matrices

## Exercise - 12 - Modules

- a) Install packages requests, flask and explore them. using (pip)
- b) Write a script that imports requests and fetch content from the page. Eg. (Wiki)
- c) Write a simple script that serves a simple HTTPResponse and a simple HTML Page

# Exercise - 13 OOP

- a) Class variables and instance variable and illustration of the self variable
- i) Robot

ii) ATM Machine

## **Exercise - 14 GUI, Graphics**

- 1. Write a GUI for an Expression Calculator using tk
- 2. Write a program to implement the following figures using turtle



## **Exercise - 15 - Testing**

- a) Write a test-case to check the function even\_numbers which return True on passing a list of all even numbers
- b) Write a test-case to check the function reverse\_string which returns the reversed string

#### **Exercise - 16 - Advanced**

- a) Build any one classical data structure.
- b) Write a program to solve knapsack problem.

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#### **COMPUTER GRAPHICS**

#### **OBJECTIVES:**

- To develop, design and implement two and three dimensional graphical structures
- To enable students to acquire knowledge Multimedia compression and animations
- To learn Creation, Management and Transmission of Multimedia objects.

#### **UNIT-I:**

**2D Primitives**Output primitives – Line, Circle and Ellipse drawing algorithms - Attributes of output primitives – Two dimensional Geometric transformations - Two dimensional viewing – Line, Polygon, Curve and Text clipping algorithms

#### UNIT-II:

**3D Concepts** Parallel and Perspective projections - Three dimensional object representation – Polygons, Curved lines, Splines, Quadric Surfaces, - Visualization of data sets - 3Dtransformations – Viewing -Visible surface identification.

## UNIT-III: Graphics Programming

Color Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Keyframe - Graphics programming using OPENGL – Basic graphics primitives –Drawing three dimensional objects - Drawing three dimensional scenes

#### UNIT- IV: Rendering

Introduction to Shading models – Flat and Smooth shading – Adding texture to faces –Adding shadows of objects – Building a camera in a program – Creating shaded objects– Rendering texture – Drawing Shadows.

## UNIT- V: Fractals

Fractals and Self similarity – Peano curves – Creating image by iterated functions –Mandelbrot sets – Julia Sets – Random Fractals

# UNIT- VI:

**Overview of Ray Tracing** Intersecting rays with other primitives – Adding Surface texture – Reflections and Transparency – Boolean operations on Objects.

# **OUTCOMES:**

- Know and be able to describe the general software architecture of programs that use 3D computer graphics.
- Know and be able to discuss hardware system architecture for computer graphics. This Includes, but is not limited to: graphics pipeline, frame buffers, and graphic accelerators /co-processors.
- Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).

# **TEXT BOOKS:**

- 1. Donald Hearn, Pauline Baker, Computer Graphics C Version, second edition, Pearson Education,2004.
- 2. F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003.

# **REFERENCE BOOKS:**

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics-Principles and practice, Second Edition in C, Pearson Education, 2007.

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## JAVA PROGRAMMING

## **OBJECTIVES:**

- Understanding the OOP's concepts, classes and objects, threads, files, applets, swings and act.
- This course introduces computer programming using the JAVA programming language with object-oriented programming principles.
- Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using Java for network level programming and middleware development

## **UNIT-I:**

Introduction to OOP, procedural programming language and object oriented language, principles of OOP, applications of OOP, history of java, java features, JVM, program structure.

Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting, flow of control.

## UNIT-II:

Classes and objects, class declaration, creating objects, methods, constructors and constructor overloading, garbage collector, importance of static keyword and examples, this keyword, arrays, command line arguments, nested classes.

#### **UNIT-III:**

Inheritance, types of inheritance, super keyword, final keyword, overriding and abstract class. Interfaces, creating the packages, using packages, importance of CLASSPATH and java.lang package. Exception handling, importance of try, catch, throw throws and finally block, user-defined exceptions, Assertions.

#### **UNIT-IV:**

Multithreading: introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. Reading data from files and writing data to files, random access file,

#### UNIT-V:

Applet class, Applet structure, Applet life cycle, sample Applet programs. Event handling: event delegation model, sources of event, Event Listeners, adapter classes, inner classes.

# **UNIT-VI:**

AWT: introduction, components and containers, Button, Label, Checkbox, Radio Buttons, List Boxes, Choice Boxes, Container class, Layouts, Menu and Scrollbar.

## **OUTCOMES:**

- Understand Java programming concepts and utilize Java Graphical User Interface in Program writing.
- Write, compile, execute and troubleshoot Java programming for networking concepts.
- Build Java Application for distributed environment.
- Design and Develop multi-tier applications.
- Identify and Analyze Enterprise applications.

# **TEXT BOOKS:**

1. The complete Reference Java, 8<sup>th</sup> edition, Herbert Schildt, TMH.

- 2. Programming in JAVA, Sachin Malhotra, Saurabh Choudary, Oxford.
- 3. Introduction to java programming, 7<sup>th</sup> edition by Y Daniel Liang, Pearson.

## **REFERENCE BOOKS:**

1. Swing: Introduction, JFrame, JApplet, JPanel, Componets in Swings, Layout Managers in

2. Swings, JList and JScrollPane, Split Pane, JTabbedPane, JTree, JTable, Dialog Box.

#### II Year - II Semester

## **E-COMMERCE**

#### **OBJECTIVES:**

- Identify the major categories and trends of e-commerce applications.
- Identify the essential processes of an e-commerce system.
- Identify several factors and web store requirements needed to succeed in e-commerce.
- Discuss the benefits and trade-offs of various e-commerce clicks and bricks alternatives.
- Understand the main technologies behind e-commerce systems and how these technologies interact.
- Discuss the various marketing strategies for an online business.
- Define various electronic payment types and associated security risks and the ways to protect against them.

#### UNIT – I

Electronic Commerce-Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications. Consumer Oriented Electronic commerce - Mercantile Process models.

#### UNIT – II

Electronic payment systems - Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems. Inter Organizational Commerce - EDI, EDI Implementation, Value added networks.

#### UNIT – III

Intra Organizational Commerce - work Flow, Automation Customization and internal Commerce, Supply chain Management.

#### UNIT – IV

Corporate Digital Library - Document Library, digital Document types, corporate Data Warehouses. Advertising and Marketing - Information based marketing, Advertising on Internet, on-line marketing process, market research.

#### UNIT – V

Consumer Search and Resource Discovery - Information search and Retrieval, Commerce Catalogues, Information Filtering.

# UNIT – VI

Multimedia - key multimedia concepts, Digital Video and electronic Commerce, Desktop video processing, Desktop video conferencing.

## **OUTCOMES:**

- Identify, interpret and analyze stakeholder needs
- Identify and apply relevant problem solving methodologies
- Design components, systems and/or processes to meet required specifications
- Design components, systems and/or processes to meet required specifications
- Demonstrate research skills

## **TEXT BOOK**:

1. Frontiers of electronic commerce – Kalakata, Whinston, Pearson.

# **REFERENCE BOOKS**:

- 1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley.
- 2. E-Commerce, S.Jaiswal Galgotia.
- 3. E-Commerce, Efrain Turbon, Jae Lee, David King, H.Michael Chang.
- 4. Electronic Commerce Gary P.Schneider Thomson.
- 5. E-Commerce Business, Technology, Society, Kenneth C.Taudon, Carol Guyerico Traver.

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## **COMPUTER ORGANIZATION**

### **OBJECTIVES:**

• Understand the architecture of a modern computer with its various processing units. Also the Performance measurement of the computer system.

• In addition to this the memory management system of computer.

#### UNIT -I:

**Basic Structure Of Computers:** Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.

#### UNIT -II:

#### **Machine Instruction and Programs:**

Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types,

Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions

## UNIT -III:

**Type of Instructions:** Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations

## UNIT -IV:

**INPUT/OUTPUT ORGANIZATION:** Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access, Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)

#### UNIT -V:

**The MEMORY SYSTEMS:** Basic memory circuits, Memory System Consideration, Read-Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: Mapping Functions, INTERLEAVING **Secondary Storage:** Magnetic Hard Disks, Optical Disks,

# UNIT -VI:

**Processing Unit:** Fundamental Concepts: Register Transfers, Performing An Arithmetic Or Logic Operation, Fetching A Word From Memory,

Execution of Complete Instruction, Hardwired Control,

**Micro programmed Control:** Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

# **OUTCOMES:**

- Students can understand the architecture of modern computer.
- They can analyze the Performance of a computer using performance equation
- Understanding of different instruction types.
- Students can calculate the effective address of an operand by addressing modes
- They can understand how computer stores positive and negative numbers.
- Understanding of how a computer performs arithmetic operation of positive and negative numbers.

# **TEXT BOOKS:**

- 1. Computer Organization, Carl Hamacher, Zvonks Vranesic, Safea Zaky, 5th Edition, McGraw Hill.
- 2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, McGraw Hill.

# **REFERENCE BOOKS:**

- 1. Computer Organization and Architecture William Stallings Sixth Edition, Pearson/PHI
- 2. Structured Computer Organization Andrew S. Tanenbaum, 4th Edition PHI/Pearson
- 3. Fundamentals or Computer Organization and Design, Sivaraama Dandamudi Springer Int. Edition.
- 4. "Computer Organization and Design: The Hardware/Software Interface" by David A. Patterson and John L. Hennessy.
- 5. J.P. Hayes, "Computer Architecture and Organization", McGraw-Hill, 1998.

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## **OBJECT ORIENTED ANALYSIS & DESIGN USING UML**

#### **OBJECTIVE:**

- To understand how to solve complex problems
- Analyze and design solutions to problems using object oriented approach
- Study the notations of Unified Modeling Language

#### UNIT-I:

**Introduction**: The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, Designing Complex Systems, Evolution of Object Model, Foundation of Object Model, Elements of Object Model, Applying the Object Model.

#### **UNIT-II:**

**Classes and Objects**: Nature of object, Relationships among objects, Nature of a Class, Relationship among Classes, Interplay of Classes and Objects, Identifying Classes and Objects, Importance of Proper Classification, Identifying Classes and Objects, Key abstractions and Mechanisms.

#### UNIT-III:

**Introduction to UML**: Why we model, Conceptual model of UML, Architecture, Classes, Relationships, Common Mechanisms, Class diagrams, Object diagrams.

#### **UNIT-IV:**

Basic Behavioral Modeling: Interactions, Interaction diagrams, Use cases, Use case Diagrams, Activity Diagrams.

#### UNIT-V:

Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

#### UNIT-VI:

Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams.

Case Study: The Unified Library application.

# **OUTCOME:**

- Ability to find solutions to the complex problems using object oriented approach
- Represent classes, responsibilities and states using UML notation
- Identify classes and responsibilities of the problem domain

## **TEXT BOOKS:**

- "Object- Oriented Analysis And Design with Applications", Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, 3<sup>rd</sup> edition, 2013, PEARSON.
- 2. "The Unified Modeling Language User Guide", Grady Booch, James Rumbaugh, Ivar Jacobson, 12<sup>th</sup> Impression, 2012, PEARSON.

## **REFERENCE BOOKS:**

- 1. "Object-oriented analysis and design using UML", Mahesh P. Matha, PHI
- 2. "Head first object-oriented analysis and design", Brett D. McLaughlin, Gary Pollice, Dave West, O"Reilly
- 3. "Object-oriented analysis and design with the Unified process", John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning

"The Unified modeling language Reference manual", James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley

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## PRINCIPLES OF PROGRAMMING LANGUAGES

#### **OBJECTIVES:**

- To understand and describe syntax and semantics of programming languages
- To understand data, data types, and basic statements
- To understand call-return architecture and ways of implementing them
- To understand object-orientation, concurrency, and event handling in programming languages
- To develop programs in non-procedural programming paradigms

#### UNIT-I:

**Syntax and semantics:** Evolution of programming languages, describing syntax, context, free grammars, attribute grammars, describing semantics, lexical analysis, parsing, recursive - decent bottom - up parsing

#### UNIT -II:

**Data, data types, and basic statements:** Names, variables, binding, type checking, scope, scope rules, lifetime and garbage collection, primitive data types, strings, array types, associative arrays, record types, union types, pointers and references, Arithmetic expressions, overloaded operators, type conversions, relational and boolean expressions, assignment statements, mixed mode assignments, control structures – selection, iterations, branching, guarded Statements

#### UNIT -III:

**Subprograms and implementations:** Subprograms, design issues, local referencing, parameter passing, overloaded methods, generic methods, design issues for functions, semantics of call and return, implementing simple subprograms, stack and dynamic local variables, nested subprograms, blocks, dynamic scoping

#### UNIT -IV:

**Object- orientation, concurrency, and event handling:** Object – orientation, design issues for OOP languages, implementation of object, oriented constructs, concurrency, semaphores, Monitors, message passing, threads, statement level concurrency, exception handling, event handling

#### UNIT -V:

**Functional programming languages:** Introduction to lambda calculus, fundamentals of functional programming languages, Programming with Scheme, – Programming with ML,

## UNIT -VI:

**Logic programming languages:** Introduction to logic and logic programming, – Programming with Prolog, multi - paradigm languages

# **OUTCOMES:**

- Describe syntax and semantics of programming languages
- Explain data, data types, and basic statements of programming languages
- Design and implement subprogram constructs, Apply object oriented, concurrency, and event handling programming constructs
- Develop programs in Scheme, ML, and Prolog
- Understand and adopt new programming languages

# **TEXT BOOKS:**

- 1. Robert W. Sebesta, "Concepts of Programming Languages", Tenth Edition, Addison Wesley, 2012.
- 2. Programming Langugaes, Principles & Paradigms, 2ed, Allen B Tucker, Robert E Noonan, TMH

# **REFERENCE BOOKS:**

- 1. R. Kent Dybvig, "The Scheme programming language", Fourth Edition, MIT Press, 2009.
- 2. Jeffrey D. Ullman, "Elements of ML programming", Second Edition, Prentice Hall, 1998.
- 3. Richard A. O'Keefe, "The craft of Prolog", MIT Press, 2009.
- 4. W. F. Clocksin and C. S. Mellish, "Programming in Prolog: Using the ISO Standard", Fifth Edition, Springer, 2003

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# UNIFIED MODELING LANGUAGES LAB

#### **OBJECTIVES:**

- Construct UML diagrams for static view and dynamic view of the system.
- Generate creational patterns by applicable patterns for given context.
- Create refined model for given Scenario using structural patterns.
- Construct behavioral patterns for given applications.

#### <u>Week 1:</u>

Familiarization with Rational Rose or Umbrello

#### For each case study:

#### Week 2, 3 & 4:

- For each case study:
- a) Identify and analyze events
- b) Identify Use cases
- c) Develop event table
- d) Identify & analyze domain classes
- e) Represent use cases and a domain class diagram using Rational Rose
- f) Develop CRUD matrix to represent relationships between use cases and problem domain classes

#### Week 5 & 6:

- For each case study:
- a) Develop Use case diagrams
- b) Develop elaborate Use case descriptions & scenarios
- c) Develop prototypes (without functionality)
- d) Develop system sequence diagrams

#### Week 7, 8, 9 & 10:

#### For each case study:

- a) Develop high-level sequence diagrams for each use case
- b) Identify MVC classes / objects for each use case
- c) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects
- d) Develop detailed design class model (use GRASP patterns for responsibility assignment)
- e) Develop three-layer package diagrams for each case study

#### Week 11 & 12:

- For each case study:
- a) Develop Use case Packages
- b) Develop component diagrams
- c) Identify relationships between use cases and represent them
- d) Refine domain class model by showing all the associations among classes

- <u>Week 13 onwards:</u>
  For each case study:
- a) Develop sample diagrams for other UML diagrams state chart diagrams, activity diagrams and deployment diagrams

# **OUTCOMES:**

- Understand the Case studies and design the Model.
- Understand how design patterns solve design problems.
- Develop design solutions using creational patterns.

Construct design solutions by using structural and behavioral patterns

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# JAVA PROGRAMMING LAB

Exercise - 1 (Basics)

a). Write a JAVA program to display default value of all primitive data type of JAVA

b). Write a java program that display the roots of a quadratic equation ax2+bx=0. Calculate the discriminate D and basing on value of D, describe the nature of root.

c). Five Bikers Compete in a race such that they drive at a constant speed which may or may not be the same as the other. To qualify the race, the speed of a racer must be more than the average speed of all 5 racers. Take as input the speed of each racer and print back the speed of qualifying racers.

d) Write a case study on public static void main(250 words)

Exercise - 2 (Operations, Expressions, Control-flow, Strings)

a). Write a JAVA program to search for an element in a given list of elements using binary search mechanism.

b). Write a JAVA program to sort for an element in a given list of elements using bubble sort

(c). Write a JAVA program to sort for an element in a given list of elements using merge sort.

(d) Write a JAVA program using StringBufferto delete, remove character.

## Exercise - 3 (Class, Objects)

a). Write a JAVA program to implement class mechanism. – Create a class, methods and invoke them inside main method.

b). Write a JAVA program to implement constructor.

## Exercise - 4 (Methods)

a). Write a JAVA program to implement constructor overloading.

b). Write a JAVA program implement method overloading.

## Exercise - 5 (Inheritance)

- a). Write a JAVA program to implement Single Inheritance
  - b). Write a JAVA program to implement multi level Inheritance
  - c). Write a java program for abstract class to find areas of different shapes

## **Exercise - 6** (Inheritance - Continued)

a). Write a JAVA program give example for "super" keyword.

b). Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

## **Exercise - 7** (Exception)

a).Write a JAVA program that describes exception handling mechanism

b).Write a JAVA program Illustrating Multiple catch clauses

## **Exercise – 8** (Runtime Polymorphism)

a). Write a JAVA program that implements Runtime polymorphism

b). Write a Case study on run time polymorphism, inheritance that implements in above problem

## **Exercise – 9** (User defined Exception)

- a). Write a JAVA program for creation of Illustrating throw
- b). Write a JAVA program for creation of Illustrating finally
- c). Write a JAVA program for creation of Java Built-in Exceptions
- d).Write a JAVA program for creation of User Defined Exception

## Exercise – 10 (Threads)

a). Write a JAVA program that creates threads by extending Thread class .First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and the third display "Welcome" every 3 seconds ,(Repeat the same by implementing Runnable)

- b). Write a program illustrating **isAlive** and **join** ()
- c). Write a Program illustrating Daemon Threads.

## Exercise - 11 (Threads continuity)

a).Write a JAVA program Producer Consumer Problem

b).Write a case study on thread Synchronization after solving the above producer consumer problem

#### Exercise – 12 (Packages)

a). Write a JAVA program illustrate class path

b). Write a case study on including in class path in your os environment of your package.

c). Write a JAVA program that import and use the defined your package in the previous Problem

Exercise - 13 (Applet)

a).Write a JAVA program to paint like paint brush in applet.

- b) Write a JAVA program to display analog clock using Applet.
- c). Write a JAVA program to create different shapes and fill colors using Applet.

## Exercise - 14 (Event Handling)

a).Write a JAVA program that display the x and y position of the cursor movement using Mouse.

b).Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

Exercise - 15 (Swings)

a).Write a JAVA programto build a Calculator in Swings

b). Write a JAVA program to display the digital watch in swing tutorial.

## **Exercise – 16 (Swings - Continued)**

a). Write a JAVA program that to create a single ball bouncing inside a JPanel.

b). Write a JAVA program JTree as displaying a real tree upside down.

# HUMAN COMPUTER INTERACTION

### **OBJECTIVES:**

- Demonstrate an understanding of guidelines, principles, and theories influencing human Computer interaction.
- Recognize how a computer system may be modified to include human diversity.
- Select an effective style for a specific application.
- Design mock ups and carry out user and expert evaluation of interfaces.
- Carry out the steps of experimental design, usability and experimental testing, and evaluation of human computer interaction systems.
- Use the information sources available, and be aware of the methodologies and technologies supporting advances in HCI.

#### UNIT-I:

The User Interface: Introduction, Importance of the User Interface, Importance and benefits of Good Design History of Human Computer Interface. Characteristics of Graphical and Web User Interface: Graphical User Interface, popularity of graphics, concepts of Direct Manipulation, Graphical System advantage and disadvantage, Characteristics of GUI. Web User Interface, popularity of web, Characteristics of Web Interface, Merging of Graphical Business systems& the Web, Principles of User Interface Design

#### UNIT-II:

The User Interface Design Process: Obstacles and Pitfall in the development Process, Usability, The Design Team, Human Interaction with Computers, Important Human Characteristics in Design, Human Consideration in Design, Human Interaction Speeds, Performance versus Preference, Methods for Gaining and Understanding of Users

## UNIT-III:

Understanding Business Functions: Business Definitions & Requirement analysis, Determining Business Functions, Design standards or Style Guides, System Training and Documentation

## **UNIT-IV:**

Principles of Good Screen Design: Human considerations in screen Design, interface design goals, test for a good design, screen meaning and purpose, Technological considerations in Interface Design System Menus and Navigation Schemes: Structure, Functions, Context, Formatting, Phrasing and Selecting, Navigating of Menus, Kinds of Graphical Menus Windows Interface: Windows characteristic, Components of Window, Windows Presentation Styles, Types of Windows, Window Management, Web systems

## UNIT-V:

Device and Screen-Based Control: Device based controls, Operable Controls, Text entry/read-Only Controls, Section Controls, Combining Entry/Selection Controls, Other Operable Controls and Presentation Controls, Selecting proper controls

## **UNIT-VI:**

Effective Feedback Guidance and Assistance: Providing the Proper Feedback, Guidance and Assistance Effective Internationalization and Accessibility- International consideration, Accessibility, Create meaningful Graphics, Icons and Images, Colors-uses, possible problems with colors, choosing colors

#### **OUTCOMES:**

• Students are assessed on their ability to communicate and apply UCD methods in the capstone project course. Assessment includes examination of team reports and how HCI students can discuss challenges and solutions for adapting UCD methods to fit the practical needs of an actual project

# **TEXT BOOKS:**

- 1. Wilbert O. Galitz, "The Essential Guide to User Interface Design", Wiley India Edition
- 2. Prece, Rogers, "Sharps Interaction Design", Wiley India.
- 3. Ben Shneidermann,"Designing the user interfaces". 3rd Edition, Pearson Education Asia.

## **REFERENCES BOOKS:**

- 1. Soren Lauesen, "User Interface Design", Pearson Education
- 2. Alan Cooper, Robert Riemann, David Cronin, "Essentials of Interaction Design", Wiley
- 3. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell, Bealg,"HumanComputer Interaction", Pearson Education.

# UNIX AND SHELL PROGRAMMING

### **OBJECTIVES:**

- Written technical communication and effective use of concepts and terminology.
- Facility with UNIX command syntax and semantics.
- Ability to read and understand specifications, scripts and programs.
- Individual capability in problem solving using the tools presented within the class. Students will demonstrate a mastery of the course materials and concepts within in class discussions.

## UNIT-I

Introduction to unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

## UNIT-II

The File system –The Basics of Files-What's in a File-Directories and File Names-Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

## UNIT-III

Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs.

## UNIT-IV

Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

#### UNIT-V

Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The \$? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Exec Command.

# UNIT-VI

The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control.

## **OUTCOMES:**

- Documentation will demonstrate good organization and readability.
- File processing projects will require data organization, problem solving and research.
- Scripts and programs will demonstrate simple effective user interfaces.
- Scripts and programs will demonstrate effective use of structured programming.
- Scripts and programs will be accompanied by printed output demonstrating completion of a test plan.
- Testing will demonstrate both black and glass box testing strategies.
- Project work will involve group participation.

# **TEXT BOOKS:**

- 1. The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
- 2. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Pearson.

## **REFERENCE BOOKS:**

Unix and shell programmingby B.M. Harwani, OXFORD university press.

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#### ADVANCED JAVA PROGRAMMING

#### **OBJECTIVES:**

• Getting the student to be well trained in Advanced Java Programming skills for an easy entry in the IT Industry.

#### UNIT –I:

Recapitulation of XTML, XTML5, Java Swing package – use of System class – Applet Context – signed applet – object serialization- shallow and deep copying – Java collections –Iterators – Array Lists – sets –hashset-hash table- queue- priority queue class-vector class- comparable interface.

#### UNIT – II:

Java Beans Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, Using Bound properties, Bean Info Interface, Constrained properties Persistence, Customizers, Java Beans API

#### UNIT - III:

Introduction to Servelets: Lifecycle of a Serverlet, JSDK The Servelet API, The javax.servelet Package, Reading Servelet parameters, Reading Initialization parameters. The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, servlet chaining-Security Issues.

#### UNIT -IV:

Introduction to JSP The Problem with Servelet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

#### UNIT - V:

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations

## UNIT - VI:

Database Access Database Programming using JDBC Studying Javax.sql. package. Accessing MySql database- Accessing MS Access database- Accessing a Database from a JSP Page Application – Specific Database Actions Deploying JAVA Beans in a JSP Page. Introduction to struts framework.

# **OUTCOMES:**

- Construct a Web Application using Servlets
- Construct a Web application using Java Server Pages
- Construct an enterprise application using Session Beans
- Construct an enterprise application using Entity Beans linked with Database
- Construct an asynchronous enterprise application using Message-Driven Beans

# **TEXT BOOKS:**

- 1. Internet and World wide web- How to program , Dietel and Nieto , Pearson. (Chapters: 3, 4, 8, 9, 10, 11, 12 to 18)
- 2. The Complete Reference, Java 2, 3ed, Patrik Naughton, Herbert Schildt, TMH. (Chapters: 19, 20, 21, 22, 25, 27)
- 3. Java Server Pages , Hans Bergstan, Oreilly (Chapters: 1-9)

## **REFERENCE BOOKS:**

- 1. Jakarta Struts cook book, Bill Siggelkow, SPD, Oreilly (Chapter 8)
- 2. Murach's, Beginning Java JDK5, Murach, SPD.
- 3. An introduction to Web Design and Programming, Wang Thomson
- 4. Web application technologies concepts, Knuckles, John Wiley.
- 5. Programming world wide web, Sebesta, Pearson
- 6. Building Web Applications, NIIT, PHI
- 7. Web Warrior Guide to Web Programing, Bai, Ekedaw, Thomas, Wiley
- 8. Beginning Web Programming, Jon Duckett , Wrox, Wiley
- 9. Java server pages, Pekowsky, Pearson

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#### DATA BASE MANAGEMENT SYSTEMS

#### **OBJECTIVES**

• To learn the principles of systematically designing and using large scale Database Management Systems for various applications.

**UNIT-I:** An Overview of Database Management, Introduction- What is Database System-What is Database-Why Database- Data Independence- Relation Systems and Others- Summary, **Database system architecture, Introduction-** The Three Levels of Architecture-The External Level- the Conceptual Level- the Internal Level- Mapping- the Database Administrator-The Database Management Systems- Client/Server Architecture.

#### **UNIT-II:**

The E/R Models, The Relational Model, Relational Calculus, Introduction to Database Design, Database Design and Er Diagrams-Entities Attributes, and Entity Sets-Relationship and Relationship Sets-Conceptual Design With the Er Models, The Relational Model Integrity Constraints Over Relations- Key Constraints –Foreign Key Constraints-General Constraints, Relational Algebra and Calculus, Relational Algebra- Selection and Projection- Set Operation, Renaming – Joins- Division- More Examples of Queries, Relational Calculus, Tuple Relational Calculus.

## UNIT-III:

**Queries, Constraints, Triggers**: The Form of Basic SQL Query, Union, Intersect, and Except, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Database.

#### **UNIT-IV:**

**Schema Refinement (Normalization) :** Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

# UNIT-V: Transaction Management and Concurrency Control:

Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and savepoint.

Concurrency control for lost updates, uncommitted data, inconsistent retrievals and the Scheduler. Concurrency control with locking methods : lock granularity, lock types, two phase locking for ensuring serializability, deadlocks, Concurrency control with time stamp ordering : Wait/Die and Wound/Wait Schemes, Database Recovery management : Transaction recovery.

# UNIT-VI:

Overview of Storages and Indexing, Data on External Storage- File Organization and Indexing – Clustered Indexing – Primary and Secondary Indexes, Index Data Structures, Hash-Based Indexing – Tree-Based Indexing, Comparison of File Organization

# OUTCOMES

- Describe a relational database and object-oriented database.
- Create, maintain and manipulate a relational database using SQL
- Describe ER model and normalization for database design.
- Examine issues in data storage and query processing and can formulate appropriate solutions.
- Understand the role and issues in management of data such as efficiency, privacy, security, ethical responsibility, and strategic advantage.
- Design and build database system for a given real world problem

# **TEXT BOOKS:**

# 1. Introduction to Database Systems, CJ Date, Pearson

- 2. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGraw Hill 3rd Edition
- 3. Database Systems The Complete Book, H G Molina, J D Ullman, J Widom Pearson

# **REFERENCES BOOKS:**

- 1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
- 2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
- 3. Introduction to Database Systems, C.J.Date Pearson Education

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#### **OPERATING SYSTEMS**

#### **OBJECTIVES:**

- Study the basic concepts and functions of operating systems.
- Understand the structure and functions of OS.
- Learn about Processes, Threads and Scheduling algorithms.
- Understand the principles of concurrency and Deadlocks.
- Learn various memory management schemes.
- Study I/O management and File systems.
- Learn the basics of Linux system and perform administrative tasks on Linux Servers.

#### UNIT I

**Introduction to Operating System Concept:** Types of operating systems, operating systems concepts, operating systems services, Introduction to System call, System call types.

## **UNIT-II:**

**Process Management** – Process concept, The process, Process State Diagram, Process control block, Process Scheduling- Scheduling Queues, Schedulers, Operations on Processes, Interprocess Communication, Threading Issues, Scheduling-Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

#### UNIT-III:

**Memory Management:** Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation

#### **Virtual Memory Management:**

Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing

#### **UNIT-IV:**

**Concurrency:** ProcessSynchronization, The Critical- Section Problem, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization examples

**Principles of deadlock** – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock

## UNIT-V:

**File system Interface-** the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management Mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers,

## UNIT VI:

**Linux System**: Components of LINUX, Interprocess Communication, Synchronization, Interrupt, Exception and System Call.

Android Software Platform: Android Architecture, Operating System Services, Android Runtime Application Development, Application Structure, Application Process management

#### **OUTCOMES:**

- Design various Scheduling algorithms.
- Apply the principles of concurrency.
- Design deadlock, prevention and avoidance algorithms.
- Compare and contrast various memory management schemes.
- Design and Implement a prototype file systems.
- Perform administrative tasks on Linux Servers
- Introduction to Android Operating System Internals

## **TEXT BOOK:**

- 1. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin and Greg Gagne 9th Edition, John Wiley and Sons Inc., 2012.
- 2.Operating Systems Internals and Design Principles, William Stallings, 7th Edition, Prentice Hall, 2011.
- 3. Operating Systems-S Halder, Alex A Aravind Pearson Education Second Edition 2016.

#### **REFERENCES:**

- 1.Modern Operating Systems, Andrew S. Tanenbaum, Second Edition, Addison Wesley, 2001.
- 2. Operating Systems: A Design-Oriented Approach, Charles Crowley, Tata Mc Graw Hill Education", 1996.
- 3. Operating Systems: A Concept-Based Approach, D M Dhamdhere, Second Edition, Tata Mc Graw-Hill Education, 2007.
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#### ADVANCED JAVA PROGRAMING LAB

#### **OBJECTIVES:**

• To develop skills in students in developing applications using advanced concepts of advanced Java programming concepts like JDBC, Servlets, JSP, Java Beans, etc.

#### **PROGRAMS LIST:**

- **1.** Write a program to prompt the user for a hostname and then looks up the IP address for the hostname and displays the results.
- 2. Write a program to read the webpage from a website and display the contents of the webpage.
- 3. Write programs for TCP server and Client interaction as per given below.
  - i). A program to create TCP server to send a message to client.
  - ii). A program to create TCP client to receive the message sent by the server.
- 4. Write programs for Datagram server and Client interaction as per given below.
  - i). A program to create Datagram server to send a message to client.
  - ii). A program to create Datagram client to receive the message sent by the server
- 5. Write a program by using JDBC to execute a SQL query for a database and display the results.
- 6. Write a program by using JDBC to execute an update query without using Prepared Statement and display the results.
- 7. Write a program by using JDBC to execute an update query by using Prepared Statement and display the results.
- 8. Write a program to execute a stored procedure in the database by using Callable Statement and display the results.
- 9. Write a program to display a greeting message in the browser by using Http Servlet.

- 10. Write a program to receive two numbers from a HTML form and display their sum in the browser by using Http Servlet.
- 11. Write a program to display a list of five websites in a HTML form and visit to the selected website by using Response redirection.
  - 12. Write a program to store the user information into Cookies. Write another program to display the above stored information by retrieving from Cookies.
  - 13. Write a program in Java Beans to add a Button to the Bean and display the number of times the button has been clicked.
  - 14. Write a program for Java Bean with Simple property by using SimpleBeanInfo class.
  - 15. Write a program for Java Bean with Indexed Property by using SimpleBeanInfo class.
  - 16. Write a program to develop a Enterprise Java Bean of "Session Bean" type.

## **OUTCOMES:**

• After successful completion of course, students will be able appreciate and apply the advanced concepts of Java including JDBC, Servlets, JSP, Java Beans, etc.

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#### UNIX AND OPERATING SYSTEMS LAB

#### **OBJECTIVES:**

- To understand the design aspects of operating system.
- To study the process management concepts & Techniques.
- To study the storage management concepts.
- To familiarize students with the Linux environment
- To learn the fundamentals of shell scripting/programming
- To familiarize students with basic Unix administration

## **Operating Systems**

- 1. Simulate the following CPU scheduling algorithms a) Round Robin b) SJF c) FCFS d) Priority
- 2. Multiprogramming-Memory management- Implementation of fork (), wait (), exec() and exit (), System calls
- 3. Simulate the following
  - a) Multiprogramming with a fixed number of tasks (MFT)b) Multiprogramming with a variable number of tasks (MVT)
- 4. Simulate Bankers Algorithm for Dead Lock Avoidance
- 5. Simulate Bankers Algorithm for Dead Lock Prevention.
- 6. Simulate the following page replacement algorithms.a) FIFO b) LRU c) LFU
- 7. Simulate the following File allocation strategiesa) Sequenced b) Indexed c) Linked

#### **UNIX Programming**

List of Experiments:

- 1. Basic Shell Commands Shell Programs:
- 2. Fibonacci Series
- 3. Designing Calculator
- 4. File Operations
- 5. Base conversion
- 6. Usage of cut and grep commands
- 7. Usage of user defined functions Administration
- 8. Managing User Accounts
- 9. User Quota Management
- 10. Installation of RPM software and Zipping, tar
- 11. Configuring RAID
- 12. Configuring Web server

## **OUTCOMES:**

- To use Unix utilities and perform basic shell control of the utilities
- To use the Unix file system and file access control.
- To use of an operating system to develop software
- Work confidently in Unix/Linux environment
- Write shell scripts to automate various tasks
- Master the basics of Linux administration

## DATA BASE MANAGEMENT SYSTEM LAB

#### **OBJECTIVES:**

- To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product-specific tools.
- To familiarize the participant with the nuances of database environments towards an information-oriented data-processing oriented framework
- To give a good formal foundation on the relational model of data
- To present SQL and procedural interfaces to SQL comprehensively
- To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design

#### List of Experiments:

## SQL

- 1. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
- 2. Queries using operators in SQL
- 3. Queries to Retrieve and Change Data: Select, Insert, Delete, and Update
- 4. Queries using Group By, Order By, and Having Clauses
- 5. Queries on Controlling Data: Commit, Rollback, and Save point
- 6. Queries to Build Report in SQL \*PLUS
- 7. Queries for Creating, Dropping, and Altering Tables, Views, and Constraints
- 8. Queries on Joins and Correlated Sub-Queries
- 9. Queries on Working with Index, Sequence, Synonym, Controlling Access, and Locking Rows for Update, Creating Password and Security features

## PL/SQL

- 10. Write a PL/SQL Code using Basic Variable, Anchored Declarations, and Usage of Assignment Operation
- 11. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL
- 12. Write a PL/SQL block using SQL and Control Structures in PL/SQL
- 13. Write a PL/SQL Code using Cursors, Exceptions and Composite Data Types
- 14. Write a PL/SQL Code using Procedures, Functions, and Packages FORMS
- 15. Write a PL/SQL Code Creation of forms for any Information System such as Student Information System, Employee Information System etc. 18
- 16. Demonstration of database connectivity

#### **OUTCOMES:**

- Understand, appreciate and effectively explain the underlying concepts of database technologies
- Design and implement a database schema for a given problem-domain
- Normalize a database
- Populate and query a database using SQL DML/DDL commands.
- Declare and enforce integrity constraints on a database using a state-of-the-artRDBMS
- Programming PL/SQL including stored procedures, stored functions, cursors, packages.
- Design and build a GUI application using a 4GL

**Note:** The creation of sample database for the purpose of the experiments is expected to be predecided by the instructor.

#### **Text Books/Suggested Reading:**

- 1. Oracle: The Complete Reference by Oracle Press
- 2. Nilesh Shah, "Database Systems Using Oracle", PHI, 2007.
- 3. Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007.

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#### **PROFESSIONAL ETHICSAND HUMAN VALUES**

#### **Course Objectives:**

\*To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.

\*Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

#### **UNIT I: Human Values**:

Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value Time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality-Character.

#### **UNIT: II: Principles for Harmony:**

Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

#### **UNIT III: Engineering Ethics and Social Experimentation:**

History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism —Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg's Theory - Gilligan's Argument – Heinz's Dilemma - Comparison with Standard Experiments — Learning from the Past – Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

#### UNIT IV: Engineers' Responsibilities towards Safety and Risk:

Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/sInvoluntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/sImmediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

## **UNIT V: Engineers' Duties and Rights:**

Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality – Senses of Loyalty - Consensus and Controversy - Professional and Individual Rights – Confidential and Proprietary Information - Conflict of Interest-Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving-Occupational Crimes-Industrial Espionage- Price Fixing-Whistle Blowing.

# **UNIT VI: Global Issues:**

Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics - Environmental Ethics – Endangering Lives - Bio Ethics - Computer Ethics - War Ethics – Research Ethics -Intellectual Property Rights.

• Related Cases Shall be dealt where ever necessary.

## **Outcome:**

\*It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.

\*It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

## **<u>References</u>**:

- 1. Professional Ethics by R. Subramaniam Oxford Publications, New Delhi.
- 2. Ethics in Engineering by Mike W. Martin and Roland Schinzinger Tata McGraw-Hill 2003.
- 3. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana Maruthi Publications.
- 4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
- 5. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
- 6. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd 2009.
- 7. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman and M. Jayakumaran University Science Press.
- 8. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill 2013
- 9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications

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	<b>COMPUTER NETWORKS</b>				

#### **OBJECTIVES:**

- Understand state-of-the-art in network protocols, architectures, and applications.
- Process of networking research
- Constraints and thought processes for networking research
- Problem Formulation—Approach—Analysis—

#### UNIT – I:

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models

#### UNIT – II:

Physical Layer – Fourier Analysis – Bandwidth Limited Signals – The Maximum Data Rate of a Channel - Guided Transmission Media, Digital Modulation and Multiplexing: Frequency Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols

#### UNIT – III:

The Data Link Layer - Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction – Error-Correcting Codes – Error Detecting Codes, Elementary Data Link Protocols- A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One Bit Sliding Window Protocol-A Protocol Using Go-Back-N-A Protocol Using Selective Repeat

#### UNIT – IV:

The Medium Access Control Sublayer-The Channel Allocation Problem-Static Channel Allocation-Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Carrier Sense Multiple Access Protocols-Collision-Free Protocols-Limited Contention Protocols-Wireless LAN Protocols, Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sublayer Protocol-Ethernet Performance-Fast Ethernet Gigabit Ethernet-10-Gigabit Ethernet-Retrospective on Ethernet, Wireless Lans-The 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer-The802.11 MAC Sublayer Protocol-The 805.11 Frame Structure-Services

#### UNIT – V:

Design Issues-The Network Layer Design Issues – Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service-Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path Algorithm, Congestion Control AlgorithmsApproaches to Congestion Control-Traffic Aware Routing-Admission Control-Traffic Throttling-Load Shedding.

## UNIT – VI:

**Transport Layer** – The Internet Transport Protocols: Udp, the Internet Transport Protocols: Tcp **Application Layer** – The Domain Name System: The DNS Name Space, Resource Records, Name Servers, Electronic Mail: Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery

## **OUTCOMES:**

- Understand OSI and TCP/IP models
- Analyze MAC layer protocols and LAN technologies
- 3 .Design applications using internet protocols
- 4 .Understand routing and congestion control algorithms
- 5 .Understand how internet works

## **TEXT BOOKS:**

- 1. Tanenbaum and David J Wetherall, Computer Networks, 5th Edition, Pearson Edu, 2010
- 2. Computer Networks: A Top Down Approach, Behrouz A. Forouzan, FirouzMosharraf, McGraw Hill Education

#### **REFERENCE BOOKS:**

1. Larry L. Peterson and Bruce S. Davie, "Computer Networks - A Systems Approach" (5th ed), Morgan Kaufmann/ Elsevier, 2011

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#### DATA MINING

#### **OBJECTIVES:**

- Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining.
- They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply.
- They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

#### UNIT –I:

**Introduction**: Why Data Mining? What Is Data Mining?1.3 What Kinds of Data Can Be Mined?1.4 What Kinds of Patterns Can Be Mined? Which Technologies Are Used? Which Kinds of Applications Are Targeted? Major Issues in Data Mining. Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity

#### UNIT –II:

**Data Pre-processing:** Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization

#### UNIT –III:

**Classification:** Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

#### UNIT –IV:

**Classification: Alterative Techniques,** Bayes' Theorem, Naïve Bayesian Classification, Bayesian Belief Networks

#### UNIT –V

Association Analysis: Basic Concepts and Algorithms: Problem Defecation, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. (Tan & Vipin)

## UNIT –VI

**Cluster Analysis: Basic Concepts and Algorithms: Overview:** What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K-means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm DBSCAN: Traditional Density Center-Based Approach, DBSCAN Algorithm, Strengths and Weaknesses. (Tan & Vipin)

## **OUTCOMES:**

- Understand stages in building a Data Warehouse
- Understand the need and importance of preprocessing techniques
- Understand the need and importance of Similarity and dissimilarity techniques
- Analyze and evaluate performance of algorithms for Association Rules.
- Analyze Classification and Clustering algorithms

## **TEXT BOOKS:**

1. Introduction to Data Mining: Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.

2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

- 1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
- 2. Data Mining: Vikram Pudi and P. Radha Krishna, Oxford.
- 3. Data Mining and Analysis Fundamental Concepts and Algorithms; Mohammed J. Zaki, Wagner Meira, Jr, Oxford
- 4. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.

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#### WEB TECHNOLOGIES

#### **OBJECTIVES:**

• This course is designed to introduce students with no programming experience to the programming languages and techniques associated with the World Wide Web. The course will introduce web-based media-rich programming tools for creating interactive web pages.

#### UNIT-I: HTML, CSS

Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Images, Hypertext Links, Lists, Tables, Forms, HTML5

CSS: Levels of Style Sheets, Style Specification Formats, Selector Forms, The Box Model, Conflict Resolution

#### UNIT-II: Javascript

The Basic of Javascript: Objects, Primitives Operations and Expressions, ScreenOutput and Keyboard Input, Control Statements, Object Creation and Modfication, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions

DHTML: Positioning Moving and Changing Elements

## UNIT-III:

**XML:** Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches,

AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX.

#### **UNIT-IV:**

**PHP Programming: Introducing PHP:** Creating PHP script, Running PHP script. **Working with variables and constants:** Using variables, Using constants, Data types,Operators.**Controlling program flow:** Conditional statements,Control statements,Arrays,functions.Working with forms and Databases such as MySQL.

**UNIT-V:** 

*Introduction to PERL, Operators and if statements, Program design and control structures, Arrays, Hashs and File handling, Regular expressions, Subroutines, Retrieving documents from the web with Perl.* 

# **UNIT-VI:**

Introduction to Ruby, Variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching. Overview of Rails.

# **OUTCOMES:**

- Analyze a web page and identify its elements and attributes.
- Create web pages using XHTML and Cascading Styles sheets.
- Build dynamic web pages.
- Build web applications using PHP.
- Programming through PERL and Ruby
- Write simple client-side scripts using AJAX

# **TEXT BOOKS:**

- 1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
- 2. Web Technologies, Uttam K Roy, Oxford
- 3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, MacIntyre, Morrissey, Cengage

- 1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)
- 2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
- 3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
- 4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning
- 5. http://www.upriss.org.uk/perl/PerlCourse.html

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#### SOFTWARE TESTING METHODOLOGIES

#### **OBJECTIVE:**

Fundamentals for various testing methodologies.

- Describe the principles and procedures for designing test cases.
- Provide supports to debugging methods.
- Acts as the reference for software testing techniques and strategies.

#### UNIT-I:

**Introduction:** Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs.

Flow graphs and Path testing: Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

#### UNIT-II:

**Transaction Flow Testing:** Transaction Flows, Transaction Flow Testing Techniques. **Dataflow testing:** Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

#### **UNIT-III:**

**Domain Testing:** Domains and Paths, Nice & Ugly Domains, Domain testing, Domains andInterfaces Testing, Domain and Interface Testing, Domains and Testability.

**Paths, Path products and Regular expressions:** Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

#### **UNIT-IV:**

**Syntax Testing:** Why, What and How, A Grammar for formats, Test Case Generation, Implementation and Application and Testability Tips.

**Logic Based Testing:** Overview, Decision Tables, Path Expressions, KV Charts, and Specifications.

## UNIT – V:

**State, State Graphs and Transition Testing:** State Graphs, Good & Bad State Graphs, State Testing, and Testability Tips.

**Graph Matrices and Application:-**Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.

## UNIT -VI:

**Software Testing Tools**: Introduction to Testing, Automated Testing, Concepts of Test Automation, Introduction to list of tools like Win runner, Load Runner, Jmeter, About Win Runner ,Using Win runner, Mapping the GUI, Recording Test, Working with Test, Enhancing Test, Checkpoints, Test Script Language, Putting it all together, Running and Debugging Tests, Analyzing Results, Batch Tests, Rapid Test Script Wizard.

## **OUTCOME:**

- Understand the basic testing procedures.
- Able to support in generating test cases and test suites.
- Able to test the applications manually by applying different testing methods and automation tools.
- Apply tools to resolve the problems in Real time environment.

## **TEXT BOOKS:**

- 1. Software testing techniques Boris Beizer, Dreamtech, second edition.
- 2. Software Testing- Yogesh Singh, Camebridge

- 1. The Craft of software testing Brian Marick, Pearson Education.
- 2. Software Testing, 3<sup>rd</sup> edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).
- 3. Software Testing, N.Chauhan, Oxford University Press.
- 4. Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge Univ.Press.
- 5. Effective methods of Software Testing, Perry, John Wiley, <sup>2nd</sup> Edition, 1999.
- 6. Software Testing Concepts and Tools, P.NageswaraRao, dreamtech Press
- 7. Win Runner in simple steps by Hakeem Shittu, 2007 Genixpress.
- 8. Foundations of Software Testing, D.Graham& Others, Cengage Learning

#### **ARTIFICIAL INTELLIGENCE**

(Open Elective)

#### **OBJECTIVES:**

- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
- To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning

## UNIT-I:

**Introduction to artificial intelligence:** Introduction ,history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of ai languages, current trends in AI

#### UNIT-II:

**Problem solving: state-space search and control strategies :** Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening a\*, constraint satisfaction

**Problem reduction and game playing:** Introduction, problem reduction, game playing, alphabeta pruning, two-player perfect information games

## UNIT-III:

**Logic concepts:** Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

## UNIT-IV:

**Knowledge representation:** Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames **advanced knowledge representation techniques:** Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

#### UNIT-V:

**Expert system and applications:** Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

## UNIT-VI:

**Uncertainty measure: probability theory:** Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory

**Fuzzy sets and fuzzy logic:** Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

## **OUTCOMES:**

- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
- Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
- Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.

## **TEXT BOOKS:**

- 1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
- 2. Artificial intelligence, A modern Approach , 2<sup>nd</sup> ed, Stuart Russel, Peter Norvig, PEA
- 3. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3<sup>rd</sup> ed, TMH
- 4. Introduction to Artificial Intelligence, Patterson, PHI

- 1. Atificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5<sup>th</sup> ed, PEA
- 2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
- 3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

## SOCIAL NETWORKS AND SEMANTIC WEB (Open Elective)

#### **OBJECTIVES:**

- To learn Knowledge Representation for the Semantic Web
- To learn Ontology Engineering
- To learn Semantic Web Applications, Services and Technology
- To learn Social Network Analysis and semantic web

#### UNIT –I:

Web Intelligence Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

## UNIT -II:

Knowledge Representation for the Semantic Web Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

#### UNIT-III:

Ontology Engineering Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

## UNIT-IV:

Semantic Web Applications, Services and Technology Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

## **UNIT-V:**

Social Network Analysis and semantic web What is social Networks analysis, development of the social networks analysis.

## UNIT- VI

Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

## **OUTCOMES:**

Understand semantic web basics, architecture and technologies

- Able to represent data from a chosen problem in XML with appropriate semantic
- Tags obtained or derived from the ontology Able to understand the semantic relationships among these data elements using
- Resource Description Framework (RDF) Able to design and implement a web services
- application that "discovers" the
- Data and/or other web services via the semantic web Able to discover the capabilities and limitations of semantic web technology for social networks

## **TEXT BOOKS:**

- 1. Thinking on the Web Berners Lee, Gödel and Turing, Wiley inter science, 2008.
- 2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

- 1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies, R.Studer, P.Warren, John Wiley & Sons.
- 2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers,(Taylor & Francis Group)
- 3. Information sharing on the semantic Web Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications. 4. Programming the Semantic Web, T.Segaran, C.Evans, J.Taylor, O'Reilly, SPD.

## DIGITAL SIGNAL PROCESSING

(Open Elective)

#### **OBJECTIVES:**

- To study DFT and its computation
- To study the design techniques for digital filters
- To study the finite word length effects in signal processing
- To study the non-parametric methods of power spectrum estimations
- To study the fundamentals of digital signal processors.

#### UNIT -I

## **Discrete Fourier Transform**

DFT and its properties, Relation between DTFT and DFT, FFT computations using Decimation in time and Decimation in frequency algorithms, Overlap-add and save methods

#### UNIT -II

#### **Infinite Impulse Response Digital Filters**

Review of design of analogue Butterworth and Chebyshev Filters, Frequency transformation in analogue domain - Design of IIR digital filters using impulse invariance technique - Design of digital filters using bilinear transform - pre warping - Realization using direct, cascade and parallel forms.

## UNIT- III

## **Finite Impulse Response Digital Filters**

Symmetric and Ant symmetric FIR filters - Linear phase FIR filters - Design using Hamming, Henning and Blackman Windows - Frequency sampling method - Realization of FIR filters - Transversal, Linear phase and Polyphasestructures.

## UNIT -IV

#### **Finite Word Length Effects**

Fixed point and floating point number representations - Comparison - Truncation and Rounding errors - Quantization noise - derivation for quantization noise power - coefficient quantization error - Product quantization error -

#### UNIT -V

Overflow error - Round off noise power - limit cycle oscillations due to product round off and overflow errors - signal scaling

#### UNIT -VI

## **Multirate Signal Processing**

Introduction to Multirate signal processing-Decimation-Interpolation-Polyphase implementation of FIR filters for interpolator and decimator -Multistage implementation of sampling rate conversion- Design of narrow band filters - Applications of Multirate signal processing.

#### **OUTCOMES:**

- an ability to apply knowledge of Mathematics, science, and engineering
- an ability to design and conduct experiments and interpret data
- an ability to design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- an ability to function as part of a multi-disciplinary team

## **TEXT BOOKS:**

- 1. John G Proakis and Manolakis, "Digital Signal Processing Principles, Algorithms and Applications", Pearson, Fourth Edition, 2007.
- 2. S.Salivahanan, A. Vallavaraj, C. Gnanapriya, Digital Signal Processing, TMH/McGraw HillInternational, 2007

- 1. E.C. Ifeachor and B.W. Jervis, "Digital signal processing A practical approach", Second edition, Pearson, 2002.
- 2. S.K. Mitra, Digital Signal Processing, A Computer Based approach, Tata Mc GrawHill, 1998.
- 3. P.P.Vaidyanathan, Multirate Systems & Filter Banks, Prentice Hall, Englewood cliffs, NJ, 1993.
- 4. Johny R. Johnson, Introduction to Digital Signal Processing, PHI, 2006.

#### **EMBEDDED SYSTEMS**

(Open Elective)

#### **OBJECTIVES:**

- Technology capabilities and limitations of the hardware, software components
- Methods to evaluate design tradeoffs between different technology choices.
- Design Methodologies

#### UNIT-I:

**Introduction to Embedded systems:** What is an embedded system Vs. General computing system, history, classification, major application areas, and purpose of embedded systems. Core of embedded system, memory, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.

#### UNIT-II:

**8—bit microcontrollers architecture:** Characteristics, quality attributes application specific, domain specific, embedded systems. Factors to be considered in selecting a controller, 8051 architecture, memory organization, registers, oscillator unit, ports, source current, sinking current, design examples.

#### UNIT-III:

RTOS and Scheduling, Operating basics, types, RTOS, tasks, process and threads, multiprocessing and multitasking, types of multitasking, non preemptive, preemptive scheduling.

#### UNIT-IV:

Task communication of RTOS, Shared memory, pipes, memory mapped objects, message passing, message queue, mailbox, signaling, RPC and sockets, task communication/synchronization issues, racing, deadlock, live lock, the dining philosopher's problem.

#### UNIT-V:

The producer-consumer problem, Reader writers problem, Priority Inversion, Priority ceiling, Task Synchronization techniques, busy waiting, sleep and wakery, semaphore, mutex, critical section objects, events, device, device drivers, how to clause an RTOS, Integration and testing of embedded hardware and fire ware.

#### UNIT-VI:

Simulators, emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry, Introduction to ARM family of processor.

## **OUTCOMES:**

Understand the basics of an embedded system

- Program an embedded system
- Design, implement and test an embedded system.
- Identify the unique characteristics of real-time systems
- Explain the general structure of a real-time system
- Define the unique design problems and challenges of real-time systems

#### **TEXT BOOK:**

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.

- 1. Ayala & Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C, CENGAGE
- 2. Embedded Systems, Rajkamal, TMH, 2009.
- 3. Embedded Software Primer, David Simon, Pearson.
- 4. The 8051 Microcontroller and Embedded Systems, Mazidi, Mazidi, Pearson,.

## ROBOTICS

## (Open Elective)

#### **OBJECTIVES**:

- To introduce the basic concepts, parts of robots and types of robots.
- To make the student familiar with the various drive systems for robot, sensors and their applications in robots and programming of robots.
- To discuss about the various applications of robots, justification and implementation of robot.

## UNIT -I:

## Introduction

Specifications of Robots- Classifications of robots – Work envelope - Flexible automation versus Robotic technology – Applications of Robots ROBOT KINEMATICS AND DYNAMICS Positions,

## **UNIT-II:**

## **Orientations and frames, Mappings**

Changing descriptions from frame to frame, Operators: Translations, Rotations and Transformations - Transformation Arithmetic - D-H Representation - Forward and inverse Kinematics Of Six Degree of Freedom Robot Arm – Robot Arm dynamics

## UNIT -III:

## **Robot Drives and Power Transmission Systems**

Robot drive mechanisms, hydraulic – electric – servomotor- stepper motor - pneumatic drives, Mechanical transmission method - Gear transmission, Belt drives, cables, Roller chains, Link -Rod systems - Rotary-to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearing screws,

## UNIT-IV:

## Manipulators

Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators

UNIT- V: Robot End Effectors Classification of End effectors – Tools as end effectors. Drive system for grippers-Mechanical adhesive-vacuum-magnetic-grippers. Hooks&scoops. Gripper force analysis and gripper design. Active and passive grippers.

## UNIT- VI:

## Path planning & Programming

Trajectory planning and avoidance of obstacles, path planning, skew motion, joint integrated motion – straight line motion-Robot languages-computer control and Robot software.

## **OUTCOMES:**

- The Student must be able to design automatic manufacturing cells with robotic control using
- The principle behind robotic drive system, end effectors, sensor, machine vision robot Kinematics and programming.

## **TEXT BOOKS**:

- 1. Deb S. R. and Deb S., "Robotics Technology and Flexible Automation", Tata McGraw Hill Education Pvt. Ltd, 2010.
- 2. John J.Craig, "Introduction to Robotics", Pearson, 2009.
- 3. Mikell P. Groover et. al., "Industrial Robots Technology, Programming and Applications", McGraw Hill, New York, 2008.

- 1. Richard D Klafter, Thomas A Chmielewski, Michael Negin, "Robotics Engineering An Integrated Approach", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd., 2006.
- 2. Fu K S, Gonzalez R C, Lee C.S.G, "Robotics: Control, Sensing, Vision and Intelligence", McGraw Hill, 1987

#### **OPERATION RESEARCH**

(Open Elective)

#### **OBJECTIVE:**

- Identify and develop operational research models from the verbal description of the real system.
- Understand the mathematical tools that are needed to solve optimisation problems.
- Use mathematical software to solve the proposed models.
- Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes in Management Engineering

## UNIT-I:

Introduction to Operations Research: Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem – Formulation of LPP, Graphical solution of LPP. Simple Method, Artificial variables, big-M method, two-phase method, degeneracy and unbound solutions.

## **UNIT-II:**

Transportation Problem. Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: the stepping stone method and MODI method

## **UNIT-III:**

Assignment model. Formulation. Hungarian method for optimal solution. Solving unbalanced problem. Traveling salesman problem and assignment problem Sequencing models. Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines – Processing 2 Jobs through m machines – Processing n Jobs through m Machines

## **UNIT-IV:**

Dynamic programming. Characteristics of dynamic programming. Dynamic programming approach for Priority Management employment smoothening, capital budgeting, Stage Coach/Shortest Path, cargo loading and Reliability problems Games Theory. Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy for 2 X 2 games

## UNIT-V:

Replacement Models. Replacement of Items that Deteriorate whose maintenance costs increase with time without change in the money value. Replacement of items that fail suddenly: individual replacement policy, group replacement policy

## **UNIT-VI:**

Inventory models. Inventory costs. Models with deterministic demand – model (a) demand rate uniform and production rate infinite, model (b) demand rate non-uniform and production rate infinite, model (c) demand rate uniform and production rate finite.

## **OUTCOME:**

- Methodology of Operations Research.
- Linear programming: solving methods, duality, and sensitivity analysis.
- Integer Programming.
- Network flows.
- Multi-criteria decision techniques.
- Decision making under uncertainty and risk.
- Game theory. Dynamic programming.

# **TEXT BOOKS:**

- 1. P. Sankara Iyer," Operations Research", Tata McGraw-Hill, 2008.
- 2. A.M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education, 2005.

- 1. J K Sharma. "Operations Research Theory & Applications, 3e", Macmillan India Ltd, 2007.
- 2. P. K. Gupta and D. S. Hira, "Operations Research", S. Chand & co., 2007.
- 3. J K Sharma., "Operations Research, Problems and Solutions, 3e", Macmillan India Ltd
- 4. N.V.S. Raju, "Operations Research", HI-TECH, 2002

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## WEB TECHNOLOGIES LAB

#### **OBJECTIVES:**

- To acquire knowledge of XHTML, Java Script and XML to develop web applications
- Ability to develop dynamic web content using Java Servlets and JSP
- To understand JDBC connections and Java Mail API
- To understand the design and development process of a complete web application
- 1. Design the following static web pages required for an online book store web site.

#### 1) HOME PAGE:

The static home page must contain three **frames**.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

Left frame: At least four links for navigation, which will display the catalogue of respective links.

For e.g.: When you click the link **"MCA"** the catalogue for MCA Books should be displayed in the Right frame.

Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site.

Logo		Web Site	Name	
Home	Login	Registration	Catalogue	Cart
mca mba BCA		Description of	the Web Site	

# 2)LOGIN PAGE

Logo		Web Site Name		
Home	Login	Registration	Catalogue	Cart
MCA MBA BCA		Login : 11a51f0003 Password: ******* Submit F	Reset	

# **3) CATOLOGUE PAGE:**

5) CATOLOGUE FAGE:
The catalogue page should contain the details of all the books available in the web site in a table.
The details should contain the following:
1. Snap shot of Cover Page.
2. Author Name.

- 3. Publisher.
- 4. Price.
- 5. Add to cart button.

Logo	Web Site Name				
Home	Login	Registration	Catalogue	Cart	
MCA MBA	X ML Bible	Book : XML Bible Author : Winston Publication : Wiely	\$ 40.5	Add to cart	
BCA	ACCEPTION OF THE STATE	Book : Al Author : S.Russel Publication : Prince hall	\$ 63 eton	Add to cart	
		Book : Java 2 Author : Watson Publication : BPB publications	\$ 35.5	Add to cart	
	HTML 4	Book: HTML in 24 Author:Sam Pete Publication:Sam	4 hours \$ 50 r	Add to cart	

## 4. REGISTRATION PAGE:

Create a "registration form "with the following fields

- 1) Name (Text field)
- 2) Password (password field)
- 3) E-mail id (text field)
- 4) Phone number (text field)
- 5) Sex (radio button)
- 6) Date of birth (3 select boxes)
- 7) Languages known (check boxes English, Telugu, Hindi, Tamil)
- 8) Address (text area)

# **5. DESIGN A WEB PAGE USING CSS (Cascading Style Sheets)** which includes the following:

1) Use different font, styles:

In the style definition you define how each selector should work (font, color etc.).

Then, in the body of your pages, you refer to these selectors to activate the styles

6. WRITE AN XML file which will display the Book information which includes the following:

- 1) Title of the book
- 2) Author Name
- 3) ISBN number
- 4) Publisher name
- 5) Edition
- 6) Price

Write a Document Type Definition (DTD) to validate the above XML file.

- 7. Write Ruby program reads a number and calculates the factorial value of it and prints the Same.
- 8. Write a Ruby program which counts number of lines in a text files using its regular Expressions facility.
- 9. Write a Ruby program that uses iterator to find out the length of a string.
- 10. Write simple Ruby programs that uses arrays in Ruby.
- 11. Write programs which uses associative arrays concept of Ruby.
- 12. Write Ruby program which uses Math module to find area of a triangle.
- 13. Write Ruby program which uses tk module to display a window
- 14. Define complex class in Ruby and do write methods to carry operations on complex objects.
- 15. Write a program which illustrates the use of associative arrays in perl.
- 16. Write perl program takes set names along the command line and prints whether they are regular files or special files

- 17. Write a perl program to implement UNIX `passed' program
- 18. An example perl program to connect to a MySQl database table and executing simple commands.
- 19. Example PHP program for cotactus page.
- 20. User Authentication:

Assume four users user1, user2, user3 and user4 having the passwords pwd1, pwd2, pwd3 and pwd4 respectively. Write a PHP for doing the following.

1. Create a Cookie and add these four user id's and passwords to this Cookie.

2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.

If he is a valid user (i.e., user-name and password match) you should welcome him by name (user-name) else you should display "You are not an authenticated user ". Use init-parameters to do this.

21. Example PHP program for registering users of a website and login.

22. Install a database (Mysql or Oracle).

Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form).

Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.

Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

23. Write a PHP which does the following job:

Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).

24. Create tables in the database which contain the details of items (books in our case like Book name, Price, Quantity, Amount) of each category. Modify your catalogue page (week 2)in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP

25. HTTP is a stateless protocol. Session is required to maintain the state.

The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time(i.e., from different systems in the LAN using the ip-address instead of local host). This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method session. Invalidate ().

Modify your catalogue and cart PHP pages to achieve the above mentioned functionality using sessions.

# **OUTCOMES:**

- Students will be able to develop static web sites using XHTML and Java Scripts
- To implement XML and XSLT for web applications
- Develop Dynamic web content using Java Servlets and JSP
- To develop JDBC connections and implement a complete Dynamic web Application

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#### SOFTWARE TESTING LAB

#### **OBJECTIVES:**

- Demonstrate the UML diagrams with ATM system descriptions.
- Demonstrate the working of software testing tools with c language.
- Study of testing tools- win runner, selenium etc.
- Writing test cases for various applications
- 1 Write programs in 'C' Language to demonstrate the working of the following constructs:
  - i) do...while
  - ii) while....do
  - iii) if...else
  - iv) switch
  - v) for
- 2 "A program written in 'C' language for Matrix Multiplication fails" Introspect the causes for its failure and write down the possible reasons for its failure.
- 3 Take any system (e.g. ATM system) and study its system specifications and report the various bugs.
- 4 Write the test cases for any known application (e.g. Banking application)
- 5 Create a test plan document for any application (e.g. Library Management System)
- 6 Study of Win Runner Testing Tool and its implementation
  - a) Win runner Testing Process and Win runner User Interface.
  - b) How Win Runner identifies GUI(Graphical User Interface) objects in an application and describes the two modes for organizing GUI map files.
  - c) How to record a test script and explains the basics of Test Script Language (TSL).
  - d) How to synchronize a test when the application responds slowly.
  - e) How to create a test that checks GUI objects and compare the behaviour of GUI objects in different versions of the sample application.

- f) How to create and run a test that checks bitmaps in your application and run the test on different versions of the sample application and examine any differences, pixel by pixel.
- g) How to Create Data-Driven Tests which supports to run a single test on several sets of data from a data table.
- h) How to read and check text found in GUI objects and bitmaps.
- i) How to create a batch test that automatically runs the tests.
- j) How to update the GUI object descriptions which in turn supports test scripts as the application changes.
- 7 Apply Win Runner testing tool implementation in any real time applications.

## **OUTCOMES:**

- Find practical solutions to the problems
- Solve specific problems alone or in teams
- Manage a project from beginning to end
- Work independently as well as in teams
- Define, formulate and analyze a problem

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## DATA MINING LAB

#### **OBJECTIVES:**

- Practical exposure on implementation of well known data mining tasks.
- Exposure to real life data sets for analysis and prediction.
- Learning performance evaluation of data mining algorithms in a supervised and an unsupervised setting.
- Handling a small data mining project for a given practical domain.

## System/Software Requirements:

- Intel based desktop PC
- WEKA TOOL
- 1. Demonstration of preprocessing on dataset student.arff
- 2. Demonstration of preprocessing on dataset labor.arff
- 3. Demonstration of Association rule process on dataset contactlenses.arff using apriori algorithm
- 4. Demonstration of Association rule process on dataset test.arff using apriori algorithm
- 5. Demonstration of classification rule process on dataset student.arff using j48 algorithm
- 6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm
- 7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm
- 8. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm
- 9. Demonstration of clustering rule process on dataset iris.arff using simple k-means
- 10. Demonstration of clustering rule process on dataset student.arff using simple k- means.

## **OUTCOMES:**

- The data mining process and important issues around data cleaning, pre-processing and integration.
- The principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction.
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### INTELLECTUAL PROPERTY RIGHTS AND PATENTS

#### **Objectives:**

\*To know the importance of Intellectual property rights, which plays a vital role in advanced Technical and Scientific disciplines.

\*Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latest developments.

#### **Unit I: Introduction to Intellectual Property Rights (IPR)**

Concept of Property - Introduction to IPR – International Instruments and IPR - WIPO - TRIPS – WTO -Laws Relating to IPR - IPR Tool Kit - Protection and Regulation - Copyrights and Neighboring Rights – Industrial Property – Patents - Agencies for IPR Registration – Traditional Knowledge –Emerging Areas of IPR - Layout Designs and Integrated Circuits – Use and Misuse of Intellectual Property Rights.

#### **Unit II: Copyrights and Neighboring Rights**

Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights -Subject Matters of Copyright – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of Performers – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Case Law - Semiconductor Chip Protection Act.

#### **UNIT III: Patents**

Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Search - Patent Registration and Granting of Patent -Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing — Patent Cooperation Treaty – New developments in Patents – Software Protection and Computer related Innovations.

#### **UNIT IV: Trademarks**

Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – Distinction between Trademark and Property Mark – Marks Covered under Trademark Law - Trade Mark Registration – Trade Mark Maintenance – Transfer of rights - Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

#### **UNIT V: Trade Secrets**

Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets -Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law.

# UNIT VI: Cyber Law and Cyber Crime

Introduction to Cyber Law – Information Technology Act 2000 - Protection of Online and Computer Transactions - E-commerce - Data Security – Authentication and Confidentiality -Privacy - Digital Signatures – Certifying Authorities - Cyber Crimes - Prevention and Punishment – Liability of Network Providers.

• Relevant Cases Shall be dealt where ever necessary.

## **Outcome:**

\* IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.

\*Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.

## **References:**

- 1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
- 2. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
- 3. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw -Hill, New Delhi
- 4. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
- 5. Kompal Bansal & Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
- 6. Cyber Law Texts & Cases, South-Western's Special Topics Collections.
- 7. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
- 8. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

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### **CRYPTOGRAPHY AND NETWORK SECURITY**

### **OBJECTIVES:**

- Understand security concepts, Ethics in Network Security.
- Understand security threats, and the security services and mechanisms to counter them
- Comprehend and apply relevant cryptographic techniques
- Comprehend security services and mechanisms in the network protocol stack
- Comprehend and apply authentication services and mechanisms
- Comprehend and apply relevant protocol like SSL, SSH etc.
- Comprehend and apply email security services and mechanisms
- Comprehend and apply web security services and mechanisms
- Comprehend computer and network access control

### **UNIT- I: Basic Principles**

Security Goals, Cryptographic Attacks, Services and Mechanisms, Mathematics of Cryptography

## **UNIT -II: Symmetric Encryption**

Mathematics of Symmetric Key Cryptography, Introduction to Modern Symmetric Key Ciphers, Data Encryption Standard, Advanced Encryption Standard.

## **UNIT- III: Asymmetric Encryption**

Mathematics of Asymmetric Key Cryptography, Asymmetric Key Cryptography

## UNIT -IV: Data Integrity, Digital Signature Schemes & Key Management

Message Integrity and Message Authentication, Cryptographic Hash Functions, Digital Signature, Key Management.

## **UNIT-V: Network Security-I**

Security at application layer: PGP and S/MIME, Security at the Transport Layer: SSL and TLS

## **UNIT- VI: Network Security-II**

Security at the Network Layer: IPSec, System Security

### **OUTCOMES:**

- To be familiarity with information security awareness and a clear understanding of Its importance.
- To master fundamentals of secret and public cryptography
- To master protocols for security services
- To be familiar with network security threats and countermeasures
- To be familiar with network security designs using available secure solutions (such asPGP, SSL, IPSec, etc)

## **TEXT BOOKS:**

- Cryptography and Network Security, Behrouz A Forouzan, Debdeep Mukhopadhyay, (3e) Mc Graw Hill.
- 2) Cryptography and Network Security, William Stallings, (6e) Pearson.
- 3) Everyday Cryptography, Keith M.Martin, Oxford.

### **REFERENCE BOOKS:**

1) Network Security and Cryptography, Bernard Meneges, Cengage Learning.

### **MOBILE COMPUTING**

### **OBJECTIVE:**

- To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
- To understand the typical mobile networking infrastructure through a popular GSM protocol
- To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
- To understand the database issues in mobile environments & data delivery models.
- To understand the ad hoc networks and related concepts.
- To understand the platforms and protocols used in mobile environment.

### UNIT- I

**Introduction:** Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

## UNIT –II

(Wireless) Medium Access Control (MAC) : Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

### UNIT –III

**Mobile Network Layer:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

### UNIT –IV

**Mobile Transport Layer:** Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

**Database Issues:** Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

## UNIT- V

**Data Dissemination and Synchronization :** Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols.

## UNIT- VI

Mobile Ad hoc Networks (MANETs) : Introduction, Applications & Challenges of a MANET,<br/>ClassificationRouting,ClassificationRouting Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , Mobile Agents, Service<br/>Discovery.

**Protocols and Platforms for Mobile Computing :** WAP, Bluetooth, XML, J2ME, Java Card, PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices, Android.

## **OUTCOMES:**

- Able to think and develop new mobile application.
- Able to take any new technical issue related to this new paradigm and come up with a solution(s).
- Able to develop new ad hoc network applications and/or algorithms/protocols.
- Able to understand & develop any existing or new protocol related to mobile environment

## **TEXT BOOKS:**

- 1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2009.
- 2. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772

## **REFERENCE BOOKS:**

- 1. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, "Mobile Computing, Technology Applications and Service Creation" Second Edition, Mc Graw Hill.
- 2. UWE Hansmann, Lother Merk, Martin S. Nocklous, Thomas Stober, "Principles of Mobile Computing," Second Edition, Springer.

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#### DATA WAREHOUSING AND BUSINESS INTELLIGENCE

#### **OBJECTIVES:**

- Approach business problems data-analytically by identifying opportunities to derive business value from data.
- Know the basics of data mining techniques and how they can be applied to extract relevant Business in

### UNIT-I:

Introduction to Data Mining: Motivation for Data Mining, Data Mining-Definition & Functionalities, Classification of DM systems, DM task primitives, Integration of a Data Mining system with a Database or a Data Warehouse, Major issues in Data Mining. **Data Warehousing** (Overview Only): Overview of concepts like star schema, fact and dimension tables, OLAP operations, From OLAP to Data Mining.

#### UNIT -II:

Data Preprocessing: Why? Descriptive Data Summarization, Data Cleaning: Missing Values, Noisy Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Data Discretization and Concept hierarchy generation for numerical and categorical data.

### **UNIT-III:**

Mining Frequent Patterns, Associations, and Correlations: Market Basket Analysis, Frequent Itemsets, Closed Itemsets, and Association Rules, Frequent Pattern Mining, Efficient and Scalable Frequent Itemset Mining Methods, The Apriori Algorithm for finding Frequent Itemsets Using Candidate Generation, Generating Association Rules from Frequent Itemsets, Improving the Efficiency of Apriori, Frequent Itemsets without Candidate Generation using FP Tree, Mining Multilevel Association Rules, Mining Multidimensional Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

#### **UNIT-IV:**

Classification & Prediction: What is it? Issues regarding Classification and prediction **Classification methods**: Decision tree, Bayesian Classification, Rule based Prediction: Linear and non linear regression, Accuracy and Error measures, Evaluating the accuracy of a Classifier or Predictor. **Cluster Analysis**: What is it? Types of Data in cluster analysis, Categories of clustering methods, Partitioning methods ñ K-Means, K-Mediods. Hierarchical Clustering- Agglomerative and Divisive Clustering, BIRCH and ROCK methods, DBSCAN, Outlier Analysis

# UNIT- V:

**Mining Stream and Sequence Data:** What is stream data? Classification, Clustering Association Mining in stream data. Mining Sequence Patterns in Transactional Databases. **Spatial Data and Text Mining:** Spatial Data Cube Construction and Spatial OLAP, Mining Spatial Association and Co-location Patterns, Spatial Clustering Methods, Spatial Classification and Spatial Trend Analysis. Text Mining Text Data Analysis and Information Retrieval, Dimensionality Reduction for Text, Text Mining Approaches.

# UNIT- VI:

**Web Mining:** Web mining introduction, Web Content Mining, Web Structure Mining, Web Usage mining, Automatic Classification of web Documents.

**Data Mining for Business Intelligence Applications:** Data mining for business Applications like Balanced Scorecard, Fraud Detection, Click stream Mining, Market Segmentation, retail industry, telecommunications industry, banking & finance and CRM etc

# OUTCOMES

- Describe the scope and application of business intelligence and decision support;
- Design systems for sourcing and structuring data to provide an integrated, non-volatile collection of data for decision support using data warehouses;
- Design multidimensional data models and implement them using star schemas and relational databases;
- Communicate and foster realistic expectations of the role of OLAP technology and business intelligence systems in management and decision support;
- Explain the need for evolutionary development approaches to developing business intelligence and data warehouse systems;
- Develop a simple business intelligence system using an OLAP tool;
- Apply theories and principles of data visualization to encourage high quality analysis of business information to inform decision making;
- Design governance mechanisms for the development and management of business intelligence and data warehouse systems in an organization.

## **TEXT BOOKS:**

1. Han, Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann 2 nd Edition

2. P. N. Tan, M. Steinbach, Vipin Kumar, introduction to Data Miming, Pearson Education

### **REFERENCE BOOKS:**

- 1. MacLennan Jamie, Tang ZhaoHui and Crivat Bogdan, Data Mining with Microsoft SQL Server 2008î, Wiley India Edition.
- 2. G. Shmueli, N.R. Patel, P.C. Bruce, iData Mining for Business Intelligence: Concepts, Techniques and Applications in Microsoft Office Excel with XLMinerî, Wiley India.
- 3. Michael Berry and Gordon Linoff iData Mining Techniquesî, 2nd Edition Wiley Publications.
- 4. Alex Berson and Smith, iData Mining and Data Warehousing and OLAPî, McGraw Hill Publication.
- 5. E. G. Mallach, iDecision Support and Data Warehouse Systems", Tata McGraw Hill.
- Michael Berry and Gordon Linoff iMastering Data Mining- Art & science of CRMî, Wiley Student Edition
- 7. Arijay Chaudhry & P. S. Deshpande, iMultidimensional Data Analysis and Data Mining Dreamtech Press
- 8. Vikram Pudi & Radha Krishna, ìData Miningî, Oxford Higher Education.
- 9. Chakrabarti, S., iMining the Web: Discovering knowledge from hypertext dataî,
- 10. M. Jarke, M. Lenzerini, Y. Vassiliou, P. Vassiliadis (ed.), iFundamentals of Data Warehousesî, Springer-Verlag, 1999.telligence.

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# MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS (Common to all Branches)

### **Course Objectives:**

- The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

## UNIT-I

### Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

## UNIT – II:

### **Production and Cost Analyses:**

Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs –Cost – Volume-Profit analysis-Determination of Breakeven point(simple problems)-Managerial significance and limitations of Breakeven point.

### UNIT – III:

## Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing.

# UNIT – IV:

### **Types of Business Organization and Business Cycles:**

Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of a Business Cycle.

### UNIT – V:

### Introduction to Accounting & Financing Analysis:

Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)

### UNIT – VI:

**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

### **Course Outcome:**

- \*The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
- \* One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
- \*The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

### **TEXT BOOKS**

- 1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
- 2. Dr. A. R. Aryasri Managerial Economics and Financial Analysis, TMH 2011
- 3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

## **REFERENCES:**

- 1. Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
- 2. V. Maheswari: Managerial Economics, Sultan Chand.2014
- 3. Suma Damodaran: Managerial Economics, Oxford 2011.
- 4. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
- 5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
- 6. Maheswari: Financial Accounting, Vikas Publications.
- 7. S. A. Siddiqui& A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
- 8. Ramesh Singh, Indian Economy, 7<sup>th</sup> Edn., TMH2015
- 9. Pankaj Tandon A Text Book of Microeconomic Theory, Sage Publishers, 2015
- 10. Shailaja Gajjala and Usha Munipalle, Univerties press, 2015

# **BIG DATA ANALYTICS**

(Elective - 1)

### **OBJECTIVES:**

- Optimize business decisions and create competitive advantage with Big Data analytics
- Introducing Java concepts required for developing map reduce programs
- Derive business benefit from unstructured data
- Imparting the architectural concepts of Hadoop and introducing map reduce paradigm
- To introduce programming tools PIG & HIVE in Hadoop echo system.

## UNIT – I:

Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization

### UNIT – II:

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

### UNIT – III:

Writing MapReduce Programs: A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner

### UNIT – IV:

Hadoop I/O: The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators

### UNIT – V:

Pig: Hadoop Programming Made Easier

Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin

# UNIT – VI:

Applying Structure to Hadoop Data with Hive:

Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data.

### **OUTCOMES:**

- Preparing for data summarization, query, and analysis.
- Applying data modeling techniques to large data sets
- Creating applications for Big Data analytics
- Building a complete business data analytic solution

### **TEXT BOOKS:**

- 1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
- 2. Hadoop: The Definitive Guide by Tom White, 3<sup>rd</sup> Edition, O'reilly
- 3. Hadoop in Action by Chuck Lam, MANNING Publ.
- 4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

### **REFERENCE BOOKS:**

- 1. Hadoop in Practice by Alex Holmes, MANNING Publ.
- 2. Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne

## **SOFTWARE LINKS:**

- 1. Hadoop:<u>http://hadoop.apache.org/</u>
- 2. Hive: <u>https://cwiki.apache.org/confluence/display/Hive/Home</u>
- 3. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

# INFORMATION RETRIEVAL SYSTEMS

### **OBJECTIVES:**

- To provide the foundation knowledge in information retrieval.
- To equip students with sound skills to solve computational search problems.
- To appreciate how to evaluate search engines.
- To appreciate the different applications of information retrieval techniques in the Internet or Web environment.
- To provide hands-on experience in building search engines and/or hands-on experience in evaluating search engines.

### **UNIT-I:**

**Introduction to Information Storage and Retrieval System:** Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation.

Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms

### UNIT-II:

**Inverted files:** Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques.

### **UNIT-III:**

**Signature Files:** Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.

### **UNIT-IV:**

**New Indices for Text:** PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.

### UNIT-V:

**Stemming Algorithms:** Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files

## UNIT-VI:

**Thesaurus Construction:** Introduction, Features of Thesauri, Thesaurus Construction, Thesaurus construction from Texts, Merging existing Thesauri

### **OUTCOMES:**

- Identify basic theories in information retrieval systems
- Identify the analysis tools as they apply to information retrieval systems
- Understands the problems solved in current IR systems
- Describes the advantages of current IR systems
- Understand the difficulty of representing and retrieving documents.
- Understand the latest technologies for linking, describing and searching the web.

## **TEXT BOOKS:**

- 1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
- 2. Modern Information Retrieval by Yates Pearson Education.
- 3. Information Storage & Retrieval by Robert Korfhage John Wiley & Sons.

# **REFERENCE BOOKS:**

- 1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.
- 2. Information retrieval Algorithms and Heuristics, 2ed, Springer

## **INTERNET OF THINGS**

### **OBJECTIVES:**

- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
- Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
- Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

### UNIT- I

Introduction to Internet of Things, Definition & Characteristics of IoT, Physical Design of IoT Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs: Home, Cities, Environment, Energy systems, Logistics, Agriculture, Health & Lifestyle

### UNIT- II

IOT & M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, 1 Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG, NETOPEER

### UNIT-III

IoT Platforms Design Methodology IoT Design Methodology, Case Study on IoT System for Weather Monitoring, Motivation for Using Python, IoT Systems - Logical Design using Python Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling I, Date/Time Operations, Classes, Python Packages of Interest for IoT

### UNIT -IV

IoT Physical Devices & Endpoints, Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python, Other IoT Devices, IoT Physical Servers & Cloud Offerings, Introduction to Cloud Storage Models & Communication APIs, WAMP - AutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework - Django, Designing a RESTful Web API, Amazon Web Services for ,SkyNet IoT Messaging Platform

### UNIT -V

Case Studies Illustrating IoT Design, Introduction, Home Automation, Cities, Environment, Agriculture, Productivity Applications

## UNIT -VI

Data Analytics for IoT, Introduction, Apache Hadoop, Using Hadoop MapReduce for Batch Data Analysis, Apache Oozie, Apache Spark, Apache Storm, Using Apache Storm for Realtime Data Analysis, Structural Health Monitoring Case Study, Tools for IOT, Chef Case Studies, NETCONF-YANG Case Studies.

### **OUTCOMES:**

- Demonstrate knowledge and understanding of the security and ethical issues of the Internet of Things
- Conceptually identify vulnerabilities, including recent attacks, involving the Internet of Things
- Develop critical thinking skills
- Compare and contrast the threat environment based on industry and/or device type

### **TEXTBOOKS:**

Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

### **REFERNCE BOOKS:**

Fundamentals of Python, K.A.Lambert and B.L.Juneja, Cengage Learning, 2012.

## MULTIMEDIA PROGRAMMING

### UNIT 1:

### **Multimedia Information Representation:**

Introduction, Digitization Principles – Analog Signals, Encoder Design, Decoder Design. Text – Unformatted Text, Formatted Text, Hyper Text. Images- Graphics, Digitized Documents, Digitized Pictures. Audio – PCM Speech, CD – Quality Audio, Synthesized Audio. Video – Broadcast Television, Digital Video, PC Video, Video Content.

#### UNIT 2:

#### **Text Compression:**

Compression Principles – Source Encoder and Destination Decoder, Lossless and Lossy Compression, Entropy Encoding, Source Encoding. Text Compression – Static and Dynamic Huffman Coding, Arithmetic Coding.

#### UNIT 3:

#### **Image Compression:**

Graphics Interchange Format (GIF), Tagged Image File Format (TIFF), Digitised Documents, JPEG.

#### UNIT 4:

#### Audio Compression:

Differential Pulse Coded Modulation (DPCM), Adaptive Differential PCM (ADPCM), Adaptive Predictive Coding and Linear Predictive Coding, MPEG Audio Coding. UNIT 5:

#### Video Compression:

Principles, H.261 Video Compression, MPEG 1, MPEG 2 and MPEG 4.

#### UNIT 6:

#### **Multimedia Applications:**

Inter- personnel Communication, Interactive Applications over the Internet, Entertainment Applications and Multimedia Conferencing.

#### **TEXT BOOK:**

1. Halshall, Fred. "Multimedia Communications – Applications, Networks, Protocols and Standards". 2001. Pearson Education.

#### **REFERENCE BOOKS:**

1. Chapman, Nigel and Chapman, Jenny. "Digital Multimedia". 2000. John Wily & Sons.

2. Steinmaetz, Ralf and Nahrstedt, Klara. Multimedia: "Communications and Applications". 2003. Pearson Education.

# CLOUD COMPUTING (Elective-II)

### **OBJECTIVES:**

• The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud based software applications on top of cloud platforms.

### UNIT -I: Systems modeling, Clustering and virtualization

Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency

### UNIT- II: Virtual Machines and Virtualization of Clusters and Data Centers

Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

## **UNIT- III: Cloud Platform Architecture**

Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

### **UNIT -IV: Cloud Programming and Software Environments**

Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

### **UNIT- V: Cloud Resource Management and Scheduling**

Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling MapReduce Applications Subject to Deadlines.

### **UNIT- VI: Storage Systems**

Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system. Apache Hadoop, Big Table, Megastore, Amazon Simple Storage Service (S3)

### **OUTCOMES:**

- Understanding the key dimensions of the challenge of Cloud Computing
- Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization
- Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
- Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas

### **TEXT BOOKS:**

- 1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
- 2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
- 3. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press

## **REFERNCE BOOKS:**

- 1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
- 2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

## SOFTWARE PROJECT MANAGEMENT

### **OBJECTIVES:**

- To study how to plan and manage projects at each stage of the software development life cycle (SDLC)
- To train software project managers and other individuals involved in software project planning and tracking and oversight in the implementation of the software project management process.
- To understand successful software projects that support organization's strategic goals

## **UNIT -I: Introduction**

Project, Management, Software Project Management activities, Challenges in software projects, Stakeholders, Objectives & goals

Project Planning: Step-wise planning, Project Scope, Project Products & deliverables, Project activities, Effort estimation, Infrastructure

## **UNIT -II: Project Approach**

Lifecycle models, Choosing Technology, Prototyping Iterative & incremental Process Framework: Lifecycle phases, Process Artifacts, Process workflows (Book 2)

## **UNIT -III: Effort estimation & activity Planning**

Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation, Activity Identification Approaches, Network planning models, Critical path analysis

## **UNIT -IV: Risk Management**

Risk categories, Identification, Assessment, Planning and management, PERT technique, Monte Carlo approach

### **UNIT -V: Project Monitoring & Control, Resource Allocation**

Creating a framework for monitoring & control, Progress monitoring, Cost monitoring, Earned value Analysis, Defects Tracking, Issues Tracking, Status reports, Types of Resources, Identifying resource requirements, Resource scheduling

## **UNIT -VI: Software Quality**

Planning Quality, Defining Quality - ISO 9016, Quality Measures, Quantitative Quality Management Planning, Product Quality & Process Quality

Metrics, Statistical Process Control Capability Maturity Model, Enhancing software Quality (Book3)

### **OUTCOMES:**

- To match organizational needs to the most effective software development model
- To understand the basic concepts and issues of software project management
- To effectively Planning the software projects
- To implement the project plans through managing people, communications and change
- To select and employ mechanisms for tracking the software projects
- To conduct activities necessary to successfully complete and close the Software projects
- To develop the skills for tracking and controlling software deliverables
- To create project plans that address real-world management challenges

### **TEXT BOOKS:**

- 1. Software Project Management, Bob Hughes & Mike Cotterell, TATA Mcgraw-Hill
- 2. Software Project Management, Walker Royce: Pearson Education, 2005.
- 3. Software Project Management in practice, Pankaj Jalote, Pearson.

### **REFERENCE BOOKS:**

1. Software Project Management, Joel Henry, Pearson Education.

## MACHINE LEARNING

### **OBJECTIVES:**

- Familiarity with a set of well-known supervised, unsupervised and semi-supervised
- learning algorithms.
- The ability to implement some basic machine learning algorithms
- Understanding of how machine learning algorithms are evaluated

**UNIT- I: The ingredients of machine learning, Tasks:** the problems that can be solved with machine learning, Models: the output of machine learning, Features, the workhorses of machine learning. **Binary classification and related tasks:** Classification, Scoring and ranking, Class probability estimation

**UNIT- II: Beyond binary classification:** Handling more than two classes, Regression, Unsupervised and descriptive learning. **Concept learning**: The hypothesis space, Paths through the hypothesis space, Beyond conjunctive concepts

**UNIT- III: Tree models:** Decision trees, Ranking and probability estimation trees, Tree learning as variance reduction. **Rule models:** Learning ordered rule lists, Learning unordered rule sets, Descriptive rule learning, First-order rule learning

**UNIT- IV: Linear models:** The least-squares method, The perceptron: a heuristic learning algorithm for linear classifiers, Support vector machines, obtaining probabilities from linear classifiers, Going beyond linearity with kernel methods. **Distance Based Models:** Introduction, Neighbours and exemplars, Nearest Neighbours classification, Distance Based Clustering, Hierarchical Clustering.

**UNIT- V: Probabilistic models:** The normal distribution and its geometric interpretations, Probabilistic models for categorical data, Discriminative learning by optimising conditional likelihood Probabilistic models with hidden variables. **Features:** Kinds of feature, Feature transformations, Feature construction and selection. Model ensembles: Bagging and random forests, Boosting

**UNIT- VI: Dimensionality Reduction:** Principal Component Analysis (PCA), Implementation and demonstration. **Artificial Neural Networks:** Introduction, Neural network representation, appropriate problems for neural network learning, Multilayer networks and the back propagation algorithm.

## **OUTCOMES:**

- Recognize the characteristics of machine learning that make it useful to real-world
- Problems.
- Characterize machine learning algorithms as supervised, semi-supervised, and
- Unsupervised.
- Have heard of a few machine learning toolboxes.
- Be able to use support vector machines.
- Be able to use regularized regression algorithms.
- Understand the concept behind neural networks for learning non-linear functions.

## **TEXT BOOKS:**

- 1) Machine Learning: The art and science of algorithms that make sense of data, Peter Flach, Cambridge.
- 2) Machine Learning, Tom M. Mitchell, MGH.

# **REFERENCE BOOKS:**

- 1) Understanding Machine Learning: From Theory to Algorithms, Shai Shalev-Shwartz, Shai Ben-David, Cambridge.
- 2) Machine Learning in Action, Peter Harington, 2012, Cengage.

## **DECISION SUPPORT SYSTEMS**

## **Objectives:**

- 1. Increase the effectiveness of the manager's decision-making process.
- 2. Supports the manager in the decision-making process but does not replace it.
- 3. Ability to select appropriate modelling techniques for supporting semi-structured business decision making
- 4. Ability to identify and select appropriate decision support systems for generating innovative business solutions

# UNIT – I:

Introduction to Decision Support Systems, How Decision Support Systems Evolved-What is a DSS? Why decision Support Systems Matter – DSS Benefits – Why Study DSS?- The plan of This book.

## UNIT – II:

Human Decision –Making Processes what is a Decision? –The Decision Process, Types of Decision, How Business People make Decision, The Impact of Psychological Type on Decision Making, The Impact of culture on Decision Making

## UNIT – III:

Systems, Information Quality. And Models- About Systems- Information Systems Data Flow Diagrams – DSS as Information Systems- Information and Information Quality- Models

## UNIT – IV:

Types of Decision Support Systems – the DSS Hierarchy – Generalizing the DSS Categories – Matching DSS to the Decision Type.

## UNIT – V:

DSS Architecture, Hardware and Operating Systems platform – Defining the DSS Architecture-The Major Options- DSS on the Central Corporate System- DSS and Clint/Server Computing

## UNIT – VI:

DSS Software Tools – DSS Software Categories - Standard Packages – Programming Languages DSS, Models in Decision Support Systems- Types of Models- Discrete – Event Simulation Models – Random Numbers, Pseudo-Random Numbers, and Statistical Distribution – Static Simulation Model

## **Outcomes:**

- 1. Recognize the relationship between business information needs and decision making
- 2. Appraise the general nature and range of decision support systems
- 3.Appraise issues related to the development of DSS
- 4.Select appropriate modelling techniques

# **TEXT BOOKS:**

- 1. Decision Support and Data Warehouse Systems, Efrem G. Mallach Mc Graw Hill.
- 2. Decision Support Systems for Business Intelligence, Vicki L. Sauter, Wiley

# **REFERENCE:**

1. Decision Support Systems (2nd Edition) George M. Marakas, Prentice Hall

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### **MOBILE COMPUTING LAB**

### **OBJECTIVES:**

- To introduce the characteristics, basic concepts and systems issues in mobile and pervasive computing
- To illustrate architecture and protocols in pervasive computing and to identify the trends and latest development of the technologies in the area
- To give practical experience in the area through the design and execution of a modest
- To design successful mobile and pervasive computing applications and services research project To evaluate critical design tradeoffs associated with different mobile technologies, architectures, interfaces and business models and how they impact the usability, security, privacy and commercial viability of mobile and pervasive computing services and applications
- To discover the characteristics of pervasive computing applications including the major

## **Programming:**

- 1. Write a J2ME program to show how to change the font size and colour.
- 2. Write a J2ME program which creates the following kind of menu.
  - \* cut
  - \* copy
  - \* past
  - \* delete
  - \* select all
  - \* unselect all
- 3. Create a J2ME menu which has the following options (Event Handling):
  - $\cdot$  cut can be on/off
  - $\cdot$  copy can be on/off
  - $\cdot$  paste can be on/off

- $\cdot$  delete can be on/off
- $\cdot$  select all put all 4 options on
- unselect all put all
- 4. Create a MIDP application, which draws a bar graph to the display. Data values can be given at int [] array. You can enter four data (integer) values to the input text field.
- 5. Create an MIDP application which examine, that a phone number, which a user has entered is in the given format (Input checking):
  - \* Area code should be one of the following: 040, 041, 050, 0400, 044
  - \* There should 6-8 numbers in telephone number (+ area code)
- 6. Write a sample program to show how to make a SOCKET Connection from J2ME phone. This J2ME sample program shows how to how to make a SOCKET Connection from a J2ME Phone. Many a times there is a need to connect backend HTTP server from the J2ME application. Show how to make a SOCKET connection from the phone to port 80.
- 7. Login to HTTP Server from a J2ME Program. This J2ME sample program shows how to display a simple LOGIN SCREEN on the J2ME phone and how to authenticate to a HTTP server. Many J2ME applications for security reasons require the authentication of the user. This free J2ME sample program, shows how a J2ME application can do authentication to the backend server. Note: Use Apache Tomcat Server as Web Server and MySQL as Database Server.
- 8. The following should be carried out with respect to the given set of application domains: (Assume that the Server is connected to the well maintained database of the given domain. Mobile Client is to be connected to the Server and fetch the required data value/information)
  - Students Marks Enquiry
  - Town/City Movie Enquiry
  - Railway/Road/Air (For example PNR) Enquiry/Status
  - Sports (say, Cricket) Update
  - Town/City Weather Update
  - Public Exams (say Intermediate or SSC)/ Entrance (Say EAMCET) Results Enquiry

Divide Student into Batches and suggest them to design database according to their domains and render information according the requests.

9. Write an Android application program that displays Hello World using Terminal.

- 10. Write an Android application program that displays Hello World using Eclipse.
- 11. Write an Android application program that accepts a name from the user and displays the hello name to the user in response as output using Eclipse.
- 12. Write an Android application program that demonstrates the following:
  - (i) Linear Layout
  - (ii) Relative Layout
  - (iii) Table Layout
  - (iv) Grid View layout
- 13. Write an Android application program that converts the temperature in Celsius to Fahrenheit.
- 14. Write an Android application program that demonstrates intent in mobile application development

# **OUTCOME:**

- To analyze the strengths and limitations of the tools and devices for development of pervasive computing systems
- To explore the characteristics of different types of mobile networks on the performance of a pervasive computing system
- To analyze and compare the performance of different data dissemination techniques and algorithms for mobile real-time applications
- To develop an attitude to propose solutions with comparisons for problems related to pervasive computing system through investigation

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<b>CRYPTOGRAPHY AND NETWORKING SECURI</b>	FY LAI	3		

### **Programming:**

Breaking the Shift Cipher Breaking the Mono-alphabetic Substitution Cipher One-Time Pad and Perfect Secrecy Message Authentication Codes Cryptographic Hash Functions and Applications Symmetric Key Encryption Standards (DES) Symmetric Key Encryption Standards (AES) Diffie-Hellman Key Establishment Public-Key Cryptosystems (PKCSv1.5) Digital Signatures

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### DISTRIBUTED SYSTEMS

### **OBJECTIVES:**

- Provides an introduction to the fundamentals of distributed computer systems, assuming the availability of facilities for data transmission, IPC mechanisms in distributed systems, Remote procedure calls.
- Expose students to current technology used to build architectures to enhance distributed Computing infrastructures with various computing principles

### UNIT-I:

**Characterization of Distributed Systems:** Introduction, Examples of Distributed Systems, Resource Sharing and the Web, Challenges.

**System Models:** Introduction, Architectural Models- Software Layers, System Architecture, Variations, Interface and Objects, Design Requirements for Distributed Architectures, Fundamental Models- Interaction Model, Failure Model, Security Model.

### **UNIT-II:**

**Interprocess Communication:** Introduction, The API for the Internet Protocols- The Characteristics of Interprocess communication, Sockets, UDP Datagram Communication, TCP Stream Communication; External Data Representation and Marshalling; Client Server Communication; Group Communication- IP Multicast- an implementation of group communication, Reliability and Ordering of Multicast.

### **UNIT-III:**

**Distributed Objects and Remote Invocation:** Introduction, Communication between Distributed Objects- Object Model, Distributed Object Modal, Design Issues for RMI, Implementation of RMI, Distributed Garbage Collection; Remote Procedure Call, Events and Notifications, Case Study: JAVA RMI

### **UNIT-IV:**

**Operating System Support:** Introduction, The Operating System Layer, Protection, Processes and Threads –Address Space, Creation of a New Process, Threads.

## UNIT-V:

**Distributed File Systems:** Introduction, File Service Architecture; Peer-to-Peer Systems: Introduction, Napster and its Legacy, Peer-to-Peer Middleware, Routing Overlays.

**Coordination and Agreement:** Introduction, Distributed Mutual Exclusion, Elections, Multicast Communication.

### **UNIT-VI:**

**Transactions & Replications:** Introduction, System Model and Group Communication, Concurrency Control in Distributed Transactions, Distributed Dead Locks, Transaction Recovery; Replication-Introduction, Passive (Primary) Replication, Active Replication.

## **OUTCOMES:**

- Develop a familiarity with distributed file systems.
- Describe important characteristics of distributed systems and the salient architectural features of such systems.
- Describe the features and applications of important standard protocols which are used in distributed systems.
- Gaining practical experience of inter-process communication in a distributed environment

### **TEXT BOOKS:**

- 1. Ajay D Kshemkalyani, Mukesh Sighal, "Distributed Computing, Principles, Algorithms and Systems", Cambridge
- 2. George Coulouris, Jean Dollimore, Tim Kindberg, "Distributed Systems- Concepts and Design", Fourth Edition, Pearson Publication

### **REFERENCE BOOKS**

Distributed-Systems-Principles-Paradigms-Tanenbaum PHI

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#### MANAGEMENT SCIENCE

**Course Objectives:** 

\*To familiarize with the process of management and to provide basic insight into select contemporary management practices

\*To provide conceptual knowledge on functional management and strategic management.

### UNIT I

**Introduction to Management**: Concept –nature and importance of Management –Generic Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization – Organizational typology- International Management: Global Leadership and Organizational behavior Effectiveness(GLOBE) structure

### UNIT II

**Operations Management**: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

#### **UNIT III**

**Functional Management**: Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management-Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions. Operationlizing change through performance management.

#### **UNIT IV**

**Project Management**: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

### Unit V

**Strategic Management**: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives. Global strategies, theories of Multinational Companies.

#### UNIT VI

**Contemporary Management Practice**: Basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management, Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card. **Course Outcome:** 

- \*After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
- \*Will familiarize with the concepts of functional management project management and strategic management.

### **Text Books**

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, 'Management Science' Cengage, Delhi, 2012.

2. Dr. A. R. Aryasri, Management Science' TMH 2011.

### **References:**

- 1. Koontz & Weihrich: 'Essentials of management' TMH 2011
- 2. Seth & Rastogi: Global Management Systems, Cengage learning, Delhi, 2011
- 3. Robbins: Organizational Behaviour, Pearson publications, 2011
- 4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011
- 5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
- 6. Biswajit Patnaik: Human Resource Management, PHI, 2011
- 7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning
- 8. Prem Chadha: Performance Management, Trinity Press(An imprint of Laxmi Publications Pvt. Ltd.) Delhi 2015.
- 9. Anil Bhat& Arya Kumar : Principles of Management, Oxford University Press, New Delhi, 2015.

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### MANAGEMENT INFORMATION SYSTEMS

### **OBJECTIVES:**

- MIS is very useful for efficient and effective planning and control functions of the management. Management is the art of getting things done through others. MIS will be instrumental in getting the things done by providing quick and timely information to the management.
- MIS is helpful in controlling costs by giving information about idle time, labour turnover, wastages and losses and surplus capacity.
- By making comparison of actual performance with the standard and budgeted performance, variances are brought to the notice of the management by MIS which can be corrected by taking remedial steps.

### UNIT - I:

#### Information System And Organization

Matching the Information System Plan to the Organizational Strategic Plan – Identifying Key Organizational Objective and Processes and Developing an Information System Development – User role in Systems Development Process – Maintainability and Recoverability in System Design.

### UNIT - II:

#### **Representation And Analysis Of System Structure**

Models for Representing Systems: Mathematical, Graphical and Hierarchical organization Chart, Tree Diagram) – Information Flow – Process Flow – Methods and Heuristics – Decomposition and Aggregation – Information Architecture – Application of System Representation to Case Studies.

#### UNIT - III:

#### Systems, Information and Decision Theory

Information Theory – Information Content and Redundancy – Classification and Compression – Summarizing and Filtering – Inferences and Uncertainty.

#### **UNIT-IV:**

Identifying Information needed to Support Decision Making – Human Factors – Problem characteristics and Information System Capabilities in Decision Making.

# UNIT – V:

# **Information System Application**

Transaction Processing Applications – Basic Accounting Application – Applications for Budgeting and Planning – Other use of Information Technology: Automation – Word Processing – Electronic Mail – Evaluation Remote Conferencing and Graphics – System and Selection – Cost Benefit – Centralized versus Decentralized Allocation Mechanism.

# UNIT – VI:

## **Development And Maintenance Of Information Systems**

Systems analysis and design – System development life cycle – Limitation – End user Development – Managing End Users – off– the shelf software packages – Outsourcing – Comparison of different methodologies.

# **OUTCOMES:**

- MIS brings to the notice of the management strength (i.e., strong points) of the organization, to take advantage of the opportunities available.
- MIS reports on production statistics regarding rejection, defective and spoilage and their effect on costs and quality of the products.

# **TEXT BOOK:**

1. Laudon K.C, Laudon J.P, Brabston M.E, "Management Information Systems - Managing the digital firm", Pearson Education, 2004.

## **REFERENCES:**

- 1. Turban E.F, Potter R.E, "Introduction to Information Technology"; Wiley, 2 004.
- 2. Jeffrey A.Hoffer, Joey F.George, Joseph S. Valachich, "Modern Systems Analys and Design", Third Edition, Prentice Hall, 2002.


# CONCURRENT AND PARALLEL PROGRAMMING

(Elective - III)

# **OBJECTIVES:**

- Improvement of students comprehension of CPP, new programming concepts, paradigms and idioms
- Change of 'mood' regarding Concurrency counter-intuitiveness
- Proactive attitude: theoretical teaching shouldn't be so dull
- Multipath, individually paced, stop-and-replay, personalized learning process
- Frequent assessment of learning advances on the subject

# UNIT-1

Concurrent versus sequential programming. Concurrent programming constructs and race condition. Synchronization primitives.

# UNIT-II

Processes and threads. Interprocess communication. Livelock and deadlocks, starvation, and deadlock prevention. Issues and challenges in concurrent programming paradigm and current trends.

# UNIT-III

Parallel algorithms - sorting, ranking, searching, traversals, prefix sum etc.,

# UNIT- IV

Parallel programming paradigms – Data parallel, Task parallel, Shared memory and message passing, Parallel Architectures, GPGPU, pthreads, STM,

# UNIT-V

OpenMP, OpenCL, Cilk++, Intel TBB, CUDA

# UNIT-VI

Heterogeneous Computing: C++AMP, OpenCL

# **OUTCOMES:**

- Understanding improvement of CPP concepts presented
- The number of reinforcement–exercises assigned
- The time required for the resolution of exercises
- Compliance level with the new model of theoretical teaching

# **TEXT BOOKS:**

- 1. Mordechai Ben-Ari. Principles of Concurrent and Distributed Programming, Prentice-Hall international.
- 2. Greg Andrews. Concurrent Programming: Principles and Practice, Addison Wesley.
- 3. GadiTaubenfeld. Synchronization Algorithms and Concurrent Programming, Pearson.

# **REFERENCES:**

- 1. M. Ben-Ari. Principles of Concurrent Programming, Prentice Hall.
- 2. Fred B. Schneider. On Concurrent Programming, Springer.
- 3. Brinch Hansen. The Origins of Concurrent Programming: From Semaphor

# **CYBER SECURITY**

# **OBJECTIVES:**

- The Cyber security Course will provide the students with foundational Cyber Security principles, Security architecture, risk management, attacks, incidents, and emerging IT and IS technologies.
- Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.

# **UNIT- I: Introduction to Cybercrime:**

Introduction, Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security ,Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens

# **UNIT -II: Cyber offenses:**

How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

# **UNIT -III: Cybercrime Mobile and Wireless Devices:**

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

#### UNIT -IV: Tools and Methods Used in Cybercrime:

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and<br/>Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS<br/>Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks, Phishing and Identity<br/>Theft:Introduction, Phishing, IdentityTheft(IDTheft)

#### **UNIT -V: Cybercrimes and Cyber security:**

Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information Security Blueprint, Security education, Training and awareness program, Continuing Strategies.

# **UNIT -VI: Understanding Computer Forensics:**

Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Approaching a Computer Forensics Investigation, Computer Forensics and Steganography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Computer Forensics from Compliance Perspective, Challenges in Computer Forensics, Special Tools and Techniques, Forensics Auditing, Ant forensics

# **OUTCOMES:**

- Cyber Security architecture principles
- Identifying System and application security threats and vulnerabilities
- Identifying different classes of attacks
- Cyber Security incidents to apply appropriate response
- Describing risk management processes and practices
- Evaluation of decision making outcomes of Cyber Security scenarios

# **TEXT BOOKS:**

- 1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, Sunit Belapure, Wiley.
- 2. Principles of Information Security, Micheal E.Whitman and Herbert J.Mattord, Cengage Learning.

# **REFERENCES:**

1. Information Security, Mark Rhodes, Ousley, MGH.

# **ARTIFICIAL NEURAL NETWORKS**

# **OBJECTIVES:**

- Understand the role of neural networks in engineering, artificial intelligence, and cognitive modeling.
- Provide knowledge of supervised learning in neural networks
- Provide knowledge of computation and dynamical systems using neural networks
- Provide knowledge of reinforcement learning using neural networks.
- Provide knowledge of unsupervised learning using neural networks.
- Provide hands-on experience in selected applications

# **UNIT-I: Introduction and ANN Structure.**

Biological neurons and artificial neurons. Model of an ANN. Activation functions used in ANNs. Typical classes of network architectures.

# UNIT-II

Mathematical Foundations and Learning mechanisms.Re-visiting vector and matrix algebra. State-space concepts. Concepts of optimization. Error-correction learning. Memory-based learning. Hebbian learning. Competitive learning.

# UNIT-III

Single layer perceptrons. Structure and learning of perceptrons. Pattern classifier - introduction and Bayes' classifiers. Perceptron as a pattern classifier. Perceptron convergence. Limitations of a perceptrons.

# **UNIT-IV: Feed forward ANN.**

Structures of Multi-layer feed forward networks. Back propagation algorithm. Back propagation - training and convergence. Functional approximation with back propagation. Practical and design issues of back propagation learning.

# **UNIT-V: Radial Basis Function Networks.**

Pattern separability and interpolation. Regularization Theory. Regularization and RBF networks.RBF network design and training. Approximation properties of RBF.

# **UNIT-VI: Support Vector machines.**

Linear separability and optimal hyperplane.Determination of optimal hyperplane. Optimal hyperplane for nonseparable patterns. Design of a SVM.Examples of SVM.

# **OUTCOMES:**

- This course has been designed to offer as a graduate-level/ final year undergraduate level elective subject to the students of any branch of engineering/ science, having basic foundations of matrix algebra, calculus and preferably (not essential) with a basic knowledge of optimization.
- Students and researchers desirous of working on pattern recognition and classification, regression and interpolation from sparse observations; control and optimization are expected to find this course useful. The course covers theories and usage of artificial neural networks (ANN) for problems pertaining to classification (supervised/ unsupervised) and regression.
- The course starts with some mathematical foundations and the structures of artificial neurons, which mimics biological neurons in a grossly scaled down version. It offers mathematical basis of learning mechanisms through ANN. The course introduces perceptrons, discusses its capabilities and limitations as a pattern classifier and later develops concepts of multilayer perceptrons with back propagation learning.

# **TEXT BOOKS:**

- 1. Simon Haykin, "Neural Networks: A comprehensive foundation", Second Edition, Pearson Education Asia.
- 2. Satish Kumar, "Neural Networks: A classroom approach", Tata McGraw Hill, 2004.

# **REFERENCE BOOKS:**

1. Robert J. Schalkoff, "Artificial Neural Networks", McGraw-Hill International Editions, 1997.

# SOFTWARE QUALITY ASSURANCE

# **OBJECTIVES:**

- Describe approaches to quality assurance
- Understand quality models
- Evaluate the system based on the chosen quality model

# **Unit I: Introduction:**

The Software Quality Challenge. What is Software Quality? Software Quality Factors: The Components of the Software Quality Assurance System -Overview **Pre-Project Software Quality Components** 

# Unit II:

# SQA Components in the Project Life Cycle

Integrating Quality Activities in the Project Life Cycle, ReviewsSoftware Testing - Strategies Software Testing –Implementation, Assuring the Quality of Software Maintenance

# **Unit III: Software Quality Infrastructure Components**

Procedures and Work Instructions. Supporting Quality Devices Staff Training, Instructing and Certification. Preventive and Corrective Actions.

# Unit IV: Software Quality Management Components

Project Progress Control: Software Quality Metrics, Software Quality Costs

# Unit V: Standards, Certification and Assessment

SQA StandardsISO 9001 Certification Software, Process Assessment

# Unit VI: Organizing for Quality Assurance

Management and its Role in Quality Assurance, The Software Quality Assurance

# **OUTCOMES:**

Upon Completion of the course, the students will be able to

- Describe different approaches to testing software applications
- Analyze specifications and identify appropriate test generation strategies
- Develop an appropriate test design for a given test object

# **TEXT BOOKS:**

- 1. Software Quality Assurance, Theory of implementation-Daniel Galin, Pearson
- 2. MauroPezze and Michal Young, "Software Testing and Analysis. Process, Principles, and Techniques", John Wiley 2008

# **REFERENCE BOOKS:**

- 1. BorizBeizer, "Software Testing Techniques", 2nd Edition, DreamTech, 2009.
- 2. Aditya P. Mathur, "Foundations of Software Testing", Pearson, 2008
- 3. Mauro Pezze and Michal Young, "Software Testing and Analysis. Process, Principles, and Techniques", John Wiley 2008
- 4. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", 2nd Edition, Pearson, 2003
- 5. KshirasagarNaik and PriyadarshiTripathy (Eds), "Software Testing and Quality Assurance: Theory and Practice", John Wiley, 2008

# COURSE STRUCTURE AND SYLLABUS

For

# **ELECTRICAL AND ELECTRONICS ENGINEERING**

(Applicable for batches admitted from 2016-2017)



# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA KAKINADA - 533 003, Andhra Pradesh, India

# I Year – I Semester

S. No	Subjects	L	Т	Р	Credits
1-HS	English – I	4			3
2-BS	Mathematics - I	4			3
3-ES	Applied Chemistry	4			3
4-BS	Engineering Mechanics	4			3
5-BS	Computer Programming	4			3
6-ES	Environmental Studies	4			3
7-HS	Applied / Engineering Chemistry Laboratory			3	2
8-BS	English- Communication Skills Laboratory - I			3	2
9-ES	Computer Programming Laboratory			3	2
	Total Credits				24

# I Year – II Semester

S. No	Subjects	L	Т	Р	Credits
1-HS	English – II	4			3
2-BS	Mathematics – II (Mathematical Methods)	4			3
3-BS	Mathematics – III	4			3
4-ES	Applied Physics	4			3
5	Electrical Circuit Analysis - I	4			3
6-ES	Engineering Drawing	4			3
7-BS	English - Communication Skills Laboratory - II			3	2
8-HS	Applied / Engineering Physics Laboratory			3	2
9-ES	Applied / Engineering Physics – Virtual Labs			2	
	- Assignments				
10	Engg.Workshop & IT Workshop			3	2
	Total Credits				24

# II Year – I Semester

S. No	Subjects	L	Т	Р	Credits
1	Electrical Circuit Analysis - II	4			3
2	Electrical Machines-I	4			3
3	Basic Electronics and Devices	4			3
4	Electro Magnetic Fields	4			3
5	Thermal and Hydro Prime Movers	4			3
6	Managerial Economics & Financial Analysis	4			3
7	Thermal and Hydro Laboratory			3	2
8	Electrical Circuits Laboratory			3	2
	Total Credits				22

# II Year – II Semester

S. No	Subjects	L	Т	Р	Credits
1	Electrical Measurements	4			3
2	Electrical Machines-II	4			3
3	Switching Theory and Logic Design	4			3
4	Control Systems	4			3
5	Power Systems-I	4			3
6	Management Science	4			3
7	Electrical Machines -I Laboratory			3	2
8	Electronic Devices & Circuits Laboratory			3	2
	Total Credits				22

# III Year – I Semester

S. No	Subjects	L	Т	Р	Credits
1	Power Systems-II	4			3
2	Renewable Energy Sources	4			3
3	Signals and Systems	4			3
4	Pulse & Digital Circuits	4			3
5	Power Electronics	4			3
6	Electrical Machines-II Laboratory			3	2
7	Control Systems Laboratory			3	2
8	Electrical Measurements Laboratory			3	2
9-MC	IPR & Patents		2		
	Total Credits				21

# III Year – II Semester

S. No	Subjects	L	Т	Р	Credits
1	Power Electronic Controllers & Drives	4			3
2	Power System Analysis	4			3
3	Micro Processors and Micro controllers	4			3
4	Data Structures	4			3
	Open Elective				
	1. Unix and Shell Programming	4			
	2. OOPS Through JAVA		4		
5	3. VLSI Design				2
5	4. Robotics				3
	5. Neural Networks & Fuzzy Logic				
	6. Energy Audit and Conservation&				
	Management				
6	Power Electronics Laboratory			3	2
7	Microprocessors & Microcontrollers			3	2
/	Laboratory				
8	Data Structures Laboratory			3	2
9-MC	Professional Ethics & Human Values		3		
Total Credits     21					21

# IV Year – I Semester

S. No	Subjects	L	Т	Р	Credits
1	Utilization of Electrical Energy	4			3
2	Linear IC Applications	4			3
3	Power System Operation & Control	4			3
4	Switchgear and Protection	4			3
5	<ul> <li><u>Elective – I:</u></li> <li>1. Electrical Machine Modeling and Analysis</li> <li>2. Advanced Control Systems</li> <li>3. Programmable Logic Controllers&amp; Applications</li> <li>4. Instrumentation</li> </ul>	4			3
6	Elective – II: 1. Optimization Techniques 2. Electric Power Quality 3. Special Electrical Machines	4			3
7	Electrical Simulation Laboratory			2	2
8	Power Systems & Simulation Laboratory			2	2
	Total Credits				22

# IV Year - II Semester

S. No	Subjects	L	Т	Р	Credits
1	Digital Control Systems	4			3
2	HVDC Transmission	4			3
3	Electrical Distribution Systems	4			3
4	<ul> <li><u>Elective – III:</u></li> <li>1. High Voltage Engineering</li> <li>2. Flexible Alternating Current Transmission Systems</li> <li>3. Power System Reforms</li> </ul>	4	-	-	3
5	Seminar		3		2
6	Project				10
	Total Credits				24

#### **SYLLABUS**

IV IC		L	Т	Р	С
1 Year - I Semester		4	0	0	3
	FNCLISH - I				

#### ENGLISH - I

#### **Introduction:**

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

# **Objectives:**

- 1. To imporve the language proficiency of the students in English with emphasis on LSRW skills.
- 2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theorotical and practical components.
- 3. To develop the communication skills of the students in both formal and informal situations.

# **LISTENING SKILLS:**

#### **Objectives:**

- 1. To enable the students to appreciate the role of listening skill and improve their pronounciation.
- 2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
- 3. To enable the students to listen for general content, to fill up information and for specific information.

# **SPEAKING SKILLS:**

#### **Objectives:**

- 1. To make the students aware of the importance of speaking for their personal and professional communication.
- 2. To enable the students to express themselves fluently and accurately in social and professional success.
- 3. To help the students describe objects, situations and people.
- 4. To make the students participate in group activities like roleplays, discussions and debates.
- 5. To make the students particiapte in Just a Minute talks.

## **READING SKILLS:**

# **Objectives:**

- 1. To enable the students to comprehend a text through silent reading.
- 2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
- 3. To enable the students to skim and scan a text.
- 4. To enable the students to identify the topic sentence.
- 5. To enable the students to identify discourse features.
- 6. To enable the students to make intensive and extensive reading.

# WRITING SKILLS:

#### **Objectives:**

- 1. To make the students understand that writing is an exact formal skills.
- 2. To enable the students to write sentences and paragraphs.
- 3. To make the students identify and use appropriate vocabulary.
- 4. To enable the students to narrate and describe.
- 5. To enable the students capable of note-making.
- 6. To enable the students to write coherently and cohesively.
- 7. To make the students to write formal and informal letters.
- 8. To enable the students to describe graphs using expressions of comparision.
- 9. To enable the students to write techincal reports.

# Methodology:

- 1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
- 2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
- 3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher interventionis perimitted as per the complexity of the task/exercise.
- 4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
- 5. The teacher is perimitted to use lecture method when a completely new concept is introduced in the class.

# **Assessment Procedure: Theory**

- 1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
- 2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the langauge skills learnt in the unit are to be tested.
- 3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails,letters and reports-- are to be tested along with appropriate langauge and expressions.
- 4. Examinations: I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%

(80% for the best of two and 20% for the other)

Assignments= 5%

End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech I Semester (Common for all branches) and I B.Pharma I Sem of JNTU Kakinada from the academic year 2016-17

(R-16 Regualtions)

# **DETAILED TEXTBOOK:**

# ENGLISH FOR ENGINEERS AND TECHNOLOGISTS, Published by Orient Blackswan Pvt Ltd

# **NON-DETAILED TEXTBOOK:**

# PANORAMA: A COURSE ON READING, Published by Oxford University Press India

The course content along with the study material is divided into six units.

# UNIT I:

1. 'Human Resources' from English for Engineers and Technologists. **OBJECTIVE:** To develop human resources to serve the society in different ways. **OUTCOME:** The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly. 2. 'An Ideal Family' from Panorama: A Course on Reading **OBJECTIVE:** To develop extensive reading skill and comprehension for pleasure and profit. **OUTCOME:** Acquisition of writing skills **UNIT 2:** 1. 'Transport: Problems and Solutions' from English for Engineers and Technologists. **OBJECTIVE:** To highlight road safety measures whatever be the mode of transport. **OUTCOME:** 

The lesson motivates the public to adopt road safety measures. 2. 'War' from 'Panorama : A Course on Reading' **OBJECTIVE:** To develop extensive reading skill and comprehension for pleasure and profit. **OUTCOME:** 

Acquisition of writing skills

# **UNIT 3:**

1. 'Evaluating Technology' from English for Engineers and Technologists.

# **OBJECTIVE:**

To highlight the advantages and disadvantages of technology.

# **OUTCOME:**

The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival.

2. 'The Verger' from 'Panorama : A Course on Reading'

# **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

# **OUTCOME:**

Acquisition of writing skills

# UNIT 4:

1. 'Alternative Sources of Energy' from English for Engineers and Technologists.

# **OBJECTIVE:**

To bring into focus different sources of energy as alternatives to the depleting sources.

# **OUTCOME:**

The lesson helps to choose a source of energy suitable for rural India.

2. 'The Scarecrow' from Panorama : A Course on Reading

# **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

# **OUTCOME:**

Acquisition of writing skills

# **UNIT 5:**

1. 'Our Living Environment' from English for Engineers and Technologists.

# **OBJECTIVE:**

To highlight the fact that animals must be preserved beacuase animal life is precious.

# **OUTCOME:**

The lesson creates an awareness in the reader as to the usefulness of animals for the human society.

2. 'A Village Host to Nation' from Panorama : A Course on Reading

# **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

# **OUTCOME:**

Acquisition of writing skills

# **UNIT 6:**

1. 'Safety and Training' from English for Engineers and Technologists.

# **OBJECTIVE:**

To highlight the possibility of accidents in laboratories, industries and other places and to follow safety measures.

# **OUTCOME:**

The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.

2. 'Martin Luther King and Africa' from Panorama : A Course on Reading

# **OBJECTIVE:**

To develop extensive reading skill and comprehension for pleasure and profit.

# **OUTCOME:**

Acquisition of writing skills

# NOTE:

All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

# **OVERALL COURSE OUTCOME:**

- 1. Using English languages, both written and spoken, competently and correctly.
- 2. Improving comprehension and fluency of speech.
- **3.** Gaining confidence in using English in verbal situations.

# MODEL QUESTION PAPER FOR THEORY

# PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

# PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks

- B from non-detailed text: 3 marks
- C on grammar and Vocabulary: 6 marks

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#### MATHEMATICS-I (Common to ALL branches of First Year B.Tech.)

#### **Course Objectives:**

- 1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
- 2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

#### Course Outcomes: At the end of the Course, Student will be able to:

- 1. Solve linear differential equations of first, second and higher order.
- 2. Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
- 3. Calculate total derivative, Jocobian and minima of functions of two variables.

#### UNIT I: Differential equations of first order and first degree:

Linear-Bernoulli-Exact-Reducible to exact.

Applications: Newton's Law of cooling-Law of natural growth and decay-Orthogonal trajectories- Electrical circuits- Chemical reactions.

#### UNIT II: Linear differential equations of higher order:

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type  $e^{ax}$ , sin ax, cos ax, polynomials in x,  $e^{ax} V(x)$ , xV(x)- Method of Variation of parameters. Applications: LCR circuit, Simple Harmonic motion.

#### **UNIT III: Laplace transforms:**

Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

# **UNIT IV: Partial differentiation:**

Introduction- Homogeneous function-Euler's theorem-Total derivative-Chain rule-Generalized Mean value theorem for single variable (without proof)-Taylor's and Mc Laurent's series expansion of functions of two variables– Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

#### **UNIT V: First order Partial differential equations:**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

# **UNIT VI: Higher order Partial differential equations:**

Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type  $e^{ax+by}$ , sin(ax+by), cos(ax+by),  $x^m y^n$ . Classification of second order partial differential equations.

# **Text Books:**

- 1. **B.S.Grewal,** Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

# **Reference Books:**

- Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India
   Micheael Greenberg, Advanced Engineering Mathematics, 9<sup>th</sup> edition, Pearson edn
- 3. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
- 4. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
- 5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
- 6. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

# APPLIED CHEMISTRY (EEE, ECE, CSE, IT, EIE, E. Com. E.)

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

# Learning Objectives:

- Plastics are nowadays used in household appliances; also they are used as composites (FRP) in aerospace industries.
- Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
- The basics for the construction of galvanic cells as well as some of the sensors used in instruments are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory.
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.
- Understanding of crystal structures will help to understand the conductivity, semiconductors and superconductors. Magnetic properties are also studied.
- With the increase in demand for power and also with depleting sources of fossil fuels, the demand for alternative sources of fuels is increasing. Some of the prospective fuel sources are introduced.

# UNIT I: HIGH POLYMERS AND PLASTICS

Polymerisation : Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties – Plastics as engineering materials : advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4/5 techniques)- Preparation, properties and applications of polyethene, PVC, Bakelite Teflon and polycarbonates

Elastomers – Natural rubber- compounding and vulcanization – Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers.

Composite materials & Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

# **UNIT II: FUEL TECHNOLOGY**

*Fuels*:- Introduction – Classification – Calorific value - HCV and LCV – Dulong's formula – Bomb calorimeter – Numerical problems – Coal — Proximate and ultimate analysis – Significance of the analyses – Liquid fuels – Petroleum- Refining – Cracking – Synthetic petrol –Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knock agents – Power alcohol – Bio-diesel – Gaseous fuels – Natural gas. LPG and CNG – Combustion – Calculation of air for the combustion of a fuel – Flue gas analysis – Orsat apparatus – Numerical problems on combustion.

*Explosives:*- Introduction, classification, examples: RDX, TNT and ammonium nitrite - rocket fuels.

# UNIT III: ELECTROCHEMICAL CELLS AND CORROSION

Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc – air cells.

*Corrosion:-* Definition – Theories of Corrosion (electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Design and material selection – Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroplating)

# UNIT IV: CHEMISTRY OF ADVANCED MATERIALS

*Nano materials:* Introduction – Sol-gel method & chemical reduction method of preparation – Characterization by BET method and TEM methods - Carbon nano tubes and fullerenes: Types, preparation, properties and applications

*Liquid crystals:-* Introduction – Types – Applications

Superconductors :- Type-I & Type-2, properties & applications

Green synthesis:- Principles - 3or 4 methods of synthesis with examples - R<sub>4</sub>M<sub>4</sub> principles

# **UNIT V: SOLID STATE CHEMISTRY**

Types of solids - close packing of atoms and ions - BCC, FCC, structures of rock salt - cesium chloride- spinel - normal and inverse spinels,

Non-elemental *semiconducting Materials:* - Stoichiometric, controlled valency & Chalcogen photo/semiconductors, Preparation of Semiconductors - Semiconductor Devices:- p-n junction diode as rectifier – junction transistor.

*Insulators* (electrical and electronic applications)

Magnetic materials:- Ferro and ferri magnetism. Hall effect and its applications.

# UNIT VI: NON CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES

Solar Energy: - Introduction, application of solar energy, conversion of solar energy (Thermal

conversion & photo conversion) – photovoltaic cell: design, working and its importance *Non-conventional energy sources:* 

- (i) Hydropower include setup a hydropower plant (schematic diagram)
- (ii) Geothermal energy: Introduction-schematic diagram of a geothermal power plant
- (iii) Tidal and wave power: Introduction- Design and working-movement of tides and their effect on sea level.
- (iv) Ocean thermal energy: Introduction, closed-cycle, ocean thermal energy conversion (OTEC), open cycle OTEC, hybrid OTEC, schematic diagram and explanation.
- (v) Biomass and biofuels

*Fuel cells:* Introduction - cell representation,  $H_2$ - $O_2$  fuel cell: Design and working, advantages and limitations. Types of fuel cells: Alkaline fuel cell - methanol-oxygen - phosphoric acid fuel cells - molten carbonate fuel cells.

**Outcomes:** The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano-materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. Conductance phenomenon is better understood. The students are exposed to some of the alternative fuels and their advantages and limitations.

# **Standard Books:**

- 1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.
- 2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

#### **Reference Books:**

- 1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
- 2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
- 3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
- 4. Applied Chemistry by H.D. Gesser, Springer Publishers
- 5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

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#### **ENIGINEERING MECHANICS**

**Objectives:** The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

# UNIT – I

Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.

Introduction to Engg. Mechanics – Basic Concepts.

**Systems of Forces:** Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

**Friction:** Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction

# UNIT II

**Objectives:** The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.

**Equilibrium of Systems of Forces:** Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium, analysis of plane trusses.

# UNIT – III

**Objectives :** The students are to be exposed to concepts of centre of gravity.

**Centroid:** Centroids of simple figures (from basic principles ) – Centroids of Composite Figures

**Centre of Gravity:** Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems.

#### UNIT IV

# **Objective:** The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.

**Area moments of Inertia:** Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia:** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

# UNIT – V

# Objectives: The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.

**Kinematics:** Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

# UNIT – VI

Objectives: The students are to be exposed to concepts of work, energy and particle motion

**Work – Energy Method:** Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

# **TEXT BOOKS :**

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4<sup>th</sup> Edn - , Mc Graw Hill publications.

# **REFERENCES**:

- 1. Engineering Mechanics statics and dynamics R.C.Hibbeler, 11<sup>th</sup> Edn Pearson Publ.
- 2. Engineering Mechanics, statics J.L.Meriam, 6<sup>th</sup> Edn Wiley India Pvt Ltd.
- 3. Engineering Mechanics, statics and dynamics I.H.Shames, Pearson Publ.
- 4. Mechanics For Engineers, statics F.P.Beer & E.R.Johnston 5<sup>th</sup> Edn Mc Graw Hill Publ.
- 5. Mechanics For Engineers, dynamics F.P.Beer & E.R.Johnston -5<sup>th</sup> Edn Mc Graw Hill Publ.
- Theory & Problems of engineering mechanics, statics & dynamics E.W.Nelson, C.L.Best & W.G. McLean, 5<sup>th</sup> Edn – Schaum's outline series - Mc Graw Hill Publ.
- 7. Singer's Engineering Mechanics: Statics And Dynamics, K. Vijay Kumar Reddy, J. Suresh Kumar, Bs Publications
- 8. Engineering Mechanics, Fedinand . L. Singer, Harper Collins.
- 9. Engineering Mechanics statics and dynamics, A Nelson, Mc Graw Hill publications

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# COMPUTER PROGRAMMING

# Learning objectives:

Formulating algorithmic solutions to problems and implementing algorithms in C.

- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

# **UNIT-I:**

**History and Hardware** - Computer Hardware, Bits and Bytes, Components, Programming Languages - Machine Language, Assembly Language, Low- and High-Level Languages, Procedural and Object-Oriented Languages, Application and System Software, The Development of C Algorithms The Software Development Process.

#### **UNIT-II:**

**Introduction to C Programming-** Identifiers, The main () Function, The printf () Function **Programming Style** - Indentation, Comments, Data Types, Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization.

**Assignment** - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

# UNIT -III:

# **Control Flow-Relational Expressions - Logical Operators:**

Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.

**Repetition**: Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, The while Statement, The for Statement, Nested Loops, The dowhile Statement.

# UNIT-IV

**Modular Programming:** Function and Parameter Declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Storing Addresses, Using Addresses, Declaring and Using Pointers, Passing Addresses to a Function.

Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

# UNIT-V:

# Arrays & Strings

**Arrays:** One-DimensionalArrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, LargerDimensionalArrays-Matrices

Strings: String Fundamentals, String Input and Output, String Processing, Library Functions

# **UNIT-VI:**

# **Pointers, Structures, Files**

**Pointers**: Concept of a Pointer, Initialisation of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.

**Structures**: Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.

**Data Files**: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

# **Outcomes:**

- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers
- Use different data structures and create/update basic data files.

# **Text Books:**

- 1. ANSI C Programming, Gary J. Bronson, Cengage Learning.
- 2. Programming in C, Bl Juneja Anita Seth, Cengage Learning.
- 3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

# **Reference Books:**

- 1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
- 2. Programming with C, Bichkar, Universities Press.
- 3. Programming in C, ReemaThareja, OXFORD.
- 4. C by Example, Noel Kalicharan, Cambridge.

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#### **ENVIRONMENTAL STUDIES**

#### **Course Learning Objectives:**

The objectives of the course is to impart

- Overall understanding of the natural resources
- Basic understanding of the ecosystem and its diversity
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- An understanding of the environmental impact of developmental activities
- Awareness on the social issues, environmental legislation and global treaties

#### **Course Outcomes:**

The student should have knowledge on

- The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
- The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
- The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
- Social issues both rural and urban environment and the possible means to combat the challenges
- The environmental legislations of India and the first global initiatives towards sustainable development.
- About environmental assessment and the stages involved in EIA and the environmental audit.
- Self Sustaining Green Campus with Environment Friendly aspect of Energy, Water and Wastewater reuse Plantation, Rain water Harvesting, Parking Curriculum.

#### Syllabus:

# UNIT – I

**Multidisciplinary nature of Environmental Studies:** Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, Carbon Credits, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

# UNIT – II

Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Literate, Coal, Sea and River sands.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

#### UNIT - III Biodiversity and its conservation:

Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, manwildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

# UNIT – IV

**Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

**Solid Waste Management:** Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

#### UNIT – V

**Social Issues and the Environment:** Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act - Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

#### UNIT – VI

**Environmental Management**: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

# **TEXT BOOKS:**

- 1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
- 2. Environmental Studies, R. Rajagopalan, 2<sup>nd</sup> Edition, 2011, Oxford University Press.
- 3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

#### **REFERENCE:**

- 1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
- 2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
- 3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
- 4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014

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#### APPLIED/ENGINEERING CHEMISTRY LABORATORY (Common to all branches)

- 1. Introduction to Chemistry laboratory Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.
- 2. Trial experiment Determination of HCl using standard Na<sub>2</sub>CO<sub>3</sub> solution.
- 3. Determination of alkalinity of a sample containing Na<sub>2</sub>CO<sub>3</sub> and NaOH.
- 4. Determination of KMnO<sub>4</sub> using standard Oxalic acid solution.
- 5. Determination of Ferrous iron using standard  $K_2Cr_2O_7$  solution.
- 6. Determination of Copper using standard  $K_2Cr_2O_7$  solution.
- 7. Determination of temporary and permanent hardness of water using standard EDTA solution.
- 8. Determination of Copper using standard EDTA solution.
- 9. Determination of Iron by a Colorimetric method using thiocynate as reagent.
- 10. Determination of pH of the given sample solution using pH meter.
- 11. Conductometric titration between strong acid and strong base.
- 12. Conductometric titration between strong acid and weak base.
- 13. Potentiometric titration between strong acid and strong base.
- 14. Potentiometric titration between strong acid and weak base.
- 15. Determination of Zinc using standard EDTA solution.
- 16. Determination of Vitamin C.

**Outcomes**: The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

# **Reference Books**

- 1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
- 2. Dr. Jyotsna Cherukuris (2012) *Laboratory Manual of engineering chemistry-II*, VGS Techno Series
- 3. Chemistry Practical Manual, Lorven Publications
- 4. K. Mukkanti (2009) Practical Engineering Chemistry, B.S. Publication

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#### **ENGLISH - COMMUNICATION SKILLS LAB- I**

#### PRESCRIBED LAB MANUAL FOR SEMESTER I:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

#### **OBJECTIVES:**

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

# **OUTCOME:**

A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

# **UNIT 1:**

- 1. WHY study Spoken English?
- 2. Making Inqueries on the phone, thanking and responding to Thanks Practice work.

#### **UNIT 2:**

1. Responding to Requests and asking for Directions Practice work.

#### **UNIT 3:**

- 1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
- 2. Apologising, Advising, Suggesting, Agreeing and Disagreeing Practice work.

#### **UNIT 4:**

1. Letters and Sounds Practice work.

#### **UNIT 5:**

1. The Sounds of English Practice work.

# **UNIT 6:**

- 1. Pronunciation
- 2. Stress and Intonation Practice work.

# **Assessment Procedure: Laboratory**

- 1. Every lab session (150 minutes) should be handled by not less than two teachers (three would be ideal) where each faculty has to conduct a speaking activity for 20/30 students.
- 2. The teachers are to assess each learner in the class for not less than 10 speaking activities, each one to be assessed for 10 marks or 10%. The average of 10 day-to-day activity assessments is to be calculated for 10 marks for internal assessment.

The rubric given below has to be filled in for all the students for all activities.

#### The rubric to assess the learners:

Body lar	nguage	Fluency & Audibilit y	Clarity in Speech	Neutraliz ation of accent	Appropr Langua	riate ge	Total 10 mark s	Remarks
Gesture s & Posture s	Eye Contac t				Gram mar	Voca bular y & expre ssion s		

# • Lab Assessment: Internal (25 marks)

- 1. Day-to-Day activities: 10 marks
- 2. Completing the exercises in the lab manual: 5 marks
- 3. Internal test (5 marks written and 5 marks oral)

# • Lab Assessment: External (50 marks)

- 1. Written test: 20 marks (writing a dialogue, note-taking and answering questions on listening to an audio recording.
- 2. Oral: Reading aloud a text or a dialogue- 10 marks
- 3. Viva-Voce by the external examiner: 20 marks

# **Reference Books:**

- 1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
- 2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
- 3. Unlock, Listening and speaking skills 2, Cambridge University Press
- 4. Spring Board to Success, Orient BlackSwan
- 5. A Practical Course in effective english speaking skills, PHI
- 6. Word power made handy, Dr shalini verma, Schand Company
- 7. Let us hear them speak, Jayashree Mohanraj, Sage texts
- 8. Professional Communication, Aruna Koneru, Mc Grawhill Education
- 9. Cornerstone, Developing soft skills, Pearson Education
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### COMPUTER PROGRAMMING LAB

### **OBJECTIVES:**

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.

### Programming

**Exercise - 1** Basics

a) What is an OS Command, Familiarization of Editors - vi, Emacs

b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man

c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

Exercise - 2 Basic Matha) Write a C Program to Simulate 3 Laws at Motionb) Write a C Program to convert Celsius to Fahrenheit and vice versa

Exercise - 3 Control Flow - Ia)Write a C Program to Find Whether the Given Year is a Leap Year or not.b)Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II
a)Write a C Program to Find Whether the Given Number is

i) Prime Number
ii) Armstrong Number

b) Write a C program to print Floyd Triangle

c) Write a C Program to print Pascal Triangle

**Exercise – 5** Functions

a) Write a C Program demonstrating of parameter passing in Functions and returning values.

b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

# Exercise – 6 Control Flow - III

a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch...case

b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

# Exercise – 7 Functions - Continued

Write a C Program to compute the values of sin x and  $\cos x$  and  $e^x$  values using Series expansion. (use factorial function)

# Exercise – 8 Arrays

Demonstration of arrays

- a) Search-Linear.
- b) Sorting-Bubble, Selection.
- c) Operations on Matrix.

# **Exercises - 9** Structures

a)Write a C Program to Store Information of a Movie Using Structure

b)Write a C Program to Store Information Using Structures with Dynamically Memory Allocation

c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

# Exercise - 10 Arrays and Pointers

a)Write a C Program to Access Elements of an Array Using Pointer

b) Write a C Program to find the sum of numbers with arrays and pointers.

# Exercise – 11 Dynamic Memory Allocations

- a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
- b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

Understand the difference between the above two programs

# Exercise – 12 Strings

a) Implementation of string manipulation operations with library function.

- i) copy
- ii) concatenate
- iii) length
- iv) compare

b) Implementation of string manipulation operations without library function.

- i) copy
- ii) concatenate
- iii) length
- iv) compare

# Exercise -13 Files

a)Write a C programming code to open a file and to print it contents on screen. b)Write a C program to copy files

# Exercise - 14 Files Continued

a) Write a C program merges two files and stores their contents in another file.b) Write a C program to delete a file.

# **OUTCOMES:**

- Apply and practice logical ability to solve the problems.
- Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
- Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
- Understand and apply the in-built functions and customized functions for solving the problems.
- Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
- Document and present the algorithms, flowcharts and programs in form of user-manuals

•Identification of various computer components, Installation of software

Note:

a) All the Programs must be executed in the Linux Environment. (Mandatory)

b) The Lab record must be a print of the LATEX (.tex) Format.

### **ENGLISH -II**

### Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

### **Objectives:**

- 1. To imporve the language proficiency of the students in English with emphasis on LSRW skills.
- 2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theorotical and practical components.
- 3. To develop the communication skills of the students in both formal and informal situations.

# LISTENING SKILLS:

### **Objectives:**

- 1. To enable the students to appreciate the role of listening skill and improve their pronounciation.
- 2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
- 3. To enable the students to listen for general content, to fill up information and for specific information.

# **SPEAKING SKILLS:**

### **Objectives:**

- 1. To make the students aware of the importance of speaking for their personal and professional communication.
- 2. To enable the students to express themselves fluently and accurately in social and professional success.
- 3. To help the students describe objects, situations and people.
- 4. To make the students participate in group activities like roleplays, discussions and debates.
- 5. To make the students particiapte in Just a Minute talks.

# **READING SKILLS:**

### **Objectives:**

- 1. To enable the students to comprehend a text through silent reading.
- 2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
- 3. To enable the students to skim and scan a text.
- 4. To enable the students to identify the topic sentence.
- 5. To enable the students to identify discourse features.
- 6. To enable the students to make intensive and extensive reading.

### WRITING SKILLS:

### **Objectives:**

- 1. To make the students understand that writing is an exact formal skills.
- 2. To enable the students to write sentences and paragraphs.
- 3. To make the students identify and use appropriate vocabulary.
- 4. To enable the students to narrate and describe.
- 5. To enable the students capable of note-making.
- 6. To enable the students to write coherently and cohesively.
- 7. To make the students to write formal and informal letters.
- 8. To enable the students to describe graphs using expressions of comparision.
- 9. To enable the students to write techincal reports.

# Methodology:

- 1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
- 2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
- 3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher interventionis perimitted as per the complexity of the task/exercise.
- 4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
- 5. The teacher is perimitted to use lecture method when a completely new concept is introduced in the class.

# Assessment Procedure: Theory

- 1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
- 2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the langauge skills learnt in the unit are to be tested.
- 3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails,letters and reports-- are to be tested along with appropriate langauge and expressions.
- 4. Examinations:

I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%

(80% for the best of two and 20% for the other)

Assignments= 5%

End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech II Semester (Common for all branches) and I B.Pharma II Sem of JNTU Kakinada from the academic year 2016-17 (**R-16 Regulations**)

**DETAILED TEXTBOOK: ENGLISH ENCOUNTERS** Published by **Maruthi Publishers**.

# **DETAILED NON-DETAIL:THE GREAT INDIAN SCIENTISTS** Published by **Cenguage learning**

The course content along with the study material is divided into six units.

# **UNIT 1:**

1. 'The Greatest Resource- Education' from English Encounters

# **OBJECTIVE:**

Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts.

# **OUTCOME:**

The lesson underscores that the ultimate aim of Education is to enhance wisdom.

2. ' A P J Abdul Kalam' from The Great Indian Scientists.

# **OBJECTIVE:**

The lesson highlights Abdul Kalam's contributions to Indian science and the awards he received.

# **OUTCOME:**

Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.

# **UNIT 2:**

1. ' A Dilemma' from English Encounters

**OBJECTIVE:** The lesson centres on the pros and cons of the development of science and technology.

**OUTCOME:** The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.

2. 'C V Raman' from The Great Indian Scientists.

# **OBJECTIVE:**

The lesson highlights the dedicated research work of C V Raman and his achievements in Physics.

# **OUTCOME:**

The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists.

# **UNIT 3:**

1. 'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.

# **OBJECTIVE:**

The lesson depicts of the symptoms of Cultural Shock and the aftermath consequences.

# **OUTCOME:**

The lesson imparts the students to manage different cultural shocks due to globalization.

2. 'Homi Jehangir Bhabha' from The Great Indian Scientists.

# **OBJECTIVE:**

The lesson highlights Homi Jehangir Bhabha's contributions to Indian nuclear programme as architect.

# **OUTCOME:**

The seminal contributions of Homi Jehangir Bhabha to Indian nuclear programme provide an aspiration to the readers to serve the nation and sterngthen it.

# **UNIT 4:**

1. 'The Lottery' from English Encounters.

# **OBJECTIVE:**

The lesson highlights insightful commentary on cultural traditions.

### **OUTCOME:**

The theme projects society's need to re examine its traditions when they are outdated.

2. 'Jagadish Chandra Bose' from The Great Indian Scientists.

# **OBJECTIVE:**

The lesson gives an account of the unique discoveries and inventions of Jagadish Chandra Bose in Science.

**OUTCOME:** The Scientific discoveries and inventions of Jagadish Chandra Bose provide inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.

# **UNIT 5:**

1. 'The Health Threats of Climate Change' from English Encounters.

# **OBJECTIVE:**

The essay presents several health disorders that spring out due to environmental changes

# **OUTCOME:**

The lesson offers several inputs to protect environment for the sustainability of the future generations.

2. ' Prafulla Chandra Ray' from The Great Indian Scientists.

# **OBJECTIVE:**

The lesson given an account of the experiments and discoveries in Pharmaceuticals of Prafulla Chandra Ray.

# **OUTCOME:**

Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader.

# **UNIT 6:**

1. 'The Chief Software Architect' from English Encounters

# **OBJECTIVE:**

The lesson supports the developments of technology for the betterment of human life.

# **OUTCOME:**

Pupil get inspired by eminent personalities who toiled for the present day advancement of software development.

2. ' Srinivasa Ramanujan' from The Great Indian Scientists.

# **OBJECTIVE:**

The lesson highlights the extraordinary achievements of Srinivasa Ramanujan, a great mathematician and the most romantic figure in mathematics.

# **OUTCOME:**

The lesson provides inspiration to the readers to think and tap their innate talents.

# NOTE:

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All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered

# MODEL QUESTION PAPER FOR THEORY

# PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

# PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks

B from non-detailed text: 3 marks

C on grammar and Vocabulary: 6 marks

### MATHEMATICS-II (Mathematical Methods)

### **Course Objectives:**

- 1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
- 2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
- 3. Understand the most basic numerical methods to solve simultaneous linear equations.

### Course Outcomes: At the end of the Course, Student will be able to:

- 1. Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators.
- 2. Compute interpolating polynomial for the given data.
- 3. Solve ordinary differential equations numerically using Euler's and RK method.
- 4. Find Fourier series and Fourier transforms for certain functions.
- 5. Identify/classify and solve the different types of partial differential equations.

### **UNIT I: Solution of Algebraic and Transcendental Equations:**

Introduction- Bisection method – Method of false position – Iteration method – Newton-Raphson method (One variable and simultaneous Equations).

### **UNIT II: Interpolation:**

Introduction- Errors in polynomial interpolation – Finite differences- Forward differences-Backward differences – Central differences – Symbolic relations and separation of symbols -Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.

### **UNIT III: Numerical Integration and solution of Ordinary Differential equations:**

Trapezoidal rule- Simpson's 1/3<sup>rd</sup> and 3/8<sup>th</sup> rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations-Euler's method - Runge-Kutta method (second and fourth order).

### **UNIT IV: Fourier Series:**

Introduction- Periodic functions – Fourier series of -periodic function - Dirichlet's conditions – Even and odd functions –Change of interval– Half-range sine and cosine series.

### **UNIT V: Applications of PDE:**

Method of separation of Variables- Solution of One dimensional Wave, Heat and twodimensional Laplace equation.

### **UNIT VI: Fourier Transforms:**

Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

### **Text Books:**

- 1. **B.S.Grewal**, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

### **Reference Books:**

- 1. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
- 2. **V.Ravindranath and P.Vijayalakshmi,** Mathematical Methods, Himalaya Publishing House.
- 3. Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India
- 4. **David Kincaid, Ward Cheney**, Numerical Analysis-Mathematics of Scientific Computing, 3<sup>rd</sup> Edition, Universities Press.
- 5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
- 6. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

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### MATHEMATICS-III

### **Course Objectives:**

- 1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
- 2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
- 3. Understand the most basic numerical methods to solve simultaneous linear equations.

### Course Outcomes: At the end of the Course, Student will be able to:

- 1. Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations.
- 2. Solve simultaneous linear equations numerically using various matrix methods.
- 3. Determine double integral over a region and triple integral over a volume.
- 4. Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

### **UNIT I: Linear systems of equations:**

Rank-Echelon form-Normal form – Solution of linear systems – Gauss elimination - Gauss Jordon- Gauss Jacobi and Gauss Seidal methods. Applications: Finding the current in electrical circuits.

### UNIT II: Eigen values - Eigen vectors and Quadratic forms:

Eigen values - Eigen vectors- Properties - Cayley-Hamilton theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Diagonalization- Quadratic forms- Reduction of quadratic form to canonical form - Rank - Positive, negative and semi definite - Index - Signature.

Applications: Free vibration of a two-mass system.

# **UNIT III: Multiple integrals:**

Curve tracing: Cartesian, Polar and Parametric forms.

Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration.

Applications: Finding Areas and Volumes.

### **UNIT IV: Special functions:**

Beta and Gamma functions- Properties - Relation between Beta and Gamma functions-Evaluation of improper integrals.

Applications: Evaluation of integrals.

### **UNIT V: Vector Differentiation:**

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities. Applications: Equation of continuity, potential surfaces

# **UNIT VI: Vector Integration:**

ine integral – Work done – Potential function – Area- Surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.

Applications: Work done, Force.

### **Text Books:**

- 1. **B.S.Grewal**, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

### **Reference Books:**

- Greenberg, Advanced Engineering Mathematics, 2<sup>nd</sup> edition, Pearson edn
   Erwin Kreyszig, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India
   Peter O'Neil, Advanced Engineering Mathematics, 7<sup>th</sup> edition, Cengage Learning.
- 4. D.W. Jordan and T.Smith, Mathematical Techniques, Oxford University Press.
- 5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
- 6. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

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### APPLIED PHYSICS (CSE, ECE, EEE, IT, EIE, E.Com.E)

<u>**OBJECTIVES:**</u> Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by JNTUniv.Kkd. that serves as a transit to understand the branch specific advanced topics. The courses are designed to:

- Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization involving required to design instruments with higher resolution.
- Teach Concepts of coherent sources, its realization and utility optical instrumentation.
- Study the concepts regarding the bulk response of materials to the EM fields and their analytically study in the back-drop of basic quantum mechanics.
- Understand the physics of Semiconductors and their working mechanism for their utility in sensors.

### UNIT-I

**INTERFERENCE:** Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings – construction and basic principle of Interferometers.

### UNIT-II

**DIFFRACTION:** Fraunhofer diffraction at single slit - Cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscopes.

### UNIT-III

**POLARIZATION:** Types of Polarization – Methods of production - Nicol Prism -Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter).

**LASERS:** Characteristics– Stimulated emission – Einstein's Transition Probabilities-Pumping schemes - Ruby laser – Helium Neon laser.

### UNIT-IV

**ELECTROMAGNETIC FIELDS:** Scalar and Vector Fields – Electric Potential- Gradient, Divergence of fields – Gauss and Stokes theorems-Propagation of EM waves through dielectric medium.

### UNIT-V

**QUANTUM MECHANICS:** Introduction - Matter waves – Schröedinger Time Independent and Time Dependent wave equations – Particle in a box. **FREE ELECTRON THEORY:** Defects of Classical free electron theory –Quantum Free electron theory - concept of Fermi Energy.

# UNIT-VI

**BAND THEORY OF SOLIDS:** Bloch's theorem (qualitative) – Kronig – Penney model – energy bands in crystalline solids – classification of crystalline solids– effective mass of electron & concept of hole.

**SEMICONDUCTOR PHYSICS:** Conduction – Density of carriers in Intrinsic and Extrinsic semiconductors – Drift & Diffusion – relevance of Einstein's equation- Hall effect in semiconductors

**Outcome**: Construction and working details of instruments, i.e., Interferometer, Diffractometer and Polarimeter are learnt. Study EM-fields and semiconductors under the concepts of Quantum mechanics paves way for their optimal utility.

# List of Text Books:

- 1. A Text book of Engineering Physics by Dr. M.N.Avadhanulu and Dr.P.G.Kshira sagar, S.Chand & Company Ltd., (2014)
- 2. 'Solid State Physics' by A.J.Dekker, Mc Millan Publishers (2011)
- 3. Engineering Physics by D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

# **List of Reference Books:**

- 1. Applied Physics by P.K.Palanisamy, Scitech publications (2014)
- 2. Lasers and Non-Linear optics by B.B.Laud, New Age International Publishers (2008).
- 3. Engineering Physics by M. Arumugam, Anuradha Publication (2014)

# ELECTRICAL CIRCUIT ANALYSIS – I

### **Preamble**:

This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes single phase circuits, magnetic circuits, network theorems, transient analysis and network topology.

# Learning Objectives:

- To study the concepts of passive elements, types of sources and various network reduction techniques.
- To understand the applications of network topology to electrical circuits.
- To study the concept of magnetic coupled circuit.
- To understand the behaviour of RLC networks for sinusoidal excitations.
- To study the performance of R-L, R-C and R-L-C circuits with variation of one of the parameters and to understand the concept of resonance.
- To understand the applications of network theorems for analysis of electrical networks.

### UNIT-I

### **Introduction to Electrical Circuits**

Passive components and their V-I relations. Sources (dependent and independent) -Kirchoff's laws, Network reduction techniques(series, parallel, series - parallel, star-to-delta and delta-to-star transformation). source transformation technique, nodal analysis and mesh analysis.

# UNIT-II

### Network topology

Definitions of Graph and Tree, Basiccutset and tieset matrices for planar networks, Loop and nodal methods of analysis of networks with dependent and independent voltage and current sources, Duality and Dual networks.

# UNIT-III

### Magnetic Circuit

Basic definition of MMF, flux and reluctance. Analogy between electrical and magnetic circuits.Faraday's laws of electromagnetic induction Concept of self and mutual inductance. Dot convention-coefficient of coupling and composite magnetic circuit.Analysis of series and parallel magnetic circuits.

# UNIT-IV

### Single Phase A.C Systems

Periodic waveforms (determination of rms, average value and form factor).Concept of phase angle and phase difference – Waveforms and phasor diagrams for lagging, leading networks. Complex and polar forms of representations, steady state analysis of R, L and C circuits. Power Factor and its significance real, reactive power and apparent power, waveform of instantaneous power triangle and complex power

### UNIT-V Analysis of AC Networks

Extension of node and mesh analysis to AC networks, Numerical problems on sinusoidal steady state analysis, Series and parallel resonance, Selectively band width and Quasi factor, Introduction to locus diagram.

# UNIT-VI

# Network theorems (DC & AC Excitations)

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem and compensation theorem.

# **Learning Outcomes:**

Students are able to solve

- Various electrical networks in presence of active and passive elements.
- Electrical networks with network topology concepts.
- Any magnetic circuit with various dot conventions.
- Any R, L, C network with sinusoidal excitation.
- Any R, L, network with variation of any one of the parameters i.e R, L, C. and f.
- Electrical networks by using principles of network theorems.

# **Text Books**:

- 1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,McGraw Hill Company,6 th edition
- 2. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd

# **Reference Books**:

- 1. Fundamentals of Electrical Circuits by Charles K.Alexander and Mathew N.O.Sadiku, McGraw Hill Education (India)
- 2. Linear Circuit Analysis by De Carlo, Lin, Oxford publications
- Electric Circuits- (Schaum's outlines) by MahmoodNahvi& Joseph Edminister, Adapted by KumaRao, 5<sup>th</sup> Edition – McGraw Hill.
- 4. Electric Circuits by David A. Bell, Oxford publications
- 5. Introductory Circuit Analysis by Robert L Boylestad, Pearson Publications
- 6. Circuit Theory(Analysis and Synthesis) by A.Chakrabarthi,DhanpatRai&Co.

I Veen II Comester	L	Т	Р	С
1 Year - 11 Semester	4	0	0	3

### **ENGINEERING DRAWING**

**Objective**: Engineering drawing being the principle method of communication for engineers, the objective to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

- To introduce the use and the application of drawing instruments and to make the students construct the polygons, curves and various types of scales. The student will be able to understand the need to enlarge or reduce the size of objects in representing them.
- To introduce orthographic projections and to project the points and lines parallel to one plane and inclined to other.
- To make the students draw the projections of the lines inclined to both the planes.
- To make the students draw the projections of the plane inclined to both the planes.
- To make the students draw the projections of the various types of solids in different positions inclined to one of the planes.
- To represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

**UNIT I** Polygons, Construction of regular polygons using given length of a side; Ellipse, arcs of circles and Oblong methods; Scales – Vernier and Diagonal scales.

**UNIT II** Introduction to orthographic projections; projections of points; projections of straight lines parallel to both the planes; projections of straight lines – parallel to one plane and inclined to the other plane.

**UNIT III** Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclinations and traces.

**UNIT IV** Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

**UNIT V** Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

**UNIT VI** Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

# **TEXT BOOKS:**

- 1. Engineering Drawing, N. D. Butt, Chariot Publications
- 2. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publishers.
- 3. Engineering Graphics, P.I. Varghese, McGraw Hill Publishers

### **REFERENCE BOOKS:**

- 1. Engineering Graphics for Degree, K. C. John, PHI Publishers
- 2. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers
- 3. Engineering Drawing + AutoCad K Venugopal, V. Prabhu Raja, New Age

I Voor II Somostor	L	Т	Р	С
1 Tear - 11 Semester	0	0	3	2

# ENGLISH LANGUAGE COMMUNICATION SKILLS LAB- II

### PRESCRIBED LAB MANUAL FOR SEMESTER II:

'INTERACT: English Lab Manual for Undergraduate Students' Published by Orient Blackswan Pvt Ltd.

### **OBJECTIVES:**

To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

# **OUTCOME:**

A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

# **UNIT 1:**

1. Debating Practice work

# **UNIT 2:**

1. Group Discussions Practice work

# **UNIT 3:**

1. Presentation Skills Practice work

# **UNIT 4:**

1. Interview Skills Practice work

### **UNIT 5:**

- 1. Email,
- 2. Curriculum Vitae Practice work

# **UNIT 6:**

- 1. Idiomatic Expressions
- 2. Common Errors in English Practice work

### **Reference Books:**

- 1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
- 2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
- 3. Unlock, Listening and speaking skills 2, Cambridge University Press
- 4. Spring Board to Success, Orient BlackSwan
- 5. A Practical Course in effective english speaking skills, PHI
- 6. Word power made handy, Dr shalini verma, Schand Company
- 7. Let us hear them speak, Jayashree Mohanraj, Sage texts
- 8. Professional Communication, Aruna Koneru, Mc Grawhill Education
- 9. Cornerstone, Developing soft skills, Pearson Education

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I Year - II Semester	
	0

# L T P C 0 0 3 2

### APPLIED/ENGINEERING PHYSICS LAB (Any 10 of the following listed experiments)

**Objective:** *Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.* 

# LIST OF EXPERIMENTS:

- 1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
- 2. Newton's rings Radius of Curvature of Plano Convex Lens.
- 3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
- 4. Determination of Rigidity modulus of a material- Torsional Pendulum.
- 5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
- 6. Melde's experiment Transverse and Longitudinal modes.
- 7. Verification of laws of vibrations in stretched strings Sonometer.
- 8. Determination of velocity of sound Volume Resonator.
- 9. L- C- R Series Resonance Circuit.
- 10. Study of I/V Characteristics of Semiconductor diode.
- 11. I/V characteristics of Zener diode.
- 12. Characteristics of Thermistor Temperature Coefficients.
- 13. Magnetic field along the axis of a current carrying coil Stewart and Gee's apparatus.
- 14. Energy Band gap of a Semiconductor p n junction.
- 15. Hall Effect in semiconductors.
- 16. Time constant of CR circuit.
- 17. Determination of wavelength of laser source using diffraction grating.
- 18. Determination of Young's modulus by method of single cantilever oscillations.
- 19. Determination of lattice constant lattice dimensions kit.
- 20. Determination of Planck's constant using photocell.
- 21. Determination of surface tension of liquid by capillary rise method.

**Outcome:** *Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements.* 

I Veen II Comester	L	Т	Р	С
1 Year - 11 Semester	0	0	2	0

# APPLIED/ENGINEERING PHYSICS - VIRTUAL LABS – ASSIGNMENTS (Constitutes 5% marks of 30marks of Internal-component)

**Objective:** *Training Engineering students to prepare a technical document and improving their writing skills.* 

# LIST OF EXPERIMENTS

- 1. Hall Effect
- 2. Crystal Structure
- 3. Hysteresis
- 4. Brewster's angle
- 5. Magnetic Levitation / SQUID
- 6. Numerical Aperture of Optical fiber
- 7. Photoelectric Effect
- 8. Simple Harmonic Motion
- 9. Damped Harmonic Motion
- 10. LASER Beam Divergence and Spot size
- 11. B-H curve
- 12. Michelson's interferometer
- 13. Black body radiation

URL: <u>www.vlab.co.in</u>

**Outcome:** *Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.* 

# **ENGINEERING WORKSHOP & IT WORKSHOP**

# **ENGINEERING WORKSHOP:**

**Course Objective:** To impart hands-on practice on basic engineering trades and skills. Note: At least two exercises to be done from each trade.

# Trade:

Carpentry	1. T-Lap Joint
	2. Cross Lap Joint
	3. Dovetail Joint
	4. Mortise and Tennon Joint
Fitting	1. Vee Fit
	2. Square Fit
	3. Half Round Fit
	4. Dovetail Fit
Black Smithy	1. Round rod to Square
	2. S-Hook
	3. Round Rod to Flat Ring
	4. Round Rod to Square headed bolt
House Wiring	1. Parallel / Series Connection of three bulbs
	2. Stair Case wiring
	3. Florescent Lamp Fitting
	4. Measurement of Earth Resistance
Tin Smithy	1. Taper Tray
	2. Square Box without lid
	3. Open Scoop
	4. Funnel

# **IT WORKSHOP:**

**Objectives:** Enabling the student to understand basic hardware and software tools through practical exposure

# PC Hardware:

Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Troubleshooting Hardware and software \_ some tips and tricks.

# Internet & World Wide Web:

Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums .Awareness of cyber hygiene( protecting the personal computer from getting infected with the viruses), worms and other cyber attacks .

**Productivity tools** Crafting professional word documents; excel spread sheets, power point presentations and personal web sites using the Microsoft suite of office tools

# (Note: Student should be thoroughly exposed to minimum of 12 Tasks)

### PC Hardware

### Task 1:Identification of the peripherals of a computer.

To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

**Task 2(Optional):** A practice on disassembling the components of a PC and assembling them to back to working condition.

**Task 3:** Examples of Operating systems- DOS, MS Windows, Installation of MS windows on a PC.

**Task 4:** Introduction to Memory and Storage Devices , I/O Port, Device Drivers, Assemblers, Compilers, Interpreters , Linkers, Loaders.

### Task 5:

### Hardware Troubleshooting (Demonstration):

Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).

**Software Troubleshooting (Demonstration):** Identification of a problem and fixing the PC for any software issues

# **Internet & Networking Infrastructure**

**Task 6**: Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC ,Bluetooth Technology, Wireless Technology, Modem, DSL, Dialup Connection.

**Orientation & Connectivity Boot Camp and web browsing:** Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

### Task 7: Search Engines & Netiquette:

Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc). Students are acquainted to the principles of microblogging, wiki, collaboration using social networks, participating in online technology forums

**Task 8: Cyber Hygiene (Demonstration):** Awareness of various threats on the internet. Importance of security patch updates and anti-virus solutions. Ethical Hacking, Firewalls, Multi-factor authentication techniques including Smartcard, Biometrics are also practiced **Word** 

### **Task 9: MS Word Orientation:**

Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving

**Task 10: Creating project :** Abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check , Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

# Excel

**Task 11:** Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations

**Creating a Scheduler -** Features to be covered:- Gridlines, Format Cells, Summation, auto fill, Formatting Text

# LOOKUP/VLOOKUP

**Task 12: Performance Analysis** - Features to be covered:- Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting **Power Point** 

**Task 13:** Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in Powerpoint.

**Task 14:** Focusing on the power and potential of Microsoft power point. Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes: - Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background, textures, Design Templates, Hidden slides, OLE in PPT.

# **TEXT BOOK:**

### Faculty to consolidate the workshop manuals using the following references

- 1. Computer Fundamentals, Anita Goel, Pearson
- 2. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008
- 3. Information Technology Workshop, 3e, G. Praveen Babu, M. V. Narayana BS Publications.
- 4. Comdex Information Technology, Vikas Gupta, dreamtech.

### **REFERENCE:**

Essential Computer and IT Fundamentals for Engineering and Science Students, N. B. Venkateswarlu

### ELECTRICAL CIRCUIT ANALYSIS-II

### **Preamble :**

This course aims at study of three phase systems, transient analysis, network synthesis and fourier analysis for the future study and analysis of power systems.

### **Learning Objectives:**

- To study the concepts of balanced and unbalanced three-phase circuits.
- To study the transient behaviour of electrical networks with DC, pulse and AC excitations.
- To study the performance of a network based on input and output excitation/response.
- To understand the realization of electrical network function into electrical equivalent passive elements.
- To understand the application of fourier series and fourier transforms for analysis of electrical circuits.

### **UNIT-I** Balanced Three phase circuits

Phase sequence- star and delta connection - relation between line and phase voltages and currents - analysis of balanced three phase circuits - measurement of active and reactive power.

### **UNIT-II** Unbalanced Three phase circuits

Analysis of three phase unbalanced circuits: Loop method – Star-Delta transformation technique, Two wattmeter methods for measurement of three phase power.

### UNIT-III Transient Analysis in DC and AC circuits

Transient response of R-L, R-C, R-L-C circuits for DC and AC excitations, Solution using differential equations and Laplace transforms.

### **UNIT-IV Two Port Networks**

Two port network parameters -Z, Y, ABCD and Hybrid parameters and their relations, Cascaded networks - Poles and zeros of network functions.

### **UNIT-V** Network synthesis

Positive real function - basic synthesis procedure - LC immittance functions - RC impedance functions and RL admittance function - RL impedance function and RC admittance function - Foster and Cauer methods.

### **UNIT-VI Fourier analysis and Transforms**

Fourier theorem- Trigonometric form and exponential form of Fourier series, Conditions of symmetry- line spectra and phase angle spectra, Analysis of electrical circuits to non sinusoidal periodic waveforms.

Fourier integrals and Fourier transforms – properties of Fourier transforms physical significance of the Fourier Transform and its application to electrical circuits.

### **Learning Outcomes:**

- Students are able to solve three- phase circuits under balanced and unbalanced condition
- Students are able find the transient response of electrical networks for different types of excitations.
- Students are able to find parameters for different types of network.
- Students are able to realize electrical equivalent network for a given network transfer function.
- Students are able to extract different harmonics components from the response of a electrical network.

# **Text Books**:

- 1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,McGraw Hill Company,6 th edition
- 2. Network synthesis: Van Valkenburg; Prentice-Hall of India Private Ltd

# **Reference Books**:

1. Fundamentals of Electrical Circuits by Charles K.Alexander and Mathew N.O.Sadiku, McGraw Hill Education (India)

- 2. Introduction to circuit analysis and design by TildonGlisson. Jr, Springer Publications.
- 3. Circuits by A.Bruce Carlson, Cengage Learning Publications
- 4. Network Theory Analysis and Synthesis by SmarajitGhosh, PHI publications
- 5. Networks and Systems by D. Roy Choudhury, New Age International publishers
- 6. Electric Circuits by David A. Bell, Oxford publications
- 7. Circuit Theory (Analysis and Synthesis) by A.Chakrabarthi, DhanpatRai&Co.

### II Year – I SEMESTER

# **ELECTRICAL MACHINES – I**

### **Preamble:**

This is a basic course on rotating electrical machines. This course covers the topics related to principles, performance, applications and design considerations of dc machines and transformers.

### Learning objectives:

- Understand the unifying principles of electromagnetic energy conversion.
- Understand the construction, principle of operation and performance of DC machines.
- Learn the characteristics, performance, methods of speed control and testing methods of DC motors.
- To predetermine the performance of single phase transformers with equivalent circuit models.
- Understand the methods of testing of single-phase transformer.
- Analyze the three phase transformers and achieve three phase to two phase conversion.

### UNIT-I:

### Electromechanical Energy Conversion and introduction to DC machines

Principles of electromechanical energy conversion – singly excited and multi excited system – Calculation of force and torque using the concept of co-energy.

Construction and principle of operation of DC machine – EMF equation for generator – Classification of DC machines based on excitation – OCC of DC shunt generator.

### UNIT-II:

### Performance of D.C. Machines

Torque and back-emf equations of dc motors– Armature reaction and commutation – characteristics of separately-excited, shunt, series and compound motors - losses and efficiency- applications of dc motors.

### **UNIT-III:**

### Starting, Speed Control and Testing of D.C. Machines

Necessity of starter – Starting by 3 point and 4 point starters – Speed control by armature voltage and field control – testing of DC machines - brake test, Swinburne's method – principle of regenerative or Hopkinson's method - retardation test -- separation of losses.

### UNIT-IV:

### **Single-phase Transformers**

Types and constructional details - principle of operation - emf equation - operation on no load and on load – lagging, leading and unity power factors loads - phasor diagrams of transformers – equivalent circuit – regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – All day efficiency.

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# UNIT-V

### Single-phase Transformers Testing

Tests on single phase transformers – open circuit and short circuit tests – Sumpner's test – separation of losses – parallel operation with equal voltage ratios – auto transformer - equivalent circuit – comparison with two winding transformers.

# UNIT-VI

# **3-Phase Transformers**

Polyphase connections - Y/Y, Y/ $\Delta$ ,  $\Delta$ /Y,  $\Delta$ / $\Delta$  and open  $\Delta$  -- Third harmonics in phase voltages - three winding transformers: determination of Zp, Zs and Zt -- transients in switching - off load and on load tap changers -- Scott connection.

### Learning outcomes:

- Able to assimilate the concepts of electromechanical energy conversion.
- Able to mitigate the ill-effects of armature reaction and improve commutation in dc machines.
- Able to understand the torque production mechanism and control the speed of dc motors.
- Able to analyze the performance of single phase transformers.
- Able to predetermine regulation, losses and efficiency of single phase transformers.
- Able to parallel transformers, control voltages with tap changing methods and achieve three-phase to two-phase transformation.

### **Text Books:**

- 1. Electrical Machines P.S. Bhimbra, Khanna Publishers
- 2. Electric Machinery by A.E.Fitzgerald, Charleskingsley, StephenD.Umans, TMH

# **Reference Books:**

- 1. Electrical Machines by D. P.Kothari, I .J .Nagarth,McGrawHill Publications, 4<sup>th</sup> edition
- 2. Electrical Machines by R.K.Rajput, Lakshmi publications,5<sup>th</sup> edition.
- 3. Electrical Machinery by AbijithChakrabarthi and SudhiptaDebnath,McGraw Hill education 2015
- 4. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 2010
- 5. Electric Machines by MulukutlaS.Sarma&Mukeshk.Pathak, CENGAGE Learning.
- 6. Theory & Performance of Electrical Machines by J.B.Guptha. S.K.Kataria& Sons

### **BASIC ELECTRONICS AND DEVICES**

### **Preamble:**

This course introduces the concepts of semi-conductor physics and operation of various semi-conductor devices. Realization of rectifiers, amplifiers and oscillators using semi-conductor devices and their analysis is also introduced in this course.

# Unit-I:

# **Objective:**

To learn the basics of semiconductor physics.

**Review of Semi Conductor Physics:** Insulators, Semi conductors, and Metals classification using Energy Band Diagrams, Mobility and Conductivity, Electrons and holes in Intrinsic Semi conductors, Extrinsic Semi Conductor, (P and N Type semiconductor) Hall effect, Generation and Recombination of Charges, Diffusion, Continuity Equation, Injected Minority Carriers, Law of Junction, Introduction to fermi level in Intrinsic, Extrinsic semi conductors with necessary mathematics

### **Outcome:**

Students are able to understand the basic concepts of semiconductor physics, which are useful to understand the operation of diodes and transistors.

### Unit-II:

### **Objective:**

To study the construction details, operation and characteristics of various semiconductor diodes.

### **Junction Diode Characteristics**

Operation and characteristics of p-n junction diode. Current components in p-n diode, diode equation. Temperature dependence on V–I characteristic, diffusion capacitance and diode resistance (static and dynamic), energy band diagram of p-n diode.

Special Diodes: Avalanche and Zener break down, Zener characteristics, tunnel diode, characteristics with the help of energy band diagrams, Varactor diode, LED, PIN diode, Photo diode

### **Outcome:**

Students are able to explain the operation and characteristics of PN junction diode and special diodes.

### Unit-III:

### **Objective:**

To understand the operation and analysis of rectifiers with and without filters. Further study the operation of series and shunt regulators using zener diodes.

### **Rectifiers and Regulators**

Half wave rectifier, ripple factor, full wave rectifier (with and without transformer), harmonic components in a rectifier circuit, inductor filter, capacitor filter, L-section filter,  $\Pi$ - section filter, and comparison of various filter circuits in terms of ripple factors. Simple circuit of a regulator using Zener diode. Types of regulators-series and shunt voltage regulators, over load voltage protection.

### **Outcome:**

Ability to understand operation and design aspects of rectifiers and regulators.

# Unit-IV:

# **Objective:**

To study the characteristics of different bipolar junction transistors and their biasing stabilization and compensation techniques. To analyze transistor amplifiers using h-parameters.

# Transistors

Junction transistor, transistor current components, transistor as an amplifier and switch. Characteristics of transistor (CE, CB and CC configurations). Transistor biasing and thermal stabilization (to fixed bias, collector to base bias, self bias). Compensation against variation in base emitter voltage and collector current. Thermal runaway. Hybrid model of transistor. Analysis of transistor amplifier using h-parameters

# **Outcome:**

Students are able to understand the characteristics of various transistor configurations. They become familiar with different biasing, stabilization and compensation techniques used in transistor circuits.

# Unit- V:

### **Objective:**

To understand the basics of FET, Thyristors, Power IGBTs and Power MOSFETs.

# Power semiconductor devices

Principle of operation and characteristics of Thyristors, Silicon control rectifiers, power IGBT and power MOSFET their ratings. Comparison of power devices.

FET: JFET Characteristics (Qualitative explanation), MOFET Characteristics-static and Transfer (enhancement and depletion mode), low frequency model of FET, FET as an amplifier.

# **Outcome:**

Students are able to understand the operation and characteristics of FET, Thyristors, Power IGBTs and Power MOSFETs.

# Unit VI :

# **Objective:**

To understand the concepts of positive and negative feedbacks and their role in amplifiers and oscillators.

# **Amplifiers and oscillators**

Feedback Amplifiers -classification, feedback concept, transfer gain and general characteristics of negative feedback amplifiers, effect of feedback on input and output resistances. Methods of analysis of feedback amplifiers.

Power Amplifiers – Classification, push-pull amplifiers, Introduction to harmonics (distortion factor.

Oscillators – Condition for oscillation, RC-phase shift oscillator. Wein bridge oscillator, Crystal oscillator. Frequency and amplitude stability of oscillators.

# Outcome:

Students are able to understand the merits and demerits of positive and negative feedback and the role of feedback in oscillators and amplifiers.

# **TEXT BOOKS:**

1. Electronic Devices and Circuits - J. Millman, C.C. Halkias, Tata Mc-Graw Hill

# **REFERENCE BOOKS:**

- 1. Electronic Devices and Circuits by David A. Bell, Oxford University Press
- 2. Electronic Devices and Circuits Salivahanan, Kumar, Vallavaraj, TATA McGraw Hill, Second Edition
- 3. Electronic Devices and Circuits R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9<sup>th</sup>Edition, 2006

II Year – I SEMESTER		L 4	Т 0	Р 0	C 3
	ELECTROMAGNETIC FIELDS				

### Preamble:

Electromagnetic fields are the pre-requisite for most of the subjects in the gamut of electrical engineering. The study of this subject enables students to understand and interpret the phenomenon pertinent to electrical engineering using microscopic quantities such as electric and magnetic field intensities, scalar and vector potentials.

### Learning objectives:

- To study the production of electric field and potentials due to different configurations of static charges.
- To study the properties of conductors and dielectrics, calculate the capacitance of various configurations and understand the concept of conduction and convection current densities.
- To study the magnetic fields produced by currents in different configurations, application of ampere's law and the Maxwell's second and third equations.
- To study the magnetic force and torque through Lorentz force equation in magnetic field environment like conductors and other current loops.
- To develop the concept of self and mutual inductances and the energy stored.
- To study time varying and Maxwell's equations in different forms and Maxwell's fourth equation for the induced e.m.f.

# **UNIT – I Electrostatics:**

Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Guass's law — Maxwell's first law, div(D)=pv Laplace's and Poison's equations and Solution of Laplace's equation in one variable.

# UNIT – II Conductors – Dielectrics and Capacitance:

Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behaviour of conductors in an electric field – Conductors and Insulators

Polarization – Boundary conditions between conduction to Dielectric and dielectric to dielectrics capacitance – capacitance of parallel plates, spherical and coaxial cables with composite dielectrics –Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity

# UNIT – III Magneto statics and Ampere's Law:

Static magnetic fields – Biot-Savart's law – Oesterd's experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0 –Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long filament carrying conductor – Point form of Ampere's circuital law –Field due to a circular loop, rectangular and square loops, Maxwell's third equation, Curl (H)=J.

# **UNIT – IV** Force in Magnetic fields:

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field.

# UNIT – V Self and Mutual inductance:

Self and Mutual inductance – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field.

# **UNIT – VI** Time Varying Fields:

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation, Curl (E)=- $\partial B/\partial t$  – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector.

# Learning outcomes:

- To Determine electric fields and potentialsusing guass's lawor solving Laplace's or Possion's equations, for various electric charge distributions.
- To Calculate and design capacitance, energy stored in dielectrics.
- To Calculate the magnetic field intensity due to current, the application of ampere's law and the Maxwell's second and third equations.
- To determine the magnetic forces and torque produced by currents in magnetic field
- To determine self and mutual inductances and the energy stored in the magnetic field.
- To calculate induced e.m.f., understand the concepts of displacement current and Poynting vector.

# **Text Books:**

1."Engineering Electromagnetics" by William H. Hayt& John. A. Buck Mc. Graw-Hill Companies, 7<sup>th</sup> Editon.2006.

# **Reference Books:**

- 1." Principles of Electro Magnetics" by Sadiku, Oxford Publications,4<sup>th</sup> edition
- 2."Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt.Ltd, 2<sup>nd</sup> edition
- 3."Electromagnetic Field Theory" by YaduvirSingh, Pearson.
- 4. Fundamentals of Engineering Electromagnetics by Sunil Bhooshan, Oxford higher Education.

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### THERMAL AND HYDRO PRIME MOVERS

### **Part-A: Thermal prime movers**

Course Objectives: To make the student understand the types of prime movers, which can be connected to generators for power production and should obtain the skills of performing the necessary calculations with respect to the functioning of the prime movers.

### UNIT I:

Objectives: To make the student learn about the constructional features, operational details of various types of internal combustion engines through the details of several engine systems and the basic air standard cycles, that govern the engines. Further, the student shall be able to calculate the performance of different types of internal combustion engines.

I.C Engines: Classification, working principles – valve and port timing diagrams – air standard cycles – Engine systems line fuel injection, carburetion, ignition, cooling and lubrication – Engine performance evaluation.

### UNIT II:

Objectives: To train the student in the aspects of steam formation and its utilities through the standard steam data tables and charts. To make the student correlate between the air standard cycles and the actual cycles that govern the steam turbines. To train the student to calculate the performance of steam turbines using velocity diagrams.

Properties of Steam and use of Steam Tables- T-S and H-S Diagrams. Analysis of Various Thermodynamic Processes under gone by Steam.

Vapor Power Cycles: Carnot Cycle-Rankine Cycle- Thermodynamic Variables Effecting Efficiency and output of Rankine Cycle-. Analysis of simple Rankine Cycle and Re-heat cycle

Steam Turbines: Schematic layout of steam power plant Classification of Steam Turbines-Impulse Turbine and Reaction Turbine- Compounding in Turbines- Velocity Diagrams for simple Impulse and Reaction Turbines- Work done & efficiency

### UNIT III:

# **Objectives:** To impart the knowledge of gas turbine fundamentals, the governing cycles and the methods to improve the efficiency of gas turbines.

Gas Turbines: Simple gas turbine plant-ideal cycle, closed cycle -open cycle-. Efficiency, Work ratio and optimum pressure ratio for simple gas turbine cycle. Actual cycle, analysis of simple cycles & cycles with inter cooling, reheating and Regeneration

### **Part-B: Hydro prime movers**

### UNIT IV:

**Objectives:** To teach the student about the fundamental of fluid dynamic equations and its applications fluid jets. To impart the knowledge of various types of pumps, their constructional features, working and performance.
IMPACT OF JETS AND PUMPS: Impulse momentum equation, Impact of Jet on stationary and moving vanes (flat and curved). Pumps: Types of pumps, Centrifugal pumps: Main components, Working principle, Multi stage pumps, Performance and characteristic curves

# UNIT V:

# **Objectives:** To make the student learn about the constructional features, operational details of various types of hydraulic turbines. Further, the student shall be able to calculate the performance of hydraulic turbines.

HYDRAULIC TURBINES: Classification of turbines; Working principle, Efficiency calculation and Design principles for Pelton Wheel, Francis and for Kaplan turbines; Governing of turbines; Performance and characteristic curves.

# UNIT VI:

# **Objectives:** To train the student in the areas of types of hydro electric power plants, estimation and calculation of different loads by considering various factors.

HYDRO POWER: Components of Hydro electric power plant: pumped storage systems, Estimation of water power potential; Estimation of load on turbines: load curve, load factor, capacity factor, utilization factor, diversity factor, load – duration curve, firm power, secondary power, prediction of load.

# **Text Books:**

- 1. Thermal Engineering by Rajput, Lakshmi publications
- 2. Thermal engineering by M.L.Mathur and F.S.Mehta, Jain Brothers.
- 3. "Hydraulics & Fluid Mechanics", P.N. Modi and S.M. Seth, TEXT BOOKS House, Delhi
- 4. "Fluid Mechanics & Hydraulic Machinery" A.K.Jain, , Khanna Publishers, Delhi.

#### **Reference Books:**

- 1. "Fluid Mechanics" by Victor.L.Streeter
- 2. "Introduction to Fluid Mechanics" Edward .J. Shaughnessy Jr.
- 3. "Fluid Mechanics & Its Applications", Vijay Gupta, Santhosh.k.Gupta
- 4. "Fluid Mechanics & Fluid power Engineering, Dr D.S.Kumar
- 5. "Water Power Engineering" M.M Desumukh

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II Year - I Semester				
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# MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS (Common to all Branches)

#### **Course Objectives:**

- The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

#### Unit-I

#### Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand-Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

#### Unit – II:

# **Production and Cost Analyses:**

Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs – Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)-Managerial significance and limitations of Breakeven point.

#### Unit – III:

# Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing.

# Unit – IV:

# Types of Business Organization and Business Cycles:

Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of a Business Cycle.

# Unit – V:

# **Introduction to Accounting & Financing Analysis:**

Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)

# Unit – VI:

**Capital and Capital Budgeting:** Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

# **Course Outcome:**

- \*The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
- \*One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
- \*The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

# **TEXT BOOKS**

- 1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
- 2. Dr. A. R. Aryasri Managerial Economics and Financial Analysis, TMH 2011
- 3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

# **REFERENCES:**

- 1.Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
- 2. V. Maheswari: Managerial Economics, Sultan Chand.2014
- 3. Suma Damodaran: Managerial Economics, Oxford 2011.
- 4. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
- 5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
- 6. Maheswari: Financial Accounting, Vikas Publications.
- 7. S. A. Siddiqui& A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
- 8. Ramesh Singh, Indian Economy, 7<sup>th</sup> Edn., TMH2015
- 9. Pankaj Tandon A Text Book of Microeconomic Theory, Sage Publishers, 2015
- 10. Shailaja Gajjala and Usha Munipalle, Univerties press, 2015

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#### THERMAL AND HYDRO LAB

Course Objective: To impart practical knowledge on the performance evaluation methods of various internal combustion engines, flow measuring equipment and hydraulic turbines and pumps.

NOTE: TO CONDUCT A MINIMUM OF 12 EXPERIMENTS BY CONDUCTING A MINIMUM OF SIX FROM EACH SECTION.

#### **SECTION A - THERMAL ENGINEERING LAB**

- 1. I.C. Engines valve / port timing diagrams.
- 2. I.C. Engines performance test on 4 -stroke Diesel engine.
- 3. I.C. Engines performance test on 2-stroke petrol engine.
- 4. Evaluation of engine friction by conducting Morse test on 4-stroke multi cylinder petrol engine
- 5. Determination of FHP by retardation and motoring test on IC engine
- 6. I.C. Engines heat balance on petrol / Diesel engines.
- 7. Economical speed test of an IC engine
- 8. Study of boilers

#### SECTION B – HYDRAULIC MACHINES LAB

- 1. Impact of jets on Vanes.
- 2. Performance Test on Pelton Wheel.
- 3. Performance Test on Francis Turbine.
- 4. Performance Test on Kaplan Turbine.
- 5. Performance Test on Single Stage Centrifugal Pump.
- 6. Performance Test on Reciprocating Pump.
- 7. Calibration of Venturimeter.
- 8. Calibration of Orifice meter.
- 9. Determination of loss of head due to sudden contraction in a pipeline.

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#### ELECTRICAL CIRCUITS LAB

#### Learning objectives:

To verify and demonstrate various thermos, locus diagrams, resonance and two port networks. To determine self and mutual inductance of a magnetic circuit, parameters of a given coil and measurement of 3- phase power.

Any 10 of the following experiments are to be conducted:

- 1) Verification of Thevenin's and Norton's Theorems
- 2) Verification of Superposition theorem and Maximum Power Transfer Theorem
- 3) Verification of Compensation Theorem
- 4) Verification of Reciprocity, Millmann's Theorems
- 5) Locus Diagrams of RL and RC Series Circuits
- 6) Series and Parallel Resonance
- 7) Determination of Self, Mutual Inductances and Coefficient of coupling
- 8) Z and Y Parameters
- 9) Transmission and hybrid parameters
- 10) Parameters of a choke coil.
- 11) Determination of cold and hot resistance of an electric lamp.
- 12) Measurement of 3-phase Power by two Wattmeter Method for unbalanced loads

#### Learning outcomes:

Able to apply various thermos, determination of self and mutual inductances, two port parameters of a given electric circuits. Able to draw locus diagrams. Waveforms and phasor diagram for lagging and leading networks.

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#### **ELECTRICAL MEASUREMENTS**

#### **Preamble:**

This course introduces principle of operation of basic analog and digital measuring instruments for measurement of current, voltage, power, energy etc. Measurement of resistance, inductance and capacitance by using bridge circuits will be discussed in detail. It is expected that student will be thorough with various measuring techniques that are required for an electrical engineer.

#### **Learning Objectives:**

- To study the principle of operation and working of different types of instruments. Measurement of voltage and current.
- To study the working principle of operation of different types of instruments for measurement of power and energy
- To understand the principle of operation and working of dc and ac potentiometers.
- To understand the principle of operation and working of various types of bridges for measurement of parameters –resistance, inductance, capacitance and frequency.
- To study the principle of operation and working of various types of magnetic measuring instruments.
- To study the applications of CRO for measurement of frequency, phase difference and hysteresis loop using Lissajous patterns

#### UNIT-I:

#### **Measuring Instruments**

Classification – Deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type, dynamometer and electrostatic instruments – Expression for the deflecting torque and control torque – Errors and compensations– Extension of range using shunts and series resistance –CT and PT: Ratio and phase angle errors – Numerical problems.

#### UNIT –II:

#### **Measurement of Power and Energy**

Single phase and three phase dynamometer wattmeter – LPF and UPF – Expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems – Type of P.F. Meters – Single phase and three phase dynamometer and moving iron type Single phase induction type energy meter – Driving and braking torques – errors and compensations –Testing by phantom loading using R.S.S. meter– Three phase energy meter – Maximum demand meters– Electrical resonance type frequency meter and Weston type synchro-scope.

#### UNIT – III:

#### Potentiometers

Principle and operation of D.C. Crompton's potentiometer – Standardization – Measurement of unknown resistance – Current – Voltage.AC Potentiometers: polar and coordinate types – Standardization – Applications.

# UNIT – IV:

# Measurements of Parameters

Method of measuring low, medium and high resistance – Sensitivity of Wheat stone's bridge – Carey Foster's bridge– Kelvin's double bridge for measuring low resistance– Loss of charge method for measurement of high resistance – Megger– Measurement of earth resistance – Measurement of inductance – Quality Factor – Maxwell's bridge–Hay's bridge – Anderson's bridge–Measurement of capacitance and loss angle – DesautyBridge – Schering Bridge–Wagner's earthing device–Wien's bridge.

# UNIT – V:

# **Magnetic Measurements**

Ballistic galvanometer – Equation of motion – Flux meter – Constructional details– Determination of B–H Loop methods of reversals six point method – AC testing – Iron loss of bar samples– Core loss measurements by bridges and potentiometers.

# UNIT – VI:

# **Digital Meters**

Digital Voltmeter–Successive approximation – Measurement of phase difference – Frequency – Hysteresis loop using lissajious patterns in CRO – Ramp and integrating type– Digital frequency meter–Digital multimeter–Digital Tachometer.

# **Learning Outcomes:**

- Able to choose right type of instrument for measurement of voltage and current for ac and dc.
- Able to choose right type of instrument for measurement of power and energy able to calibrate energy meter by suitable method
- Able to calibrate ammeter and potentiometer.
- Able to select suitable bridge for measurement of electrical parameters
- Able to use the ballistic galvanometer and flux meter for magnetic measuring instruments
- Able to measure frequency and phase difference between signals using CRO. Able to use digital instruments in electrical measurements.

# **Text Books:**

- 1. Electrical Measurements and measuring Instruments by E.W. Golding and F.C.Widdis, fifth Edition, Wheeler Publishing.
- 2. Modern Electronic Instrumentation and Measurement Techniques A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.

# **Reference Books:**

- 1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney DhanpatRai & Co.Publications.
- 2. Electrical and Electronic Measurements and instrumentation by R.K.Rajput, S.Chand.
- 3. Electrical Measurements by Buckingham and Price, Prentice Hall
- 4. Electrical Measurements by Forest K. Harris. John Wiley and Sons
- 5. Electrical Measurements: Fundamentals, Concepts, Applications by
- Reissland, M.U, New Age International (P) Limited, Publishers.
- 6. Electrical and Electronic Measurements –by G.K.Banerjee, PHI Learning Private Ltd, New Delhi–2012.

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# ELECTRICAL MACHINES – II

#### **Preamble:**

This course covers the topics on 3-phase induction motor, 1-phase induction motorand synchronous machines which have wide application in power systems. The main aim of the course is to provide a detailedanalysis of operation and performance of 3-phase induction motor, 1-phase induction motorand synchronous machines. In addition, it also covers voltage regulation and parallel operation of synchronous generators.

#### Learning objectives:

- Understand the principle of operation and performance of 3-phase induction motor.
- Quantify the performance of induction motor and induction generator in terms of torque and slip.
- To understand the torque producing mechanism of a single phase induction motor.
- To understand the principle of emf generation, the effect of armature reaction and predetermination of voltage regulation in synchronous generators.
- To study parallel operation and control of real and reactive powers for synchronous generators.
- To understand the operation, performance and starting methods of synchronous motors.

# UNIT-I

#### **3-phase Induction Motors**

Construction details of cage and wound rotor machines - production of rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor current and pf at standstill and during running conditions - rotor power input, rotor copper loss and mechanical power developed and their interrelationship – equivalent circuit – phasor diagram

#### UNIT-II

# Characteristics, starting and testing methods of Induction Motors

Torque equation - expressions for maximum torque and starting torque - torque slip characteristic - double cage and deep bar rotors - crawling and cogging – speed control of induction motor with V/f method – no load and blocked rotor tests - circle diagram for predetermination of performance– methods of starting – starting current and torque calculations – induction generator operation (Qualitative treatment only)

#### UNIT – III:

#### **Single Phase Motors**

Single phase induction motors – Constructional features and equivalent circuit Problem of starting–Double revolving field theory–Starting methods, shaded pole motors, AC Series motor.

#### UNIT-IV:

#### Construction, Operation and Voltage Regulation of Synchronous generator

Constructional features of non-salient and salient pole type – Armature windings – Distributed and concentrated windings – Distribution– Pitch and winding factors –E.M.F equation–Improvements of waveform and armature reaction–Voltage regulation by synchronous impedance method– MMFmethod and Potier triangle method–Phasor diagrams– Two reaction analysis of salient pole machines and phasor diagram.

# UNIT –V:

# Parallel operation of synchronous generators

Parallel operation with infinite bus and other alternators – Synchronizing power – Load sharing – Control of real and reactive power– Numerical problems.

# UNIT-VI:

# Synchronous motor – operation, starting and performance

Synchronous Motor principle and theory of operation– Phasor diagram – Starting torque– Variation of current and power factor with excitation –Synchronous condenser – Mathematical analysis for power developed– Hunting and its suppression – Methods of starting – Applications.

# Learning outcomes:

- Able to explain the operation and performance of three phase induction motor.
- Able to analyze the torque-speed relation, performance of induction motor and induction generator.
- Able to explain design procedure for transformers and three phase induction motors.
- Implement the starting of single phase induction motors.
- To perform winding design and predetermine the regulation of synchronous generators.
- Avoid hunting phenomenon, implement methods of staring and correction of power factor with synchronous motor.

# **Text Books:**

- 1. Electrical Machines P.S. Bhimbra, Khanna Publishers
- 2. Electric Machinery by A.E.Fitzgerald, Charleskingsley, StephenD. Umans, TMH

# **Reference Books:**

- 1. Electrical Machines by D. P.Kothari, I .J .Nagarth,McGrawHill Publications, 4<sup>th</sup> edition
- 2. Electrical Machines by R.K.Rajput, Lakshmi publications,5<sup>th</sup> edition
- 3. Electrical Machinery by AbijithChakrabarthi and SudhiptaDebnath,McGraw Hill education 2015
- 4. Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 2010
- 5. Electric Machines by MulukutlaS. Sarma&Mukeshk. Pathak, CENGAGE Learning.
- 6. Theory & Performance of Electrical Machines by J.B.Guptha. S.K.Kataria& Sons

#### SWITCHING THEORY AND LOGIC DESIGN

# UNIT – I

# **REVIEW OF NUMBER SYSTEMS & CODES:**

- i) Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members, problem solving.
- ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9's compliment code etc.,
- iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR realizations.

#### UNIT – II

#### **MINIMIZATION TECHNIQUES:**

Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 6 variables, tabular minimization, problem solving (code-converters using K-Map etc..).

#### UNIT – III

#### **COMBINATIONAL LOGIC CIRCUITS DESIGN :**

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

#### UNIT – IV

#### **INTRODUCTION OF PLD's :**

PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, programming tables of PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

#### $\mathbf{UNIT} - \mathbf{V}$

#### **SEQUENTIAL CIRCUITS I:**

Classification of sequential circuits (synchronous and asynchronous); basic flip-flops, truth tables and excitation tables (nand RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Conversion from one flip-flop to flip-flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

# UNIT – VI SEQUENTIAL CIRCUITS II :

Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Meelay to Moore conversion and vice-versa.

# **TEXT BOOKS:**

- 1. Switching Theory and Logic Design by Hill and Peterson Mc-Graw Hill TMH edition.
- 2. Switching Theory and Logic Design by A. Anand Kumar
- 3. Digital Design by Mano PHI.

# **REFERENCE BOOKS:**

- 1. Modern Digital Electronics by RP Jain, TMH
- 2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers
- 3. Micro electronics by Milliman MH edition.

# **CONTROL SYSTEMS**

#### **Preamble :**

This course introduces the elements of linear control systems and their analysis. Classical methods of design using frequency response. The state space approach for design, modeling and analysis of simple PD,PID controllers.

#### **Learning Objectives:**

- To learn the mathematical modeling of physical systems and to use block diagram algebra and signal flow graph to determine overall transfer function
- To analyze the time response of first and second order systems and improvement of performance by proportional plus derivative and proportional plus integral controllers
- To investigate the stability of closed loop systems using Routh's stability criterion and the analysis by root locus method.
- To present the Frequency Response approaches for the analysis of linear time invariant (LTI) systems using Bode plots, polar plots and Nyquist stability criterion.
- To discuss basic aspects of design and compensation of linear control systems using Bode plots.
- Ability to formulate state models and analyze the systems. To present the concepts of Controllability and Observability.

#### UNIT – I:

#### **Mathematical Modeling Of Control Systems**

Classification of control systems, Open Loop and closed loop control systems and their differences, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro, transmitter and receiver - Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

#### **UNIT-II:**

#### **Time Response Analysis**

Standard test signals - Time response of first and second order systems - Time domain specifications - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

#### UNIT – III:

#### **Stability and Rootlocus Technique**

The concept of stability – Routh's stability criterion –limitations of Routh's stability –Root locus concept - construction of root loci (Simple problems)

#### **UNIT-IV:**

#### **Frequency Response Analysis**

Introduction to Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion.

# UNIT-V: Classical Control Design Techniques

Lag, Lead, Lag-Lead compensators, design of compensators – using Bode plots.

# UNIT-VI:

# State Space Analysis OfLti Systems

Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization- Solving the time invariant state equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

# **Learning Outcome:**

- Ability to derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.
- Capability to determine time response specifications of second order systems and to determine error constants.
- Acquires the skill to analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method.
- Capable to analyze the stability of LTI systems using frequency response methods.
- Able to design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.
- Ability to represent physical systems as state models and determine the response. Understanding the concepts of controllability and observability.

# **Text Books**:

- 1. Control Systems principles and design, M.Gopal, Tata McGraw Hill education Pvt Ltd., 4<sup>th</sup> Edition.
- 2. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India, 2<sup>nd</sup>Edition.

# **Reference Books:**

1.Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.

- 2.Control Systems, ManikDhanesh N, Cengage publications.
- 3.Control Systems Engineering, I.J.Nagarath and M.Gopal, Newage International Publications, 5<sup>th</sup> Edition.
- 4. Control Systems Engineering, S.Palani, TataMcGraw Hill Publications.

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#### **POWER SYSTEMS-I**

#### **Preamble:**

Electrical Power plays significant role in day to day life of entire mankind. The aim of this course is to allow the students to understand the concepts of the generation and distribution of power along with economic aspects.

#### Learning objectives :

- To study the principle of operation of different components of a thermal power stations.
- To study the principle of operation of different components of a Nuclear power stations.
- To study the concepts of DC/AC distribution systems and voltage drop calculations.
- To study the constructional and operation of different components of an Air and Gas Insulated substations.
- To study the constructional details of different types of cables.
- To study different types of load curves and tariffs applicable to consumers.

# **UNIT-I Thermal Power Stations**

Selection of site, general layout of a thermal power plant showing paths of coal, steam, water, air, ash and flue gasses, ash handling system, Brief description of components: Boilers, Super heaters, Economizers, electrostatic precipitators steam Turbines : Impulse and reaction turbines, Condensers, feed water circuit, Cooling towers and Chimney.

#### **UNIT-II Nuclear Power Stations**

Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor Components : Moderators, Control rods, Reflectors and Coolants.Types of Nuclear reactors and brief description of PWR, BWR and FBR.Radiation: Radiation hazards and Shielding, nuclear waste disposal.

#### **UNIT-III** Distribution Systems

Classification of distribution systems, design features of distribution systems, radial distribution, ring main distribution, voltage drop calculations: DC distributors for following cases - radial DC distributor fed at one end and at both ends (equal / unequal voltages), ring main distributor, stepped distributor and AC distribution, comparison of DC and AC distribution.

#### **UNIT-IV** Substations

#### Classification of substations:

**Air Insulated Substations -** Indoor & Outdoor substations, Substations layouts of 33/11 kV showing the location of all the substation equipment.

Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, double bus bar with one and two circuit breakers, main and transfer bus bar system with relevant diagrams.

**Gas Insulated Substations (GIS)** – Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, constructional aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

# **UNIT-V Underground Cables**

Types of Cables, Construction, Types of insulating materials, Calculation of insulation resistance, stress in insulation and power factor of cable.

Capacitance of single and 3-Core belted Cables: Grading of Cables-Capacitance grading and Inter sheath grading.

# **UNIT-VI Economic Aspects of Power Generation & Tariff**

**Economic Aspects -** Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, power capacity factor and plant use factor, Base and peak load plants. **Tariff Methods**- Costs of Generation and their division into Fixed, Semi-fixed and Running Costs, Desirable Characteristics of a Tariff Method, Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three–part, and power factor tariff methods.

# **Learning Outcomes:**

- Students are able to identify the different components of thermal power plants.
- Students are able to identify the different components of nuclear Power plants.
- Students are able to distinguish between AC/DC distribution systems and also estimate voltage drops of distribution systems.
- Students are able to identify the different components of air and gas insulated substations.
- Students are able to identifysingle core and multi core cables with different insulating materials.
- Students are able to analyze the different economic factors of power generation and tariffs.

# **Text Books**:

- 1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagarand A. Chakrabarti, DhanpatRai& Co. Pvt. Ltd.
- 2. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa New age International (P) Limited, Publishers.

# **Reference Books:**

- 1. Electrical Power Distribution Systems by V. Kamaraju, TataMcGraw Hill, New Delhi.
- 2. Elements of Electrical Power Station Design by M V Deshpande, PHI, New Delhi.

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#### MANAGEMENT SCIENCE

#### **Course Objectives:**

- \*To familiarize with the process of management and to provide basic insight into select contemporary management practices
- \*To provide conceptual knowledge on functional management and strategic management.

#### Unit I

**Introduction to Management**: Concept –nature and importance of Management –Generic Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization – Organizational typology- International Management: Global Leadership and Organizational behavior Effectiveness(GLOBE) structure

#### Unit II

**Operations Management**: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and C-chart) Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

#### **Unit III**

**Functional Management**: Concept of HRM, HRD and PMIR- Functions of HR Manager-Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions. Operationlizing change through performance management.

#### Unit IV

**Project Management**: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems)

#### Unit V

**Strategic Management**: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy Alternatives. Global strategies, theories of Multinational Companies.

#### Unit VI

**Contemporary Management Practice**: Basic concepts of MIS, MRP, Justin- Time(JIT) system, Total Quality Management(TQM), Six sigma and Capability Maturity Model(CMM) Levies, Supply Chain Management, Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

#### **Course Outcome:**

- \*After completion of the Course the student will acquire the knowledge on management functions, global leadership and organizational behavior.
- \*Will familiarize with the concepts of functional management project management and strategic management.

# **References:**

**Text Books** 

- 1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, 'Management Science' Cengage, Delhi, 2012.
- 2. Dr. A. R. Aryasri, Management Science' TMH 2011.

# References

- 1. Koontz & Weihrich: 'Essentials of management' TMH 2011
- 2. Seth & Rastogi: Global Management Systems, Cengage learning, Delhi, 2011
- 3. Robbins: Organizational Behaviour, Pearson publications, 2011
- 4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011
- 5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications
- 6. Biswajit Patnaik: Human Resource Management, PHI, 2011
- 7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning
- 8. Prem Chadha: Performance Management, Trinity Press(An imprint of Laxmi Publications Pvt. Ltd.) Delhi 2015.
- 9. Anil Bhat& Arya Kumar : Principles of Management, Oxford University Press, New Delhi, 2015.

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# **ELECTRICAL MACHINES – I LABORATORY**

# Learning objectives:

- To plot the magnetizing characteristics of DC shunt generator and understand the mechanism of self-excitation.
- To control the speed of the DC motors.
- Determine and predetermine the performance of DC machines.
- To predetermine the efficiency and regulation of transformers and assess their performance.

#### Any 10 of the following experiments are to be conducted

- 1. Magnetization characteristics of DC shunt generator. Determination of critical field resistance and critical speed.
- 2. Brake test on DC shunt motor. Determination of performance curves.
- 3. Hopkinson's test on DC shunt machines. Predetermination of efficiency.
- 4. Swinburne's test and Predetermination of efficiencies as Generator and Motor.
- 5. Speed control of DC shunt motor by Field and armature Control.
- 6. Retardation test on DC shunt motor. Determination of losses at rated speed.
- 7. Separation of losses in DC shunts motor.
- 8. Oc& SC test on single phase transformer.
- 9. Sumpner's test on single phase transformer.
- 10. Scott connection of transformers
- 11. Parallel operation of Single phase Transformers
- 12. Separation of core losses of a single phase transformer
- 13. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers

#### Learning outcomes:

- To determine and predetermine the performance of DC machines and Transformers.
- To control the speed of DC motor.
- To achieve three phase to two phase transformation.

# ELECTRONIC DEVICES AND CIRCUITS LAB

**Note:** The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

#### **Electronic Workshop Practice:**

- Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
- 2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
- 3. Soldering Practice- Simple circuits using active and passive components.
- 4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

#### List of Experiments: (Minimum of Ten Experiments has to be performed)

- P-N Junction Diode Characteristics
   Part A: Germanium Diode (Forward bias& Reverse bias)
   Part B: Silicon Diode (Forward Bias only)
- Zener Diode Characteristics
   Part A: V-I Characteristics
   Part B: Zener Diode as Voltage Regulator
- Rectifiers (without and with c-filter)
   Part A: Half-wave Rectifier
   Part B: Full-wave Rectifier
- BJT Characteristics(CE Configuration)
   Part A: Input Characteristics
   Part B: Output Characteristics
- FET Characteristics(CS Configuration)
   Part A: Drain Characteristics
   Part B: Transfer Characteristics
- 6. SCR Characteristics
- 7. UJT Characteristics
- 8. Transistor Biasing
- 9. CRO Operation and its Measurements
- 10. BJT-CE Amplifier
- 11. Emitter Follower-CC Amplifier

# 12. FET-CS Amplifier

# **Equipment required:**

- 1. Regulated Power supplies
- 2. Analog/Digital Storage Oscilloscopes
- 3. Analog/Digital Function Generators
- 4. Digital Multimeters
- 5. Decade Résistance Boxes/Rheostats
- 6. Decade Capacitance Boxes
- 7. Ammeters (Analog or Digital)
- 8. Voltmeters (Analog or Digital)
- 9. Active & Passive Electronic Components

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#### POWER SYSTEMS-II

#### **Preamble:**

This course is an extension of power systems–I course. It deals with basic theory of transmission lines modeling and their performance analysis. Transient in power system, improvement of power factor and voltage control are discussed in detail. It is important for the student to understand the mechanical design aspects of transmission lines, cables, insulators. These aspects are also covered in detail in this course.

#### Learning Objectives:

- To compute inductance/capacitance of transmission lines and to understand the concepts of GMD/GMR.
- To study the short and medium length transmission lines, their models and performance.
- To study the performance and modeling of long transmission lines.
- To study the effect of travelling waves on transmission lines.
- To study the factors affecting the performance of transmission lines and power factor improvement methods.
- To discuss sag and tension computation of transmission lines as well as to study the performance of overhead insulators.

#### UNIT-I:

#### **Transmission Line Parameters**

Conductor materials - Types of conductors – Calculation of resistance for solid conductors – Calculation of inductance for single phase and three phase– Single and double circuit lines– Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition–Bundled conductors-Numerical Problems–Calculation of capacitance for 2 wire and 3 wire systems – Effect of ground on capacitance – Capacitance calculations for symmetrical and asymmetrical single and three phase–Single and double circuit lines- Bundled conductors-Numerical Problems.

#### UNIT-II:

#### Performance of Short and Medium Length Transmission Lines

Classification of Transmission Lines – Short, medium, long line and their model representations –Nominal-T–Nominal-Pie and A, B, C, D Constants for symmetrical and Asymmetrical Networks– Numerical Problems– Mathematical Solutions to estimate regulation and efficiency of all types of lines – Numerical Problems.

#### UNIT-III:

#### **Performance of Long Transmission Lines**

Long Transmission Line–Rigorous Solution – Evaluation of A,B,C,D Constants– Interpretation of the Long Line Equations, regulation and efficiency– Incident, Reflected and Refracted Waves –Surge Impedance and SIL of Long Lines–Wave Length and Velocity of Propagation of Waves – Representation of Long Lines – Equivalent-T and Equivalent Pie network models (Numerical Problems).

# **Power System Transients**

Types of System Transients – Travelling or Propagation of Surges – Attenuation–Distortion– Reflection and Refraction Coefficients – Termination of lines with different types of conditions – Open Circuited Line–Short Circuited Line – T-Junction– Lumped Reactive Junctions.

# UNIT-V:

# Various Factors governing the Performance of Transmission line

Skin and Proximity effects – Description and effect on Resistance of Solid Conductors – Ferranti effect – Charging Current –Shunt Compensation –Corona – Description of the phenomenon–Factors affecting corona–Critical voltages and power loss – Radio Interference.

# UNIT-VI:

# Sag and Tension Calculations and Overhead Line Insulators

Sag and Tension calculations with equal and unequal heights of towers–Effect of Wind and Ice on weight of Conductor–Numerical Problems – Stringing chart and sag template and its applications–Types of Insulators – String efficiency and Methods for improvement–Numerical Problems – Voltage distribution–Calculation of string efficiency–Capacitance grading and Static Shielding.

# **Learning Outcomes:**

- Able to understand parameters of various types of transmission lines during different operating conditions.
- Able to understand the performance of short and medium transmission lines.
- Student will be able to understand travelling waves on transmission lines.
- Will be able to understand various factors related to charged transmission lines.
- Will be able to understand sag/tension of transmission lines and performance of line insulators.

#### **Text Books:**

- 1. Electrical power systems by C.L.Wadhwa, New Age International (P) Limited, Publishers, 1998.
- 2. Modern Power System Analysis by I.J.Nagarath and D.P.Kothari, Tata McGraw Hill, 2<sup>nd</sup>Edition

#### **Reference Books:**

- 1. Power system Analysis-by John J Grainger William D Stevenson, TMC Companies, 4<sup>th</sup>edition
- 2. Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.
- 3. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.BhatnagarA.Chakrabarthy, DhanpatRai& Co Pvt. Ltd.
- 4. Electrical Power Systems by P.S.R. Murthy, B.S.Publications.

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#### **RENEWABLE ENERGY SOURCES**

#### **Preamble:**

This course gives a flavor of renewable sources and systems to the students. It introduces solar energy its radiation, collection, storage and its applications. This covers generation, design, efficiency and characteristics of various renewable energy sources including solar, wind, hydro, biomass, fuel cells and geothermal systems.

#### **Learning Objectives:**

- To study the solar radiation data, extraterrestrial radiation, radiation on earth's surface.
- To study solar thermal collections.
- To study solar photo voltaic systems.
- To study maximum power point techniques in solar pv and wind energy.
- To study wind energy conversion systems, Betz coefficient, tip speed ratio.
- To study basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

#### UNIT-I:

#### Fundamentals of Energy Systems and Solar energy

Energy conservation principle – Energy scenario (world and India) – various forms of renewable energy - Solar radiation: Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

#### UNIT-II:

#### **Solar Thermal Systems**

Liquid flat plate collectors: Performance analysis –Transmissivity– Absorptivity product collector efficiency factor – Collector heat removal factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors, solar pond and solar still – solar thermal plants.

#### UNIT-III:

#### **Solar Photovoltaic Systems**

Solar photovoltaic cell, module, array – construction – Efficiency of solar cells – Developing technologies – Cell I-V characteristics – Equivalent circuit of solar cell – Series resistance – Shunt resistance – Applications and systems – Balance of system components - System design: storage sizing – PV system sizing – Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique.

#### UNIT-IV:

#### Wind Energy

Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - Kinetic energy of wind – Betz coefficient – Tip–speed ratio – Efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking – wind farms – Power generation for utility grids.

# UNIT-V:

# Hydro and Tidal power systems

Basic working principle – Classification of hydro systems: Large, small, micro – measurement of head and flow – Energy equation – Types of turbines – Numerical problems. Tidal power – Basics – Kinetic energy equation – Turbines for tidal power - Numerical problems – Wave power – Basics – Kinetic energy equation – Wave power devices – Linear generators.

# UNIT-VI:

# Biomass, fuel cells and geothermal systems

Biomass Energy: Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing.

Fuel cell: Classification of fuel for fuel cells – Fuel cell voltage– Efficiency – V-I characteristics.

Geothermal: Classification – Dry rock and hot acquifer – Energy analysis – Geothermal based electric power generation

# **Learning Outcomes:**

Student should be able to

- Analyze solar radiation data, extraterrestrial radiation, and radiation on earth's surface.
- Design solar thermal collectors, solar thermal plants.
- Design solar photo voltaic systems.
- Develop maximum power point techniques in solar PV and wind energy systems.
- Explain wind energy conversion systems, wind generators, power generation.
- Explain basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

# **Text Books:**

- 1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3<sup>rd</sup> Edition.
- 2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis second edition, 2013.

# **Reference Books:**

- 1. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford University Press.
- 2. Renewable Energy- Edited by Godfrey Boyle-oxford university.press,3<sup>rd</sup> edition,2013.
- 3. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore.
- 4. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
- 5. Renewable energy technologies A practical guide for beginners Chetong Singh Solanki, PHI.
- 6. Non conventional energy source –B.H.khan- TMH-2<sup>nd</sup> edition.

#### SIGNALS & SYSTEMS

#### **OBJECTIVES:**

#### The main objectives of this course are given below:

- To introduce the terminology of signals and systems.
- To introduce Fourier tools through the analogy between vectors and signals.
- To introduce the concept of sampling and reconstruction of signals.
- To analyze the linear systems in time and frequency domains.
- To study z-transform as mathematical tool to analyze discrete-time signals and systems.

**UNIT-I: INTRODUCTION:** Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions.

#### UNIT -II: FOURIER SERIES AND FOURIER TRANSFORM:

Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform.

**UNIT –III: SAMPLING THEOREM** – Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

**UNIT-IV: ANALYSIS OF LINEAR SYSTEMS:** Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

Cross-correlation and auto-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

**UNIT –V: LAPLACE TRANSFORMS :** Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Relation

between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

**UNIT -VI: Z-TRANSFORMS :** Fundamental difference between continuous-time and discrete-time signals, discrete time signal representation using complex exponential and sinusoidal components, Periodicity of discrete time using complex exponential signal, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in

Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

# **TEXT BOOKS**:

- 1. Signals, Systems & Communications B.P. Lathi, BS Publications, 2003.
- 2. Signals and Systems A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.
- 3. Signals & Systems- Narayan Iyer and K Satya Prasad, Cenage Pub.

# **REFERENCE BOOKS:**

- 1. Signals & Systems Simon Haykin and Van Veen, Wiley, 2nd Edition.
- 2. Principles of Linear Systems and Signals BP Lathi, Oxford University Press, 2015
- 3. Signals and Systems K Raja Rajeswari, B VisweswaraRao, PHI, 2009
- 4. Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008.
- 5. Signals and Systems T K Rawat, Oxford University press, 2011

# **OUTCOMES:**

#### At the end of this course the student will able to:

- Characterize the signals and systems and principles of vector spaces, Concept of orthgonality.
- Analyze the continuous-time signals and continuous-time systems using Fourier series, Fourier transform and Laplace transform.
- Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back.
- Understand the relationships among the various representations of LTI systems
- Understand the Concepts of convolution, correlation, Energy and Power density spectrum and their relationships.
- Apply z-transform to analyze discrete-time signals and systems.

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# PULSE AND DIGITAL CIRCUITS OBJECTIVES

The student will be made

- To understand the concept of wave shaping circuits, Switching Characteristics of diode and transistor.
- To study the design and analysis of various Multivibrators.
- To understand the functioning of different types of time-base Generators.
- To learn the working of logic families & Sampling Gates.

# UNIT I

**LINEAR WAVESHAPING:** High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square, ramp and exponential inputs. RC network as differentiator and integrator; Attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

# UNIT II

**NON-LINEAR WAVE SHAPING :** Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper; Clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

#### **UNIT III**

**SWITCHING CHARACTERISTICS OF DEVICES :** Diode as a switch, piecewise linear diode characteristics, Design and analysis of Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

**Bistable Multivibrator:** Analysis And Design of Fixed Bias, Self Bias Bistable Multi Vibrator, Collector Catching Diodes, Commutating Capacitors, Triggering of Binary Circuits, Emitter Coupled Bistable Multivibrator (Schmitt Trigger).

#### UNIT IV

**Monostable Multivibrator:** Analysis and Design of Collector Coupled Monostable Multivibrator, Triggering of Monostable Multivibrator, Applications of Monostable Multivibrator. **Astable Multivibrator:** Analysis and Design of Collector Coupled Astable Multivibrator, Application of Astable Multivibrator as a Voltage to Frequency Converter.

#### UNIT V

# **VOLTAGE TIME BASE GENERATORS:**

General features of a time base signal, Methods of generating time base waveform Exponential Sweep Circuits, Negative Resistance Switches, basic principles in Miller and Bootstrap time base generators, Transistor Miller time base generator, Transistor Bootstrap time base generator.

# UNIT VI LOGIC FAMILIES & SAMPLING GATES:

**LOGIC FAMILIES:** Diode Logic, Transistor Logic, Diode-Transistor Logic, Transistor-Transistor Logic, Emitter Coupled Logic, AOI Logic, Comparison of Logic Families.

**SAMPLING GATES:** Basic Operating Principles of Sampling Gates, Diode Unidirectional Sampling Gate and Two-Diode Bi-Directional Sampling Gate, Four-Diode gates, Six-Diode Gates, Reduction of Pedestal in Sampling Gates, Applications of Sampling Gates.

# **TEXT BOOKS:**

- 1. Pulse, Digital and Switching Waveforms J. Millman and H. Taub, McGraw-Hill
- 2. Pulse and Digital Circuits A. Anand Kumar, PHI, 2005

# **REFERENCES**:

- 1.Pulse, Digital and Switching Waveforms J. Millman and H. Taub, Mothiki S Prakash Rao McGraw-Hill, Second Edition, 2007.
- 2. Solid State Pulse circuits David A. Bell, PHI, 4th Edn., 2002
- 3. Pulse & Digital Circuits by Venkata Rao,K,Ramasudha K, Manmadha Rao,G., Pearson,2010

# OUTCOMES

After going through this course the student will be able to

- Design linear and non-linear wave shaping circuits.
- Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.
- Design different multivibrators and time base generators.
- Utilize the non sinusoidal signals in many experimental research areas.

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#### **POWER ELECTRONICS**

#### **Preamble:**

The usage of power electronics in day to day life has increased in recent years. It is important for student to understand the fundamental principles behind all these converters. This course covers characteristics of semiconductor devices, ac/dc, dc/dc, ac/ac and dc/ac converters. The importance of using pulse width modulated techniques to obtain high quality power supply (dc/ac converter) is also discussed in detail in this course.

#### **Learning Objectives:**

- To study the characteristics of various power semiconductor devices and to design firing circuits for SCR.
- To understand the operation of single phase full-wave converters and analyze harmonics in the input current.
- To study the operation of three phase full–wave converters.
- To understand the operation of different types of DC-DC converters.
- To understand the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- To analyze the operation of AC-AC regulators.

#### UNIT-I:

#### **Power Semi-Conductor Devices**

Thyristors–Silicon controlled rectifiers (SCR's) –Characteristics of power MOSFET and power IGBT– Basic theory of operation of SCR–Static characteristics– Turn on and turn off methods–Dynamic characteristics of SCR– Snubber circuit design– Basic requirements of gating circuits for SCR, IGBT and MOSFET.

#### UNIT-II:

#### **AC-DCSingle-Phase Converters**

1-phase half wave controlled rectifiers – R load and RL load with and without freewheeling diode – 1-phase full wave controlled rectifiers – center tapped configuration and bridge configuration- R load and RL load with and without freewheeling diode – continuous and discontinuous conduction – Effect of source inductance in 1-phase fully controlled bridge rectifier with continuous conduction.

#### UNIT-III:

#### **AC-DC3-Phase Converters**

3-phase half wave and Full wave uncontrolled rectifier - 3-phase half wave controlled rectifier with R and RL load - 3-phase fully controlled rectifier with R and RL load - 3-phase semi controlled rectifier with R and RL load.

#### UNIT-IV: DC-DC Converters

Analysis of Buck, boost and buck, buck-boost converters in ContinuousConduction Mode (CCM) and Discontinuous Conduction Modes (DCM) – Output voltage equations using volt-sec balance in CCM & DCM output voltage ripple & inductor current, ripple for CCM only – Principle operation of forward and fly back converters in CCM.

# UNIT – V: DC–AC Converters

1- phase halfbridge and full bridge inverters with R and RL loads – 3-phase square wave inverters –  $120^{0}$  conduction and  $180^{0}$  conduction modes of operation – PWM inverters – Quasi-square wave pulse width modulation – Sinusoidal pulse width modulation – Prevention of shoot through fault in Voltage Source Inverter (VSI) – Current Source Inverter (CSI) – Introduction to Auto Sequential Commutated Current Source Inverter (ASCCSI).

# UNIT – VI:

# AC – AC Regulators.

Static V-I characteristics of TRIAC and modes of operation – 1-phase AC-AC regulator phase angle control and integrated cycle control with R and RL load – For continuous and discontinuous conduction- 3-Phase AC-AC regulators with R load only – Transformer tap changing using antiparallel Thyristors.

# Learning Outcomes:

Student should be able to

- Explain the characteristics of various power semiconductor devices and analyze the static and dynamic characteristics of SCR's.
- Design firing circuits for SCR.
- Explain the operation of single phase full-wave converters and analyze harmonics in the input current.
- Explain the operation of three phase full–wave converters.
- Analyze the operation of different types of DC-DC converters.
- Explain the operation of inverters and application of PWM techniques for voltage control and harmonic mitigation.
- Analyze the operation of AC-AC regulators.

# **Text Books:**

- 1. Power Electronics: Circuits, Devices and Applications by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
- 2. Power Electronics: Essentials & Applications by L.Umanand, Wiley, Pvt. Limited, India, 2009

# **Reference Books:**

- 1. Elements of Power Electronics-Philip T.Krein.oxford.
- 2. Power Electronics by P.S.Bhimbra, Khanna Publishers.
- 3. Thyristorised Power Controllers by G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K.Sinha, New Age International (P) Limited Publishers, 1996.
- 4. Power Electronics handbook by Muhammad H.Rashid, Elsevier.
- 5. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd.
- 6. Power Converter Circuits -by William Shepherd, Li zhang, CRC Taylor & Francis Group.

L	Т	Р	С
0	0	3	2

# ELECTRICAL MACHINES – II LABORATORY

# Learning objectives:

- To control the speed of three phase induction motors.
- To determine /predetermine the performance three phase and single phase induction motors.
- To improve the power factor of single phase induction motor .
- To predetermine the regulation of three–phase alternator by various methods, find  $X_d/X_q$  ratio of alternator and asses the performance of three–phase synchronous motor.

# The following experiments are required to be conducted as compulsory experiments:

- 1. Brake test on three phase Induction Motor
- 2. No-load & Blocked rotor tests on three phase Induction motor
- 3. Regulation of a three –phase alternator by synchronous impedance &m.m.f. Methods
- 4. Regulation of three-phase alternator by Potier triangle method
- 5. V and Inverted V curves of a three—phase synchronous motor.
- 6. Determination of  $X_d$  and  $X_q$  of a salient pole synchronous machine
- 7. Equivalent circuit of single phase induction motor
- 8. Speed control of induction motor by V/f method.
- 9. Determination of efficiency of three phase alternator by loading with three phase induction motor.
- 10. Power factor improvement of single phase induction motor by using capacitors and load test on single phase induction motor.

#### Learning outcomes:

- Able to assess the performance of single phase and three phase induction motors.
- Able to control the speed of three phase induction motor.
- Able to predetermine the regulation of three–phase alternator by various methods.
- Able to find the  $X_d/X_q$  ratio of alternator and asses the performance of three-phase synchronous motor.

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# CONTROL SYSTEMS LAB

# Learning Objectives:

- To impart hands on experience to understand the performance of basic control system components such as magnetic amplifiers, D.C. servo motors, A.C. Servo motors, stepper motor and potentiometer.
- To understand time and frequency responses of control system with and without controllers and compensators.

#### Any 10 of the following experiments are to be conducted:

- 1. Time response of Second order system
- 2. Characteristics of Synchros
- 3. Programmable logic controller characteristics of stepper motor
- 4. Effect of feedback on DC servo motor
- 5. Effect of P, PD, PI, PID Controller on a second order systems
- 6. Lag and lead compensation Magnitude and phase plot
- 7. DC position control system
- 8. Transfer function of DC motor
- 9. Temperature controller using PID
- 10. Characteristics of magnetic amplifiers
- 11. Characteristics of AC servo motor
- 12. Characteristics of DC servo motor
- 13. Potentiometer as an error detector

# **Learning Outcomes**

- Able to analyze the performance and working Magnetic amplifier, D.C and A.C. servo motors and synchronous motors.
- Able to design P,PI,PD and PID controllers
- Able to design lag, lead and lag–lead compensators
- Able to control the temperature using PID controller
- Able to determine the transfer function of D.C.motor
- Able to control the position of D.C servo motor performance

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0	0	3	2

# ELECTRICAL MEASUREMENTS LABORATORY

# **Learning Objectives:**

- To understand the correct function of electrical parameters and calibration of voltage, current, single phase and three phase power and energy, and measurement of electrical characteristics of resistance, inductance and capacitance of a circuits through appropriate methods.
- To understand testing of transformer oil.

# Any 10 of the following experiments are to be conducted

- 1. Calibration and Testing of single phase energy Meter
- 2. Calibration of dynamometer wattmeter using phantom loading
- 3.Calibration of PMMC ammeter and voltmeter using Crompton D.C. Potentiometer
- 4. Measurement of resistance and Determination of Tolerance using Kelvin's double Bridge.
- 5. Capacitance Measurement using Schering bridge.
- 6. Inductance Measurement using Anderson bridge.
- 7. Measurement of 3 phase reactive power with single phase wattmeter for balanced loading.
- 8. Calibration of LPF wattmeter by direct loading.
- 9. Measurement of 3 phase power with single watt meter and using two C.Ts.
- 10. Testing of C.T. using mutual inductance method.
- 11. Testing of P.T. using absolute null method.
- 12. Dielectric oil testing using H.T test Kit.
- 13.Calibration of AC voltmeter and measurement of choke parameters using AC Potentiometer in polarform.
- 14. Measurement of Power by 3 Voltmeter and 3 Ammeter method.

# Learning Outcomes:

- To be able to measure the electrical parameters voltage, current, power, energy and electrical characteristics of resistance, inductance and capacitance.
- To be able to test transformer oil for its effectiveness.
- To be able to measure the parameters of inductive coil.

L	Т	Р	С
0	2	0	0

#### INTELLECTUAL PROPERTY RIGHTS AND PATENTS

#### **Objectives:**

\*To know the importance of Intellectual property rights, which plays a vital role in advanced Technical and Scientific disciplines.

\*Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latest developments.

#### Unit I: Introduction to Intellectual Property Rights (IPR)

Concept of Property - Introduction to IPR – International Instruments and IPR - WIPO - TRIPS – WTO -Laws Relating to IPR - IPR Tool Kit - Protection and Regulation - Copyrights and Neighboring Rights – Industrial Property – Patents - Agencies for IPR Registration – Traditional Knowledge –Emerging Areas of IPR - Layout Designs and Integrated Circuits – Use and Misuse of Intellectual Property Rights.

#### **Unit II: Copyrights and Neighboring Rights**

Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Subject Matters of Copyright – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of Performers – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Case Law -Semiconductor Chip Protection Act.

#### **Unit III: Patents**

Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Search - Patent Registration and Granting of Patent -Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing — Patent Cooperation Treaty – New developments in Patents – Software Protection and Computer related Innovations.

#### **Unit IV: Trademarks**

Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – Distinction between Trademark and Property Mark – Marks Covered under Trademark Law - Trade Mark Registration – Trade Mark Maintenance – Transfer of rights - Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

#### **Unit V: Trade Secrets**

Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law.

# Unit VI: Cyber Law and Cyber Crime

Introduction to Cyber Law – Information Technology Act 2000 - Protection of Online and Computer Transactions - E-commerce - Data Security – Authentication and Confidentiality -Privacy - Digital Signatures – Certifying Authorities - Cyber Crimes - Prevention and Punishment – Liability of Network Providers.

• Relevant Cases Shall be dealt where ever necessary.

#### **Outcome:**

\* IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.

\*Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.

#### **References:**

- 1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
- 2. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
- 3. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
- 4. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
- 5. Kompal Bansal & Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
- 6. Cyber Law Texts & Cases, South-Western's Special Topics Collections.
- 7. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
- 8. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

# POWER ELECTRONIC CONTROLLERS & DRIVES

#### **Preamble:**

This course is an extension of power electronics applications to electric drives. This course covers in detail the basic and advanced speed control techniques using power electronic converters that are used in industry. It is equally important to understand the four quadrant operation of electric drives and slip power recovery schemes in induction motors.

#### **Learning Objectives:**

- To learn the fundamentals of electric drive and different electric braking methods.
- To analyze the operation of three phase converter controlled dc motors and four quadrant operation of dc motors using dual converters.
- To discuss the converter control of dc motors in various quadrants.
- To understand the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.
- To learn the principles of static rotor resistance control and various slip power recovery schemes.
- To understand the speed control mechanism of synchronous motors

# UNIT-I:

# **Fundamentals of Electric Drives**

Electric drive – Fundamental torque equation – Load torque components – Nature and classification of load torques – Steady state stability – Load equalization– Four quadrant operation of drive (hoist control) – Braking methods: Dynamic – Plugging – Regenerative methods.

#### UNIT-II:

#### **Controlled Converter Fed DC Motor Drives**

1-phase half and fully controlled converter fed separately and self-excited DC motor drive – Output voltage and current waveforms – Speed-torque expressions – Speed-torque characteristics — Principle of operation of dual converters and dual converter fed DC motor drives -Numerical problems.

#### UNIT-III:

#### **DC–DC Converters Fed DC Motor Drives**

Single quadrant – Two quadrant and four quadrant DC-DC converter fed separately excited and self-excitedDC motors – Continuous current operation– Output voltage and current waveforms – Speed–torque expressions – Speed–torque characteristics –Four quadrant operation – Closed loop operation (qualitative treatment only).

#### UNIT-IV:

#### **Stator side control of 3-phase Induction motor Drive**

Stator voltage control using 3-phase AC voltage regulators – Waveforms –Speed torque characteristics– Variable Voltage Variable Frequency control of induction motor byPWMvoltage source inverter – Closed loop v/f control of induction motor drives (qualitative treatment only).
## UNIT-V:

## **Rotor side control of 3-phase Induction motor Drive**

Static rotor resistance control – Slip power recovery schemes – Static Scherbius drive – Static Kramer drive – Performance and speed torque characteristics – Advantages –Applications.

## UNIT-VI:

## **Control of Synchronous Motor Drives**

Separate control & self-control of synchronous motors – Operation of self-controlled synchronous motors by VSI– Closed Loop control operation of synchronous motor drives (qualitative treatment only).–Variable frequency control–Pulse width modulation.

## Learning Outcomes:

After completion of the course, studentswill be able to:

- Explain the fundamentals of electric drive and different electric braking methods.
- Analyze the operation of three phase converter fed dc motors and four quadrant operations of dc motors using dual converters.
- Describe the converter control of dc motors in various quadrants of operation
- Know the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.
- Differentiate the stator side control and rotor side control of three phase induction motor..
- Explain the speed control mechanism of synchronous motors

#### **Text Books:**

- 1. Fundamentals of Electric Drives by G K DubeyNarosa Publications
- 2. Power Semiconductor Drives, by S.B.Dewan, G.R.Slemon, A.Straughen, Wiley-India Edition.

- 1.Electric Motors and Drives Fundamentals, Types and Apllications, by Austin Hughes and Bill Drury, Newnes.
- 2. Thyristor Control of Electric drives VedamSubramanyam Tata McGraw Hill Publications.
- 3. Power Electronic Circuits, Devices and applications by M.H.Rashid, PHI
- 4. Power Electronics handbook by Muhammad H.Rashid, Elsevier.

#### III Year – II SEMESTER

L	Т	Р	С
4	0	0	3

#### POWER SYSTEM ANALYSIS

#### **Preamble:**

The course is designed to give students the required knowledge for the design and analysis of electrical power grids. Calculation of power flow in a power system network using various techniques, formation of  $Z_{bus}$  and its importance are covered in this course. It also deals with short circuit analysis and analysis of power system for steady state and transient stability.

#### Learning Objectives:

- To development the impedance diagram (p.u) and formation of Y<sub>bus</sub>
- To study the different load flow methods.
- To study the concept of the Z<sub>bus</sub>building algorithm.
- To study short circuit calculation for symmetrical faults
- To study the effect of unsymmetrical faults and their effects.
- To study the rotor angle stability of power systems.

#### UNIT –I:

#### Per Unit Representation & Topology

Per Unit Quantities–Single line diagram– Impedance diagram of a power system–Graph theory definition – Formation of element node incidence and bus incidence matrices – Primitive network representation – Formation of Y–bus matrix by singular transformation and direct inspection methods.

#### UNIT –II:

#### **Power Flow Studies**

Necessity of power flow studies – Derivation of static power flow equations – Power flow solution using Gauss-Seidel Method – Newton Raphson Method (Rectangular and polar coordinates form) –Decoupled and Fast Decoupled methods – Algorithmic approach – Problems on 3–bus system only.

#### UNIT –III:

#### **Z–Bus formulation**

Formation of Z–Bus: Partial network– Algorithm for the Modification of  $Z_{bus}$  Matrix for addition element for the following cases: Addition of element from a new bus to reference– Addition of element from a new bus to an old bus– Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).– Modification of Z–Bus for the changes in network (Problems).

#### UNIT – IV:

#### Symmetrical Fault Analysis

Transients on a Transmission line-Short circuit of synchronous machine(on no-load) - 3– Phase short circuit currents and reactances of synchronous machine–Short circuit MVA calculations -Series reactors – selection of reactors.

## UNIT –V:

## Symmetrical Components & Fault analysis

Definition of symmetrical components - symmetrical components of unbalanced three phase systems – Power in symmetrical components – Sequence impedances – Synchronous generator – Transmission line and transformers – Sequence networks –Various types of faults LG– LL– LLG and LLL on unloaded alternator–unsymmetrical faults on power system.

## UNIT – VI:

## **Power System Stability Analysis**

Elementary concepts of Steady state– Dynamic and Transient Stabilities– Description of Steady State Stability Power Limit–Transfer Reactance–Synchronizing Power Coefficient – Power Angle Curve and Determination of Steady State Stability –Derivation of Swing Equation–Determination of Transient Stability by Equal Area Criterion–Applications of Equal Area Criterion–Methods to improve steady state and transient stability.

#### **`Learning Outcomes:**

- Able to draw impedance diagram for a power system network and to understand per unit quantities.
- Able to form aY<sub>bus</sub>and Z<sub>bus</sub>for a power system networks.
- Able to understand the load flow solution of a power system using different methods.
- Able to find the fault currents for all types faults to provide data for the design of protective devices.
- Able to find the sequence components of currents for unbalanced power system network.
- Able to analyze the steady state, transient and dynamic stability concepts of a power system.

#### **Text Books:**

- 1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
- 2. Modern Power system Analysis by I.J.Nagrath&D.P.Kothari: Tata
  - McGraw-Hill Publishing Company, 2nd edition.

- 1. Power System Analysis by A.R.Bergen, Prentice Hall, Inc.
- 2. Power System Analysis by HadiSaadat TMH Edition.
- 3. Power System Analysis by B.R.Gupta, Wheeler Publications.
- 4. Power System Analysis and Design by J.Duncan Glover, M.S.Sarma, T.J.Overbye CengageLearning publications.

## **III Year – II SEMESTER**

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4	0	0	3

## MICROPROCESSORS AND MICROCONTROLLERS

#### **Preamble:**

Microprocessor and microcontroller have become important building blocks in digital electronics design. It is important for student to understand the architecture of a microprocessor and its interfacing with various modules. 8086 microprocessor architecture, programming, and interfacing is dealt in detail in this course. Interfacing, PIC, architecture, programming in C.

#### Learning objectives:

- To understand the organization and architecture of Micro Processor
- To understand addressing modes to access memory
- To understand 8051 micro controller architecture
- To understand the programming principles for 8086 and 8051
- To understand the interfacing of MP with IO as well as other devices
- To understand how to develop cyber physical systems

#### UNIT-I:

#### Introduction to Microprocessor Architecture

Introduction and evolution of Microprocessors– Architecture of 8086–Register Organization of 8086–Memory organization of 8086– General bus operation of 8086–Introduction to 80286–80386 and 80486 and Pentium.

#### UNIT-II:

#### **Minimum and Maximum Mode Operations**

Instruction set, Addressing modes– Minimum and Maximum mode operations of 8086–8086 Control signal interfacing–Read and write cycle timing diagrams.

#### UNIT-III:

#### **I/O Interface**

8255 PPI– Architecture of 8255–Modes of operation– Interfacing I/O devices to 8086 using 8255–Interfacing A to D converters– Interfacing D to A converters– Stepper motor interfacing– Static memory interfacing with 8086–DMA controller (8257)–Architecture–Interfacing 8257 DMA controller– Programmable Interrupt Controller (8259)–Command words and operating modes of 8259– Interfacing of 8259–Keyboard/display controller (8279)–Architecture–Modes of operation–Command words of 8279– Interfacing of 8279.

#### UNIT-IV:

#### **Introduction to 8051 Micro Controller**

Overview of 8051 Micro Controller– Architecture– Register set–I/O ports and Memory Organization– Interrupts–Timers and Counters–Serial Communication.

## UNIT-V:

#### **PIC Architecture**

Block diagram of basic PIC 18 micro controller, registers I/O ports.

#### UNIT– VI: Programming in C for PIC

Data types, I/O programming, logical operations, data conversion

## **Learning Outcomes:**

- To be able to understand the microprocessor capability in general and explore the evaluation of microprocessors.
- To be able to understand the addressing modes of microprocessors
- To be able to understand the micro controller capability
- To be able to program mp and mc
- To be able to interface mp and mc with other electronic devices
- To be able to develop cyber physical systems

#### **Text Books:**

- 1. Kenneth J Ayala, "The 8051 Micro Controller Architecture, Programming and Applications", Thomson Publishers, 2nd Edition.
- PIC Microcontroller and Embedded Systems using Assembly and C for PIC 18, -Muhammad Ali Mazidi, RolindD.Mckinay, Danny causey -Pearson Publisher 21<sup>st</sup> Impression.

- 1. R.S. Kaler, "A Text book of Microprocessors and Micro Controllers", I.K. International Publishing House Pvt. Ltd.
- 2. Ajay V. Deshmukh, "Microcontrollers Theory and Applications", Tata McGraw-Hill Companies –2005.
- 3. Ajit Pal, "Microcontrollers Principles and Applications", PHI Learning Pvt Ltd, 2011.
- 4. Microprocessors and Interfacing, Douglas V Hall, Mc–Graw Hill, 2<sup>nd</sup> Edition.
- 5. Ray and Burchandi, "Advanced Micro Processors and Interfacing", Tata McGraw-Hill.

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4	0	0	3

#### DATA STRUCTURES THROUGH C++

#### **OBJECTIVES:**

- To be familiar with basic techniques of object oriented principles and exception handling using C++
- To be familiar with the concepts like Inheritance, Polymorphism
- Solve problems using data structures such as linear lists, stacks, queues, hash tables
- Be familiar with advanced data structures such as balanced search trees, AVLTrees, and B Trees.

#### **UNIT-I: ARRAYS**

Abstract Data Types and the C++ Class, An Introduction to C++ Class- Data Abstraction and Encapsulation in C++- Declaring Class Objects and Invoking Member Functions- Special Class Operations- Miscellaneous Topics- ADTs and C++Classes, The Array as an Abstract Data Type, The Polynomial Abstract Data type- Polynomial Representation- Polynomial Addition. Spares Matrices,Introduction- Sparse Matrix Representation- Transposing a Matrix- Matrix Multiplication, Representation of Arrays.

#### **UNIT-II: STACKS AND QUEUES**

Templates in C++, Template Functions- Using Templates to Represent Container Classes, The Stack Abstract Data Type, The Queue Abstract Data Type, Subtyping and Inheritance in C++, Evaluation of Expressions, Expression- Postfix Notation- Infix to Postfix.

#### **UNIT-III: LINKED LISTS**

Single Linked List and Chains, Representing Chains in C++, Defining a Node in C++-Designing a Chain Class in C++- Pointer manipulation in C++- Chain Manipulation Operations, The Template Class Chain, Implementing Chains with Templates- Chain Iterators- Chain Operations- Reusing a Class, Circular Lists, Available Space Lists, Linked Stacks and Queues, Polynomials, Polynomial Representation- Adding Polynomials- Circular List Representation of Polynomials, Equivalence Classes, Sparse Matrices, Sparse Matrix Representation- Sparse Matrix Input- Deleting a Sparse Matrix, Doubly Linked Lists, Generalized Lists, Representation of Generalized Lists- Recursive Algorithms for Lists-Reference Counts, Shared and Recursive Lists

#### **UNIT-IV: TREES**

Introduction, Terminology, Representation of Trees, Binary Trees, The Abstract Data Type, Properties of Binary Tress, Binary Tree Representations, Binary Tree Traversal and Tree Iterators, Introduction, Inorder Traversal Preorder Traversal, Postorder Traversal, Thread Binary Trees, Threads, Inorder Traversal of a Threaded Binary Tree, Inserting a Node into a Threaded Binary Tree, Heaps, Priority Queues, Definition of a Max Heap, Insertion into a Max Heap, Deletion from a Max Heap, Binary Search Trees, Definition, Searching a Binary Search Tree, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree, Height of Binary Search Tree.

## **UNIT-V: GRAPHS**

The Graph Abstract Data Type, Introduction, Definition, Graph Representation, Elementary Graph Operation, Depth First Search, Breadth First Search, Connected Components, Spanning Trees, Biconnected Components, Minimum Cost Spanning Trees, Kruskal S Algorithm, Prim s Algorithm Sollin' s Algorithm, Shortest Paths and Transitive Closure, Single Source/All Destination: Nonnegative Edge Cost, Single Source/All Destination: General Weights, All-Pairs Shortest Path, Transitive Closure.

## **UNIT-VI: SORTING**

Insertion Sort, Quick Sort, Merge Sort Merging, Iterative Merge Sort, Recursive Merge Sort, Heap Sort.

## **OUTCOMES:**

- Distinguish between procedures and object oriented programming.
- Apply advanced data structure strategies for exploring complex data structures.
- Compare and contrast various data structures and design techniques in the area of Performance.
- Implement data structure algorithms through C++. Incorporate data structures into the applications such as binary search trees, AVL and B Trees
- Implement all data structures like stacks, queues, trees, lists and graphs and compare their Performance and trade offs

## **TEXT BOOKS:**

- 1. Data structures, Algorithms and Applications in C++, S.Sahni, University Press (India) Pvt.Ltd, 2nd edition, Universities Press, Pvt. Ltd.
- 2. Data structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education. Ltd.Second, Edition.
- 3. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and .Mount, Wiley student edition, John Wiley and Sons.

## **REFERENCE BOOKS:**

Data structures and algorithms in C++, 3rd Edition, Adam Drozdek, Thomson
Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.
Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.

#### **III Year – II SEMESTER**

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## UNIX AND SHELL PROGRAMMIN OPEN ELECTIVE

#### **OBJECTIVES:**

- Written technical communication and effective use of concepts and terminology.
- Facility with UNIX command syntax and semantics.
- Ability to read and understand specifications, scripts and programs.
- Individual capability in problem solving using the tools presented within the class. Students will demonstrate a mastery of the course materials and concepts within in class discussions.

#### UNIT-I

Introduction to unix-Brief History-What is Unix-Unix Components-Using Unix-Commands in Unix-Some Basic Commands-Command Substitution-Giving Multiple Commands.

#### UNIT-II

The File system –The Basics of Files-What's in a File-Directories and File Names-Permissions-I Nodes-The Directory Hierarchy, File Attributes and Permissions-The File Command knowing the File Type-The Chmod Command Changing File Permissions-The Chown Command Changing the Owner of a File-The Chgrp Command Changing the Group of a File.

#### UNIT-III

Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O Redirection-Looping in Shell Programs.

#### **UNIT-IV**

Filters-The Grep Family-Other Filters-The Stream Editor Sed-The AWK Pattern Scanning and processing Language-Good Files and Good Filters.

#### UNIT-V

Shell Programming-Shell Variables-The Export Command-The Profile File a Script Run During Starting-The First Shell Script-The read Command-Positional parameters-The \$? Variable knowing the exit Status-More about the Set Command-The Exit Command-Branching Control Structures-Loop Control Structures-The Continue and Break Statement-The Expr Command: Performing Integer Arithmetic-Real Arithmetic in Shell Programs-The here Document(<<)-The Sleep Command-Debugging Scripts-The Script Command-The Eval Command-The Eval Command-The Exec Command.

## UNIT-VI

The Process-The Meaning-Parent and Child Processes-Types of Processes-More about Foreground and Background processes-Internal and External Commands-Process Creation-The Trap Command-The Stty Command-The Kill Command-Job Control.

## **OUTCOMES:**

- Documentation will demonstrate good organization and readability.
- File processing projects will require data organization, problem solving and research.
- Scripts and programs will demonstrate simple effective user interfaces.
- Scripts and programs will demonstrate effective use of structured programming.
- Scripts and programs will be accompanied by printed output demonstrating completion of a test plan.
- Testing will demonstrate both black and glass box testing strategies.
- Project work will involve group participation.

## **TEXT BOOKS:**

- 1. Introduction to Unix Shell Programming by M.G.Venkateshmurthy, Parson.
- 2. Unix programming environment by Brain W. Kernighan & Rob Pike, Pearson.

## **REFERENCE BOOKS:**

1. Unix and shell programmingby B.M. Harwani, OXFORD university press.

## **OOPs through Java**

#### **OBJECTIVE:**

- To strengthen their problem solving ability by applying the characteristics of an object- oriented approach.
- To introduce object oriented concepts in C++ and Java.

## **Programming:**

- 1. Write a Programme that computes the simple interest and compound interest payable on principal amount (in Rs.) of loan borrowed by the customer from a bank for a giver period of time (in years) at specific rate of interest. Further determine whether the b bank will benefit by charging simple interest or compound interest
- 2. Write a Programme to calculate the fare for the passengers traveling in a bus. When a Passenger enters the bus, the conductor asks "What distance will you travel?" On knowing distance from passenger (as an approximate integer), the conductor mentions the fare to the passenger according to following criteria.
- 3. Write a C++ Program to illustrate Enumeration and Function Overloading
- 4. Write a C++ Program to illustrate Scope and Storage class
- 5. Implementation of ADT such as Stack and Queues
- 6. Write a C++ Program to illustrate the use of Constructors and Destructors and Constructor Overloading
- 7. Write a Program to illustrate Static member and methods
- 8. Write a Program to illustrate Bit fields
- 9. Write a Program to overload as binary operator, friend and member function
- 10. Write a Program to overload unary operator in Postfix and Prefix form as member and friend function
- 11. Write a C++ Program to illustrate Iterators and Containers
- 12. Write a C++ Program to illustrate function templates
- 13. Write a C++ Program to illustrate template class
- 14. Write C++ Programs and incorporating various forms of Inheritance
- 15. Write a C++ Program to illustrate Virtual functions
- 16. To write a C++ program to find the sum for the given variables using function with default arguments.
- 17. To write a C++ program to find the value of a number raised to its power that demonstrates a function using call by value.
- 18. To write a C++ program and to implement the concept of Call by Address

- 19. To write a program in C++ to prepare a student Record using class and object
- 20. To implement the concept of unary operator overloading by creating a C++ program.
- 21. Write a C++ program for swapping two values using function templates
- 22. Write a C++ program to implement a file handling concept using sequential access.

## **OUTCOMES:**

- Explain what constitutes an object-oriented approach to programming and identify potentialbenefits of object-oriented programming over other approaches.
- Apply an object-oriented approach to developing applications of varying complexities

## **VLSI DESIGN**

## **Objectives:**

## The main objectives of this course are:

- Basic characteristics of MOS transistor and examines various possibilities for configuring inverter circuits and aspects of latch-up are considered.
- Design processes are aided by simple concepts such as stick and symbolic diagrams but the key element is a set of design rules, which are explained clearly.
- Basic circuit concepts are introduced for MOS processes we can set out approximate circuit parameters which greatly ease the design process.

#### **Outcomes:**

#### At the end of this course the student can able to:

- Understand the properties of MOS active devices and simple circuits configured when using them and the reason for such encumbrances as ratio rules by which circuits can be interconnected in silicon.
- Know three sets of design rules with which nMOS and CMOS designs may be fabricated.
- Understand the scaling factors determining the characteristics and performance of MOS circuits in silicon.

## Syllabus:

## Unit-I:

Introduction and Basic Electrical Properties of MOS Circuits: Introduction to IC technology, Fabrication process: nMOS, pMOS and CMOS.  $I_{ds}$  versus  $V_{ds}$  Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. nMOS Inverter, Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, and through one or more pass transistors. Alternative forms of pull-up, The CMOS Inverter, Latch-up in CMOS circuits, Bi-CMOS Inverter, Comparison between CMOS and BiCMOS technology. (Text Book-1)

## Unit-II:

MOS and Bi-CMOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules,  $2\mu m$  Double Metal, Double Poly, CMOS/BiCMOS rules,  $1.2\mu m$  Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic Diagrams-Translation to Mask Form.

(Text Book-1)

## Unit-III:

**Basic Circuit Concepts:** Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, Some area Capacitance Calculations, The Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances, Choice of layers.

**Scaling of MOS Circuits:** Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling, Limits due to sub threshold currents, Limits on logic levels and supply voltage due to noise and current density. Switch logic, Gate logic.

(Text Book-1)

#### Unit-IV:

**Chip Input and Output circuits:** ESD Protection, Input Circuits, Output Circuits and L(di/dt) Noise, On-Chip clock Generation and Distribution.

**Design for Testability**: Fault types and Models, Controllability and Observability, Ad Hoc Testable Design Techniques, Scan Based Techniques and Built-In Self Test techniques.

#### (Text Book-2)

#### Unit-V:

**FPGA Design:** FPGA design flow, Basic FPGA architecture, FPGA Technologies, FPGA families- Altera Flex 8000FPGA, Altera Flex 10FPGA, Xilinx XC4000 series FPGA, Xilinx Spartan XL FPGA, Xilinx Spartan II FPGAs, Xilinx Vertex FPGA. Case studies: FPGA Implementation of Half adder and full adder.

Introduction to synthesis: Logic synthesis, RTL synthesis, High level Synthesis.

(Reference Text Book-1)

#### Unit-VI:

**Introduction to Low Power VLSI Design:** Introduction to Deep submicron digital IC design, Low Power CMOS Logic Circuits: Over view of power consumption, Low –power design through voltage scaling, Estimation and optimisation of switching activity, Reduction of switching capacitance. Interconnect Design, Power Grid and Clock Design.

#### (Text Book-2)

## **Text Books:**

- 1. Essentials of VLSI Circuits and Systems Kamran Eshraghian, Douglas and A. Pucknell and Sholeh Eshraghian, Prentice-Hall of India Private Limited, 2005 Edition.
- 2. CMOS Digital Integrated Circuits Analysis and Design- <u>Sung-Mo Kang</u>, <u>Yusuf</u> <u>Leblebici</u>, Tata McGraw-Hill Education, 2003.

#### **References:**

- 1. Advanced Digital Design with the Verilog HDL, Michael D.Ciletti, Xilinx Design Series, Pearson Education
- 2. Analysis and Design of Digital Integrated Circuits in Deep submicron Technology, 3'rd edition, David Hodges.

## **ROBOTICS** (Open Elective)

## **OBJECTIVES**:

- To introduce the basic concepts, parts of robots and types of robots.
- To make the student familiar with the various drive systems for robot, sensors and their

applications in robots and programming of robots.

• To discuss about the various applications of robots, justification and implementation of robot.

## UNIT-I:

## Introduction

Specifications of Robots- Classifications of robots – Work envelope - Flexible automation versus Robotic technology – Applications of Robots ROBOT KINEMATICS AND DYNAMICS Positions,

## **UNIT-II:**

## **Orientations and frames, Mappings**

Changing descriptions from frame to frame, Operators: Translations, Rotations and Transformations - Transformation Arithmetic - D-H Representation - Forward and inverse Kinematics Of Six Degree of Freedom Robot Arm – Robot Arm dynamics

## UNIT-III:

## **Robot Drives and Power Transmission Systems**

Robot drive mechanisms, hydraulic – electric – servomotor- stepper motor - pneumatic drives, Mechanical transmission method - Gear transmission, Belt drives, cables, Roller chains, Link - Rod systems - Rotary-to-Rotary motion conversion, Rotary-to-Linear motion conversion, Rack and Pinion drives, Lead screws, Ball Bearing screws,

## UNIT -IV:

## Manipulators

Construction of Manipulators, Manipulator Dynamic and Force Control, Electronic and Pneumatic manipulators

#### UNIT-V:

## **Robot End Effectors**

Classification of End effectors – Tools as end effectors. Drive system for grippers-Mechanical adhesive-vacuum-magnetic-grippers. Hooks&scoops. Gripper force analysis and gripper design. Active and passive grippers.

#### UNIT -VI:

## Path planning & Programming

Trajectory planning and avoidance of obstacles, path planning, skew motion, joint integrated motion – straight line motion-Robot languages-computer control and Robot software.

## **OUTCOMES:**

- The Student must be able to design automatic manufacturing cells with robotic control using
- The principle behind robotic drive system, end effectors, sensor, machine vision robot Kinematics and programming.

## **TEXT BOOKS**:

- 1. Deb S. R. and Deb S., "Robotics Technology and Flexible Automation", Tata McGraw HillEducation Pvt. Ltd, 2010.
- 2. John J.Craig, "Introduction to Robotics", Pearson, 2009.
- 3. Mikell P. Grooveret. al., "Industrial Robots Technology, Programming and Applications", McGraw Hill, New York, 2008.

## **REFERENCE BOOKS:**

1. Richard D Klafter, Thomas A Chmielewski, Michael Negin, "Robotics Engineering An Integrated Approach", Eastern Economy Edition, Prentice Hall of India Pvt. Ltd.,

2006.

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2. Fu K S, Gonzalez R C, Lee C.S.G, "Robotics: Control, Sensing, Vision and Intelligence", McGraw Hill, 1987

## NEURAL NETWORKS AND FUZZY LOGIC (Open Elective)

## **Preamble:**

This course introduces the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward Networks. Also deals with Associate Memories and introducesFuzzy sets and Fuzzy Logic system components. The Neural Network and Fuzzy Network system application to Electrical Engineering is also presented. This subject is very important and useful for doing Project Work.

#### **Learning Objectives:**

- To understand artificial neuron models.
- To understand learning methods of ANN.
- To utilize different algorithms of ANN.
- To distinguish between classical and fuzzy sets.
- To understand different modules of fuzzy controller.
- To understand applications of neural networks and fuzzy logic.

## Unit – I: Introduction to Neural Networks

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential, Applications of ANN.

## **Unit- II: Essentials of Artificial Neural Networks**

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANNArchitectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application

## Unit-III:

## Multilayer feed forward Neural Networks

Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements, Radial Basis Function (RBF) Neural Network – Kohonen Self Organising feature Map (KSOM).

#### **Associative Memories**

Bidirectional Associative Memories (BAM)-Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network, Summary and Discussion of Instance/Memory Based Learning Algorithms, Applications.

#### Unit – IV: Classical & Fuzzy Sets

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.

## **UNIT V: Fuzzy Logic Modules**

Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

## **UNIT VI: Applications**

**Neural network applications:** Process identification, control, fault diagnosis and load forecasting.

Fuzzy logic applications: Load frequency control and Fuzzy classification.

## **Learning Outcomes:**

Students should able to:

- Know different models of artificial neuron.
- Use learning methods of ANN.
- Use different paradigms of ANN.
- Classify between classical and fuzzy sets.
- Use different modules of Fuzzy logic controller.
- Apply Neural Networks and fuzzy logic for real-time applications.

## **Text Book:**

- 1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by RajasekharanandRai PHI Publication.
- 2. Introduction to Neural Networks using MATLAB 6.0 S.N.Sivanandam, S.Sumathi, S.N.Deepa, TMH,2006

- 1. Neural Networks James A Freeman and Davis Skapura, Pearson Education, 2002.
- 2. Neural Networks Simon Hakins, Pearson Education
- 3. Neural Engineering by C.Eliasmith and CH.Anderson, PHI
- 4. Neural Networks and Fuzzy Logic System by Bart Kosko, PHI Publications.

## ENERGY AUDIT, CONSERVATION & MANAGEMENT (Open Elective)

#### **Preamble:**

This is an open elective course developed to cater the current needs of the industry. This course covers topics such as energy conservation act and energy conservation. It also covers energy efficient lighting design. The student will learn power factor improvement techniques, energy efficiency in HVAC systems. In addition The economic aspects such as payback period calculations, life cycle costing analysis is covered in this course.

#### **Learning Objectives:**

- To understand energy efficiency, scope, conservation and technologies.
- To design energy efficient lighting systems.
- To estimate/calculate power factor of systems and propose suitable compensation techniques.
- To understand energy conservation in HVAC systems.
- To calculate life cycle costing analysis and return on investment on energy efficient technologies.

#### Unit–I:

## **Basic Principles of Energy Audit and management**

Energy audit – Definitions – Concept – Types of audit – Energy index – Cost index – Pie charts –Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language – Questionnaire – Check list for top management.

## Unit–II:

## Lighting

Modification of existing systems – Replacement of existing systems – Priorities: Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures.

#### Unit-III:

## Power Factor and energy instruments

Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

#### Unit-IV:

## Space Heating and Ventilation

Ventilation – Air–Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning – Insulation–Cooling load – Electric water heating systems – Energy conservation methods.

## Unit–V

Understanding energy cost - Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts) – Economics of energy efficient motors and systems.

## Unit–VI:

## **Computation of Economic Aspects**

Need of investment, appraisal and criteria - Calculation of simple payback period–Return on investment – Net present value – Internal rate of return – numerical examples – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment – Numerical examples.

## Learning Outcomes:

Student will be able to

- Explain energy efficiency, conservation and various technologies.
- Design energy efficient lighting systems.
- Calculate power factor of systems and propose suitable compensation techniques.
- Explain energy conservation in HVAC systems.
- Calculate life cycle costing analysis and return on investment on energy efficient technologies.

## **Text Books:**

- 1. Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill
- 2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2<sup>nd</sup> edition, 1995

- 1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012
- 2. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
- 3. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1<sup>st</sup> edition, 1998.
- 4. Energy management hand book by W.C.Turner, John wiley and sons.
- 5. Energy management and conservation –k v Sharma and pvenkataseshaiah-I K International Publishing House pvt.ltd,2011.
- 6. <u>http://www.energymanagertraining.com/download/Gazette\_of\_IndiaPartIISecI-37\_25-08-2010.pdf</u>

#### **III Year – II SEMESTER**

#### L T P C 0 0 3 2

#### POWER ELECTRONICS LAB

#### Learning objectives:

- To study the characteristics of various power electronic devices and analyze firing circuits and commutation circuits of SCR.
- To analyze the performance of single-phase and three-phase full-wave bridge converters with both resistive and inductive loads.
- To understand the operation of AC voltage regulator with resistive and inductive loads.
- To understand the working of Buck converter, Boost converter and inverters.

#### Any 10 of the Following Experiments are to be conducted

- 1. Study of Characteristics of Thyristor, MOSFET & IGBT.
- 2. Design and development of a firing circuit for Thyristor.
- 3. Design and development of gate drive circuits for IGBT.
- 4. Single -Phase Half controlled converter with R and RL load
- 5. Single -Phase fully controlled bridge converter with R and RL loads
- 6. Single -Phase AC Voltage Regulator with R and RL Loads
- 7. Single -Phase square wave bridge inverter with R and RL Loads
- 8. Three- Phase fully controlled converter with RL-load.
- 9. Design and verification of voltages gain of Boost converter in Continuous Conduction Mode(CCM) and Discontinuous Conduction Mode(DCM).
- 10. Design and verification of voltages ripple in buck converter in CCM operation.
- 11. Single -phase PWM inverter with sine triangle PWM technique.
- 12. 3-phase AC-AC voltage regulator with R-load.

#### Learning outcomes:

- Able to study the characteristics of various power electronic devices and analyze gate drive circuits of IGBT.
- Able to analyze the performance of single-phase and three-phase full-wave bridge converters with both resistive and inductive loads.
- Able to understand the operation of single phase AC voltage regulator with resistive and inductive loads.
- Able to understand the working of Buck converter, Boost converter, single-phase square wave inverter and PWM inverter.

## MICRO MPROCESSORS AND MICRO CONTROLLERS LAB

#### Learning Objectives:

- To study programming based on 8086 microprocessor and 8051 microcontroller.
- To study 8086 microprocessor based ALP using arithmetic, logical and shift operations.
- To study to interface 8086 with I/O and other devices.
- To study parallel and serial communication using 8051& PIC 18 micro controllers.

#### Any 10 of the following experiments are to be conducted:

#### I. Microprocessor 8086&Microcontroller 8051

Introduction to MASM/TASM.

- 1. Arithmetic operation Multi byte addition and subtraction, multiplication and division Signed and unsigned arithmetic operation, ASCII Arithmetic operation.
- 2. Logic operations Shift and rotate Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
- 3. By using string operation and Instruction prefix: Move block, Reverse string Sorting, Inserting, Deleting, Length of the string, String comparison.
- 4. Interfacing 8255–PPI
- 5. Interfacing 8259 Interrupt Controller.
- 6. Interfacing 8279 Keyboard Display.
- 7. Stepper motor control using 8253/8255.
- 8. Reading and Writing on a parallel port using 8051
- 9. Timer in different modes using 8051
- 10. Serial communication implementation using 8051
- 11. Understanding three memory areas of 00 FF Using 8051 external interrupts.
- 12. Interface PIC 18 with an optoisolator
- 13. Interface PIC 18 with a DC motor

#### **Learning Outcomes:**

- Will be able to write assembly language program using 8086 micro based on arithmetic, logical, and shift operations.
- Will be able to interface 8086 with I/O and other devices.
- Will be able to do parallel and serial communication using 8051 & PIC 18 micro controllers.

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#### DATASTRUCTURES THROUGH C LAB

## **OBJECTIVES:**

- To develop skills to design and analyze simple linear and non linear data structures
- To Strengthen the ability to identify and apply the suitable data structure for the given real world problem
- To Gain knowledge in practical applications of data structures

## List of Experiments:

- 1. Implementation of Singly linked list.
- 2. Implementation of Doubly linked list.
- 3. Implementation of Multistack in a Single Array.
- 4. Implementation of Circular Queue
- 5. Implementation of Binary Search trees.
- 6. Implementation of Hash table.
- 7. Implementation of Heaps.
- 8. Implementation of Breadth First Search Techniques.
- 9. Implementation of Depth First Search Techniques.
- 10. Implementation of Prim's Algorithm.
- 11. Implementation of Dijkstra's Algorithm.
- 12. Implementation of Kruskal's Algorithm
- 13. Implementation of MergeSort
- 14. Implementation of Quick Sort
- 15. Implementation of Data Searching using divides and conquers technique

## **OUTCOMES:**

At the end of this lab session, the student will

- Be able to design and analyze the time and space efficiency of the data structure
- Be capable to identity the appropriate data structure for given problem
- Have practical knowledge on the application of data structures

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#### **PROFESSIONAL ETHICSAND HUMAN VALUES**

#### **Course Objectives:**

\*To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.

# \*Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

#### **UNIT I: Human Values**:

Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty – Courage – Value Time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

#### **UNIT: II: Principles for Harmony:**

Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

#### **UNIT III: Engineering Ethics and Social Experimentation:**

History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism —Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory -Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg's Theory - Gilligan's Argument –Heinz's Dilemma - Comparison with Standard Experiments — Learning from the Past –Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

#### UNIT IV: Engineers' Responsibilities towards Safety and Risk:

Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/sInvoluntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/sImmediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

#### **UNIT V: Engineers' Duties and Rights:**

Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality – Senses of Loyalty - Consensus and Controversy - Professional and Individual Rights – Confidential and Proprietary Information - Conflict of Interest-Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving-Occupational Crimes-Industrial Espionage- Price Fixing-Whistle Blowing.

## **UNIT VI: Global Issues:**

Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics - Environmental Ethics – Endangering Lives - Bio Ethics - Computer Ethics - War Ethics – Research Ethics - Intellectual Property Rights.

• Related Cases Shall be dealt where ever necessary.

## **Outcome:**

\*It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.

# \*It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

## **References:**

- 1. Professional Ethics by R. Subramaniam Oxford Publications, New Delhi.
- 2. Ethics in Engineering by Mike W. Martin and Roland Schinzinger Tata McGraw-Hill – 2003.
- 3. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana Maruthi Publications.
- 4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
- 5. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
- 6. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd 2009.
- 7. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman and M. Jayakumaran University Science Press.
- 8. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill 2013
- 9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications

## UTILIZATION OF ELECTRICAL ENERGY

#### **Preamble:**

This course primarily deals with utilization of electrical energy generated from various sources. It is important to understand the technical reasons behind selection of motors for electric drives based on the characteristics of loads. Electric heating, welding and illumination are some important loads in the industry in addition to motor/drives. Another major share of loads is taken by Electric Traction. Utilization of electrical energy in all the above loads is discussed in detail in this course. Demand side management concepts are also introduced as a part of this course.

#### Learning objectives:

- To understand the operating principles and characteristics of traction motors with respect to speed, temperature, loading conditions.
- To acquaint with the different types of heating and welding techniques.
- To study the basic principles of illumination and its measurement.
- To understand different types of lightning system including design.
- To understand the basic principle of electric traction including speed-time curves of different traction services.
- To understand the method of calculation of various traction system for braking, acceleration and other related parameters, including demand side management of energy.

#### UNIT – I:

#### Selection of Motors

Choice of motor, type of electric drives, starting and running characteristics–Speed control– Temperature rise–Applications of electric drives–Types of industrial loads–continuous– Intermittent and variable loads–Load equalization.

#### UNIT – II:

#### **Electric Heating**

Advantages and methods of electric heating–Resistance heating induction heating and dielectric heating – Arc furnaces – Direct and indirect arc furnaces

#### **Electric Welding**

Electric welding-Resistance and arc welding-Electric welding equipment-Comparison between AC and DC Welding

#### UNIT – III:

#### **Illumination fundamentals**

Introduction, terms used in illumination–Laws of illumination–Polar curves–Integrating sphere–Lux meter–Discharge lamps, MV and SV lamps – Lumen or flux method of calculation - Sources of light.

#### UNIT – IV:

#### Various Illumination Methods

Comparison between tungsten filament lamps and fluorescent tubes–Basic principles of light control– Types and design of lighting and flood lighting–LED lighting, principle of operation, street lighting and domestic lighting – Conservation of energy.

## UNIT – V:

#### **Electric Traction – I**

System of electric traction and track electrification– Review of existing electric traction systems in India– Special features of traction motor– Mechanics of train movement–Speed– time curves for different services – Trapezoidal and quadrilateral speed time curves-High speed transportation trains.

## UNIT – VI:

#### **Electric Traction – II**

Calculations of tractive effort– power –Specific energy consumption for given run–Effect of varying acceleration and braking retardation–Adhesive weight and braking, retardation adhesive weight and coefficient of adhesion–Principles of energy efficient motors-Modern traction motors.

#### **Learning Outcomes:**

- Able to identify a suitable motor for electric drives and industrial applications
- Able to identify most appropriate heating or welding techniques for suitable applications.
- Able to understand various level of illuminosity produced by different illuminating sources.
- Able to estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.
- Able to determine the speed/time characteristics of different types of traction motors.
- Able to estimate energy consumption levels at various modes of operation.

#### **Text Books:**

 Utilization of Electric Energy – by E. Openshaw Taylor, Orient Longman.
Art & Science of Utilization of electrical Energy – by Partab, DhanpatRai& Sons.

- 1. Utilization of Electrical Power including Electric drives and Electric traction by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
- 2. Generation, Distribution and Utilization of electrical Energy by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1997.

#### **IV Year – I SEMESTER**

## LINEAR IC APPLICATIONS

## L T P C 4 0 0 3

#### **OBJECTIVES**

□To understand the basic operation & performance parameters of differential amplifiers.

□To understand & learn the measuring techniques of performance parameters of OP-AMP

□To learn the linear and non-linear applications of operational amplifiers.

□To understand the analysis & design of different types of active filters using opamps

□ To learn the internal structure, operation and applications of different analog ICs

□To Acquire skills required for designing and testing integrated circuits

#### UNIT I

**INTEGRATED CIRCUITS:** Differential Amplifier- DC and AC analysis of Dual input Balanced output Configuration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single Ended Input – Balanced/ Unbalanced Output), DC Coupling and Cascade Differential Amplifier Stages, Level translator.

#### UNIT II

Characteristics of OP-Amps, Integrated circuits-Types, Classification, Package Types and Temperature ranges, Power supplies, Op-amp Block Diagram, ideal and practical Op-amp Specifications, DC and AC characteristics, 741 op-amp & its features, Op-Amp parameters & Measurement, Input & Out put Off set voltages & currents, slew rate, CMRR, PSRR, drift, Frequency Compensation techniques.

#### UNIT III

**LINEAR and NON-LINEAR APPLICATIONS OF OP-AMPS:** Inverting and Noninverting amplifier, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier, V to I, I to V converters, Buffers. Non- Linear function generation, Comparators, Multivibrators, Triangular and Square wave generators, Log and Anti log Amplifiers, Precision rectifiers.

## UNIT IV

ACTIVE FILTERS, ANALOG MULTIPLIERS AND MODULATORS: Design & Analysis of Butterworth active filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters.

Four Quadrant Multiplier, IC 1496, Sample & Hold circuits.

## UNIT V

**TIMERS & PHASE LOCKED LOOPS**: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger; PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of PLL – frequency multiplication, frequency translation, AM, FM & FSK demodulators. Applications of VCO (566).

## UNIT VI

**DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS:** Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC.DAC and ADC Specifications, Specifications AD 574 (12 bit ADC).

## **TEXT BOOKS:**

- 1. Linear Integrated Circuits D. Roy Choudhury, New Age International (p) Ltd, 2nd Edition,2003.
- 2. Op-Amps & Linear ICs Ramakanth A. Gayakwad, PHI,1987.
- 3. Operational Amplifiers-C.G. Clayton, Butterworth & Company Publ. Ltd./Elsevier, 1971

## **REFERENCES** :

- Operational Amplifiers & Linear Integrated Circuits –Sanjay Sharma ;SK Kataria &Sons;2<sup>nd</sup> Edition,2010
- 2. Design with Operational Amplifiers & Analog Integrated Circuits Sergio Franco, McGraw Hill, 1988.
- 3. OP AMPS and Linear Integrated Circuits concepts and Applications, James M Fiore, Cenage Learning India Ltd.
- 4. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin & Fredrick Driscoll, PHI, 6th Edition.
- 5. Operational Amplifiers & Linear ICs David A Bell, Oxford Uni. Press, 3rd Edition

## OUTCOMES

- Design circuits using operational amplifiers for various applications.
- □Analyze and design amplifiers and active filters using Op-amp.
- Diagnose and trouble-shoot linear electronic circuits.
- Understand the gain-bandwidth concept and frequency response of the amplifier configurations.
- Understand thoroughly the operational amplifiers with linear integrated circuits.

## POWER SYSTEM OPERATION AND CONTROL

#### **Preamble:**

This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control and reactive power control.

#### **Learning Objectives:**

- To understand optimal dispatch of generation with and without losses.
- To study the optimal scheduling of hydro thermal systems.
- To study the optimal unit commitment problem.
- To study the load frequency control for single area system with and without controllers
- .To study the load frequency control for two area system with and without controllers
- To understand the reactive power control and compensation of transmission lines.

#### UNIT-I:

#### **Economic Operation of Power Systems**

Optimal operation of Generators in Thermal power stations, – Heat rate curve – Cost Curve – Incremental fuel and Production costs – Input–output characteristics – Optimum generation allocation with line losses neglected – Optimum generation allocation including the effect of transmission line losses – Loss Coefficients – General transmission line loss formula.

## UNIT-II:

#### Hydrothermal Scheduling

Optimal scheduling of Hydrothermal System: Hydroelectric power plant models – Scheduling problems – Short term hydrothermal scheduling problem.

## UNIT-III:

#### Unit Commitment

Optimal unit commitment problem – Need for unit commitment – Constraints in unit commitment – Cost function formulation – Solution methods – Priority ordering – Dynamic programming.

#### UNIT-IV:

#### Load Frequency Control-I

Modeling of steam turbine – Generator – Mathematical modeling of speed governing system – Transfer function – Modeling of Hydro turbine –Necessity of keeping frequency constant – Definitions of Control area – Single area control system – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case. Proportional plus Integral control of single area and its block diagram representation – Steady state response.

#### UNIT-V:

#### Load Frequency Control-II

Block diagram development of Load Frequency Control of two area system uncontrolled case and controlled case. Tie-line bias control. Load Frequency Control and Economic dispatch control.

## UNIT-VI: Reactive Power Control

Overview of Reactive Power control – Reactive Power compensation in transmission systems – Advantages and disadvantages of different types of compensating equipment for transmission systems – Load compensation – Specifications of load compensator – Uncompensated and compensated transmission lines: Shunt and series compensation – Need for FACTS controllers.

## **Learning Outcomes:**

- Able to compute optimal scheduling of Generators.
- Able to understand hydrothermal scheduling.
- Understand the unit commitment problem.
- Able to understand importance of the frequency.
- Understand importance of PID controllers in single area and two area systems.
- Will understand reactive power control and compensation for transmission line.

## **Text Books:**

- 1. Electric Energy systems Theory by O.I.Elgerd, Tata McGraw-hill Publishing Company Ltd., Second edition.
- 2. Modern Power System Analysis by I.J.Nagrath&D.P.Kothari Tata McGraw Hill Publishing Company Ltd, 2nd edition.

- 1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma., Thompson, 3<sup>rd</sup>Edition.
- 2. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
- 3. Power System Analysis by HadiSaadat TMH Edition.
- 4. Power System stability & control, PrabhaKundur, TMH

#### **IV Year – I SEMESTER**

L	Т	Р	С
4	0	0	3

#### SWITCHGEAR AND PROTECTION

#### **Preamble:**

In order to supply power from generating end to receiving end several equipments are connected in to the system. In order to protect the equipments and components against various operating conditions and over voltages protective devices are required to be installed in the system. Topics specified in this subject deal with various types of protective equipments and their working principle including limitations etc.

#### Learning objectives:

- To provide the basic principles and operation of various types of circuit breakers.
- To study the classification, operation and application of different types of electromagnetic protective relays.
- To explain protective schemes, for generator and transformers.
- To impart knowledge of various protective schemes used for feeders and bus bars.
- To explain the principle and operation of different types of static relays.
- To study different types of over voltages in a power system and principles of different protective schemes for insulation co-ordination.

#### UNIT-I:

#### **Circuit Breakers**

Miniature Circuit Breaker(MCB)– Elementary principles of arc interruption– Restriking Voltage and Recovery voltages– Restriking phenomenon - RRRV– Average and Max. RRRV– Current chopping and Resistance switching– Introduction to oil circuit breakers– Description and operation of Air Blast– Vacuum and SF6 circuit breakers– CB ratings and specifications– Concept of Auto reclosing.

#### UNIT-II:

#### **Electromagnetic Protection**

Relay connection – Balanced beam type attracted armature relay - induction disc and induction cup relays–Torque equation - Relays classification–Instantaneous– DMT and IDMT types– Applications of relays: Over current and under voltage relays– Directional relays– Differential relays and percentage differential relays– Universal torque equation– Distance relays: Impedance– Reactance– Mho and offset mho relays– Characteristics of distance relays and comparison.

#### UNIT-III:

#### **Generator Protection**

Protection of generators against stator faults– Rotor faults and abnormal conditions– restricted earth fault and inter turn fault protection– Numerical examples.

#### **Transformer Protection**

Protection of transformers: Percentage differential protection– Design of CT's ratio– Buchholz relay protection–Numerical examples.

#### UNIT-IV:

#### Feeder and Bus bar Protection

Protection of lines: Over currentProtection schemes – PSM,TMS - Numerical examples - Carrier current and three zone distance relay using impedance relays–Protection of bus bars by using Differential protection.

## UNIT-V:

## **Static and Digital Relays**

Static relays: Static relay components- Static over current relays- Static distance relay-Micro processor based digital relays

## UNIT-VI:

## Protection against over voltage and grounding

Generation of over voltages in power systems– Protection against lightning over voltages– Valve type and zinc oxide lighting arresters– Insulation coordination– BIL– impulse ratio– Standard impulse test wave– volt-time characteristics– Grounded and ungrounded neutral systems–Effects of ungrounded neutral on system performance– Methods of neutral grounding: Solid–resistance–Reactance–Arcing grounds and grounding Practices.

#### **Learning Outcomes:**

- Able to understand the principles of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, SF<sub>6</sub> gas type.
- Ability to understand the working principle and operation of different types of electromagnetic protective relays.
- Students acquire knowledge of faults and protective schemes for high power generator and transformers.
- Improves the ability to understand various types of protective schemes used for feeders and bus bar protection.
- Able to understand different types of static relays and their applications.
- Able to understand different types of over voltages and protective schemes required for insulation co–ordination.

#### **Text Books:**

- 1. Power System Protection and Switchgear by Badari Ram and D.N Viswakarma, TMH Publications
- 2. Power system protection- Static Relays with microprocessor applications.by
- T.S.MadhavaRao,TMH

## **Reference Books:**

1.Fundamentals of Power System Protection by Paithankar and S.R.Bhide.,PHI, 2003.

- 2. Art & Science of Protective Relaying by C R Mason, Wiley Eastern Ltd.
- 3. Protection and SwitchGear by BhaveshBhalja, R.P. Maheshwari, NileshG.Chothani, Oxford University Press, 2013

## ELECTRICAL MACHINE MODELING & ANALYSIS (Elective-I)

## **Preamble:**

Electrical Motor is one of the main components of electrical drive. So, in order to develop control strategies for electrical motor drives, it is very essential to have complete knowledge on modeling of electrical machines.

#### Learning Objectives

- Establish unified theory of rotating machines.
- To understand the concept of phase transformation.
- Analyze different electrical machines for improved performance through modification of their characteristics.
- Develop concepts on mathematical modeling of electrical machines.

## UNIT – I

#### **Basic concepts of Modeling**

Basic Two-pole Machine representation of Commutator machines, 3-phase synchronous machine with and without damper bars and 3-phase induction machine, Kron's primitiveMachine-voltage, current and Torque equations.

## UNIT – II

## **DC Machine Modeling**

Mathematical model of separately excited D.Cmotor – Steady State analysis-Transient State analysis-Suddenapplication of Inertia Load-Transfer function of Separately excited D.C Motor- Mathematical model of D.C Series motor, Shunt motor-Linearization Techniques for small perturbations.

## UNIT- III

#### Reference frame theory & Modeling of single phase InductionMachines

Linear transformation-Phase transformation - three phase totwo phase transformation (abc to dq0) and two phase to three phasetransformation dq0 to abc -Power equivalence-Mathematical modeling of single phase induction machines.

#### UNIT – IV

#### **Modeling of three phase Induction Machine**

Generalized model inarbitrary reference frame-Electromagnetic torque-Derivation of commonly used Induction machine models- Stator reference framemodel-Rotor reference frame model-Synchronously rotating referenceframe model-state space model with flux linkages as variables.

#### UNIT –V

## **Modeling of Synchronous Machine**

Synchronous machine inductances–voltage equations in the rotor's dq0 reference frameelectromagnetic orque-current in terms of flux linkages-three synchronous machinemodel.

## UNIT –IV

## **Modeling of Special Machines**

Modeling of PM Synchronous motor, modeling of BLDC motor, modeling of Switched Reluctance motor.

## Learning Outcomes:

After completion of this course, students will be able to

- Develop modeling of dc machine
- Apply mathematical modeling concepts to 3-phase Induction machines
- Design control strategies based on dynamic modeling of 3-ph Induction machines and 3-phase synchronous machine.
- Analyze BLDC Machine and switched reluctance machine based on mathematical modeling of BLDCM and SRM.

#### **Text Books:**

- 1. Generalized theory of Electrical Machinery –P.S.Bimbra- Khanna Publishers.
- 2. Electric Motor Drives Modeling, Analysis& control -R.Krishnan- Pearson Publications-1st edition -2002.

- 1. Analysis of Electrical Machinery and Drive systems P.C.Krause, OlegWasynczuk, Scott D.Sudhoff Second Edition-IEEE Press.
- 2. Dynamic simulation of Electric machinery using Matlab / Simulink CheeMunOng-PHI.
- 3. Modern Power Electronics and AC Drives-B.K. Bose PHI

## ADVANCED CONTROL SYSTEMS

## **Preamble:**

This subject aims to study state space, describing function, phase plane and stability analysis including controllability and observability. It also deals with modern control and optimal control systems.

#### Learning Objectives:

- Review of the state space representation of a control system: Formulation of different models from the signal flow graph, diagonalization.
- To introduce the concept of controllability and observability. Design by pole placement technique.
- Analysis of a nonlinear system using Describing function approach and Phase plane analysis.
- The Lypanov's method of stability analysis of a system.
- Formulation of Euler Laugrange equation for the optimization of typical functionals and solutions.
- Formulation of linear quadratic optimal regulator (LQR) problem by parameter adjustment and solving riccatti equation.

## UNIT – I:

#### State space analysis

State Space Representation – Solution of state equation – State transition matrix, –Canonical forms – Controllable canonical form – Observable canonical form, Jordan Canonical Form.

## UNIT – II:

## Controllability, observability and design of pole placement

Tests for controllability and observability for continuous time systems – Time varying case – Minimum energy control – Time invariant case – Principle of duality – Controllability and observability form Jordan canonical form and other canonical forms – Effect of state feedback on controllability and observability – Design of state feedback control through pole placement.

#### UNIT – III:

#### **Describing function analysis**

Introduction to nonlinear systems, Types of nonlinearities, describing functions, Introduction to phase–plane analysis.

## UNIT-IV:

#### **Stability analysis**

Stability in the sense of Lyapunov – Lyapunov's stability and Lypanov's instability theorems – Direct method of Lyapunov for the linear and nonlinear continuous time autonomous systems.

#### UNIT-V:

#### **Calculus of variations**

Minimization of functional of single function – Constrained minimization – Minimum principle – Control variable inequality constraints – Control and state variable inequality constraints – Euler lagrangine equation.

## UNIT –VI:

## **Optimal control**

Linear Quadratic Optimal Regulator (LQR) problem formulation – Optimal regulator design by parameter adjustment (Lyapunov method) – Optimal regulator design by Continuous Time Algebraic Riccatti equation (CARE) - Optimal controller design using LQG framework.

## **Learning Outcomes:**

- State space representation of control system and formulation of different state models are reviewed.
- Able to design of control system using the pole placement technique is given after introducing the concept of controllability and observability.
- Able to analyse of nonlinear system using the describing function technique and phase plane analysis.
- Able to analyse the stability analysis using lypnov method.
- Minimization of functionals using calculus of variation studied.
- Able to formulate and solve the LQR problem and riccatti equation.

#### **Text Books:**

- 1. Modern Control Engineering by K. Ogata, Prentice Hall of India, 3rd edition, 1998
- 2. Automatic Control Systems by B.C. Kuo, Prentice Hall Publication

- 1. Modern Control System Theory by M. Gopal, New Age International Publishers, 2nd edition,1996
- 2. Control Systems Engineering by I.J. Nagarath and M.Gopal, New Age International (P) Ltd.
- 3. Digital Control and State Variable Methods by M. Gopal, Tata McGraw– Hill Companies, 1997.
- 4. Systems and Control by Stainslaw H. Zak, Oxford Press, 2003.
- 5. Optimal control theory: an Introduction by Donald E.Kirk by Dover publications.
### **PROGAMMABLE LOGIC CONTROLLERS & APPLICATIONS**

**Preamble:**IN most of the industry applications, computer control is gaining importance, PLC is a industry computer, hence this course PLC makes the students to acquire knowledge required for industry.

### Learning Objectives:

- To have knowledge on PLC.
- To acquire the knowledge on programming of PLC.
- To understand different PLC registers and their description.
- To have knowledge on data handling functions of PLC.
- To know how to handle analog signal and converting of A/D in PLC.

### Unit I:

### Introduction

PLC Basics: PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of PLC ladder diagrams, devices connected to I/O modules.

### Unit II:

### **PLC Programming**

PLC Programming: Input instructions, outputs, operational procedures, programming examples using contacts and coils. Digital logic gates, programming in the Boolean algebra system, conversion examples. Ladder diagrams and sequence listings, ladder diagram construction.

#### **Unit III:**

### **Programmable Timers and Counters**

Timer instructions – On delay time instruction – Off delay timer instruction – Retentive timer – Counter instructions – Up counter – Down counter - Cascading counters - Incremental encoder – Counter applications – Combining counter and timer functions.

#### Unit IV:

#### **Program Control Instructions**

Master control reset instruction – Jump instructions and sub routines – Immediate input and output instructions.

### Unit V:

#### **Other Instructions**

Data manipulation – Data transfer operation – Data compare instruction – Data manipulation programs – Numerical data I/O interfaces – Math instructions – Addition, subtraction, multiplication & division instruction – Sequential instructions – Sequence programs – Shift registers – Word shift registers.

# Unit VI:

### Applications

Control of water level indicator – Alarm monitor - Conveyor motor control – Parking garage – Ladder diagram for process control – PID controller.

LearningOutcomes: After completion of the course, students are able to:

- Understand the PLCs and their I/O modules.
- Develop control algorithms to PLC using ladder logic.
- Manage PLC registers for effective utilization in different applications.
- Design PID controller with PLC.

# **Text Books:**

- 1. Programmable logic controllers by Frank D.Petruzella- McGraw Hill  $-3^{rd}$  Edition.
- 2. Programmable Logic Controllers Principle and Applications by John W. Webb and Ronald A. Reiss, Fifth Edition, PHI

- 1. Programmable Logic Controllers Programming Method and Applications by JR. Hackworth and F.D Hackworth Jr. Pearson, 2004.
- 2. Introduction to Programmable Logic Controllers- Gary Dunning-Cengage Learning.
- 3. Programmable Logic Controllers -W.Bolton-Elsevier publisher

### INSTRUMENTATION (Elective – I)

#### **Preamble:**

Electrical and Electronic Instrumentation plays a key role in the industry. With the advancement of technology day to day manual maintenance is replaced by simply monitoring using various instruments. Thus this course plays very important role in overall maintenance of the industry.

### Learning Objectives:

- To study various types of signals and their representation.
- To study various types of transducers: Electrical, Mechanical, Electromechanical, Optical etc.
- To study and measure the various types of Non–electrical quantities.
- To study various types of digital voltmeters
- To study the working principles of various types of oscilloscopes and their applications.
- To study various types of signal analyzers.

### UNIT-I:

### Signals and their representation

Measuring Systems, Performance Characteristics, – Static characteristics – Dynamic Characteristics – Errors in Measurement – Gross Errors – Systematic Errors – Statistical analysis of random errors – Signal and their representation – Standard test, periodic, aperiodic, modulated signal – Sampled data pulse modulation and pulse code modulation.

### UNIT-II:

#### Transducers

Definition of transducers – Classification of transducers – Advantages of Electrical transducers – Characteristics and choice of transducers – Principle operation of resistor, inductor, LVDT and capacitor transducers – LVDT Applications – Strain gauge and its principle of operation – Guage factor – Thermistors – Thermocouples – Synchros – Piezo electric transducers – Photo diodes.

### UNIT-III:

#### **Measurement of Non–Electrical Quantities**

Measurement of strain – Gauge Sensitivity – Displacement – Velocity – Angular Velocity – Acceleration – Force – Torque – Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level.

# UNIT-IV:

#### **Digital Voltmeters**

Digital voltmeters – Successive approximation, ramp, dual–Slope integration continuous balance type – Microprocessor based ramp type – DVM digital frequency meter – Digital phase angle meter.

#### UNIT-V:

#### Oscilloscope

Cathode ray oscilloscope – Time base generator – Horizantal and vertical amplifiers – Measurement of phase and frequency – Lissajous patterns – Sampling oscilloscope – Analog and digital type data logger – Transient recorder.

#### UNIT–VI: Signal Analyzers

Wave Analyzers – Frequency selective analyzers – Heterodyne – Application of Wave analyzers – Harmonic Analyzers – Total Harmonic distortion – Spectrum analyzers – Basic spectrum analyzers – Spectral displays – Vector impedance meter – Q meter – Peak reading and RMS voltmeters.

### Learning Outcomes:

- Able to represent various types of signals .
- Acquire proper knowledge to use various types of Transducers.
- Able to monitor and measure various parameters such as strain, velocity, temperature, pressure etc.
- Acquire proper knowledge and working principle of various types of digital voltmeters.
- Able to measure various parameter like phase and frequency of a signal with the help of CRO.
- Acquire proper knowledge and able to handle various types of signal analyzers.

#### **Text Books:**

- 1. Electronic Instrumentation-by H.S.Kalsi Tata MCGraw-Hill Edition, 1995.
- 2. A course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpatrai& Co.

- 1. Measurement and Instrumentation theory and application, Alan S.Morris and Reza Langari, Elsevier
- 2. Measurements Systems, Applications and Design by D O Doeblin
- 3. Principles of Measurement and Instrumentation by A.S Morris, Pearson/ Prentice Hall ofIndia
- 4. Modern Electronic Instrumentation and Measurement techniques by A.D HelfrickandW.D.Cooper, Pearson/Prentice Hall of India.
- 4. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India.

### IV Year – I SEMESTER

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### **OPTIMIZATION TECHNIQUES** (Elective – II)

### **Preamble:**

Optimization techniques have gained importance to solve many engineering design problems by developing linear and nonlinear mathematical models. The aim of this course is to educate the student to develop a mathematical model by defining an objective function and constraints in terms of design variables and then apply a particular mathematical programming technique. This course covers classical optimization techniques, linear programming, nonlinear programming and Genetic & Partial Swarm Optimization algorithms.

### Learning Objectives:

- To define an objective function and constraint functions in terms of design variables, and then state the optimization problem.
- To state single variable and multi variable optimization problems, without and with constraints.
- To explain linear programming technique to an optimization problem, define slack and surplus variables, by using Simplex method.
- To study and explain nonlinear programming techniques, unconstrained or constrained, and define exterior and interior penalty functions for optimization problems.
- To introduce evolutionary programming techniques.
- To introduce basic principles of Genetic Algorithms and Partial Swarm Optimization methods.

#### UNIT – I:

### **Introduction and Classical Optimization Techniques:**

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

### UNIT – II:

### **Classical Optimization Techniques**

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints.Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

#### UNIT – III:

### **Linear Programming**

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm - Duality in Linear Programming – Dual Simplex method.

# UNIT – IV:

### Nonlinear Programming:

**Unconstrained cases -** One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method - Univariate method, Powell's method and steepest descent method.

**Constrained cases -** Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods.Introduction to convex Programming Problem.

### UNIT – V:

### **Introduction to Evolutionary Methods:**

Evolutionary programming methods - Introduction to Genetic Algorithms (GA)– Control parameters –Number of generation, population size, selection, reproduction, crossover and mutation – Operator selection criteria – Simple mapping of objective function to fitness function – constraints – Genetic algorithm steps – Stopping criteria –Simple examples.

### UNIT – VI:

### **Introduction to Swarm Intelligence Systems:**

Swarm intelligence programming methods - Basic Partial Swarm Optimization – Method – Characteristic features of PSO procedure of the global version – Parameters of PSO (Simple PSO algorithm – Operators selection criteria – Fitness function constraints) – Comparison with other evolutionary techniques – Engineering applications of PSO.

### **Learning Outcomes:**

The student should be able to:

- State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.
- Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.
- Formulate a mathematical model and apply linear programming technique by using Simplex method. Also extend the concept of dual Simplex method for optimal solutions.
- Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions.
- Able to apply Genetic algorithms for simple electrical problems.
- Able to solve practical problems using PSO.

### **Text Books**

- 1. "Engineering optimization: Theory and practice"-by S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
- 2. Soft Computing with Matlab Programming by N.P.Padhy&S.P.Simson, Oxford University Press 2015

- 1. "Optimization methods in operations Research and Systems Analysis" by K.V.Mital and C.Mohan, New Age International (P) Limited, Publishers, 3<sup>rd</sup> edition, 1996.
- 2. Genetic Algorithms in search, optimization, and Machine Learning by David E.Goldberg,ISBN:978-81-7758-829-3, Pearsonby Dorling Kindersley (India) Pvt. Ltd.
- 3. "Operations Research: An Introduction" by H.A.Taha, PHI pvt. Ltd., 6<sup>th</sup> edition.
- 4. Linear Programming by G.Hadley.

### **ELECTRIC POWER QUALITY**

### **Preamble:**

Power quality is a major problem for utilities and customers. Customers using sensitive critical loads need quality power for proper operation of the electrical equipment. It is important for the student to learn the power quality issues and improvement measures provided by the utility companies. This course covers the topics on voltage and current imperfections, harmonics, voltage regulation, power factor improvement, distributed generation, power quality monitoring and measurement equipment.

### **Learning Objectives:**

- To learn different types of power quality phenomena.
- To identify sources for voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
- To describe power quality terms and study power quality standards.
- To learn the principle of voltage regulation and power factor improvement methods.
- To explain the relationship between distributed generation and power quality.
- To understand the power quality monitoring concepts and the usage of measuring instruments.

### **Unit–I:Introduction**

Overview of power quality – Concern about the power quality – General classes of power quality and voltage quality problems – Transients – Long–duration voltage variations – Short–duration voltage variations – Voltage unbalance – Waveform distortion – Voltage fluctuation – Power frequency variations.

### Unit-II:Voltage imperfections in power systems

Power quality terms – Voltage sags – Voltage swells and interruptions – Sources of voltage sag, swell and interruptions – Nonlinear loads – IEEE and IEC standards. Source of transient over voltages – Principles of over voltage protection – Devices for over voltage protection – Utility capacitor switching transients.

### **Unit–III: Voltage Regulation and power factor improvement:**

Principles of regulating the voltage – Device for voltage regulation – Utility voltage regulator application – Capacitor for voltage regulation – End–user capacitor application – Regulating utility voltage with distributed resources – Flicker – Power factor penalty – Static VAR compensations for power factor improvement.

### **Unit- IV: Harmonic distortion and solutions**

Voltagedistortion vs. Current distortion – Harmonics vs. Transients – Harmonic indices – Sources of harmonics – Effect of harmonic distortion – Impact of capacitors, transformers, motors and meters – Point of common coupling – Passive and active filtering – Numerical problems.

### **Unit–V: Distributed Generation and Power Quality**

Resurgence of distributed generation – DG technologies – Interface to the utility system – Power quality issues and operating conflicts – DG on low voltage distribution networks.

### **Unit-VI : Monitoring and Instrumentation**

Power quality monitoring and considerations – Historical perspective of PQ measuring instruments – PQ measurement equipment – Assessment of PQ measuring data – Application of intelligent systems – PQ monitoring standards.

### **Learning Outcomes:**

At the end of this course the student should be able to

- Differentiate between different types of power quality problems.
- Explain the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
- Analyze power quality terms and power quality standards.
- Explain the principle of voltage regulation and power factor improvement methods.
- Demonstrate the relationship between distributed generation and power quality.
- Explain the power quality monitoring concepts and the usage of measuring instruments.

### **Textbooks:**

- 1. Electrical Power Systems Quality, Dugan R C, McGranaghan M F, Santoso S, and Beaty H W, Second Edition, McGraw–Hill, 2012, 3<sup>rd</sup> edition.
- 2. Electric power quality problems -M.H.J.Bollen IEEE series-Wiley India publications, 2011.

- 1. Power Quality Primer, Kennedy B W, First Edition, McGraw-Hill, 2000.
- 2. Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M HJ, First Edition, IEEE Press; 2000.
- 3. Power System Harmonics, Arrillaga J and Watson N R, Second Edition, John Wiley & Sons, 2003.
- 4. Electric Power Quality control Techniques, W. E. Kazibwe and M. H. Sendaula, Van Nostrad Reinhold, New York.
- 5. Power Quality c.shankaran, CRC Press, 2001
- 6. Harmonics and Power Systems Franciso C.DE LA Rosa–CRC Press (Taylor & Francis)
- 7. Power Quality in Power systems and Electrical Machines–EwaldF.fuchs, Mohammad A.S. Masoum–Elsevier.

### SPECIAL ELECTRICAL MACHINES

### **Preamble:**

This is an advanced course on electrical machines. Students will be exposed to various special machines which are gaining importance in industry. This course covers topics related to principles, performance and applications of these special machines including switched reluctance motors, stepper motors, permanent magnet dc motors and linear motors.

#### Learning Objective:

- To explain theory of operation and control of switched reluctance motor.
- To explain the performance and control of stepper motors, and their applications.
- To describe the operation and characteristics of permanent magnet dc motor.
- To distinguish between brush dc motor and brush less dc motor.
- To explain the theory of travelling magnetic field and applications of linear motors.

#### Unit I:

### Permanent magnet materials and PMDC motors

Introduction-classification of permanent magnet materials used in electrical machines-minor hysteresis loop and recoil line-Stator frames of conventional dc machines-Development of electronically commutated dc motor from conventional dc motor-Permanent-magnet materials and characteristics-B-H loop and demagnetization characteristics-Temperature effects: reversible and irreversible losses-high temperature effects-reversible losses-Irreversible losses recoverable by magnetization-Mechanical properties, handling and magnetization-Application of permanent magnets in motors-power density-operating temperature range-severity of operation duty.

#### Unit II:

#### **Stepper Motors**

Classification of stepper motors – Hybrid and Variable Reluctance Motor (VRM) - Construction and principle of hybid type synchronous stepper motor – Different configuration for switching the phase windings control circuits for stepper motors – Open loop and closed loop control of 2-phase hybrid stepping motor.

Construction and principle of operation of Variable Reluctance Motor (VRM) – Single stack and multiple stack – Open loop control of 3- phase VR Stepper Motor- Applications.

#### Unit III:

#### **Switched Reluctance Motors**

Construction – Comparison of conventional and switched reluctance motors – Design of stator and rotor pole arcs – Torque producing principle and torque expression – Different converter configurations for SRM – Drive and power circuits for SRM – Position sensing of rotor – Applications of SRM.

#### Unit IV:

#### **Square Wave Permanent Magnet Brushless DC Motor**

Types of constructions – Surface mounted and interior type permanent magnet – Principle of operation of BLDC motor. Torque and EMF equations – Torque speed characteristics – Performance and efficiency- Square wave brushless motors with  $120^{\circ}$  and  $180^{\circ}$  magnetic areas commutation.

# Unit V:

### Sine wave Permanent Magnet Brushless Motor

Torque and EMF equations – Phasor Diagram – Circle diagram – Torque/speed characteristics – Comparison between square wave and sine wave permanent magnet motors - Applications.

### Unit VI:

### Linear Induction Motors (LIM)

Construction– principle of operation–Double sided LIM from rotating type Induction Motor – Schematic of LIM drive for traction – Development of one sided LIM with back iron-equivalent circuit of LIM.

### **Learning Outcomes:**

The student should be able to

- Distinguish between brush dc motor and brush less dc motor.
- Explain the performance and control of stepper motors, and their applications.
- Explain theory of operation and control of switched reluctance motor.
- Explain the theory of travelling magnetic field and applications of linear motors.
- Understand the significance of electrical motors for traction drives.

### **Text Books:**

- 1. Brushless Permanent magnet and reluctance motor drives, Clarenden press, T.J.E. Miller, 1989, Oxford.
- 2. Special electrical Machines, K.VenkataRatnam, University press, 2009, New Delhi.

### **IV Year – I SEMESTER**

### ELECTRICAL SIMULATION LAB

#### Learning objectives:

- To simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full convertor and PWM inverter.
- To simulate transmission line by incorporating line, load and transformer models.
- To perform transient analysis of RLC circuit and single machine connected to infinite bus(SMIB).

### Following experiments are to be conducted:

- 1. Simulation of transient response of RLC circuits
  - a. Response to pulse input
  - b. Response to step input
  - c. Response to sinusoidal input
- 2. Analysis of three phase circuit representing the generator transmission line and load. Plot three phase currents & neutral current .
- 3. Simulation of single-phase full converter using RLE loads and single phase AC voltage controller using RL loads
- 4. Plotting of Bode plots, root locus and nyquist plots for the transfer functions of systems up to 5<sup>th</sup> order
- 5. Simulation of Boost and Buck converters.
- 6. Integrator & Differentiator circuits using op-amp.
- 7. Simulation of D.C separately excited motor using transfer function approach.

### Any 2 of the following experiments are to be conducted:

- 1. Modeling of transformer and simulation of lossy transmission line.
- 2. Simulation of single phase inverter with PWM control.
- 3. Simulation of three phase full converter using MOSFET and IGBTs.
- 4. Transient analysis of single machine connected to infinite bus(SMIB).

#### Learning outcomes:

- Able to simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full convertor and PWM inverter.
- Able to simulate transmission line by incorporating line, load and transformer models.
- Able to perform transient analysis of RLC circuit and single machine connected to infinite bus(SMIB).

- 1. "Simulation of Power Electronic Circuit", by M.B.patil, V.Ramanarayan, V.T.Ranganathan.Narosha, 2009.
- 2. Pspice for circuits and electronics using PSPICE by M.H.Rashid, M/s PHI Publications
- 3. Pspice A/D user`s manual Microsim, USA
- 4. Pspice reference guide Microsim, USA
- 5. MATLAB user's manual Mathworks, USA
- 6. MATLAB control system tool box Mathworks, USA
- 7. SIMULINK user's manual Mathworks, USA
- 8. EMTP User`s Manual.
- 9. SEQUEL- A public domain circuit simulator available at <u>www.ee.iitb.ac.in/~sequel</u>

#### IV Year – I SEMESTER

L	Т	Р	С
0	0	3	2

#### POWER SYSTEMS LAB

#### **Learning Objectives:**

To impart the practical knowledge of functioning of various power system components and determination of various parameters and simulation of load flows, transient stability, LFC and Economic dispatch.

#### Any 10 of the Following experiments are to be conducted:

- 1. Sequence impedances of 3 phase Transformer.
- 2. Sequence impedances of 3 phase Alternator by Fault Analysis.
- 3. Sequence impedances of 3 phase Alternator by Direct method.
- 4. ABCD parameters of Transmission line.
- 5. Power Angle Characteristics of 3phase Alternator with infinite bus bars.
- 6. Dielectric strength of Transformer oil.
- 7. Calibration of Tong Tester.
- 8 Load flow studies using Gauss-seidel method
- 9. Load flow studies using N-R method.
- 10. Transient Stability Analysis
- 11. Load frequency control with & without control
- 12. Load frequency control with control
- 13. Economic load dispatch with & without losses
- 14. Economic load dispatch with losses.

#### **Learning Outcomes:**

The student is able to determine the parameters of various power system components which are frequently occur in power system studies and he can execute energy management systems functions at load dispatch center.

### **IV Year – II SEMESTER**

L	Т	Р	С
4	0	0	3

### DIGITAL CONTROL SYSTEMS

#### **Preamble:**

In recent years digital controllers have become popular due to their capability of accurately performing complex computations at high speeds and versatility in leading nonlinear control systems. In this context, this course focuses on the analysis and design of digital control systems.

#### Learning objectives:

- To understand the concepts of digital control systems and assemble various components associated with it. Advantages compared to the analog type.
- The theory of z-transformations and application for the mathematical analysis of digital control systems.
- To represent the discrete-time systems in state-space model and evaluation of state transition matrix.
- To examine the stability of the system using different tests.
- To study the conventional method of analyzing digital control systems in the w-plane.
- To study the design of state feedback control by "the pole placement method."

### UNIT – I:

#### Introduction and signal processing

Introduction to analog and digital control systems – Advantages of digital systems – Typical examples – Signals and processing – Sample and hold devices – Sampling theorem and data reconstruction – Frequency domain characteristics of zero order hold.

#### UNIT-II:

#### z-transformations

z-Transforms – Theorems – Finding inverse z-transforms – Formulation of difference equations and solving – Block diagram representation – Pulse transfer functions and finding open loop and closed loop responses.

#### UNIT-III:

#### State space analysis and the concepts of Controllability and observability

State space representation of discrete time systems – State transition matrix and methods of evaluation – Discretization of continuous – Time state equations – Concepts of controllability and observability – Tests(without proof).

### UNIT – IV:

#### Stability analysis

Mapping between the s–Plane and the z–Plane – Primary strips and Complementary strips – Stability criterion – Modified Routh's stability criterion and Jury's stability test.

#### UNIT – V:

#### Design of discrete-time control systems by conventional methods

Transient and steady state specifications – Design using frequency response in the w–plane for lag and lead compensators – Root locus technique in the z–plane.

# UNIT – VI:

### State feedback controllers:

Design of state feedback controller through pole placement – Necessary and sufficient conditions – Ackerman's formula.

#### Learning outcomes:

- The students learn the advantages of discrete time control systems and the "know how" of various associated accessories.
- The learner understand z-transformations and their role in the mathematical analysis of different systems(like Laplace transforms in analog systems).
- The stability criterion for digital systems and methods adopted for testing the same are explained.
- Finally, the conventional and state space methods of design are also introduced.

#### **Text Book:**

- 1. Discrete–Time Control systems K. Ogata, Pearson Education/PHI, 2nd Edition.
- 2. Digital Control and State Variable Methods by M.Gopal, TMH, 4<sup>th</sup> Edition.

### **Reference Books:**

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.

### **IV Year – II SEMESTER**

L	Т	Р	С
4	0	0	3

#### H.V.D.C. TRANSMISSION

#### **Preamble:**

This subject deals with the importance of HVDC transmission, analysis of HVDC converters, Faults and protections, Harmonics and Filters. It also deals with Reactive power control and Power factor improvements of the system.

#### **Learning Objectives:**

- To Understand basic concepts of HVDC Transmission.
- To analyze the converter configuration.
- To Know the control of converter and HVDC Transmission.
- To Understand the significance of reactive power control and AC/Dc load flow.
- To Know different converter faults, protection and effect of harmonics.
- To leave low pass and high pass filters.

#### UNIT – I

#### **Basic Concepts**

Economics & Terminal equipment of HVDC transmission systems: Types of HVDC Links – Apparatus required for HVDC Systems – Comparison of AC &DC Transmission, Application of DC Transmission System – Planning & Modern trends in D.C. Transmission.

#### UNIT – II

#### **Analysis of HVDC Converters**

Choice of converter configuration – analysis of Graetz – characteristics of 6 pulse & 12 pulse converters –Cases of two 3 phase converters in star –star mode – their performance.

#### UNIT – III

#### **Converter & HVDC System Control**

Principal of DC Link Control – Converters Control Characteristics – Firing angle control – Current and extinction angle control – Effect of source inductance on the system - Starting and stopping of DC link - Power Control.

#### **UNIT-IV**

#### **Reactive Power Control in HVDC**

Reactive Power Requirements in steady state-Conventional control strategies-Alternate control strategiessources of reactive power-AC Filters – shunt capacitors-synchronous condensers.

#### Power Flow Analysis In AC/DC Systems

Modelling of DC Links-DC Network-DC Converter-Controller Equations-Solution of DC loadflow –solution of AC-DC Power flow-Simultaneous method-Sequential method.

#### UNIT-V

#### **Converter Fault & Protection**

Converter faults – protection against over current and over voltage in converter station – surge arresters –smoothing reactors – DC breakers –Audible noise-space charge field-corona effects on DC lines-Radio interference.

#### Harmonics

Generation of Harmonics –Characteristics harmonics, calculation of AC Harmonics, Non-Characteristics harmonics, adverse effects of harmonics – Calculation of voltage & Current harmonics – Effect of Pulse number on harmonics.

# UNIT-VI

Filters

Types of AC filters, Design of Single tuned filters –Design of High pass filters.

# **Learning Outcomes:**

The Student shall be able to

- Learn different types of HVDC levels and basic concepts
- Know the operation of converters
- Acquire control concept of reactive power control and AC/DC load flow.
- Understand converter faults, protection and harmonic effects
- Design low pass and high pass filters

### **Text Books:**

- 1. HVDC Power Transmission Systems: Technology and system Interactions by K.R.Padiyar,New Age International (P) Limited, and Publishers.
- 2. HVDC Transmission by S.Kamakshaiah and V.Kamaraju-Tata McGraw-Hill

- 1. HVDC Transmission J.Arrillaga.
- 2. Direct Current Transmission by E.W.Kimbark, John Wiley & Sons.
- 3. Power Transmission by Direct Current by E.Uhlmann, B.S.Publications.

#### **IV Year – II SEMESTER**

L	Т	Р	C
4	0	0	3

#### ELECTRICAL DISTRIBUTION SYSTEMS

#### **Preamble:**

This subject deals with the general concept of distribution system, substations and feeders as well as discusses distribution system analysis, protection and coordination, voltage control and power factor improvement.

#### **Learning Objectives**

- To study different factors of Distribution system.
- To study and design the substations and distribution systems.
- To study the concepts of voltage drop and power loss.
- To study the distribution system protection and its coordination.
- To study the effect of compensation for power factor improvement.
- To study the effect of voltage control on distribution system.

#### UNIT – I:

#### **General Concepts**

Introduction to distribution systems, Load modeling and characteristics – Coincidence factor – Contribution factor loss factor – Relationship between the load factor and loss factor – Classification of loads (Residential, commercial, Agricultural and Industrial).

#### UNIT – II:

#### **Substations**

Location of substations: Rating of distribution substation – Service area with 'n'primary feeders – Benefits and methods of optimal location of substations..

#### **Distribution Feeders**

Design Considerations of distribution feeders: Radial and loop types of primary feeders – Voltage levels – Feeder loading – Basic design practice of the secondary distribution system.

#### UNIT – III:

#### System Analysis

Voltage drop and power–loss calculations: Derivation for voltage drop and power loss in lines – Uniformly distributed loads and non-uniformly distributed loads – Numerical problems - Three phase balanced primary lines.

### UNIT – IV:

#### Protection

Objectives of distribution system protection – Types of common faults and procedure for fault calculations for distribution system – Protective devices: Principle of operation of fuses – Circuit reclosures – Line sectionalizes and circuit breakers.

#### Coordination

Coordination of protective devices: General coordination procedure –Various types of coordinated operation of protective devices - Residual Current Circuit Breaker

#### UNIT – V:

#### **Compensation for Power Factor Improvement**

Capacitive compensation for powerfactor control – Different types of power capacitors – shunt and series capacitors – Effect of shunt capacitors (Fixed and switched) – Power factor correction – Capacitor allocation – Economic justification – Procedure to determine the best capacitor location – Numerical problems.

# UNIT – VI:

### Voltage Control

Voltage Control: Equipment for voltage control – Effect of series capacitors – Effect of AVB/AVR – Line drop compensation – Numerical problems.

### Learning Outcomes:

- Able to understand various factors of distribution system.
- Able to design the substation and feeders.
- Able to determine the voltage drop and power loss
- Able to understand the protection and its coordination.
- Able to understand the effect of compensation forp.f improvement.
- Able to understand the effect of voltage control.

### **Text Book:**

1. "Electric Power Distribution system, Engineering" – by TuranGonen, McGraw–hill Book Company.

- 1. Electrical Distribution Systems by Dale R.Patrick and Stephen W.Fardo, CRC press
- 2. Electric Power Distribution by A.S. Pabla, Tata McGraw–hill Publishing company, 4<sup>th</sup> edition, 1997.
- 3. Electrical Power Distribution Systems by V.Kamaraju, Right Publishers.

L	Т	Р	С
4	0	0	3

### HIGH VOLTAGE ENGINEERING (ELECTIVE – III)

#### **Preamble:**

With the growth of power, HV power transmission has become an important subject. The performance of generating equipment requires knowledge of different phenomena occurring at higher voltage. Thus evaluations of various insulating materials are required for protection of HV <u>equipments</u>. Keeping this in view the course is designed to understand various phenomena related to breakdown study and withstand characteristics of insulating materials. The course also describes the generation and measurement of DC, AC and Impulse voltages as well various testing techniques.

### Learning Objectives:

- To understand electric field distribution and computation in different configuration of electrode systems.
- To understand HV breakdown phenomena in gases, liquids and solids dielectrics.
- To acquaint with the generating principle of operation and design of HVDC, AC and Impulse voltages and currents.
- To understand various techniques of AC, DC and Impulse measurement of high voltages and currents.
- To understand the insulating characteristics of dielectric materials.
- To understand the various testing techniques of HV equipments.

#### UNIT-I:

### Introduction to High Voltage Technology

Electric Field Stresses – Uniform and non–uniform field configuration of electrodes – Estimation and control of electric Stress – Numerical methods for electric field computation.

#### UNIT-II:

#### Break down phenomenon in gaseous, liquid and solid insulation

Gases as insulating media – Collision process – Ionization process – Townsend's criteria of breakdown in gases – Paschen's law – Liquid as Insulator – Pure and commercial liquids – Breakdown in pure and commercial liquid – Intrinsic breakdown – Electromechanical breakdown – Thermal breakdown –Breakdown of solid dielectrics, composite dielectrics used in practice.

#### UNIT-III:

#### Generation of High voltages and High currents

Generation of high DC voltages – Generation of high alternating voltages – Generation of impulse voltages and currents – Tripping and control of impulse generators.

#### **UNIT-IV:**

#### Measurement of high voltages and High currents

Measurement of high AC, DC and Impulse voltages – Voltages and measurement of high currents – Direct, alternating and Impulse.

### UNIT-V:

### Non-destructive testing of material and electrical apparatus

Measurement of DC resistivity – Measurement of dielectric constant and loss factor – Partial discharge measurements.

### UNIT-VI:

### High voltage testing of electrical apparatus

Testing of insulators and bushings – Testing of isolators and circuit breakers – Testing of cables – Testing of transformers – Testing of surge arresters – Radio interference measurements.

### **Learning Outcomes:**

- To be acquainted with the performance of high voltages with regard to different configurations of electrode systems.
- To be able to understand theory of breakdown and withstand phenomena of all types of dielectric materials.
- To acquaint with the techniques of generation of AC,DC and Impulse voltages.
- To be able to apply knowledge for measurement of high voltage and high current AC,DC and Impulse.
- To be in a position to measure dielectric property of material used for HV equipment.
- To know the techniques of testing various equipment's used in HV engineering.

### **Text Books:**

- 1. High Voltage Engineering: Fundamentals by E.Kuffel, W.S.Zaengl, J.Kuffel by Elsevier, 2<sup>nd</sup> Edition.
- 2. High Voltage Engineering and Technology by Ryan, IET Publishers.

- 1. High Voltage Engineering by M.S.Naidu and V. Kamaraju TMH Publications, 3rd Edition
- 2. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
- 3. High Voltage Insulation Engineering by RavindraArora, Wolfgang Mosch, New Age International (P)Limited,1995.

### FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS

### **Preamble:**

Flexible Alternating Current Transmission System controllers have become a part of modern power system. It is important for the student to understand the principle of operation of series and shunt compensators by using power electronics. As the heart of many power electronic controllers is a voltage source converter (VSC), the student should be acquainted with the operation and control of VSC. Two modern power electronic controllers are also introduced.

### Learning Objectives:

- To learn the basics of power flow control in transmission lines using FACTS controllers
- To explain operation and control of voltage source converter.
- To understand compensation methods to improve stability and reduce power oscillations of a power system.
- To learn the method of shunt compensation using static VAR compensators.
- To learn the methods of compensation using series compensators
- To explain operation of Unified Power Flow Controller (UPFC).

#### Unit–I:

### **Introduction to FACTS**

Power flow in an AC System – Loading capability limits – Dynamic stability considerations – Importance of controllable parameters – Basic types of FACTS controllers – Benefits from FACTS controllers – Requirements and characteristics of high power devices – Voltage and current rating – Losses and speed of switching – Parameter trade–off devices.

### Unit-II:

#### Voltage source and Current source converters

Concept of voltage source converter(VSC) – Single phase bridge converter – Square–wave voltage harmonics for a single–phase bridge converter – Three–phase full wave bridge converter– Three–phase current source converter – Comparison of current source converter with voltage source converter.

#### Unit-III:

#### Shunt Compensators-1

Objectives of shunt compensation – Mid–point voltage regulation for line segmentation – End of line voltage support to prevent voltage instability – Improvement of transient stability – Power oscillation damping.

#### Unit-IV:

#### Shunt Compensators-2

Thyristor Switched Capacitor(TSC)–Thyristor Switched Capacitor – Thyristor Switched Reactor (TSC–TCR). Static VAR compensator(SVC) and Static Compensator(STATCOM): The regulation and slope transfer function and dynamic performance – Transient stability enhancement and power oscillation damping– Operating point control and summary of compensation control.

#### Unit V: Series Compensators

Static series compensators: Concept of series capacitive compensation – Improvement of transient stability – Power oscillation damping – Functional requirements. GTO thyristor controlled Series Capacitor (GSC) – Thyristor Switched Series Capacitor (TSSC) and Thyristor Controlled Series Capacitor (TCSC).

# Unit–VI:

### **Combined Controllers**

Schematic and basic operating principles of Unified Power Flow Controller (UPFC).– Application on transmission lines.

### Learning Outcomes:

The student should be able to

- Understandpower flow control in transmission lines using FACTS controllers.
- Explain operation and control of voltage source converter.
- Analyze compensation methods to improve stability and reduce power oscillations in the transmission lines.
- Explain the method of shunt compensation using static VAR compensators.
- Understand the methods of compensations using series compensators.
- Explain operation of Unified Power Flow Controller (UPFC).

### **Text Books:**

1. "Understanding FACTS" N.G.Hingorani and L.Guygi, IEEE Press.Indian Edition is available:—Standard Publications, 2001.

- 1. "Flexible ac transmission system (FACTS)" Edited by Yong Hue Song and Allan T Johns, Institution of Electrical Engineers, London.
- 2. Thyristor-based FACTS Controllers for Electrical Transmission Systems, by R.MohanMathur and Rajiv k.Varma, Wiley

# POWER SYSTEM REFORMS (Elective III)

### **Preamble:**

This course introduces the concepts and issues of power system reforms and aims at computation of Available Transfer Capability (ATC), Congestion Management, Electricity Pricing, Ancillary services Management and Power system operation in competitive environment

### **Learning Objectives:**

- To study fundamentals of power system deregulation and restructuring.
- To study available transfer capability.
- To study congestion management
- To study various electricity pricing methods.
- To study operation of power system in deregulated environment.
- To study importance of Ancillary services management.

### UNIT-I

### Over view of key issues in electric utilities

Introduction – Restructuring models – Independent system operator (ISO) – Power Exchange – Market operations – Market Power – Standard cost – Transmission Pricing – Congestion Pricing – Management of Inter zonal/Intra zonal Congestion.

### UNIT-II

### **Available Transfer Capability (ATC)**

Structure of OASIS – Processing of Information – Transfer capability on OASIS – Definitions Transfer Capability Issues – ATC – TTC – TRM – CBM calculations – Methodologies to calculate ATC.

### UNIT-III

#### **Congestion Management**

Introduction to congestion management – Methods to relieve congestion

#### UNIT-IV

### **Electricity Pricing:**

Introduction – Electricity price volatility electricity price indexes – Challenges to electricity pricing – Construction of forward price curves – Short–time price forecasting.

### UNIT-V

### Power system operation in competitive environment:

Introduction – Operational planning activities of ISO – The ISO in pool markets – The ISO in bilateral markets – Operational planning activities of a GENCO.

### UNIT-VI

#### **Ancillary Services Management:**

Introduction – Reactive power as an ancillary service – A review – Synchronous generators as ancillary service providers.

### **Learning Outcomes:**

- Will understand importance of power system deregulation and restructuring.
- Able to compute Available Transfer Capability.
- Will understand transmission congestion management.
- Able to compute electricity pricing in deregulated environment.
- Will be able to understand power system operation in deregulated environment.
- Will understand importance of ancillary services.

# **Text Books:**

- 1. Kankar Bhattacharya, Math H.J. Boller, JaapE.Daalder, 'Operation of Restructured Power System' Kluver Academic Publisher 2001.
- 2. Mohammad Shahidehpour, and Muwaffaqalomoush, "Restructured electrical Power systems" Marcel Dekker, Inc. 2001

- 1. Loi Lei Lai; "Power system Restructuring and Deregulation", Jhon Wiley & Sons Ltd., England.
- 2. Electrical Power Distribution Case studies from Distribution reform, upgrades and Management (DRUM) Program, by USAID/India, TMH