ACADEMIC REGULATIONS & COURSE STRUCTURE

For

VLSI, VLSID, VLSISD

(Applicable for batches admitted from 2016-2017)



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

I Semester

S. No.	Name of the Subject	L	Р	С
1	Digital System Design	4	-	3
2	VLSI Technology and Design	4	-	3
3	CMOS Analog IC Design	4	-	3
4	CMOS Digital IC Design	4	-	3
5	 Elective I 1. Digital Design using HDL 2. Advanced Operating Systems 3 Soft Computing Techniques 4. Cyber Security 	4	-	3
6	 Elective II 1. CPLD and FPGA Architectures and Applications 2. Advanced Computer Architecture 3. Hardware Software Co-Design 	4	-	3
7	Front end VLSI Design Laboratory	-	3	2
	Total Credits			20

II Semester

S. No.	Name of the Subject	L	Р	С
1	CMOS Mixed Signal Circuit Design	4	-	3
2	Embedded System Design	4	-	3
3	Low Power VLSI Design	4	-	3
4	Design For Testability	4	-	3
5	Elective III 1. CAD for VLSI 2. DSP Processors & Architectures 3. VLSI Signal Processing	4	-	3
6	Elective IV1. System on Chip Design2. Optimization Techniques in VLSI Design3. Semiconductor Memory Design and Testing	4	-	3
7	1. Back end VLSI Design Laboratory	-	3	2
	Total Credits			20

III Semester

S. No.	Subject	L	Р	Credits
1	Comprehensive Viva-Voce			2
2	Seminar – I			2
3	Project Work Part – I			16
Total Credits			20	

IV Semester

S. No.	Subject	L	Р	Credits
1	Seminar – II			2
2	Project Work Part - II			18
Total Credits			20	

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I Year I Semester	4	0	3

DIGITAL SYSTEM DESIGN

UNIT-I: Minimization Procedures and CAMP Algorithm

Review on minimization of switching functions using tabular methods, k-map, QM algorithm, CAMP-I algorithm, Phase-I: Determination of Adjacencies, DA, CSC, SSMs and EPCs,, CAMP-I algorithm, Phase-II: Passport checking, Determination of SPC, CAMP-II algorithm: Determination of solution cube, Cube based operations, determination of selected cubes are wholly within the given switching function or not, Introduction to cube based algorithms.

UNIT-II: PLA Design, PLA Minimization and Folding Algorithms

Introduction to PLDs, basic configurations and advantages of PLDs, PLA-Introduction, Block diagram of PLA, size of PLA, PLA design aspects, PLA minimization algorithm(IISc algorithm), PLA folding algorithm(COMPACT algorithm)-Illustration of algorithms with suitable examples.

UNIT -III: Design of Large Scale Digital Systems

Algorithmic state machinecharts-Introduction, Derivation of SM Charts, Realization of SM Chart, control implementation, control unit design, data processor design, ROM design, PAL design aspects, digital system design approaches using CPLDs, FPGAs and ASICs.

UNIT-IV: Fault Diagnosis in Combinational Circuits

Faults classes and models, fault diagnosis and testing, fault detection test, test generation, testing process, obtaining a minimal complete test set, circuit under test methods- Path sensitization method, Boolean difference method, properties of Boolean differences, Kohavi algorithm, faults in PLAs, DFT schemes, built in self-test.

UNIT-V: Fault Diagnosis in Sequential Circuits

Fault detection and location in sequential circuits, circuit test approach, initial state identification, Haming experiments, synchronizing experiments, machine identification, distinguishing experiment, adaptive distinguishing experiments.

TEXT BOOKS:

- 1. Logic Design Theory-N. N. Biswas, PHI
- 2. Switching and Finite Automata Theory-Z. Kohavi , 2nd Edition, 2001, TMH
- 3. Digital system Design using PLDd-Lala

- 1. Fundamentals of Logic Design Charles H. Roth, 5th Ed., Cengage Learning.
- 2. Digital Systems Testing and Testable Design MironAbramovici, Melvin A. Breuer and Arthur D. Friedman- John Wiley & Sons Inc.

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VLSI TECHNOLOGY AND DESIGN

UNIT-I:

VLSI Technology: Fundamentals and applications, IC production process, semiconductor processes, design rules and process parameters, layout techniques and process parameters.

VLSI Design: Electronic design automation concept, ASIC and FPGA design flows, SOC designs, design technologies: combinational design techniques, sequential design techniques, state machine logic design techniques and design issues.

UNIT-II:

CMOS VLSI Design: MOSTechnology and fabrication process of pMOS, nMOS, CMOS and BiCMOS technologies, comparison of different processes.

Building Blocks of a VLSI circuit: Computer architecture, memory architectures, communication interfaces, mixed signal interfaces.

VLSI Design Issues: Design process, design for testability, technology options, power calculations, package selection, clock mechanisms, mixed signal design.

UNIT-III:

Basic electrical properties of MOS and BiCMOS circuits, MOS and BiCMOS circuit design processes, Basic circuit concepts, scaling of MOS circuits-qualitative and quantitative analysis with proper illustrations and necessary derivations of expressions.

UNIT-IV:

Subsystem Design and Layout: Some architectural issues, switch logic, gate logic, examples of structured design (combinational logic), some clocked sequential circuits, other system considerations.

Subsystem Design Processes: Some general considerations and an illustration of design processes, design of an ALU subsystem.

UNIT-V:

Floor Planning: Introduction, Floor planning methods, off-chip connections.

Architecture Design: Introduction, Register-Transfer design, high-level synthesis, architectures for low power, architecture testing.

Chip Design: Introduction and design methodologies.

TEXT BOOKS:

- 1. Essentials of VLSI Circuits and Systems, K. Eshraghian, Douglas A. Pucknell, SholehEshraghian, 2005, PHI Publications.
- 2. Modern VLSI Design-Wayne Wolf, 3rd Ed., 1997, Pearson Education.
- 3. VLSI Design-Dr.K.V.K.K.Prasad, KattulaShyamala, Kogent Learning Solutions Inc., 2012.

- 1. VLSI Design Technologies for Analog and Digital Circuits, Randall L.Geiger, Phillip E.Allen, Noel R.Strader, TMH Publications, 2010.
- 2. Introduction to VLSI Systems: A Logic, Circuit and System Perspective- Ming-BO Lin, CRC Press, 2011.
- 3. Principals of CMOS VLSI Design-N.H.E Weste, K. Eshraghian, 2nd Edition, Addison Wesley.

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CMOS ANALOG IC DESIGN

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.

TEXT BOOKS:

- 1. CMOS Analog Circuit Design Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.
- 2. Analysis and Design of Analog Integrated Circuits- Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, Wiley India, Fifth Edition, 2010.

- 1. Analog Integrated Circuit Design- David A. Johns, Ken Martin, Wiley Student Edn, 2013.
- 2. Design of Analog CMOS Integrated Circuits- BehzadRazavi, TMH Edition.
- 3. CMOS: Circuit Design, Layout and Simulation- Baker, Li and Boyce, PHI.

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I Year I Semester	4	0	3

CMOS DIGITAL IC DESIGN

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: Semiconductor Memories

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 Circuit Design Ken Martin, Oxford University Press, 2011.
- CMOS Digital Integrated Circuits Analysis and Design Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.

- 1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective Ming-BO Lin, CRC Press, 2011
- 2. Digital Integrated Circuits A Design Perspective, Jan M. Rabaey, AnanthaChandrakasan, BorivojeNikolic, 2nd Ed., PHI.

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DIGITAL DESIGN USING HDL

(ELECTIVE-I)

UNIT-I:

Digital Logic Design using VHDL

Introduction, designing with VHDL, design entry methods, logic synthesis, entities, architecture, packages and configurations, types of models: dataflow, behavioral, structural, signals vs. variables, generics, data types, concurrent vs. sequential statements, loops and program controls.

Digital Logic Design using Verilog HDL

Introduction, Verilog Data types and Operators, Binary data manipulation, Combinational and Sequential logic design, Structural Models of Combinational Logic, Logic Simulation, Design Verification and Test Methodology, Propagation Delay, Truth Table models using Verilog.

UNIT-II:

Combinational Logic Circuit Design using VHDL

Combinational circuits building blocks: Multiplexers, Decoders , Encoders , Code converters, Arithmetic comparison circuits , VHDL for combinational circuits , Adders-Half Adder, Full Adder, Ripple-Carry Adder, Carry Look-Ahead Adder, Subtraction, Multiplication.

Sequential Logic Circuit Design using VHDL

Flip-flops, registers & counters, synchronous sequential circuits: Basic design steps, Mealy State model, Design of FSM using CAD tools, Serial Adder Example, State Minimization, Design of Counter using sequential Circuit approach.

UNIT-III: Digital Logic Circuit Design Examples using Verilog HDL

Behavioralmodeling, Data types, Boolean-Equation-Based behavioral models of combinational logics, Propagation delay and continuous assignments, latches and level-sensitive circuits in Verilog, Cyclic behavioral models of flip-flops and latches and Edge detection, comparison of styles for behavioral model; Behavioral model, Multiplexers, Encoders and Decoders, Counters, Shift Registers, Register files, Dataflow models of a linear feedback shift register, Machines with multi cycle operations, ASM and ASMD charts for behavioralmodeling, Design examples, Keypad scanner and encoder.

UNIT-IV: Synthesis of Digital Logic Circuit Design

Introduction to Synthesis, Synthesis of combinational logic, Synthesis of sequential logic with latches and flip-flops, Synthesis of Explicit and Implicit State Machines, Registers and counters.

UNIT-V: Testing of Digital Logic Circuits and CAD Tools

Testing of logic circuits, fault model, complexity of a test set, path-sensitization, circuits with tree structure, random tests, testing of sequential circuits, built in self test, printed circuit boards, computer aided design tools, synthesis, physical design.

TEXT BOOKS:

- 1. Stephen Brown &ZvonkoVranesic, "Fundamentals of Digital logic design with VHDL", Tata McGraw Hill,2nd edition.
- 2. Michael D. Ciletti, "Advanced digital design with the Verilog HDL", Eastern economy edition, PHI.

- 1. Stephen Brown &ZvonkoVranesic, "Fundamentals of Digital logic with Verilog design", Tata McGraw Hill,2nd edition.
- 2. Bhaskar, "VHDL Primer",3rd Edition, PHI Publications.
- 3. Ian Grout, "Digital systems design with FPGAs and CPLDs", Elsevier Publications.

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CPLD AND FPGA ARCHITECURES AND APPLICATIONS (ELECTIVE – II)

UNIT-I: Introduction to Programmable Logic Devices

Introduction, Simple Programmable Logic Devices – Read Only Memories, Programmable Logic Arrays, Programmable Array Logic, Programmable Logic Devices/Generic Array Logic; Complex Programmable Logic Devices – Architecture of Xilinx Cool Runner XCR3064XL CPLD, CPLD Implementation of a Parallel Adder with Accumulation.

UNIT-II: Field Programmable Gate Arrays

Organization of FPGAs, FPGA Programming Technologies, Programmable Logic Block Architectures, Programmable Interconnects, Programmable I/O blocks in FPGAs, Dedicated Specialized Components of FPGAs, Applications of FPGAs.

UNIT -III: SRAM Programmable FPGAs

Introduction, Programming Technology, Device Architecture, The Xilinx XC2000, XC3000 and XC4000 Architectures.

UNIT -IV: Anti-Fuse Programmed FPGAs

Introduction, Programming Technology, Device Architecture, TheActel ACT1, ACT2 and ACT3 Architectures.

UNIT -V: Design Applications

General Design Issues, Counter Examples, A Fast Video Controller, A Position Tracker for a Robot Manipulator, A Fast DMA Controller, Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture.

TEXT BOOKS:

- 1. Field Programmable Gate Array Technology Stephen M. Trimberger, Springer International Edition.
- 2. Digital Systems Design Charles H. Roth Jr, LizyKurian John, Cengage Learning.

- 1. Field Programmable Gate Arrays John V. Oldfield, Richard C. Dorf, Wiley India.
- 2. Digital Design Using Field Programmable Gate Arrays Pak K. Chan/SamihaMourad, Pearson Low Price Edition.
- 3. Digital Systems Design with FPGAs and CPLDs Ian Grout, Elsevier, Newnes.
- 4. FPGA based System Design Wayne Wolf, Prentice Hall Modern Semiconductor Design Series.

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FRONT END VLSI DESIGN LABORATORY

- The students are required to design the logic circuit to perform the following experiments using necessary Industry standard simulator to verify the logical /functional operation, perform the analysis with appropriate synthesizer and to verify the implemented logic with different hardware modules/kits (CPLD/FPGA kits).
- The students are required to acquire the knowledge on any of the TWO different environmental platforms by perform at least **FTVE** experiments on each platform.

List of Experiments:

- 1. Realization of Logic gates.
- 2. Parity Encoder.
- 3. Random Counter
- 4. Single Port Synchronous RAM.
- 5. Synchronous FIFO.
- 6. ALU.
- 7. UART Model.
- 8. Dual Port Asynchronous RAM.
- 9. Fire Detection and Control System using Combinational Logic circuits.
- 10. Traffic Light Controller using Sequential Logic circuits
- 11. Pattern Detection using Moore Machine.
- 12. Finite State Machine (FSM) based logic circuit.

Lab Requirements:

Software: Industrial standard software with prefectural licence consisting of required simulator, synthesizer, analyzer etc. in an appropriate integrated environment.

Hardware:Personal Computer with necessary peripherals, configuration and operating System and relevant VLSI (CPLD/FPGA) hardware Kits.

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CMOS MIXED SIGNAL CIRCUIT DESIGN			

UNIT-I: Switched Capacitor Circuits

Introduction to Switched Capacitor circuits- basic building blocks, Operation and Analysis, Nonideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, biquad filters.

UNIT-II: Phased Lock Loop (PLL)

Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non-idealities, Jitter in PLLs, Delay locked loops, applications.

UNIT-III: Data Converter Fundamentals

DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters

UNIT-IV: Nyquist Rate A/D Converters

Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters.

UNIT-V: Oversampling Converters

Noise shaping modulators, Decimating filters and interpolating filters, Higher order modulators, Delta sigma modulators with multibitquantizers, Delta sigma D/A

TEXT BOOKS:

- 1. Design of Analog CMOS Integrated Circuits- BehzadRazavi, TMH Edition, 2002
- 2. CMOS Analog Circuit Design Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.
- 3. Analog Integrated Circuit Design- David A. Johns, Ken Martin, Wiley Student Edition, 2013

- 1. CMOS Integrated Analog-to- Digital and Digital-to-Analog converters-Rudy Van De Plassche, Kluwer Academic Publishers, 2003
- 2. Understanding Delta-Sigma Data converters-Richard Schreier, Wiley Interscience, 2005.
- 3. CMOS Mixed-Signal Circuit Design R. Jacob Baker, Wiley Interscience, 2009.

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EMBEDDED SYSTEM DESIGN

UNIT-I: Introduction

An Embedded System-Definition, Examples, Current Technologies, Integration in system Design, Embedded system design flow, hardware design concepts, software development, processor in an embedded system and other hardware units, introduction to processor based embedded system design concepts.

UNIT-II: Embedded Hardware

Embedded hardware building blocks, Embedded Processors – ISA architecture models, Internal processor design, processor performance, Board Memory – ROM, RAM, Auxiliary Memory, Memory Management of External Memory, Board Memory and performance.

Embedded board Input / output – Serial versus Parallel I/O, interfacing the I/O components, I/O components and performance, Board buses – Bus arbitration and timing, Integrating the Bus with other board components, Bus performance.

UNIT-III: Embedded Software

Device drivers, Device Drivers for interrupt-Handling, Memory device drivers, On-board bus device drivers, Board I/O drivers, Explanation about above drivers with suitable examples.

Embedded operating systems – Multitasking and process Management, Memory Management, I/O and file system management, OS standards example – POSIX, OS performance guidelines, Board support packages, Middleware and Application Software – Middle ware, Middleware examples, Application layer software examples.

UNIT-IV: Embedded System Design, Development, Implementation and Testing

Embedded system design and development lifecycle model, creating an embedded system architecture, introduction to embedded software development process and tools- Host and Target machines, linking and locating software, Getting embedded software into the target system, issues in Hardware-Software design and co-design.

Implementing the design-The main software utility tool, CAD and the hardware, Translation tools, Debugging tools, testing on host machine, simulators, Laboratory tools, System Boot-Up.

UNIT-V: Embedded System Design-Case Studies

Case studies- Processor design approach of an embedded system –Power PC Processor based and Micro Blaze Processor based Embedded system design on Xilinx platform-NiosII Processor based Embedded system design on Altera platform-Respective Processor architectures should be taken into consideration while designing an Embedded System.

TEXT BOOKS:

- 1. Tammy Noergaard "Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers", Elsevier(Singapore) Pvt.Ltd.Publications, 2005.
- 2. Frank Vahid, Tony D. Givargis, "Embedded system Design: A Unified Hardware/Software Introduction", John Wily & Sons Inc.2002.

- 1. Peter Marwedel, "Embedded System Design", Science Publishers, 2007.
- 2. Arnold S Burger, "Embedded System Design", CMP.
- 3. Rajkamal, "Embedded Systems: Architecture, Programming and Design", TMH Publications, Second Edition, 2008.

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LOW POWER VLSI DESIGN

UNIT-I: Fundamentals of Low Power VLSI Design

Need for Low Power Circuit Design, Sources of Power Dissipation – Switching Power Dissipation, Short Circuit Power Dissipation, Leakage Power Dissipation, Glitching Power Dissipation, Short Channel Effects –Drain Induced Barrier Lowering and Punch Through, Surface Scattering, Velocity Saturation, Impact Ionization, Hot Electron Effect.

UNIT-II: Low-Power Design Approaches

Low-Power Design through Voltage Scaling – VTCMOS circuits, MTCMOS circuits, Architectural Level Approach –Pipelining and Parallel Processing Approaches.

Switched Capacitance Minimization Approaches

System Level Measures, Circuit Level Measures, Mask level Measures.

UNIT-III: Low-Voltage Low-Power Adders

Introduction, Standard Adder Cells, CMOS Adder's Architectures – Ripple Carry Adders, Carry Look-Ahead Adders, Carry Select Adders, Carry Save Adders, Low-Voltage Low-Power Design Techniques –Trends of Technology and Power Supply Voltage, Low-Voltage Low-Power Logic Styles.

UNIT-IV: Low-Voltage Low-Power Multipliers

Introduction, Overview of Multiplication, Types of Multiplier Architectures, Braun Multiplier, Baugh-Wooley Multiplier, Booth Multiplier, Introduction to Wallace Tree Multiplier.

UNIT-V: Low-Voltage Low-Power Memories

Basics of ROM, Low-Power ROM Technology, Future Trend and Development of ROMs, Basics of SRAM, Memory Cell, Precharge and Equalization Circuit, Low-Power SRAM Technologies, Basics of DRAM, Self-Refresh Circuit, Future Trend and Development of DRAM.

TEXT BOOKS:

- 1. CMOS Digital Integrated Circuits Analysis and Design Sung-Mo Kang, Yusuf Leblebici, TMH, 2011.
- 2. Low-Voltage, Low-Power VLSI Subsystems Kiat-Seng Yeo, Kaushik Roy, TMH Professional Engineering.

- 1. Low Power CMOS Design AnanthaChandrakasan, IEEE Press/Wiley International, 1998.
- 2. Low Power CMOS VLSI Circuit Design Kaushik Roy, Sharat C. Prasad, John Wiley & Sons, 2000.
- 3. Practical Low Power Digital VLSI Design Gary K. Yeap, Kluwer Academic Press, 2002.
- 4. Low Power CMOS VLSI Circuit Design A. Bellamour, M. I. Elamasri, Kluwer Academic Press, 1995.

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DESIGN FOR TESTABILITY

UNIT-I: Introduction to Testing

Testing Philosophy, Role of Testing, Digital and Analog VLSI Testing, VLSI Technology Trends affecting Testing, Types of Testing, FaultModeling: Defects, Errors and Faults, Functional Versus Structural Testing, Levels of Fault Models, Single Stuck-at Fault.

UNIT-II: Logic and Fault Simulation

Simulation for Design Verification and Test Evaluation, Modeling Circuits for Simulation, Algorithms for True-value Simulation, Algorithms for Fault Simulation.

UNIT -III:

Testability Measures

SCOAP Controllability and Observability, High Level Testability Measures, Digital DFT and Scan Design: Ad-Hoc DFT Methods, Scan Design, Partial-Scan Design, Variations of Scan.

UNIT-IV:

Built-In Self-Test

The Economic Case for BIST, Random Logic BIST: Definitions, BIST Process, Pattern Generation, Response Compaction, Built-In Logic Block Observers, Test-Per-Clock, Test-Per-Scan BIST Systems, Circular Self Test Path System, Memory BIST, Delay Fault BIST.

UNIT-V:

Boundary Scan Standard

Motivation, System Configuration with Boundary Scan: TAP Controller and Port, Boundary Scan Test Instructions, Pin Constraints of the Standard, Boundary Scan Description Language: BDSL Description Components, Pin Descriptions.

TEXT BOOKS:

1. Essentials of Electronic Testing for Digital, Memory and Mixed Signal VLSI Circuits - M.L. Bushnell, V. D. Agrawal, Kluwer Academic Pulishers.

- 1. Digital Systems and Testable Design M. Abramovici, M.A.Breuer and A.D Friedman, Jaico Publishing House.
- 2. Digital Circuits Testing and Testability P.K. Lala, Academic Press.

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CAD FOR VLSI

UNIT-I: VLSI Physical Design Automation

VLSI Design Cycle, New Trends in VLSI Design Cycle, Physical Design Cycle, New Trends in Physical Design Cycle, Design Styles, System Packaging Styles;

UNIT-II: Partitioning, Floor Planning, Pin Assignment and Placement

Partitioning – Problem formulation, Classification of Partitioning algorithms, Kernighan-Lin Algorithm, Simulated Annealing, Floor Planning – Problem formulation, Classification of floor planning algorithms, constraint based floor planning, Rectangular Dualization, Pin Assignment – Problem formulation, Classification of pin assignment algorithms, General and channel Pin assignments, Placement – Problem formulation, Classification of placement algorithms, Partitioning based placement algorithms;

UNIT-III: Global Routing and Detailed Routing

Global Routing – Problem formulation, Classification of global routing algorithms, Maze routing algorithms, Detailed Routing – Problem formulation, Classification of routing algorithms, Single layer routing algorithms;

UNIT-IV: Physical Design Automation of FPGAs and MCMs

FPGA Technologies, Physical Design cycle for FPGAs, Partitioning, Routing – Routing Algorithm for the Non-Segmented model, Routing Algorithms for the Segmented Model;

Introduction to MCM Technologies, MCM Physical Design Cycle.

UNIT-V: Chip Input and Output Circuits

ESD Protection, Input Circuits, Output Circuits and — noise, On-chip clock Generation and Distribution, Latch-up and its prevention.

TEXT BOOKS:

- 1. Algorithms for VLSI Physical Design Automation by NaveedShervani, 3rd Edition, 2005, Springer International Edition.
- CMOS Digital Integrated Circuits Analysis and Design Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.

3.

- 1. VLSI Physical Design Automation-Theory and Practice by Sadiq M Sait, Habib Youssef, World Scientific.
- 2. Algorithms for VLSI Design Automation, S. H. Gerez, 1999, Wiley student Edition, John Wiley and Sons (Asia) Pvt. Ltd.
- 3. VLSI Physical Design Automation by Sung Kyu Lim, Springer International Edition.

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DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES (ELECTIVE-III)

UNIT-I:

Introduction to Digital Signal Processing

Introduction, a Digital signal-processing system, the sampling process, discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.

Computational Accuracy in DSP Implementations

Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT-II:

Architectures for Programmable DSP Devices

Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT-III:

Programmable Digital Signal Processors

Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX Instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX Processors, Pipeline Operation of TMS320C54XX Processors.

UNIT-IV:

Analog Devices Family of DSP Devices

Analog Devices Family of DSP Devices - ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor.

Introduction to Black fin Processor - The Black fin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT-V:

Interfacing Memory and I/O Peripherals to Programmable DSP Devices

Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

TEXT BOOKS:

- 1. Digital Signal Processing Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
- 2. A Practical Approach To Digital Signal Processing K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009
- 3. Embedded Signal Processing with the Micro Signal Architecture: Woon-SengGan, Sen M. Kuo, Wiley-IEEE Press, 2007

- 1. Digital Signal Processors, Architecture, Programming and Applications-B. Venkataramani and M. Bhaskar, 2002, TMH.
- 2. DSP Processor Fundamentals, Architectures & Features Lapsley et al. 2000, S. Chand & Co.
- 3. Digital Signal Processing Applications Using the ADSP-2100 Family by The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Amy Mar, PHI
- 4. The Scientist and Engineer's Guide to Digital Signal Processing by Steven W. Smith, Ph.D., California Technical Publishing, ISBN 0-9660176-3-3, 1997

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VLSI SIGNAL PROCESSING (ELECTIVE-III)

UNIT-I:

Introduction to DSP

Typical DSP algorithms, DSP algorithms benefits, Representation of DSP algorithms

Pipelining and Parallel Processing

Introduction, Pipelining of FIR Digital filters, Parallel Processing, Pipelining and Parallel Processing for Low Power

Retiming

Introduction – Definitions and Properties – Solving System of Inequalities – Retiming Techniques

UNIT-II:

Folding: Introduction -Folding Transform - Register minimization Techniques – Register minimization in folded architectures – folding of multirate systems

Unfolding: Introduction – An Algorithm for Unfolding – Properties of Unfolding – critical Path, Unfolding and Retiming – Applications of Unfolding

UNIT-III:

Systolic Architecture Design

Introduction – Systolic Array Design Methodology – FIR Systolic Arrays – Selection of Scheduling Vector – Matrix Multiplication and 2D Systolic Array Design – Systolic Design for Space Representations contain Delays

UNIT-IV:

Fast Convolution

Introduction – Cook-Toom Algorithm – Winogard algorithm – Iterated Convolution – Cyclic Convolution – Design of Fast Convolution algorithm by Inspection

UNIT-V:

Low Power Design

Scaling Vs Power Consumption – Power Analysis, Power Reduction techniques – Power Estimation Approaches

Programmable DSP: Evaluation of Programmable Digital Signal Processors, DSP Processors for Mobile and Wireless Communications, Processors for Multimedia Signal Processing.

TEXT BOOKS:

- 1. VLSI Digital Signal Processing- System Design and Implementation Keshab K. Parhi, 1998, Wiley Inter Science.
- 2. VLSI and Modern Signal Processing Kung S. Y, H. J. While House, T. Kailath, 1985, Prentice Hall.

- 1. Design of Analog Digital VLSI Circuits for Telecommunications and Signal Processing Jose E. France, YannisTsividis, 1994, Prentice Hall.
- 2. VLSI Digital Signal Processing Medisetti V. K, 1995, IEEE Press (NY), USA.

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SYSTEM ON CHIP DESIGN (ELECTIVE-IV)

UNIT-I: Introduction to the System Approach

System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, An approach for SOC Design, System Architecture and Complexity.

UNIT-II: Processors

Introduction, Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT-III: Memory Design for SOC

Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation, SOC Memory System, Models of Simple Processor – memory interaction.

UNIT-IV: Interconnect Customization and Configuration

Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses , Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor, Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

UNIT-V: Application Studies / Case Studies

SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression.

TEXT BOOKS:

- 1. Computer System Design System-on-Chip Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
- 2. ARM System on Chip Architecture Steve Furber –2nd Ed., 2000, Addison Wesley Professional.

- 1. Design of System on a Chip: Devices and Components Ricardo Reis, 1st Ed., 2004, Springer
- 2. Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology) Jason Andrews Newnes, BK and CDROM.
- 3. System on Chip Verification Methodologies and Techniques –PrakashRashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

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OPTIMIZATION TECHNIQUES IN VLSI DESIGN (ELECTIVE-IV)

UNIT-I: Statistical Modeling

Modeling sources of variations, Monte Carlo techniques, Process variation modeling- Pelgrom's model, Principle component based modeling, Quad tree based modeling, Performance modeling-Response surface methodology, delay modeling, interconnect delay models.

UNIT-II: Statistical Performance, Power and Yield Analysis

Statistical timing analysis, parameter space techniques, Bayesian networks Leakage models, Highlevel statistical analysis, Gate level statistical analysis, dynamic power, leakage power, temperature and power supply variations, High level yield estimation and gate level yield estimation.

UNIT-III: Convex Optimization

Convex sets, convex functions, geometric programming, trade-off and sensitivity analysis, Generalized geometric programming, geometric programming applied to digital circuit gate sizing, Floor planning, wire sizing, Approximation and fitting- Monomial fitting, Maxmonomial fitting, Polynomial fitting.

UNIT-IV: Genetic Algorithm

Introduction, GA Technology-Steady State Algorithm-Fitness Scaling-Inversion GA for VLSI Design, Layout and Test automation- partitioning-automatic placement, routing technology, Mapping for FPGA- Automatic test generation- Partitioning algorithm Taxonomy-Multi-way Partitioning Hybrid genetic-encoding-local improvement-WDFR Comparison of CAS-Standard cell placement-GASP algorithm-unified algorithm.

UNIT-V: GA Routing Procedures and Power Estimation

Global routing-FPGA technology mapping-circuit generation-test generation in a GA frame work-test generation procedures, Power estimation-application of GA-Standard cell placement-GA for ATG-problem encoding- fitness function-GA Vs Conventional algorithm.

TEXT BOOKS / REFERENCE BOOKS:

- 1. Statistical Analysis and Optimization for VLSI: Timing and Power AshishSrivastava, Dennis Sylvester, DavidBlaauw, Springer, 2005.
- 2. Genetic Algorithm for VLSI Design, Layout and Test Automation PinakiMazumder, E.Mrudnick, Prentice Hall, 1998.
- 3. Convex Optimization Stephen Boyd, LievenVandenberghe, Cambridge University Press, 2004.

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SEMICONDUCTOR MEMORY DESIGN AND TESTING (ELECTIVE-IV)

UNIT-I: Random Access Memory Technologies

SRAM – SRAM Cell structures, MOS SRAM Architecture, MOS SRAM cell and peripheral circuit operation, Bipolar SRAM technologies, SOI technology, Advanced SRAM architectures and technologies, Application specific SRAMs, DRAM – DRAM technology development, CMOS DRAM, DRAM cell theory and advanced cell structures, BICMOS DRAM, soft error failure in DRAM, Advanced DRAM design and architecture, Application specific DRAM.

UNIT-II: Non-volatile Memories

Masked ROMs, High density ROM, PROM, Bipolar ROM, CMOS PROMS, EPROM, Floating gate EPROM cell, One time programmable EPROM, EEPROM, EEPROM technology and architecture, Non-volatile SRAM, Flash Memories (EPROM or EEPROM), advanced Flash memory architecture

UNIT-III: Memory Fault Modeling Testing and Memory Design for Testability and Fault Tolerance

RAM fault modeling, Electrical testing, Pseudo Random testing, Megabit DRAM Testing, nonvolatile memory modeling and testing, IDDQ fault modeling and testing, Application specific memory testing, RAM fault modeling, BIST techniques for memory

UNIT-IV: Semiconductor Memory Reliability and Radiation Effects

General reliability issues RAM failure modes and mechanism, Non-volatile memory reliability, reliability modeling and failure rate prediction, Design for Reliability, Reliability Test Structures, Reliability Screening and qualification, Radiation effects, Single Event Phenomenon (SEP), Radiation Hardening techniques, Radiation Hardening Process and Design Issues, Radiation Hardened Memory characteristics, Radiation Hardness Assurance and Testing, Radiation Dosimetry, Water Level Radiation Testing and Test structures

UNIT-V: Advanced Memory Technologies and High-density Memory Packing Technologies

Ferroelectric RAMs (FRAMs), GaAs FRAMs, Analog memories, magneto resistive RAMs (MRAMs), Experimental memory devices, Memory Hybrids and MCMs (2D), Memory Stacks and MCMs (3D), Memory MCM testing and reliability issues, Memory cards, High Density Memory Packaging Future Directions.

TEXT BOOKS:

- 1. Semiconductor Memories Technology Ashok K. Sharma, 2002, Wiley.
- 2. Advanced Semiconductor Memories Architecture, Design and Applications Ashok K. Sharma- 2002, Wiley.
- 3. Modern Semiconductor Devices for Integrated Circuits Chenming C Hu, 1st Ed., Prentice Hall.

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BACK END VLSI DESIGN LABORATORY

PART-A: VLSI Lab (Back-end Environment)

• The students are required to design and implement the Layout of the following experiments of any FIVE using CMOS 130nm Technology with appropriate Industrial standard software

List of Experiments:

- 9. Inverter Characteristics.
- 10. Full Adder.
- 11. RS-Latch, D-Latch and Clock Divider.
- 12. Synchronous Counter and Asynchronous Counter.
- 13. Static RAM Cell.
- 14. Dynamic RAM Cell.
- 15. ROM
- 16. Digital-to-Analog-Converter.
- 17. Analog-to-Digital Converter.

Mixed Signal Simulation PART-B:

• The students are required to perform the following experimental concepts with suitable complexity of mixed-signal application based circuits of any FOUR (circuits consisting of both analog and digital parts) using necessary appropriate Industrial standard software

List of experimental Concepts:

- Analog circuit simulation.
- Digital circuit simulation.
- Mixed signal simulation.
- Layout Extraction.
- Parasitic values estimation from layout.
- Layout Vs Schematic.
- Net List Extraction.
- Design Rule Checks

Lab Requirements:

Software: Industrial standard software with prefectural licence consisting of required simulator,

synthesizer, analyzer etc. in an appropriate integrated environment.

Hardware: Personal Computer with necessary peripherals, configuration and operating System and relevant VLSI (CPLD/FPGA) hardware kits if necessary.

ACADEMIC REGULATIONS & COURSE STRUCTURE

For

COMPUTER SCIENCE & ENGINEERING

(Applicable for batches admitted from 2016-2017)



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

I Semester

S.No.	SUBJECT	L	Р	С
1	ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS	4		3
2	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	4		3
3	COMPUTER ORGANIZATION AND ARCHITECTURE	4		3
4	DATABASE MANAGEMENT SYSTEMS	4		3
5	ADVANCED OPERATING SYSTEMS	4		3
6	DATA WAREHOUSING AND DATA MINING	4		3
7	CSE LAB 1		3	2
Total Credits				20

II Semester

S.No.	SUBJECT	L	Р	С
1	CYBER SECURITY	4		3
2	COMPUTER NETWORKS	4		3
3	BIG DATA ANALYTICS	4		3
4	ADVANCED UNIX PROGRAMMING	4		3
5	Elective – 1 1. SOFTWARE ENGINEERING 2. ARTIFICIAL INTELLIGENCE 3. COMPILER DESIGN 4. MACHINE LEARNING	4		3
6	Elective – 2 1. IMAGE PROCESSING 2. PARALLEL ALGORITHMS 3. CLOUD COMPUTING 4. MOBILE COMPUTING	4		3
7	CSE LAB 2		3	2
Total Credits 20				

III Semester

S. No.	Subject	L	Р	Credits
1	Comprehensive Viva-Voce			2
2	Seminar – I			2
3	Project Work Part - I			16
Total Credits				20

IV Semester

S. No.	Subject	L	Р	Credits
1	Seminar – II			2
2	Project Work Part - II			18
Total Credits				20

ADVANCED DATA STRUCTURES AND ALGORITHM ANAYLSIS

UNIT-I:

Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists-Algorithms. Stacks and Queues: Algorithm Implementation using Linked Lists.

UNIT-II:

Searching-Linear and Binary Search Methods. Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort. Trees- Binary trees, Properties, Representation and Traversals (DFT, BFT), Expression Trees(Infix,prefix,postfix).Graphs-Basic Concepts, Storage Structures and Traversals.

UNIT-III:

Dictionaries, ADT, The List ADT, Stack ADT, Queue ADT, Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, Open Addressing-Linear Probing, Double Hashing.

UNIT-IV:

Priority queues- Definition, ADT, Realising a Priority Queue Using Heaps, Definition, Insertion, Deletion .Search Trees- Binary Search Trees, Definition, ADT, Implementation, Operations-Searching, Insertion, Deletion.

UNIT –V:

Search Trees- AVL Trees, Definition, Height of AVL Tree, Operations, Insertion, Deletion and Searching. Search Trees- Introduction to Red-Black and Splay Trees, B-Trees, Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.

TEXT BOOKS:

1. Data Structures: A Pseudocode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.

2. Data Structures, Algorithms and Applications in java, 2/e, Sartaj Sahni, University Press.

REFERENCES BOOKS:

1. Data Structures And Algorithm Analysis, 2/e, Mark Allen Weiss, Pearson.

2. Data Structures And Algorithms, 3/e, Adam Drozdek, Cengage.

3. C and Data Structures: A Snap Shot Oriented Treatise Using Live Engineering Examples, N.B.Venkateswarulu, E.V.Prasad, S Chand & Co,2009.

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MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

UNIT-I:

Mathematical Logic: Statements and notations, Connectives, Well formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Theory of inference for the statement calculus, Rules of inference, Consistency of premises and indirect method of proof, Automatic Theorem Proving Predicate calculus: Predicates, statement functions, variables and quantifiers, predicate formulas, free & bound variables, universe of discourse, inference theory of predicate calculus

UNIT-II:

Set theory & Relations: Introduction, Relations and ordering, Properties of binary Relations, Equivalence, Compatibility Relations, Partial ordering, Hasse diagram. Functions: composition of functions, Inverse Function, Recursive Functions, Lattice and its Properties, Pigeon hole Principles and its application. Algebraic structures: Algebraic systems, Examples and general properties, Semi groups and Monoids, groups, sub groups, Definitions, Examples, homomorphism, Isomorphism and related problems.

UNIT-III:

Elementary Combinatorics: Basis of counting, Enumeration of Combinations & Permutations, Enumerating of Combinations & Permutations with repetitions and constrained repetitions, Binomial Coefficients, Binomial Multinomial theorems, principles of Inclusion – Exclusion.

UNIT-IV:

Recurrence Relations: Generating Function of Sequences, Calculating Coefficient of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, The method of Characteristic roots, Solution of Inhomogeneous Recurrence Relation.

UNIT-V:

Graph Theory: Representation of Graph, Spanning Trees, BFS, DFS, Kruskals Algorithm, Binary trees, Planar Graphs, Graph Theory and Applications, Basic Concepts, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers

TEXT BOOKS:

- 1. Discrete Mathematical Structures with Applications to computer science J.P Tremblery, R.Manohar, TMH
- 2. Discrete Mathematical for computer Scientists & Mathematicians "J.L. Molt, A.Kandel T.P.Baker, PHI

REFERENCE TEXTBOOKS:

- 1. Elements of Discrete Mathematics, C L Liu, D P Mohanpatra, TMH
- 2. Discrete Mathematics, Schaum's Outlines, Lipschutz, Lipson TMH.
- 3. Discrete Mathematical Structures, Kolman, Busby, Ross, 6th ed., PHI, 2009

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COMPUTER ORGANIZATION AND ARCHITECTURE

UNIT-I:

Number Systems And Computer Arithmetic Signed And Unsigned Numbers, Addition and Subtraction, Multiplication, Division, Floating Point Representation Logical Operation, Gray Code, BCD Code, Error Detecting Codes. Boolean Algebra, Simplification of Boolean Expressions- Maps.

UNIT-II:

Combinational and Sequential Circuits Decoders, Encoders, Multiplexers, Half and Full Adders, Shift Registers, Flip-Flops, Binary Counters, Memory Unit.

UNIT-III:

Memory Organisation Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory Concept.

UNIT-IV:

ALU Design Addition and Subtraction, Sign and Unsigned Numbers, Multiplication and Division Algorithms, BCD Adders.

UNIT-V:

Input –Output Organisation Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, DMA, Input Output Processor, Serial Communication.

TEXT BOOKS:

1. Computer System Architecture, 3/e, Moris Mano, Pearson/PHI.

2. Micro Processor and Interfacing, 2/e, Douglas V.Hall, TMH.

REFERENCE BOOKS:

1. Digital Logic and Computer Organisation, Rajaraman, Radha Krishnan, PHI.

- 2. Micro Computer Systems: 8086/8088 family, 2/e, Liu, Gibson, PHI.
- 3. Computer Organisation and Architecture, 7/e, Stallings, Pearson.

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DATABASE MANAGEMENT SYSTEMS

UNIT-I:

Database System Applications, Purpose of Database Systems, View of Data - Data Abstraction, Instances and Schemas, Data Models - the ER Model, Relational Model, Other Models - Database Languages - DDL, DML, Database Access from Applications Programs, Transaction Management, Data Storage and Querying, Database Architecture, Database Users and Administrators, History of Database Systems. Introduction to Database design, ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises. Relational Model: Introduction to the Relational Model - Integrity Constraints Over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views - Destroying /altering Tables and Views.

UNIT-II:

Relational Algebra and Calculus: Relational Algebra - Selection and Projection, Set operations, Renaming, Joins, Division, Examples of Algebra Queries, Relational calculus - Tuple relational Calculus - Domain relational calculus - Expressive Power of Algebra and calculus. Form of Basic SQL Query - Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set - Comparison Operators, Aggregate Operators, NULL values - Comparison using Null values -Logical connectives - AND, OR and NOT - Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT-III:

Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional

Dependencies - Reasoning about FDS, Normal Forms - FIRST, SECOND, THIRD Normal forms -BCNF -Properties of Decompositions- Loss less- join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design - Multi valued Dependencies - FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

UNIT-IV:

Overview of Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions - Lock Based Concurrency Control, Deadlocks - Performance of Locking -Transaction Support in SQL. Concurrency Control: Serializability, and recoverability - Introduction to Lock Management - Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques -Concurrency Control without Locking. Crash recovery: Introduction to Crash recovery, Introduction to ARIES, the Log, Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash, Media recovery
UNIT-V:

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing, Comparison of File Organizations. Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks. Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete. Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendable vs.Linear Hashing.

TEXT BOOKS:

- 1. Database Management Systems, Raghu Ramakrishna, Johannes Gehrke, TMH, 3rd Edition, 2003.
- 2. Database System Concepts, A.Silberschatz, H.F. Korth, S. Sudarshan, McGraw hill, VI edition, 2006.
- 3. Fundamentals of Database Systems 5th edition. Ramez Elmasri, Shamkant B.Navathe, Pearson Education, 2008.

REFERENCE BOOKS:

- 1. Database Management System Oracle SQL and PL/SQL, P.K. Das Gupta, PHI.
- 2. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.
- 3. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.

ADVANCED OPERATING SYSTEMS

UNIT - I:

Architectures of Distributed Systems - System Architecture types - issues in distributed operating systems - communication networks - communication primitives. Theoretical Foundations - inherent limitations of a distributed system - lamp ports logical clocks - vector clocks - casual ordering of messages - global state - cuts of a distributed computation - termination detection. Distributed Mutual Exclusion - introduction - the classification of mutual exclusion and associated algorithms - a comparative performance analysis.

UNIT - II:

Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems - issues in deadlock detection and resolution - control organizations for distributed deadlock detection - centralized and distributed deadlock detection algorithms -hierarchical deadlock detection algorithms. Agreement protocols - introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture - mechanism for building distributed file systems - design issues - log structured file systems.

UNIT - III:

Distributed shared memory-Architecture- algorithms for implementing DSM - memory coherence and protocols - design issues. Distributed Scheduling - introduction - issues in load distributing - components of a load distributing algorithm - stability - load distributing algorithm - performance comparison - selecting a suitable load sharing algorithm - requirements for load distributing -task migration and associated issues. Failure Recovery and Fault tolerance: introduction- basic concepts - classification of failures - backward and forward error recovery, backward error recovery- recovery in concurrent systems - consistent set of check points - synchronous and asynchronous check pointing and recovery - check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT - IV:

Protection and security -preliminaries, the access matrix model and its implementations.-safety in matrix model- advanced models of protection. Data security - cryptography: Model of cryptography, conventional cryptography- modern cryptography, private key cryptography, data encryption standard-public key cryptography - multiple encryption - authentication in distributed systems.

UNIT - V:

Multiprocessor operating systems - basic multiprocessor system architectures - inter connection networks for multiprocessor systems - caching - hypercube architecture. Multiprocessor Operating System - structures of multiprocessor operating system, operating system design issues- threads- process synchronization and scheduling. Database Operating systems :Introduction- requirements of a database operating system Concurrency control : theoretical aspects - introduction, database systems - a concurrency control model of database systems- the problem of concurrency control - serializability theory- distributed database systems, concurrency control algorithms - introduction, basic synchronization primitives, lock based algorithms-timestamp based algorithms, optimistic algorithms - concurrency control algorithms, data replication.

TEXT BOOKS:

1. Mukesh Singhal, Niranjan G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", TMH, 2001

REFERENCE Books:

- 1. Andrew S.Tanenbaum, "Modern operating system", PHI, 2003
- 2. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI, 2003.
- 3. Andrew S.Tanenbaum, "Distributed operating system", Pearson education, 2003

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DATA WAREHOUSING AND DATA MINING

UNIT 1: DATA WAREHOUSING:

Data warehousing Components –Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

UNIT II: BUSINESS ANALYSIS:

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.

UNIT III: DATA MINING:

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.

UNIT IV :ASSOCIATION RULE MINING AND CLASSIFICATION:

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction – Basic Concepts – Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction.

UNIT V : CLUSTERING AND TRENDS IN DATA MINING:

Cluster Analysis – Types of Data – Categorization of Major Clustering Methods – K-means– Partitioning Methods – Hierarchical Methods – Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data – Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

TEXT BOOKS:

 Alex Berson and Stephen J.Smith, "Data Warehousing, Data Mining and OLAP", Tata McGraw – Hill Edition, Thirteenth Reprint 2008.
 Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012. AULibrary.com

REFERENCES:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Person Education, 2007.

2. K.P. Soman, Shyam Diwakar and V. Aja, "Insight into Data Mining Theory and Practice", Eastern Economy Edition, Prentice Hall of India, 2006.

3. G. K. Gupta, "Introduction to Data Mining with Case Studies", Eastern Economy Edition, Prentice Hall of India, 2006.

4. Daniel T. Larose, "Data Mining Methods and Models", Wiley-Interscience, 2006.

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CSE LAB 1

Data Structures Programs:

1. To implement Stacks& Queues using Arrays & Linked Lists

- 2. To implement Stack ADT, Queue ADT using arrays & Linked Lists
- 3. To implement Dequeue using Double Linked List & Arrays
- 4. To perform various Recursive & Non-recursive operations on Binary Search Tree
- 5. To implement BFS & DFS for a graph
- 6. To implement Merge & Heap sort of given elements
- 7. To perform various operations on AVL trees
- 8. To implement Krushkal's algorithm to generate a min-cost spanning tree
- 9. To implement Prim's algorithm to generate min-cost spanning tree
- 10.To implement functions of Dictionary using Hashing

Operating system programs:

- 1. Program to implement FCFS(First Come First Serve)scheduling Algorithms
- 2. Program to implement SJF(Shortest Job First)Scheduling Algorithm
- 3. Program to implement Priority Scheduling algorithm
- 4. Program to implement Round Robin Scheduling algorithm
- 5. Program to implement FIFO(First In First Out) Page Replacement Algorithm
- 6. Program to implement LRU(least Recently used)Page Replacement Algorithm
- 7. Program to implement LFU(Least Frequently used)Page Replacement Algorithm
- 8. Write a program to implement how Disk Scheduling is done in operating system
- 9. Draw the appropriate C.P.U performance graphs for SJF Scheduling Algorithm

Operating system programs:

- 10. Program to implement FCFS(First Come First Serve)scheduling Algorithms
- 11. Program to implement SJF(Shortest Job First)Scheduling Algorithm
- 12. Program to implement Priority Scheduling algorithm
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- 14. Program to implement FIFO(First In First Out) Page Replacement Algorithm
- 15. Program to implement LRU(least Recently used)Page Replacement Algorithm
- 16. Program to implement LFU(Least Frequently used)Page Replacement Algorithm
- 17. Write a program to implement how Disk Scheduling is done in operating system
- 18. Draw the appropriate C.P.U performance graphs for SJF Scheduling Algorithm

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CYBER SECURITY

UNIT I:

Introduction:

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT II:

Conventional Encryption:

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT III:

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms

Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT IV:

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management
 Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)
 Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT V:

Intrusion Detection: Intruders, Intrusion Detection systems, Password Management. Malicious Software: Viruses and related threats & Countermeasures. Fire walls: Firewall Design principles, Trusted Systems.

TEXT BOOKS:

- 1. Network Security & Cryptography: Principles and Practices, William Stallings, PEA, Sixth edition.
- 2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:

1. Network Security & Cryptography, Bernard Menezes, Cengage, 2010

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COMPUTER NETWORKS

UNIT – I:

Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Modelthe 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.

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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BIG DATA ANALYTICS

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

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

TEXT BOOKS:

- 1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
- 2. Hadoop: The Definitive Guide by Tom White, 3rd 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: https://cwiki.apache.org/confluence/display/Hive/Home
- 3. Piglatin: http://pig.apache.org/docs/r0.7.0/tutorial.html

ADVANCED UNIX PROGRAMMING

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. 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.

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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SOFTWARE ENGINEERING (Elective – 1)

UNIT-I:

Software and Software Engineering: The Nature of Software, The Unique Nature of Web Apps, 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

UNIT-II:

Terminology, Product and Process.

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

TEXT BOOKS:

- 1. Software Engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition McGraw Hill 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, Pankaj Jalote, 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.

ARTIFICIAL INTELLIGENCE (Elective – 1)

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, alpha-beta 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

TEXT BOOKS:

- 1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
- 2. Artificial intelligence, A modern Approach, 2nd ed, Stuart Russel, Peter Norvig, PEA
- 3. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3rd ed, TMH
- 4. Introduction to Artificial Intelligence, Patterson, PHI

REFERNCE BOOKS:

- 1. Atificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5th ed, PEA
- 2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
- 3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

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COMPILER DESIGN (Elective – 1)

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.

TEXT BOOKS:

- Compilers, Principles Techniques and Tools. Alfred V Aho, Monical S. Lam, Ravi Sethi Jeffery D. Ullman,2nd edition, pearson, 2007
- 2. Compiler Design K.Muneeswaran, OXFORD
- 3. Principles of compiler design, 2nd edition, Nandhini Prasad, Elsebier.

REFERENCE BOOKS:

- 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

MACHINE LEARNING (Elective – 1)

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

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.

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DIGITAL IMAGE PROCESSING (Elective -2)

UNIT I:

Introduction: Applications of Computer Graphics and Image Processing, Fundamentals on Pixel concepts, effect of Aliasing and Jaggles, Advantages of high resolution systems **DDA line algorithms:** Bresenhams line and circle derivations and algorithms

UNIT II:

2-D Transformations: Translations, Scaling, rotation, reflection and shear transformations, Homogeneous coordinates, **Composite Transformations**- Reflection about an arbitrary line; Windowing and clipping, viewing transformations, Cohen- Sutherland clipping algorithm

UNIT III:

Digital Image Properties: Metric and topological properties of Digital Images, Histogram, entropy, Visual Perception, Image Quality, Color perceived by humans, Color Spaces, Palette Images, color Constancy

Color Images: Pixel brightness transformations, Local Preprocessing, image smoothing, Edge detectors, Robert Operators, Laplace, Prewitt, Sobel, Fri-chen, Canny Edge detection

UNIT IV:

Mathematical Morphology: Basic Mathematical Concepts, Binary dilation and Erosion, Opening and closing, Gray Scale dilation and erosion, Skeleton, Thinning, Thickening Ultimate erosion, Geodesic transformations, Morphology and reconstruction, Morphological Segmentation

UNIT V:

SEGMENTATION: Threshold detection methods, Optimal Thresholding, Edge based Segmentation-Edge image thresholding, Edge relaxation, Border tracing, Hough Transforms, Region based segmentation: Region Mergingm Region Splitting, Splitting and Merging, Watershed Segmentation.

Image Data Compression: Image data Properties, Discrete Image Transformations in data compression, Discrete Cosine and Wavelet Transforms, Types of DWT and merits; Predicative Compression methods, Hierarchical and Progressive Compression methods, Comparison of Compression methods, JPEG- MPEG Image Compression methods.

Text Books:

- 1. Computer Graphics C Version, Donald Hearn, M Paulli Baker, Pearson (Unit I and Unit II)
- 2. Image Processing, Analysis and Machine Vision, Millan Sonka, Vaclov Halvoc, Roger Boyle, Cengage Learning, 3ed, (Unit III, Unit IV, Unit V and Unit VI)

- 1. Computer & Machine Vision, Theory, Algorithms, Practicles, E R Davies, Elsevier, 4ed
- 2. Digital Image Processing with MATLAB and LABVIEW, Vipul Singh, Elsevier

PARALLEL ALGORITHMS

(Elective – 2)

UNIT1: Introduction:

Computational demand in various application areas, advent of parallel processing, terminologypipelining, Data parallelism and control parallelism-Amdahl's law.

UNIT II: Scheduling:

Organizational features of Processor Arrays, Multi processors and multi-computers. Mapping and scheduling aspects of algorithms. Mapping into meshes and hyper cubes-Load balancing-List scheduling algorithm Coffman-graham scheduling algorithm for parallel processors.

UNIT III: Algorithms:

Elementary Parallel algorithms on SIMD and MIMD machines, Analysis of these algorithms. Matrix Multiplication algorithms on SIMD and MIMD models. Fast Fourier Transform algorithms. Implementation on Hyper cube architectures. Solving linear file -system of equations, parallelizing aspects of sequential methods back substitution and Tri diagonal.

UNIT IV: Sorting:

Parallel sorting methods, Odd-even transposition Sorting on processor arrays, Biotonic ,merge sort on shuffle - exchange ID , Array processor,2D-Mesh processor and Hypercube Processor Array. Parallel Quick-sort on Multi processors. Hyper Quick sort on hypercube multi computers. Parallel search operations. Ellis algorithm and Manber and ladner's Algorithms for dictionary operations.

UNIT V: Searching

Parallel algorithms for Graph searching, All Pairs shortest paths and inimum cost spanning tree. Parallelization aspects of combinatorial search algorithms with Focus on Branch and Bound Methods and Alpha-beta Search methods.

TEXT BOOKS:

- 1. Parallel computing theory and practice, Michel J.Quinn
- 2. Programming Parallel Algorithms, Guy E. Blelloch, Communications of the ACM

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CLOUD COMPUTING (Elective -2)

UNIT I:

Introduction: Network centric computing, Network centric content, peer-to –peer systems, cloud computing delivery models and services, Ethical issues, Vulnerabilities, Major challenges for cloud computing

Parallel and Distributed Systems: introduction, architecture, distributed systems, communication protocols, logical clocks, message delivery rules, concurrency, model concurrency with Petri Nets.

UNIT II:

Cloud Infrastructure: At Amazon, The Google Perspective, Microsoft Windows Azure, Open Source Software Platforms, Cloud storage diversity, Inter cloud, energy use and ecological impact, responsibility sharing, user experience, Software licensing

Cloud Computing : Applications and Paradigms: Challenges for cloud, existing cloud applications and new opportunities, architectural styles, workflows, The Zookeeper, The Map Reduce Program model, HPC on cloud, biological research

UNIT III:

Cloud Resource virtualization: Virtualization, layering and virtualization, virtual machine monitors, virtual machines, virtualization- full and para, performance and security isolation, hardware support for virtualization, Case Study: Xen, vBlades

Cloud Resource Management and Scheduling: Policies and Mechanisms, Applications of control theory to task scheduling, Stability of a two-level resource allocation architecture, feed back control based on dynamic thresholds, coordination, resource bundling, scheduling algorithms, fair queuing, start time fair queuing, cloud scheduling subject to deadlines, Scheduling Map Reduce applications, Resource management and dynamic application scaling

UNIT IV:

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 (text book 1), Amazon Simple Storage Service(S3) (Text book 2)

Cloud Security: Cloud security risks, security – atop concern for cloud users, privacy and privacy impact assessment, trust, OS security, Virtual machine security, Security risks

UNIT V:

Cloud Application Development: Amazon Web Services : EC2 – instances, connecting clients, security rules, launching, usage of S3 in Java, Installing Simple Notification Service on Ubuntu 10.04, Installing Hadoop on Eclipse, Cloud based simulation of a Distributed trust algorithm, Cloud service for adaptive data streaming (Text Book 1)

Google: Google App Engine, Google Web Toolkit (Text Book 2)

Micro Soft: Azure Services Platform, Windows live, Exchange Online, Share Point Services, Microsoft Dynamics CRM (Text Book 2)

TEXT BOOKS:

- 1. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier
- 2. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH

REFERNCE BOOK:

1. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

MOBILE COMPUTING (Elective -2)

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.

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.

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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CSE LAB-2

1. 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 | sort

5. Write a C program that illustrates two processes communicating using shared memory

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.

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()).

9. Implementation of Connection oriented concurrent service (TCP).

10. Implementation of Connectionless Iterative time service (UDP).

11. Implementation of Select system call.

- 12. Implementation of gesockopt (), setsockopt () system calls.
- 13. Implementation of getpeername () system call.
- 14. Implementation of remote command execution using socket system calls.

ACADEMIC REGULATIONS & COURSE STRUCTURE

For

MBA (Regular)

(Applicable for batches admitted from 2016-2017)



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

JAWAHARLAL NEHRU TENHNOLOGICAL UNIVERSITY, KAKINADA: KAKINADA School of Management Studies Course Structure MBA (Regular) 2016-2017

(Effective for the students admitted into first year from the academic year 2016-2017)

Semeste	Semester - I		
Subject	Title	Marks	Credits
C-101	Principles of Management	100	3
C-102	Managerial Economics	100	3
C-103	Accounting for Managers	100	3
C-104	Managerial Communication & Soft skills	100	3
C-105	Business Environment	100	3
C-106	Quantitative Analysis for Business Decision	100	3
C-107	IT – LAB	100	3

Semester - II

Subject	Title	Marks	Credits
C-201	Financial Management	100	3
C-202	Human Resource Management	100	3
C-203	Marketing Management	100	3
C-204	Production and Operations Management	100	3
C-205	C-205 Business Research Methods 100		3
C-206	Organizational Behavior	100	3
C-207	Mini Project *	50	2
	Seminar on Mini Project	50	2

Semester - III

Subject Title		Marks	Credits
C-301	Strategic Management	100	3
C -302	Legal Aspects of Business	100	3
C -303	Business Ethics & Corporate Governance	100	3
E -301	Elective – 1	100	3
E-302	Elective – 2	100	3
E-303	Elective – 3	100	3
E-304	Elective – 4	100	3

Semester - IV

Subject	Title	Marks	Credits
C -401	Logistic and Supply Chain Management	100	3
C -402	Entrepreneurship Development	100	3
E-401	Elective – 5	100	3
E-402	Elective – 6	100	3
E-403	Elective – 7	100	3
E-404	Elective – 8	100	3
Major Project & Comprehensive Viva Grade 8		8	
	Total Marks / Credits270090		

Elective: The student has to choose any **ONE** Specialization from the following areas in the beginning of III Semester

III SEMESTER

HR

S. no	SUBJECT TITLE
1	Leadership Management
2	Compensation and Reward Management
3	Performance Management
4	Strategic Human Resource Management

FINANCE

S. no	SUBJECT TITLE
1	Security Analysis & Portfolio Management
2	Banking and Insurance Management
3	Advance Management Accounting
4	Strategic Financial Management

MARKETING

S. no	SUBJECT TITLE
1	Consumer Behavior
2	Retail Management
3	Customer Relationship Management
4	Strategic Marketing Management

SYSTEMS

S. no	SUBJECT TITLE
1	E-Business
2	RDBMS
3	Web Designing
4	System Analysis & Design

IV SEMESTER

HR

	SUBJECT TITLE
Elective-5	Organizational Development & Change Management
Elective-6	Global HRM
Elective-7	Labor Welfare & Legislation
Elective-8	Management of Industrial Relations

FINANCE

	SUBJECT TITLE
Elective-5	Financial Markets and Services
Elective-6	Global Financial Management
Elective-7	Risk Management
Elective-8	Tax Management

MARKETING

	SUBJECT TITLE
Elective-5	Services Marketing
Elective-6	Promotional Distribution Management
Elective-7	Global Marketing Management
Elective-8	Supply Chain Management

SYSTEMS

	SUBJECT TITLE
Elective-5	Business Intelligence
Elective-6	Enterprise Resource Planning
Elective-7	Cyber Laws & Security
Elective-8	Information Systems Audit

*Mini Project Report

The student should undergo survey based fieldwork under the guidance of Internal Faculty and submit the report before the completion of II Semester End Examinations.

Principles of Management

Unit 1:

Introduction of Management: Management: Definition – Importance – Managerial Roles – Functions of management – Classical theory – Scientific management - Administrative theory – Behavioral Theory – Management science – Integrative perspective – System theory – Socio – technical theory – Contingency theory – Comparing theories

Unit 2

Planning and Organizing: Nature and Definition of Planning – Principles of Planning – Objectives of planning – Planning process – Types of plans – Benefits and pitfalls of planning.

Principles of organizing – Organization levels – Organizational designs and structure – Line and staff organizations – Approaches – Delegation of authority – Factors affecting delegation of authority – Span of management – Centralization and decentralization of Authority.

Unit 3

Directing and controlling: Definition of Co-ordination – Significance and principles of Coordination– Leadership behavior and styles – Leadership in cross cultural environment. Nature and importance of controlling – Controlling process – Requirements of effective control –

Establishing controlling system – Controlling techniques.

Unit 4

Decision making: Meaning of decision – types of decisions – Rationale decision making process – Models of decision making – Problem solving and decision making – increasing participation in decision making – Vroom's Participative decision making model – challenges and problems in decision making

Unit 5

Contemporary issues in Management: MBO - Management By Walking Around – Out of the Box Thinking – Balanced Score Card –Time Management –BPOs – Stress Management causes and remedies – JIT – TQM – Six Sigma – CMM levels

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

REFERENCES:

- 1. Kumar ,Rao, Chhalill: Introduction to Management Science . Cengage Publications, New Delhi
- 2. Dilip Kumar Battacharya, Principles of Management, Pearson, 2012.
- 3. Harold Koontz, Heinz Weihrich, A.R.Aryasri, Principles of Management, TMH, 2010.
- 4. V.S.P.Rao, Management Text and Cases, Excel, Second Edition, 2012.
- 5. K.Anbuvelan, Principles of Management, University Science Press, 2013.
- 6. Neeta Baporikar, Case Method Cases in Management, Himalaya Publishing House (HPH) 2009.
- 7. Deepak Kumar Bhattacharyya, Principles of Management-text and cases, Pearson, 2012.

Managerial Economics

UNIT 1:

Introduction to Managerial Economics: Definition, Nature and Scope, Relationship with other areas in Economics, The role of managerial economist. Concept of opportunity cost, Incremental concept, time Perfective, Discounting Principle, Risk & uncertainty.

UNIT 2:

Demand Analysis: Elasticity of demand, types and significance of Elasticity of Demand - Measurement of price Elasticity of Demand – Need for Demand forecasting, forecasting techniques, law of Supply, Elasticity of Supply.

UNIT 3:

Supply and Production Analysis: Production function, Marginal Rate of Technical Substitution, Production function with one/two variables, Cobb-Douglas Production Function, Returns to Scale and Laws of returns.

UNIT 4:

Cost theory and estimation: Cost concepts, determinants of cost, cost – output relationship in the short run and long run – Modern development in cost theory – Saucer shaped short – run Average cost curves – Average total cost curve – Cost - Volume – Profit analysis

UNIT 5:

Market Structure and Pricing practices: Features and Types of different Markets – Price- Output determination in Perfect competition, Monopoly, Monopolistic competition and Oligopoly both in the long run and short run. Pricing methods in practice – Bain's limit pricing theory - Managerial Theories of a firm – Marris & Williams Models.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

- 1. Paul, Koushil: "Managerial Economics", Cengage Learning, New Delhi,
- 2. Siddiqui S A, Siddiqui A S: "Managerial Economics", and Financial Analysis", New Age International Publishers, New Delhi, 2008.
- 3. Vanita Agarwal: "Managerial Economics", Pearson, New Delhi, 2013.
- 4. Dominick Salvatore: "Managerial Economics", Oxford University Press, New Delhi, 2010.
- 5. D.L. Ahuja: "Managerial Economics", S. Chand & Company ltd, New Delhi-55.
- 6. O'Sullivan, Sheffrin, Perez "Micro Economics: Principles, Applications and Tools", Pearson Education.
- 7. Mithani D M: "Managerial Economics", Himalaya Publishing House, Mumbai, 2008.
- 8. Atmanand: "Managerial Economics", Excel Publications. New Delhi, 2012.
- 9. Varshney, R.L and Maheswari, K L: 'Managerial Economics", Sultan Chand and Sons, New Delhi, 2002.
- 10. Narayanan Nadar E, Vijayan S: ''Managerial Economics'', PHI Private Limited, New Delhi,2009.

Accounting for Managers

UNIT 1

Accenting process: Definition of accounting - Accounting Concepts and conventions - Accounting Cycle - Classification of accounts - Accounting equations – Static and dynamic nature of accounting - Users of accounting information - Books of original entry, ledger - Preparation of Trial balance

UNIT-2

Final Accounts: Preparation and Presentation of income statement - Balance Sheet with Adjustments - Accounting standards - Preparation and Presentation of Company Final Accounts – Limitations of Financial Statements

UNIT-3

Financial Analysis: The scope and purpose of financial analysis - financial statement analysis - Ratio analysis - liquidity, activity, structural, coverage and profitability ratios - Funds flow analysis - concepts of funds; ascertaining funds from operations; Sources of funds - Uses of funds - Preparation and analysis of funds flow statement and cash flow statement.

UNIT-4

Cost accounting concepts: Methods of Costing, Techniques of Costing - Role of Cost accounting - Elements of cost - Financial accounting Vs Management Accounting - Basic Cost concepts - Determination of product cost - Preparation of cost sheet under different cost heads

UNIT-5

Cost behavior and Decision making: Behavioural classification of costs and methods for calculation of fixed, variable and semi variable costs - CVP analysis and decision making - Break Even analysis-Key factor distribution & analysis - Optimization of Product mix - Make or Buy decisions - Capacity utilization - Plant shutdown or continue decision CVP under conditions of uncertainty - sensitivity analysis.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

- 1. Vijaya Kumar.P, Ravindra P.S., Kiran Kumar V: "Accounting for Managers", Himalaya Publishing House, New Delhi, 2013
- 2. Shankarnarayana, Ramanath: "Finanacial Accounting for Management", Cengage Learning, New Delhi.
- 3. Ramachandran N, RamKumar Kakani: **Financial Accounting for Management**", McGraw Hill 2013.
- 4. Maheshwari, Maheashwari and Maheshwari, "Financial Accounting", Vikas publishing House, New Delhi,2013
- 5. Amberish Gupta:"Financial Accounting for Management", Pearson Education, 2012.
- 6. Dr. Jawahar Lal: "Accounting for management", Himalaya Publishing house, NewDelhi, 2012.
- 7. Asish K. Bhattacharyya: "Essentials of Financial Accounting", PHI Learning, New Delhi, 2012.
- 8. Dr. V.R.Palanivelu: "Accounting for Management". University Science Press, New Delhi, 2009.
- 9. Ashok Banerjee: "Financial Accounting", a managerial Emphasis, Excel books, New Delhi, 2012.

Managerial Communication & Soft Skills

UNIT 1

Role of Communication in Business: Objective of Communication – The Process of Human Communication – Media of Communication - Written Communication - Oral Communication - Visual Communication - Audio Visual Communication – Silence - Developing Listening Skills – Improving Non-verbal communication skills – Cross Cultural Communication – problems and challenges.

UNIT 2

Managing Organization Communication: Formal and Informal Communication - Intrapersonal Communication – Models for Inter Personal Communication - Exchange Theory.

UNIT 3

Managing Interpersonal Communication: Inter-Personal communication – Role of Emotion in Inter Personal Communication – Communication Styles – Barriers to Communication – Gateways to Effective Interpersonal Communication.

UNIT 4

Business Writing Skills: Significance of Business Correspondence - Essentials of Effective Business Correspondence - Business Letter and Forms - Meeting - Telephone Communication – Use of Technology in Business Communication. Report Writing – Meaning and Significance: Structure of Reports - Negative, Persuasive and Special Reporting: Informal Report – Proposals. Formal Reports.

UNIT 5

Presentation skills – Techniques of Presentation – Types of Presentation – Video Conferencing and formats – Interview – formal and informal – Interview techniques –Communication etiquettes.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

- 1. Mallika Nawal: "Business Communication", Cengage Learning, New Delhi, 2012.
- 2. Kuberudu B and Srinivasa Krishna K: "Business Communication and Soft Skills", Excel Books, 2008.
- 3. Meenakshi Rama: "*Business Communication*", Oxford University Press, New Delhi
- 4. C.S.G. Krishnamacharyulu and Dr. Lalitha Ramakrishnan, Business Communication, Himalaya Publishing House, Mumbai
- 5. Paul Turner: "Organisational Communication", JAICO Publishing House, New Delhi.
- 6. SathyaSwaroopDebasish, Bhagaban Das" "*Business Communication*", PHI Private Limited, New Delhi, 2009.
- 7. R.K.Madhukar: "Business Communication", Vikas Publishing House, New Delhi, 2012.
- 8. Kelly M Quintanilla, Shawn T.Wahl:"Business and Professional Communication", SAGE, New Delhi, 2012.
- 9. Sangita Mehta, NeetyKaushish: "Business Communication", University Science Press, New Delhi, 2010.
- 10. Anjali Ghanekar: "Business Communication Skills", Everest Publishing House, New Delhi, 202011

Business Environment

UNIT 1

Business Environment: Importance at national and international level – problems and challenges – factors both internal and external influencing business environment. Industrial policies since independence and their significance – regulatory and promotional framework - Five-year plans and their importance.

UNIT 2

Structure of Indian economy: Nature and significance – Economic systems – structure of Indian industry – Economic reforms in various sectors – nature – challenges – social justice – Disinvestment mechanism – problems and procedures – Sickness in Indian industry, competition Act 2002.

UNIT 3

Fiscal Policy: Nature and significance – public revenues – expenditure- debt, development activities allocation of funds – Critical analysis of the recent fiscal policy of Government of India - Balance of Payments - Nature – Structure – major components – Causes for disequilibrium in Balance of Payments – Correction measures.

UNIT 4

India's Trade Policy: Nature – Magnitude and direction of Indian international trade – problems – bilateral and multilateral trade agreements. International business environment: Nature – significance– challenges and mechanisms. WTO: Agreements in the Uruguay round including TRIPS, TRIMS and GATS – disputes settlement mechanism – dumping and antidumping measures.

UNIT 5

Legal Frame: special features of the SICA (special provisions) 1985, BIFR, Consumer protection act 1986, Environmental laws (pertaining to the control and prevention of Air and Water pollution) and the Essential Commodities Act 1955.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

- 1. Shaikh Saleem: "Business Environment", Pearsons, New Delhi,
- 2. Veena Keshav Pailwar: "Economic Environment of Business", PHI Learning, New Delhi, 2012
- 3. Rosy Joshi, Sangam Kapoor: "Business Environment", Kalyani Publishers, New Delhi, 2011.
- 4. Aswathappa K: "Essentials of Business Environment", Himalaya Publishing House, New Delhi, 2011.
- 5. Vivek Mittal: "Business Environment Text and Cases", Excel Books New Delhi, 2011.
- 6. Sundaram and Black: "International Business Environment Text and Cases", PHI Private Limited, New Delhi.
- 7. Avid W Conklin: "Cases in Environment of Business", Sage Publication India Private Ltd, New Delhi.
- 8. Raj Kumar: "International Business Environment", Excel Publication, New Delhi, 2012.
- 9. Palle Krishna Rao: "WTO-Text and Cases", Excel Publication, New Delhi.
- 10. Government of India, Latest Economic Survey Report.

Quantitative Techniques for Business Decisions

UNIT 1

Basic Mathematical & Statistical Techniques: Linear, Quadratic, Logarithmic and Exponential Functions- Permutations and Combinations – Matrices - Elementary operations of matrices. Measures of Central Tendency – Measures of Dispersion –Simple Correlation and Regression Analysis Concept of Probability- Probability Rules – Joint and Marginal Probability – Baye's

Theorem- Probability Distributions- Binomial, Poisson, Normal and Exponential Probability Distributions.

UNIT 2

Introduction to Decision Theory: Steps involved in Decision Making, different environments in which decisions are made, Criteria for Decision Making, Decision making under uncertainty, Decision making under conditions of Risk-Utility as a decision criterion, Decision trees, Graphic displays of the decision making process, Decision making with an active opponent.

UNIT 3

Linear Programming: Formation of mathematical modeling, Graphical method, the Simplex Method; Justification, interpretation of Significance of All Elements In the Simplex Tableau, Artificial variable techniques: Big M method, Two phase method.

UNIT 4

Transportation, Assignment Models & Game theory: Definition and application of the transportation model, solution of the transportation problem, the Assignment Model, Traveling Salesman Problem. Game Theory: Introduction – Two Person Zero-Sum Games, Pure Strategies, Games with Saddle Point, Mixed strategies, Rules of Dominance, Solution Methods of Games without Saddle point – Algebraic, matrix and arithmetic methods.

UNIT 5

P.E.R.T. & C.P.M. and Replacement Model: Drawing networks – identifying critical path – probability of completing the project within given time- project crashing – optimum cost and optimum duration. Replacement models comprising single replacement and group replacement

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

- 1. N.D.Vohra: "*Quantitative Techniques in Management*", Tata-McGraw Hill Private Limited, New Delhi, 2011.
- 2. J. K. Sharma, "*Operations Research: Theory and Applications*", Macmillan Gupta S.P: "*Statistical Methods*", S. Chand and Sons, New Delhi,
- 3. Anand Sharma: "Quantitative Techniques for Business decision Making", Himalaya Publishers, New Delhi,2012;
- 4. D P Apte: "*Operation Research and Quantitative Techniques*", Excel Publication, New Delhi, 2013
- 5. Hamdy, A.Taha: "*Operations Research: An Introduction*", Prentice-Hall of India, New Delhi 2003.
- 6. Anderson: "Quantitative Methods for Business", Cengage Learning, New Delhi 2013
- 7. Sancheti, Dc & VK Kapoor, "Business Mathematics", S Chand and Sons, New Delhi

Information Technology Lab (100% Lab)

UNIT 1

Introduction of various software used for business: Significance in the current business environments - Introduction of software MS Office, SQL.

UNIT 2

Financial modeling: Present value of cash flows, Valuations, Financial ratio analysis, Forecasting, Trend analysis of data, Random input generations

UNIT 3

Statistics for Management - correlation and regression analysis data presentation techniques. Spread sheet showing the monthly payments with changing interest rate over a period of loan. (Using excel)

UNIT 4

Data Collection and analyzing techniques: Chats, Flow diagrams TQM methodologies

UNIT5

Preparation and presentations of Mini projects assigned for course work of first semester.

References:

1. Shelly, Cashman: "Microsoft copies 2007", Cengage Learning, New Delhi. 2012

ACADEMIC REGULATIONS & COURSE STRUCTURE

For

INTEGRATED MBA

(Applicable for batches admitted from 2016-2017)



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

Code	SUBJECT TITLE	Credits	Max. Marks
16IM101	English Language - I	4	100
16IM102	Business Mathematics & Statistics	4	100
16IM103	Fundamentals of Business Organization	4	100
16IM104	Financial Accounting - I	4	100
16IM105	Fundamentals of Computers	4	100
	Total	20	500

II SEMESTER

Code	SUBJECT TITLE	Credits	Max. Marks
16IM201	English Language – II	4	100
16IM202	Business Environment	4	100
16IM203	Managerial Economics	4	100
16IM204	Financial Accounting – II	4	100
16IM205	Organizational Communications.	4	100
	Total	20	500

III SEMESTER

Code	SUBJECT TITLE	Credits	Max. Marks
16IM301	Principles of Management	4	100
16IM302	Cost Accounting	4	100
16IM303	Banking Theory & Practice	4	100
16IM304	Business Law	4	100
16IM305	Entrepreneurship Development	4	100
	Total	20	500

IV SEMESTER

Code	SUBJECT TITLE	Credits	Max. Marks
16IM401	Organizational Behavior	4	100
16IM402	Management Accounting	4	100
16IM403	Company Law	4	100
16IM404	Elements of Direct & Indirect Taxes	4	100
16IM405	Management Information Systems	4	100
	Total	20	500

V SEMESTER

Code	SUBJECT TITLE	Credits	Max. Marks
16IM501	Financial Management	4	100
16IM502	Marketing Management	4	100
16IM503	Human Resource Management	4	100
16IM504	Production and Operations Management	4	100
16IM505	Research Methodology	4	100
Total		20	500

VI SEMESTER

Code	SUBJECT TITLE	Credits	Max. Marks
16IM601	Operations Research	4	100
16IM602	International Business	4	100
16IM603	Strategic Management	4	100
16IM604	Decision Support Systems	4	100
16IM605	Mini Project*	4	100
	Total	20	500

VII SEMESTER

Code	Subject Code	Credits	Max. Marks
16IM701	Knowledge Management	4	100
16IM702	Strategic Cost Management	4	100
16IM703	Elective - 1	4	100
16IM704	Elective - 2	4	100
16IM705	Elective - 3	4	100
	Total	20	500

VIII SEMESTER

Code	SUBJECT TITLE	Credits	Max. Marks
16IM801	Total Quality Management	4	100
16IM802	Project Management	4	100
16IM803	Elective - 4	4	100
16IM804	Elective - 5	4	100
16IM805	Elective - 6	4	100
	Total	20	500

IX SEMESTER

Code	SUBJECT TITLE	Credits	Max. Marks
16IM901	Intellectual Property Rights	4	100
16IM902	Corporate Governance	4	100
16IM903	Elective - 7	4	100
16IM904	Elective - 8	4	100
16IM905	Elective - 9	4	100
	Total	20	500

X SEMESTER

Code	SUBJECT TITLE	Credits	Max. Marks
16IM1001	Major Project Report	10	250
16IM1002	Project Seminar **	4	100
16IM1003	Viva - Voce	4	100
Total		18	450

VII SEMESTER

HR

	SUBJECT TITLE
Elective -1	HR Planning
Elective -2	Leadership Management
Elective -3	Compensation and Reward Management

FINANCE

	SUBJECT TITLE
Elective -1	Security Analysis
Elective -2	Banking and Insurance Management
Elective -3	Advanced Management Accounting

MARKETING

	SUBJECT TITLE	
Elective -1	Consumer Behavior	
Elective -2	Rural Marketing	
Elective -3	Supply Chain Management	

SYSTEMS

	SUBJECT TITLE	
Elective -1	E-Business	
Elective -2	RDBMS	
Elective -3	Web Designing	

VIII SEMESTER

HR

	SUBJECT TITLE	
Elective -4	Performance Management	
Elective -5	Strategic Human Resource Management	
Elective -6	Organizational Development & Change Management	

FINANCE

	SUBJECT TITLE	
Elective -4	Strategic Financial Management	
Elective -5	Portfolio Management	
Elective -6	Financial Markets and Services	

MARKETING

	SUBJECT TITLE	
Elective -4	Customer Relationship Management	
Elective -5	Strategic Marketing Management	
Elective -6	Services Marketing	

SYSTEMS

	SUBJECT TITLE
Elective -4	System Analysis & Design
Elective -5	Business Intelligence
Elective -6	Enterprise Resource Planning

IX SEMESTER

HR

	SUBJECT TITLE
Elective -7	Global HRM
Elective -8	Labor Welfare & Legislation
Elective -9	Management of Industrial Relations

FINANCE

	SUBJECT TITLE	
Elective -7	Global Financial Management	
Elective -8	Risk Management	
Elective -9	Tax Management	

MARKETING

	SUBJECT TITLE	
Elective -7	Promotion and Distribution Management	
Elective -8	Global Marketing Management	
Elective -9	Retail Marketing	

SYSTEMS

	SUBJECT TITLE	
Elective -7	Cyber Laws & Security	
Elective -8	Information Systems & Audit	
Elective -9	SAP	

*Mini Project Report

The student should undergo survey based fieldwork under the guidance of Internal Faculty and submit the report before the completion of VI Semester End Examinations.

****** Project Seminar

The Student should make a presentation before the Internal Faculty before finalizing the Final Project

ENGLISH LANGUAGE -1

Unit –I

- 1. Chapter entitled '*Wit and Humour*' from 'Skills Annexe' -Functional English for Success, Published by Orient Black Swan, Hyderabad
- 2. Chapter entitled '*Mokshagundam Visvesvaraya*' from '*Epitome of Wisdom*'', Published by Maruthi Publications, Hyderabad.
- L-Listening For Sounds, Stress and Intonation
- S-Greeting and Taking Leave, Introducing Oneself and Others (Formal and Informal Situations)
- R- Reading for Subject/ Theme
- W- Writing Paragraphs
- G-Types of Nouns and Pronouns
- V- Homonyms, homophones synonyms, antonyms

Unit –II

- 1. Chapter entitled "*Cyber Age*" from "*Skills Annexe -Functional English for Success*" Published by Orient Black Swan, Hyderabad.
- 2 Chapter entitled 'Three Days To See' from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad.
- L Listening for themes and facts
- S Apologizing, interrupting, requesting and making polite conversation
- R- for theme and gist
- W- Describing people, places, objects, events
- G- Verb forms
- V- noun, verb, adjective and adverb

Unit –III

- 1. Chapter entitled '*Risk Management*' from "*Skills Annexe -Functional English for Success*" Published by Orient Black Swan, Hyderabad
- 2. Chapter entitled '*Leela's Friend*' by R.K. Narayan from "*Epitome of Wisdom*", Published by Maruthi Publications, Hyderabad.
- L for main points and sub-points for note taking
- S giving instructions and directions; Speaking of hypothetical situations
- R reading for details
- W note-making, information transfer, punctuation
- G present tense
- V synonyms and antonyms

Unit –IV

- 1. Chapter entitled 'Human Values and Professional Ethics' from "Skills Annexe -Functional English forSuccess" Published by Orient Black Swan, Hyderabad
- 2. Chapter entitled 'The Last Leaf' from "Epitome of Wisdom", Published by Maruthi Publications, Hyderabad
- L -Listening for specific details and information
- S- narrating, expressing opinions and telephone interactions
- R -Reading for specific details and information
- W- Writing formal letters and CVs
- G- Past and future tenses
- V- Vocabulary idioms and Phrasal verbs

Unit –V

- 1. Chapter entitled 'Sports and Health' from "Skills Annexe -Functional English for Success" Published by Orient Black Swan, Hyderabad
- 2. Chapter entitled *'The Convocation Speech'* by N.R. Narayanmurthy' from *"Epitome of Wisdom"*, Published by Maruthi Publications, Hyderabad
- L- Critical Listening and Listening for speaker's tone/ attitude
- S- Group discussion and Making presentations
- R- Critical reading, reading for reference
- W-Project proposals; Technical reports, Project Reports and Research Papers
- G- Adjectives, prepositions and concord
- V- Collocations and Technical vocabulary

Using words appropriately

* Exercises from the texts not prescribed shall also be used for classroom tasks.

REFERENCES :

- 1. Contemporary English Grammar Structures and Composition by David Green, MacMillan Publishers, New Delhi. 2010.
- 2. Innovate with English: A Course in English for Engineering Students, edited by T Samson, Foundation Books.
- 3. English Grammar Practice, Raj N Bakshi, Orient Longman.
- 4. Technical Communication by Daniel Riordan. 2011. Cengage Publications. New Delhi.
- 5. Effective English, edited by E Suresh Kumar, A RamaKrishna Rao, P Sreehari, Published by Pearson
- 6. Handbook of English Grammar& Usage, Mark Lester and Larry Beason, Tata Mc Graw –Hill.
- 7. Spoken English, R.K. Bansal & JB Harrison, Orient Longman.
- 8. Technical Communication, Meenakshi Raman, Oxford University Press
- 9. Objective English Edgar Thorpe & Showick Thorpe, Pearson Education
- 10. Grammar Games, Renuvolcuri Mario, Cambridge University Press.
- 11. Murphy's English Grammar with CD, Murphy, Cambridge University Press.

BUSINESS MATHEMATICS & STATISTICS

Unit I:

Logics: Statements – connectivity – truth tables and values – equivalent and connectivities – contradictions – algebra statements – deductive reasoning – arguments – joint denial – compound statements. **Sets:** Elements – sets – power sets – operation with sets – union – algebra of sets – Cartesian product of two sets – relations – mapping. **Interests and annuities:** Finding interest and sum under simple and compound interest – annuities – perpetuity – discounts.

Unit II:

Probability: Theory of probability – terminology – types –axioms – statistical independence and dependence – Baye's theorem - Permutations and Combinations: factorial notations – finding permutations – combinations – complimentary combinations – finding combinations. **Binomial Theorem:** Random variable - binomial coefficients – finding general, middle and greatest terms – mean and standard deviation of binomial distribution. **Poisson theorem:** Poisson approximations – mean and standard deviations of Poisson probability distribution.

Unit III:

Business Statistics: Definition – concepts – scope – uses – mistrust. **Statistical Plan:** Meaning – steps – brief description of concepts of censes and sample – primary and secondary data – sources and methods of collection. **Classification and tabulation:** classes – tabulation – principles – frequency distribution: individual, discrete and continuous series.

Unit IV:

Diagrammatic and graphic presentation: One, two and three dimensional diagram – pictograms – cartograms – principles. Types of graphs – uses and limitations – guidelines. **Data analysis:** measures of central tendencies - Arithmetic mean – median – Ogive curves – mode – geometric and harmonic mean.

Unit V:

Measures of dispersion: Meaning – Range – Quartile deviation – Mean deviation – standard deviation – coefficient of dispersion. **Skewness:** Meaning of skewness, moments and kurtosis – measures of skewness, moments and kurtosis.

Text Books:

- 1. Qazi Zameeruddin, VK Khanna and SK Bhambri, Business Mathematics, Vikas Publishing House Private Limited, New Delhi, 2014.
- 2. Beri G C, Business Statistics, 3rd edititon, Tata McGraw Hill Education Private Limited, New Delhi, 2010
- 3. Gupta S P, Statistics, Sultan Chand & sons, New Delhi, 2016.
- 4. Sanchetti D C and Kapoor V K, Business Mathematics and Business Statistics, Sultan Chand & sons, New Delhi, 2015.
- 5. Shenoy G V, Srivastava U K, and Sharma S C, Business Statistics, Wiley Eastern Lmited, New Delhi.

FUNDAMENTALS OF BUSINESS ORGANIZATION

Unit -1:

Fundamental Concepts: Concepts: Business, trade, industry and commerce – Business: Features of business – Trade: Classification, Aids to Trade – Industry: Classification – Commerce - Relationship between trade, industry and commerce - Business Organization: Concept - Functions of Business.

Unit II:

Entrepreneur: Meaning - Characteristics of Entrepreneurs – Types of Entrepreneurs – Functions of an entrepreneur - Steps to start Enterprise – Sources of finance: Long Term, Short Term.

Unit – III:

Forms of Organization: Sole Proprietorship, Partnership and Joint Hindu Family: Business Organization: Forms of Business Organization – Classification – Factors influencing the choice of suitable form of organization. Sole Proprietorship: –Suitability. Partnership: Meaning – Characteristics – Kinds of partners - Registration of partnership – Partnership deed – Rights and obligations of partners. - Joint Hindu Family Business.

Unit - IV:

Joint Stock Company-I: Joint Stock Company: Meaning – Characteristics – Advantages - Kinds of Companies – Difference between private and public companies – Promotion of A Company: Stages-Promoters –Characteristics –Registration –Capital subscription – Commencement of Business – Preparation of Important documents:

Unit V:

Joint Stock company II: Memorandum of Association: Significance, Clauses – Articles of Association: Contents – Prospectus: Contents – Statement in lieu of Prospectus - Memorandum of association - Articles of Association and Prospectus - Registration of a company including documents.

References:

- Bhushan Y K: Business Organization and Management, Sultan Chand
- RK Sharma and Shashi K.Gupta: Industrial Organization and Management, Kalyani
- CB Gupta : Industrial Organization and Management, Sultan Chand
- Sherlekar etal: Business Organization and Management, Himalaya
- Talloo: Business Organisation and Management. TMH.
- Maheswari, Business Organization and Management, IBH, 2011.
- RK Sharma and Shashi K.Gupta: Industrial Organization and Management, Kalyan
- Aryasree & Murthy: Industrial Organistion & Manaement, Tata Mc Graw Hill.

FINANCIAL ACCOUNTING - I

Unit –I

Introduction to accounting - objectives and Principles - accounting concepts and conventions, journal accounting.

Unit – II

Ledger: Positing - Subsidiary books - Errors of Rectification - Trail Balance - Suspense accounts -

Unit –III

Valuation of fixed assets: Depreciation of fixed assets - Methods of deprecation – Bank reconciliation Statement -

Unit – IV

Final Accounts : Trading Accounts – Profit and Loss ccount - Balance sheet - with adjustments – Statements of Non-Profit Organization.

Unit – V

Ratio analysis: Limitations of Financial Statement – Ratios - liquidity, leverage, solvency and profitability ratios – Funds flow statement - Statement of Changes in Working Capital Statement.

References:

- Paresh Shah: "Basic Financial Accounting for Management", Oxford University Press, New Delhi, 2012.
- Narayana Swamy, "Financial Accounting & Analysis" PHI, 2012.
- Aryasri: Accounting and Financial Management, McGraw-Hill, 2011.
- V.Rajasekharam "Financial Accounting & Analysis" Pearson Education, New Delhi, 2012
- Ranjan Kumar Bal: "Financial Accounting & Analysis", S.Chand, New Delhi, 2012
- N.Ramachandran : "Financial Accounting & Analysis" Tata McGraw-Hill Publishing Limited, New Delhi, 2012.
- Ashish K .Bhattacharya "Financial Accounting & Analysis" PHI, 2012.

FUNDAMENTALS OF COMPUTERS

Unit I

1. Introduction to Computer : Hardware: Input / output devices, storage devices and memory. Software: System and Application Software, Compilers, Interpreters and Assemblers. Computer Languages: Levels of languages, generation and their features. Number System: Introduction to number system, binary, decimal, hexadecimal and their inter conversions and their uses in computer system. Internet: Concepts & Services, Hardware and software requirements, type of Internet connections

Unit II

Operating Systems: WINDOWS XP: Basic Operations, utilities and features. UNIX: Introduction, features and basic commands (like: pwd, cp, cd, rm, mv, ls, cat, mkdir, ch mod, rmdir, who, who am i, banner, date, kill, etc.). (Students should be familiar with these concepts but there will be no questions from topics)

Unit III

Application Software: (MS-Office XP 2003) MS Word: word basics, formatting text and documents, introduction to mail merge & macros.MS Excel: Excel basics, rearranging worksheets, working with graphics, using worksheet as databases, automating "what-if" projects. MS PowerPoint : PowerPoint basics, creating presentation MS Access: Database creation, screen/form design, report generation using wizard

Unit IV

E-Business: Fundamentals - E-Business framework, E-Business application - Technology Infrastructure for E-Business -Mobile computing, framework, wireless technology and switching method - E-Business Models - Elements of Business models, B2B, B2C models 10

Unit V

Payment Systems: Type of E-payment, digital token–based e-payment, smart card, credit card payment systems - risk on e-payment - Security Environment - Security Threats - Client–server security, data and message security, document security, firewalls. Ethical Social and Political issues in ecommerce.

References:

- Ravi Kalakotta & Whinston B., "Frontiers of E-Commerce", Pearson Education, Reprint 2009 New Delhi 2. R. Kalakotta & M. Robinson, "E-Business: Roadmap for Success", Pearson Education Reprint 2009, New Delhi.
- 3. lauden and Traver. Ecommerce: Business Technology Society,4THEdition2009 Pearson Education, New Delhi
- 4 Schneider ,E-Commerce Strategy technology and implementation,1st,edition,2008, Cengage Learning, India
- 5 Elias M. Awad, Electronic Commerce, PHI Learning. 2009
- 6 Rayudu C. S. e-Business, 2007, Himalaya Publishing House.

ACADEMIC REGULATIONS & COURSE STRUCTURE

For

DUAL DEGREE MBA (PREVIOUSLY MAM)

(Applicable for batches admitted from 2016-2017)



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

REVISED COURSE STRUCTURE 2013

VIII SEMESTER

Code	SUBJECT TITLE	Credits	Max. Marks
13BAM801	Project Management	4	100
13BAM802	Intellectual Property Rights	4	100
13BAM803	Decision Support Systems	4	100
13BAM804	Elective - III	4	100
13BAM805	Elective - IV	4	100
13BAM806	Seminar*	2	50
Total		22	550
At the end of IV Year Total		180	4500

IX SEMESTER

Code	SUBJECT TITLE	Credits	Max. Marks
13BAM901	Industrial Safety and Security	4	100
13BAM902	Leadership Management	4	100
13BAM903	Knowledge Management	4	100
13BAM904	Elective - V	4	100
13BAM905	Elective - VI	4	100
13BAM906	Seminar*	2	50
Total		22	550

X SEMESTER

Code	SUBJECT TITLE	Credits	Max. Marks
13BAM1001	Major Project Report**	10	250
13BAM1002	Project Seminar	4	100
13BAM1003	Comprehension Viva - Voce	4	100
Total		18	450

Elective - I	
	SUBJECT TITLE
Marketing	Consumer Behavior
Finance	Banking & Insurance Management
HRM	Performance Management
Systems	Relational Data Base Management Systems

Elective - II

	SUBJECT TITLE
Marketing	Sales and Distribution
Finance	Investments Management
HRM	Training and Development
Systems	Enterprise Resource Planning

Elective - III

	SUBJECT TITLE
Marketing	Integrated Marketing Communications
Finance	Financial Systems & Services
HRM	Management of Industrial Relations
Systems	Business Intelligence

Elective - IV

	SUBJECT TITLE
Marketing	Retail Management
Finance	Strategic Financial Decisions
HRM	Compensation Management
Systems	E-Business

Elective - V

	SUBJECT TITLE
Morkoting	Services Marketing & Logistics
Marketing	Management
Finance	International Financial Management
HRM	Management of Change
Systems	Cyber Laws & Security

Elective - VI

	SUBJECT TITLE
Marketing	International Marketing
Finance	Financial Risk Management & Derivatives
HRM	Global HRM
Systems	Information Systems & Audit

*Seminar

Student requires to prepare and submit a report on conceptual understanding of any one of the subjects of the respective semester and expected to present the same in the form of PPT in the class room. The report may consist 20-25 pages.

****Mini Project Report**

Student has to undergo practical training for a period of **4** (Four) weeks in an industry after completion of Fourth Semester end Examination. In training period, the student should prefer to work on any specific problem, and submit the report before end of Sixth Semester. The Project evaluation and Comprehensive viva-voce is conducted by inter examiner.