IV YEAR **I SEMESTER**

S. No.	Subject	T	P	Credits
1	Optical Communication	4	-	4
2	Embedded Systems	4	-	4
3	Digital Image Processing	4	-	4
4	Radar Systems	4	-	4
5	Open Elective	4	-	4
6	**Elective – I** Telecommunication Switching Systems Analog IC Design Object Oriented Programming	4	-	4
7	Digital Signal Processing Lab	-	3	2
8	Microwave and Optical Communications Lab	-	3	2
	Total			**28**

IV YEAR **II SEMESTER**

S. No.	Subject	T	P	Credits
1	Cellular and Mobile Communications	4	-	4
2	**Elective – II** Network Security & Cryptography Satellite Communications Digital Control Systems	4	-	4
3	**Elective – III** Operating Systems Structured Digital Design Wireless Sensor Networks	4	-	4
4	**Elective – IV** Analytical Instrumentation Real Time Operating Systems TV Engineering	4	-	4
5	PROJECT			12
	Total			**28**

Open Electives :

1. Bio Medical Engineering (for ECE Students also)
2. Image Processing (not for ECE Students)
3. Principles of Signals, Systems and Communications (Not for ECE Students)

Note : ECE Students can also Choose the OPEN ELECTIVES Offered by any Other Department.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – I Sem.

OPTICAL COMMUNICATIONS

UNIT I

Overview of optical fiber communication - Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays. Cylindrical fibers- Modes, Vnumber, Mode coupling, Step Index fibers, Graded Index fibers.

UNIT II

Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index. [2]. Fiber materials Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in optical fibers- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses.

UNIT III

Information capacity determination, Group delay, Types of Dispersion - Material dispersion, Wave-guide dispersion, Polarization mode dispersion, Intermodal dispersion. Pulse broadening. Optical fiber Connectors- Connector types, Single mode fiber connectors, Connector return loss.

UNIT IV

Fiber Splicing- Splicing techniques, Splicing single mode fibers. Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints,. Optical sources- LEDs, Structures, Materials, Quantum efficiency, Power, Modulation, Power bandwidth product. Injection Laser Diodes- Modes, Threshold conditions, External quantum efficiency,Laser diode rate equations,Resonant frequencies. Reliability of LED&ILD.

UNIT V

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling.

UNIT VI

Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparision of Photodetectors. Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of error, Quantum limit, Analog receivers.

UNIT VII

Optical system design — Considerations, Component choice, Multiplexing. Point-to- point links, System considerations, Link power budget with examples. Overall fiber dispersion in Multi mode and Single mode fibers, Rise time budget with examples.

UNIT VIII

Transmission distance, Line coding in Optical links, WDM, Necessity , Principles, Types of WDM, Measurement of Attenuation and Dispersion, Eye pattern.

TEXT BOOKS :

1. Optical Fiber Communications – Gerd Keiser, Mc Graw-Hill International edition, 3rd Edition, 2000.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.

RERFERENCES :

1. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005.
2. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Edition, 2004.
4. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – I Sem.

EMBEDDED SYSTEMS

UNIT-I

INTRODUCTION: Embedded System-Definition, Embedded system versus General computing systems, History of Embedded systems, Classification of Embedded systems, Major application areas of embedded systems, purpose of embedded systems, The typical embedded system-Core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, other system components, PCB and passive components.

UNIT-II

EMBEDDED SYSTEMS-CHARACTERISTICS AND QUALITY ATTRIBUTES: Characteristics of an embedded system, Quality attributes of embedded systems, Application-specific embedded system-Washing Machine, Domain-Specific examples of Embedded system-Automotive.

UNIT-III

EMBEDDED HARDWARE DESIGN: Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock, VLSI and Integrated circuit design, EDA Tools, OrCAD EDA tool, The PCB Layout design.

UNIT-IV

EMBEDDED FIRMWARE DESIGN: Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT-V

REAL TIME OPERATING SYSTEM: Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling, Task communication, Task synchronisation, Device Drivers, How to choose an RTOS.

UNIT-VI

HARDWARE SOFTWARE CO-DESIGN: Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE, issues in embedded system design.

UNIT-VII

EMBEDDED SYSTEM DEVELOPMENT: The integrated development environment, Types of files generated on cross-compilation, Deassembler/ Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools.

UNIT-VIII

EMBEDDED SYSTEM IMPLEMENTATION AND TESTING: The main software utility tool, CAD and the hardware, Translation tools-Pre-processors, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools.

TEXT BOOKS:

1. Introduction to Embedded Systems By Shibu.K.V-Tata McGraw Hill Education Private Limited,2009
2. Embedded Systems Architecture By Tammy Noergaard, Elsevier Publications, 2005.

REFERENCES:

1. Embedded Systems, Raj Kamal-Tata McGraw Hill Education Private Limited, Second Edition, 2008
2. Embedding system building blocks By Labrosse, CMP publishers.
3. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – I Sem.

DIGITAL IMAGE PROCESSING

UNIT - I

Introduction

Origins of Digital Image Processing, Uses Digital Image Processing, Fundamental steps in Digital Image Processing, Components of an Image Processing System, Digital Image Fundamentals

Elements of Visual Perception, Light and Electromagnetic Spectrum, Imaging Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels, An Introduction to the Mathematical Tools used in Digital Image Processing

Image Transforms:

Need for Image Transforms, Spatial Frequencies in Image Processing, Introduction to Fourier Transform, Discrete Fourier Transform, Fast Fourier Transform and its algorithm, Properties of Fourier transform – *Sampling Theorem, Parseval's Theorem,* Discrete Cosine Transform, Discrete Sine Transform, Walsh Transform, Hadamard Transform, Haar Transform, Slant Transform, SVD and KL Transforms *or Hotelling Transform*

UNIT - II

Intensity Transformations and Spatial Filtering

Background, Some Basic Intensity Transformation Functions, Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Combining Spatial Enhancement Methods, using Fuzzy Techniques for Intensity Transformations and Spatial Filtering

UNIT - III

Filtering in the Frequency Domain

Preliminary Concepts, Sampling and the Fourier Transform of Sampled Functions, The Discrete Fourier Transform (DFT) of one Variable, Extension to Functions of Two Variables, Some Properties of the 2-D Discrete Fourier Transform, The Basic of Filtering in the Frequency Domain, Image Smoothing using Frequency Domain Filters, Selective Filtering, Implementation

UNIT - IV

Image Restoration and Reconstruction

A Model of the Image Degradation/Restoration Process, Noise Models, Restoration in the Presence of Noise Only- Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimation the Degradation Function, Inverse Filtering,

Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering, Geometric Mean Filter, Image Reconstruction from Projections.

UNIT - V

Color Image Processing

Color Fundamentals, Color Models, Pseudocolor Image Processing, Basic of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Image Segmentation Based on Color, Noise in Color Images, Color Image Compression

UNIT - VI

Wavelets and Multi-resolution Processing

Image Pyramids, Subband Coding & Haar Transform, Multiresolution Expansions, Wavelet Transforms in One Dimension, The Fast Wavelet Transform, Wavelet Transforms in Two Dimensions, Wavelet packets

Image Compression

Fundamentals, Various Compression methods – Coding Techniques, Digital Image watermarking

UNIT - VII

Morphological Image Processing

Preliminaries, Erosion and Dilation, Opening and Closing, The Hit-or-Miss Transformation, Some Basic Morphological Algorithms, Grey- Scale Morphology

UNIT - VIII

Image segmentation

Fundamentals, Point, Line, and Edge Detection, Thresholding, Region-Based Segmentation, Segmentation Using Morphological Watersheds, The use of Motion in Segmentation

TEXT BOOKS:

1. Rafael C.Gonzalez and Richard E. Woods, "Digital Image Processing" Pearson Education, 2011
2. S.Sridhar, "Digital Image Processing" Oxford Publishers, 2011

REFERENCE BOOKS:

1) S. Jayaraman, S. Esakkirajan, T. Veerakumar, "Digital Image Processing" Mc Graw Hill Publishers, 2009
2) B.Chanda and D.Dutta Majumder, "Digital Image Processing and Analysis" Prentice Hall of India, 2011/2012(Print)
3) Anil K. Jain, "Fundamentals of Digital Image Processing," Prentice Hall of India, 2012
4) Milan Sonka, Hlavac & Boyle "Digital Image Processing and Computer Vision," Cengage Learning Publishers, 2010(Reprinted)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – I Sem.

RADAR SYSTEMS

UNIT I

Introduction Nature of Radar, Maximum Unambiguous Range, Radar Waveforms, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Related Problems.

UNIT II

Radar Equation : Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise and SNR, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment). Related Problems.

UNIT III

CW and Frequency Modulated Radar : Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar.FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Measurement Errors, Multiple Frequency CW Radar.

UNIT IV

MTI and Pulse Doppler Radar : Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, Staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance. Non-coherent MTI, MTI versus Pulse Doppler Radar.

UNIT V

Tracking Radar : Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar Amplitude Comparison Monopulse (one- and two- coordinates), Phase Comparison Monopulse. Target Reflection Characteristics and Angular Accuracy. Tracking in Range, Acquisition and Scanning Patterns. Comparison of Trackers.

UNIT VI

Radar Antennas - Antenna Parameters, Reflector Antennas, Lens Antennas, Cosecant-Squared Antenna Pattern, Radomes, Electronically Steered Phased Array Antennas, Phase Shifters , Frequency –scan Arrays, , Radiators for Phased Arrays, Architectures for Phased Arrays.

UNIT VII

Detection of Radar Signals in Noise : Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation detection, Detection criteria, Detector Characteristics, Automatic Detection, Constant False Alarm Rate Receiver .

UNIT VIII

Radar Receivers – Noise Figure and Noise Temperature. Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus Parallel Feeds, Applications, Advantages and Limitations.

TEXT BOOKS :

1. Introduction to Radar Systems – Merrill I. Skolnik, SECOND EDITION, McGraw-Hill, 1981.

REFERENCES :

1. Introduction to Radar Systems – Merrill I. Skolnik, THIRD EDITION, Tata McGraw-Hill, 2001.
2. Radar : Principles , Technologies, Applications – Byron Edde, Pearson Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering - I Sem.

TELECOMMUNICATION SWITCHING SYSTEMS
(ELECTIVE – I)

UNIT I

TELECOMMUNICATION SWITCHING SYSTEMS : Introduction, Elements of switching systems, switching network configuration, principles of cross bar switching.

UNIT II

Electronic space division switching, Time division switching, Combination switching.

UNIT III

TELEPHONE NETWORKS: Subscriber loop systems, switching hierarchy and routing, transmission plan, numbering plan, charging plans.

UNIT IV

SIGNALING TECHNIQUES: In channel signaling, common channel signaling. Network traffic load and parameters, grade of service and blocking probability.

UNIT V

DATA COMMUNICATION NETWORKS: Introduction, network architecture, layered network architecture, protocols, data communications hardware, data communication circuits.

UNIT VI

Public switched data networks, connection oriented & connection less service, Circuit Switching, packet switching and virtual circuit switching concepts, OSI reference model, LAN, WAN, MAN & Internet. Repeaters, Bridges, Routers and gate ways.

UNIT VII

INTEGRATED SERVICES DIGITAL NETWORK (ISDN) : Introduction, motivation, ISDN architecture, ISDN interfaces, functional grouping, reference points, protocol architecture, signaling, numbering, addressing, BISDN.

UNIT VIII

DSL Technology: ADSL, Cable Modem, Traditional Cable Networks, HFC Networks, Sharing, CM & CMTS and DOCSIS. SONET: Devices, Frame, Frame Transmission, Synchronous Transport Signals, STS 1, Virtual Tributaries and Higher rate of service.

TEXT BOOKS:

1. Tele communication switching system and networks - Thyagarajan Viswanath, PHI, 2000.
2. Advanced electronic communications systems - Wayne Tomasi, PHI, 2004.

REFERENCES:

1. Digital telephony - J. Bellamy, John Wiley, 2nd edition, 2001.
2. Data Communications & Networks - Achyut. S.Godbole, TMH, 2004.
3. Principles of Communication Systems – H. Taub & D. Schilling , TMH, 2nd Edition, 2003.
4. Data Communication & Networking - B.A. Forouzan, TMH, 3rd Edition, 2004.
5. Telecommunication switching, Traffic and Networks - J E Flood, Pearson Education, 2002.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – I Sem.

ANALOG IC DESIGN
(Elective-I)

UNIT I: BASIC MOS DEVICES

MOS structure, I/V characteristics, MOS device models, second order effect, Advanced MOS Modeling, Spice modeling parameters.

UNIT II: INTEGRATED DEVICES AND CURRENT MIRRORS

Single Stage Amplifiers: Basic concepts, common source stages, Source follower, Common gate stage, Cascade stage, Differential amplifiers: single ended differential amplifier, basic differential pair, common mode response, differential pair with MOS loads, Current Mirrors: basic current mirrors, cascade and active current mirrors, bipolar current mirrors and gain stages, advanced current mirrors, Op-amp: Folded cascade, fully differential, current mirror, current feedback.

UNIT III: DESIGN OF OP-AMP AND ITS FREQUENCY RESPONSE

Operational Amplifiers: one stage and two stage op-amps, gain boosting, comparison, common mode feedback, input range limitation, slew-rate, power supply rejection, noise in op-amp.

Frequency Response: Miller effect, common source stage, source followers, common gate stage, cascade stage, differential pair.

UNIT IV: NOISE AND FEEDBACK ANALYSIS OF OP-AMPS

Statistical characteristics of noise, types of noise, representation of noise in circuits, noise in single stage and differential pairs, noise bandwidth, time and frequency domain analysis of noise models.

Feedback: Properties of feedback circuits, types of amplifiers, feedback topologies, effect of loading, effect of feedback on noise.

UNIT V: STABILITY AND FREQUENCY COMPENSATION OF OPAMP

Compensation: Two-stage CMOS op-amp, Feedback and op-amp compensation, General considerations of stability, Multipole systems, Phase margin, Frequency compensation, Slewing in two-stage op-amps, Other compensation techniques.

UNIT VI: SWITCHED CAPACITOR CIRCUITS

Basic building blocks, basic operation and analysis, sampling switches, Filters: First order, Bi-quad, charge injection, switched capacitor, amplifiers , gain circuits, integrators, common mode feedback circuits, other circuits.

UNIT VII: SAMPLE & HOLD AND COMPARATOR CIRCUITS

Performance and basics of sample and hold circuit, examples of CMOS, Bi-Polar, BiCMOS sample and hold Circuits, Band gap voltage reference: basics circuit for band gap reference , trans-linear gain Cell , trans-linear multiplier using op-amp as comparator, charge injection error, latched comparator, examples of CMOS, BiCMOS, Bi-Polar comparators.

UNIT VIII: OSCILLATORS AND DATA CONVERTERS

Ring oscillator, LC Oscillator, voltage controlled oscillator, Ideal D/A & A/D converters , Quantization Noise ,Performance Limitation, Nyquist Rate, A/D Converters : Integrating , Successive Approximation ,Cyclic A/D , Two step A/D , Interpolating A/D, Folding And Pipe-Lined , Time Interleaved Converters.

TEXT BOOKS:

1. D.A John & Ken Martin: "Analog Integrated Circuit Design". John Wiley Publications, 1997.
2. Behzad Razavi, "Design of Analog CMOS Integrated Circuits", Tata-McGraw Hill Publications, 2002.

REFERENCES:

1. Philip E. Allen & Douglas R. Holberg, "CMOS Analog Circuit Design", Oxford University Press, 2002.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering - I Sem.

OBJECT ORIENTED PROGRAMMING
(ELECTIVE – I)

UNIT I:

Object oriented thinking :- Need for oop paradigm, A way of viewing world – Agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overriding and exceptions, summary of oop concepts, coping with complexity, abstraction mechanisms.

UNIT II:

Java Basics History of Java, Java buzzwords, datatypes, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling.

UNIT III:

Inheritance – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism- method overriding, abstract classes.

UNIT IV:

Packages and Interfaces : Defining, Creating and Accessing a Package. Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.Exploring packages – Java.io, java.util.

UNIT V:

Exception handling and multithreading - Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes. Differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

UNIT VI:

Event Handling : Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events. Adapter classes, inner classes.The AWT class hierarchy, user interface components-labels, button, canvas, scrollbars, text components, check box, check box groups, choices, lists panels – scrollpane, dialogs, menubar, graphics, layout manager – layout manager types – boarder, grid, flow, card and grib bag.

UNIT VII:

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons – The JButton class, Check boxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

UNIT VIII:

Networking – Basics of network programming, addresses, ports, sockets, simple client server program, multiple clients, Java .net package ,Packages – java.util,

TEXT BOOKS:

1. Java; the complete reference, 7th edition, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson education.

REFERENCES:

1. An Introduction to programming and OO design using Java, J.Nino and F.A. Hosch, John Wiley & sons.
2. An Introduction to OOP, second edition, T. Budd, Pearson education.
3. Introduction to Java programming 6th edition, Y. Daniel Liang, Pearson education.
4. An introduction to Java programming and object oriented application development, R.A. Johnson- Thomson.
5. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, seventh Edition, Pearson Education.
6. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and GaryCornell, Seventh Edition, Pearson Education
7. Object Oriented Programming through Java, P. Radha Krishna, University Press.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – I Sem.

DIGITAL SIGNAL PROCESSING LAB

LIST OF EXPERIMENTS:

1. To study the architecture of DSP chips – TMS 320C 5X/6X Instructions.
2. To verify linear convolution.
3. To verify the circular convolution.
4. To design FIR filter (LP/HP) using windowing technique

a) Using rectangular window

b) Using triangular window

c) Using Kaiser window

5. To Implement IIR filter (LP/HP) on DSP Processors
6. N-point FFT algorithm.
7. MATLAB program to generate sum of sinusoidal signals.
8. MATLAB program to find frequency response of analog LP/HP filters.
9. To compute power density spectrum of a sequence.
10. To find the FFT of given 1-D signal and plot.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – I Sem.

MICROWAVE AND OPTICAL COMMUNICATIONS LAB

Minimum Twelve Experiments to be conducted:

Part – A (Any 7 Experiments) :

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance and Frequency Measurement.
7. Waveguide parameters measurement.
8. Scattering parameters of Circulator.
9. Scattering parameters of Magic Tee.

Part – B (Any 5 Experiments) :

10. Characterization of LED.
11. Characterization of Laser Diode.
12. Intensity modulation of Laser output through an optical fiber.
13. Measurement of Data rate for Digital Optical link.
14. Measurement of NA.
15. Measurement of losses for Analog Optical link.

Equipment required for Laboratories:

1. Regulated Klystron Power Supply
2. VSWR Meter -
3. Micro Ammeter - 0 – 500 μA
4. Multi meter
5. CRO

6. GUNN Power Supply, Pin Modulator
7. Reflex Klystron
8. Crystal Diodes
9. Micro wave components (Attenuation)
10. Frequency Meter
11. Slotted line carriage
12. Probe detector
13. wave guide shorts
14. Pyramidal Horn Antennas
15. Directional Coupler
16. E, H, Magic Tees
17. Circulators, Isolator
18. Matched Loads
19. Fiber Optic Analog Trainer based LED
20. Fiber Optic Analog Trainer based laser
21. Fiber Optic Digital Trainer
22. Fiber cables - (Plastic, Glass)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – I Sem.

BIO-MEDICAL ENGINEERING
(OPEN ELECTIVE)

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

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

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

4. **MEASUREMENTS IN THE RESPIRATORY SYSTEM:** The Physiology of The Respiratory System, Tests and Instrumentation for The Mechanics of Breathing, Respiratory Therapy Equipment.

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

6. **THERAPEUTIC AND PROSTHETIC DEVICES:** Audiometers and Hearing Aids, Myoelectric Arm, Laparoscope, Ophthalmology Instruments, Anatomy of Vision, Electrophysiological Tests, Ophthalmoscope, Tonometer for Eye Pressure Measurement, Diathermy, Clinical Laboratory Instruments, Biomaterials, Stimulators.

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

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

TEXT BOOKS:

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

REFERENCES:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – I Sem.

IMAGE PROCESSING
(OPEN ELECTIVE)

UNIT - I

Introduction to Image Processing:

Overview of Image Processing, Nature of Image Processing, Image Processing Computer Graphics, Signal Processing, Machine Vision, video Processing, Optics, Statistics, Digital Image Representation, Types of Images, Digital Image Processing Operations, Fundamental steps in Image Processing, Image Processing Applications Digital Imaging System

Digital Imaging System:

Physical Aspects of Imaging Acquisition, Biological Aspects of Image Acquisition, Properties of Human Visual System, Review of Digital Camera, Sampling and Quantization, Image Quality – *Optical Resolution, Image Display Device and Device Resolution,* Digital Halftone Process – *Random Dithering, Ordered Dithering, Non-Periodic Dithering,* Image Storage and File Formats – Need for File Format Types of File Formats – *GIF, JPEG, PNG, DICOM, SVG Structure of TIFF File Format*

UNIT - II

Digital Image Processing Operations:

Basic Relationship and Distance Metrics, Classification of Image Processing Operations, Arithmetic and Logical Operations, Geometric Operations, Image Interpolation Techniques, Set Operations, Statistical Operations, Convolution and Correlation Operations, Data Structures and Image Processing Applications Development –

Relational Structures, Hierarchical Data Structures, Pyramids, Quadtrees, Application Development

UNIT - III

Digital Image Transforms:

Need for Image Transforms, Spatial Frequencies in Image Processing, Introduction to Fourier Transform, Discrete Fourier Transform, Fast Fourier Transform and its algorithm, Properties of Fourier transform – *Sampling Theorem, Parseval's Theorem,* Discrete Cosine Transform, Discrete Sine Transform, Walsh Transform, Hadamard Transform, Haar Transform, Slant Transform, SVD and KL Transforms *or Hotelling Transform*

UNIT - IV

Image Enhancement:

Image Quality and Need for Image Enhancement, Image Quality Metrics, Image Enhancement Point Operations Linear and Non-linear Functions, Piecewise Linear Functions, Histogram-based Techniques, Spatial Filtering Concepts, Image Smoothing Spatial Filters and its design, Image Sharpening Spatial Filters Frequency Domain Filtering

UNIT - V

Image Restoration:

Image Degradation (Restoration) Model, Categories of Image Degradations, Noise Modeling, Blur and Distortions, Image Restoration in the Presence of Noise Only, Mean Filters, Order-statistics Filters, Image Restoration Techniques, Constrained and Unconstrained Methods Geometrical Transforms for Image Restoration

UNIT - VI

Image Compression:

Image Compression Model, Compression Algorithm and its types – *Entropy Coding, Predictive Coding, Transform Coding, Layered Coding,* Types of Redundancy – *Coding Redundancy, Inter-pixel Redundancy, Psychovisual Redundancy, Chromatic Redundancy,*

Lossless Compression Algorithms, Run-length Coding, Huffman Coding , Shannon–Fano Coding, Bit-plane Coding, Arithmetic Coding, Lossless Predictive Coding, Lossy Compression Algorithms, Block Transform Coding, Image and Video Compression standards, JPEG, Video Compression – MPEG

UNIT - VII

Image Segmentation:

Introduction – Classification of Image Segmentation Algorithms, Detection of Discontinuities. Edge Detection – Staged in Edge Detection – Types of Edge Detectors, First-order Edge Detection Operators – Second-order Derivative Filters, Edge Operator Performance

Edge Linking Algorithms, Principle of Thresholding - Effect of Noise over Threshold Process and Peakiness Test - Parametric Methods, Non-parametric Methods, Principle of Region- growing –Dynamic Segmentation approaches Validation of Segmentation Algorithms

UNIT - VIII

Colour Image Processing:

Introduction – Colour Fundamentals, Devices for Colour Imaging, Colour Image Storage and Processing – Colour Models – RGB Colour Model, HIS Colour Model, HSV Colour Model, HLS Colour Model, TV Colour Model– YUV Model, YIQ Model, Y $C_b C_r$ Colour Model, Printing Colour Models- CMK and CMYK Models, Colour Quantization – Popularity Algorithm, Median-cut Algorithm, Octree-based Algorithm, Pseudo Colour Image Processing

Full Colour Processing – Colour Transformation – Image Filters for Colour Images – Noise in Colour Images, Colour Image Segmentation– Thresholding, K-means Clustering Technique, RGB Colour Space Segmentation, Colour Features

TEXT BOOKS:

1. S.Sridhar, "Digital Image Processing" Oxford Publishers, 2011
2. S.Jayaraman, S.Esakkirajan, T.Veerakumar, "Digital Image Processing" Mc Graw Hill Publishers, 2009

REFERENCE BOOKS:

1. Rafael C.Gonzalez and Richard E. Woods, "Digital Image Processing" Pearson Education, 2011
2. B.Chanda and D.Dutta Majumder, "Digital Image Processing and Analysis" Prentice Hall of India, 2011/2012(Print)
3. Anil K. Jain, "Fundamentals of Digital Image Processing," Prentice Hall of India, 2012
4. Milan Sonka, Hlavac & Boyle "Digital Image Processing and Computer Vision," Cengage Learning Publishers, 2010(Reprinted)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – I Sem.

PRINCIPLES OF SIGNALS, SYSTEMS AND COMMUNICATIONS
(OPEN ELECTIVE)

UNIT – I

Signal Analysis: Introduction, Fourier Series - Trigonometric Fourier Series, Complex Exponential Fourier Series; Complex Fourier Spectrum – Time Domain and Frequency Domain Representation of a Signal; Fourier Transform - Analysis of a Non Periodic Function over entire interval; Fourier Transform Involving Impulse Function; Properties of Fourier Transform and Significance - Convolution Integral, Fourier Transform of Periodic Functions.

UNIT – II

Linear Systems: Introduction; System Function – Representation of a function f(t) and its response r(t), Definition of System Function; Distortionless Transmission – Band width of a system, Rise Time and System Band Width; Energy Signals and Power Signals, Energy and Power Spectral Densities; Correlation – Cross and Auto Correlation and their properties.

UNIT – III

Amplitude Modulation: Introduction to Communication System, Need for Modulation, Types of Amplitude Modulations, AM-SC- DSB-SC & SSB-SC. AM- DSB, SSB & VSB, Power and BW requirements. Generation of AM, DSB-SC, SSB-SC; Demodulation of AM-: Diode detectors.

UNIT – IV

Angle Modulation: Frequency & Phase Modulations, Advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM, FM Modulators – Direct Method and Indirect or Armstrong method of generations; FM Demodulators- Slope Detection, Balanced Slope, Foster Seeley and Ratio Detectors.

UNIT – V

Pulse Modulations: Sampling Theorem – Nyquist Interval, Aliasing, Signal recovery from its sampled version; Flat Top and Natural Sampling, PAM-PAM Modulation and Demodulation, PWM and PPM, Time Division Multiplexing, Frequency Division Multiplexing and Comparison between TDM and FDM.

UNIT – VI

Pulse Code Modulations: Digital Representation of Analog Signal- Quantization of Signals, Quantization Error, Pulse Code Modulation- PCM System, Line Codes and their properties, Delta Modulation, Adaptive DM and comparisons.

UNIT – VII

Digital Modulation: ASK, FSK, PSK and DPSK, QPSK demodulation, Coherent and Non-coherent Reception, Comparison of Binary and Quaternary Modulation Schemes, M-ary modulation techniques.

UNIT – VIII

Advanced Communication Systems: Telephone Switching, Computer Communication, Optical Communications, Mobile Telephone Communication – The Cellular Concept, Satellite Communications, RADAR Systems.

TEXT BOOKS:

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 2nd Edition, 2008
2. Principles of Communication Systems- H. Taub and D. Schilling, TMH, 2003.

REFERENCE BOOKS:

1. Modern Digital and Analog Communication Systems – B.P. Lathi, Oxford 3rd Edition
2. Communication Systems – Simon Haykin, John Wiley, 3rd Edition
3. Digital and Analog Communication Systems – K Sam Shanmugam, WSE, 2006
4. Electronic & Communication Systems – Kennedy and Davis, TMH, 4th Edition, 2004.

IV YEAR **II SEMESTER**

S. No.	Subject	T	P	Credits
1	Cellular and Mobile Communications	4	-	4
2	**Elective – II** Network Security & Cryptography Satellite Communications Digital Control Systems	4	-	4
3	**Elective – III** Operating Systems Structured Digital Design Wireless Sensor Networks	4	-	4
4	**Elective – IV** Analytical Instrumentation Real Time Operating Systems TV Engineering	4	-	4
5	PROJECT			12
	Total			**28**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – II Sem.

CELLULAR AND MOBILE COMMUNICATIONS

UNIT I

CELLULAR MOBILE RADIO SYSTEMS : Introduction to Cellular Mobile System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

UNIT II

ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN : General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni directional Antenna system, Cell splitting, consideration of the components of Cellular system.

UNIT III

INTERFERENCE : Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-cochannel interference-different types.

UNIT IV

CELL COVERAGE FOR SIGNAL AND TRAFFIC : Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

UNIT V

CELL SITE AND MOBILE ANTENNAS : Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

UNIT VI

FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT : Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment.

UNIT VII

Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

UNIT VIII

DIGITAL CELLULAR NETWORKS : GSM architecture, GSM channels, multiplex access scheme , TDMA, CDMA.

TEXTBOOKS :

1. Mobile Cellular Telecommunications – W.C. Y. Lee, Tata McGraw Hill, 2rd Edn., 2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.

REFERENCES :

1. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.
2. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006.
3. Wireless Communication and Networking – Jon W. Mark and Weihua Zhqung, PHI, 2005.
4. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – II Sem.

NETWORK SECURITY & CRYPTOGRAPHY
(ELECTIVE – II)

UNIT-I:

Introduction: Security Attacks, Security Services, Security Mechanisms, and a Model for Network Security, Non-Cryptographic Protocol Vulnerabilities - DoS, DDoS, Session Hijacking and Spoofing, Software Vulnerabilities - Phishing, Buffer Overflow, Format String Attacks, SQL Injection, Basics of Cryptography - Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Other Cipher Properties - Confusion, Diffusion, Block and Stream Ciphers.

UNIT-II:

Secret Key Cryptography: Data Encryption Standard (DES), Strength of DES, Block Cipher Design Principles and Modes of Operations, Triple DES, International Data Encryption algorithm, Blowfish, CAST-128, AES

UNIT-III

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, the Chinese Remainder Theorem, Discrete Logarithms.

UNIT-IV

Public Key Cryptography: Principles of Public Key Cryptosystems, RSA Algorithm, Diffie-Hellman Key Exchange, Introduction to Elliptic Curve Cryptography.

UNIT-V:

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Secure Hash Algorithm, Message Authentication Codes - Message Authentication Requirements and Functions, HMAC, Digital signatures, Digital Signature Schemes, Authentication Protocols, Digital Signature Standards.

UNIT-VI:

Authentication Applications: Kerberos, Key Management and Distribution, X.509 Directory Authentication service, Public Key Infrastructure, Electronic

Mail Security: Pretty Good Privacy, S/MIME.

UNIT-VII:

IP Security: Overview, Architecture, Authentication Header, Encapsulating Security Payload, Combining security Associations, Internet Key Exchange, Web Security: Web Security Considerations, Secure Sockets Layer and Transport Layer Security, Electronic Payment.

UNIT-VIII:

System Security: Intruders, Intrusion Detection, Password Management, Malicious Software - Types, Viruses, Virus Countermeasures, Worms, Firewalls - Characteristics, Types of Firewalls, Placement of Firewalls, Firewall Configuration, Trusted systems.

TEXT BOOKS:

1. Cryptography and Network Security: Principles and Practice, 5th Edition, William Stallings, Pearson Education, 2011.
2. Network Security and Cryptography, Bernard Menezes, Cengage Learning, 2011.
3. Cryptography and Network, 2nd Edition, Behrouz A. Fourouzan and Debdeep Mukhopadhyay, McGraw-Hill, 2010.

REFERENCE BOOKS:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Principles of Information Security, Whitman, Thomson.
3. Introduction to Cryptography, Buchmann, Springer.
4. Applied Cryptography, 2nd Edition, Bruce Schneier, Johnwiley & Sons.
5. Mobile Cellular Communications- G. Sashibhushana Rao, Pearson Publications, 2012

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – II Sem.

SATELLITE COMMUNICATIONS
(ELECTIVE – II)

UNIT I

INTRODUCTION [2] : Origin of Satellite Communications, Historical Background, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

UNIT II

ORBITAL MECHANICS AND LAUNCHERS[1] : Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

UNIT III

SATELLITE SUBSYSTEMS[1] : Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

UNIT IV

SATELLITE LINK DESIGN[1] : Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

UNIT V

MULTIPLE ACCESS[1][2] : Frequency division multiple access (FDMA) Intermodulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple access (CDMA),Spread spectrum transmission and reception.

UNIT VI

EARTH STATION TECHNOLOGY[3] : Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power test methods.

UNIT VII

LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS[1] : Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations, Operational NGSO constellation Designs

UNIT VIII

SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM [1] : Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

TEXT BOOKS :

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

REFERENCES :

1. Satellite Communications : Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
4. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – II Sem.

DIGITAL CONTROL SYSTEMS
(ELECTIVE - II)

UNIT – I SAMPLING AND RECONSTRUCTION

Introduction, Examples of Data control systems – Digital to Analog conversion and Analog to Digital conversion, sample and hold operations.

UNIT-II THE Z – TRANSFORMS

Introduction, Linear difference equations, pulse response, Z – transforms, Theorems of Z – Transforms, the inverse Z – transforms, Modified Z-Transforms

UNIT-III Z-PLANE ANALYSIS OF DISCRETE-TIME CONTROL SYSTEM

Z-Transform method for solving difference equations: Pulse transforms function, block diagram analysis of sampled – data systems, mapping between s-plane and z-plane.

UNIT – IV STATE SPACE ANALYSIS

State Space Representation of discrete time systems, Pulse Transfer Function Matrix solving discrete time state space equations, State transition matrix and it's Properties, Methods for Computation of State Transition Matrix, Discretization of continuous time state – space equations.

UNIT – V CONTROLLABILITY AND OBSERVABILITY

Concepts of Controllability and Observability, Tests for controllability and Observability. Duality between Controllability and Observability, Controllability and Observability conditions for Pulse Transfer Function.

UNIT – VI STABILITY ANALYSIS

Mapping between the S-Plane and the Z-Plane – Primary strips and Complementary Strips – Constant frequency loci, Constant damping ratio loci, Stability Analysis of closed loop systems in the Z-Plane. Jury stablility test – Stability Analysis by use of the Bilinear Transformation and Routh Stability criterion.

UNIT – VII DESIGN OF DISCRETE TIME CONTROL SYSTEM BY CONVENTIONAL METHODS

Transient and steady – State response Analysis – Design based on the frequency response method – Bilinear Transformation and Design procedure in the w-plane, Lead, Lag and Lead-Lag compensators and digital PID controllers.

UNIT – VIII STATE FEEDBACK CONTROLLERS AND OBSERVERS

Design of state feedback controller through pole placement – Necessary and sufficient conditions, Ackerman's formula.State Observers – Full order and Reduced order observers.

TEXT BOOKS:

1. Discrete-Time Control systems - K. Ogata, Pearson Education/PHI, 2nd Edition
2. Digital Control and State Variable Methods by M.Gopal, TMH

REFERENCES:

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control Engineering, M.Gopal

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – II Sem.

OPERATING SYSTEMS (ELECTIVE - III)

UNIT I

Computer System and Operating System Overview; Overview of Computer System hardware – Instruction execution – I/O function – Interrupts – Memory hierarchy – I.O Communication techniques. Operating System Objectives and functions – Evaluation of operating System – Example Systems.

UNIT II

Process Description – Process Control-process states – Process and Threads - Examples of Process description and Control.

UNIT III

Concurrency : Principles of Concurrency – Mutual Exclusion – Software and hardware approaches – semaphores – Monitors – Message Passing – Readers Writers Problem.

UNIT IV

Principles of deadlock – deadlock prevention, detection and avoidance dining philosophers problem – example Systems.

UNIT V

Memory Management: Memory Management requirements – loading programmes in to main memory – virtual memory – hardware and Control structures – OS Software – Examples of Memory Management.

UNIT VI

Uniprocessor Scheduling: Types of Scheduling – Scheduling algorithms – I/O management and Disc Scheduling – I/o devices – organization – of I/O function – OS design issues – I/O buffering – Disk I/O – disk scheduling Policies – examples System.

UNIT VII

File Management and Security: Overview of file management – file organization

and access – File Directories – File sharing – record blocking – secondary Storage Management – example system.

UNIT VIII

Security : Security threats – Protection – intruders – Viruses – trusted System.

TEXT BOOKS :

1. Operating Systems' – Internal and Design Principles, Fifth Edition-2005, Pearson education./PHI
2. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne,7th Edition John Wiley

REFERENCES :

1. Operating Systems A design approach- Crowley,TMH.
2. Modern Operating Systems, Andrew S Tanenbaum. 2nd Edition, PHI/ PEARSON.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – II Sem.

STRUCTURED DIGITAL DESIGN
(Elective-III)

UNIT-I: INTRODUCTION TO HDL

Design Concepts: The Design process, Design of Digital Hardware, Introduction to Logic Circuits, Introduction to CAD Tools, Introduction to VHDL, Introduction to Digital Design Methodology, Design methodology, Introduction to Verilog.

UNIT-II: 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.

UNIT-III: 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.

UNIT-IV: 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-V: DIGITAL LOGIC CIRCUIT DESIGN USING VERILOG

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 of combinational and sequential logic using Verilog, Verilog for combinational circuits.

UNIT-VI: DIGITAL LOGIC CIRCUIT DESIGN EXAMPLES USING VERILOG

Behavioral modeling , 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 behavioral modeling, Design examples, Keypad scanner and encoder.

UNIT-VII: 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-VIII: 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 & Zvonko Vranesic, "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.

REFERENCES:

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

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – II Sem.

WIRELESS SENSOR NETWORKS
(ELECTIVE - III)

UNIT I

OVERVIEW OF WIRELESS SENSOR NETWORKS:

Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints an challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks.

UNIT II

ARCHITECTURES:

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT III

NETWORKING Technologies:

Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs,WANETs.

UNIT-IV

MAC Protocols for Wireless Sensor Networks:

Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

UNIT-V

ROUTING PROTOCOLS:

Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols, Proactive Routing

UNIT-VI

TRANSPORT LAYER AND SECURITY PROTOCOLS:

Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc

Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks,

UNIT VII

INFRASTRUCTURE ESTABLISHMENT:

Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

SECURITY IN WSNs:

Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

UNIT-VIII

SENSOR NETWORK PLATFORMS AND TOOLS:

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

APPLICATIONS of WSN:

S Ultra wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications

TEXT BOOKS:

1. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S.Manoj, 2004, PHI
2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control – Jagannathan Sarangapani, CRC Press
3. Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.

REFERENCES:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, and Applications", John Wiley, 2007.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.
3. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh ,1 ed. Pearson Education.
4. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer
5. Wireless Sensor Networks – S Anandamurugan , Lakshmi Publications

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – II Sem.

ANALYTICAL INSTRUMENTATION
(ELECTIVE - IV)

UNIT – I: pH AND CONDUCTIVITY & DISSOLVED COMPONENT ANALYSER

Conductivity meters – pH meters – Dissolved oxygen, hydrogen analyzers – Sodium analyzer – Silica analyzer and sampling systems.

UNIT – II: GAS ANALYSERS

Thermal conductivity types – CO monitor – NOX analyzer – H2S analyzer system and sampling – Industrial analyzer circuits, Theory and problems on Beer – Lamberts Law.

UNIT – III: CHROMATOGRAPHY - I

Gas chromatography – Liquid chromatography – their principles and applications –

UNIT – IV: CHROMATOGRAPHY – II oxygen analyzer – paramagnetic type – detectors and sampling systems.

UNIT – V: SPECTROPHOTOMETERS - I

UV, VIS Spectrophotometers – Single beam and double beam instruments – Instrumentation associated with the above Spectrophotometers – Sources and detectors – Sources and detectors for IR Spectrophotometers.

UNIT – VI: SPECTROPHOTOMETERS - II

FT IR Spectrometer – Flame emission and atomic absorption Spectrophotometer – Atomic emission Spectrophotometer - sources for Flame Photometers and online calorific value measurements.

UNIT – VII: PRINCIPLE OF NUCLEAR MAGNETIC RESONANCE

Instrumentation associated with NMR Spectrophotometer – Introduction to mass spectrophotometers , Principle and brief discussion on ELECTRON SPIN RESONANCE (ESR.)

UNIT – VIII: APPLICATIONS

Nuclear radiation detectors – Ionization chamber – GM Counter – Proportional Counter – Solid state detectors.

TEXT BOOK:

1. Handbook of Analytical Instruments – by Khandpur. TMH

REFERENCES:

1. Instrumental Methods of Analysis – by Willard H.H., Merrit L.L., Dean J.A.. and Seattle F.L., CBS Publishing and Distributors, 6/e, 1995.
2. Instrument Technology – by Jones B.E., Butterworth Scientific Publ., London, 1987.
3. Mechanical and Industrial Measurements – by Jain R.K., Khanna Publishing, New Delhi, 2/e, 1992.
4. Principles of Instrumental Analysis – by Skoog D.A. and West D.M., Holt Sounder Publication, Philadelphia, 1985.
5. Instrumental Analysis – by Mann C.K., Vickerks T.J. & Gullick W.H., Harper and Row Publishers, New York, 1974.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – II Sem.

REAL TIME OPERATING SYSTEMS
(Elective-IV)

UNIT-I: INTRODUCTION TO REAL-TIME OPERATING SYSTEM

OS Services, Process Management, Timer Functions, Event Functions, Memory Management, Device, File and IO Systems Management, Interrupt Routines in RTOS Environment and Handling of Interrupt Source Calls, Real-Time Operating Systems, Basic Design Using an RTOS, RTOS Task Scheduling Models, Interrupt Latency and Response of the Tasks as Performance Metrics, OS Security Issues.

UNIT-II: REAL-TIME OPERATING SYSTEM PROGRAMMING-I

Basic Functions and Types of RTOS for Embedded Systems, RTOS mCOS-II, RTOS Vx Works, Programming concepts of above RTOS with relevant Examples.

UNIT-III: REAL-TIME OPERATING SYSTEM PROGRAMMING-II

Programming concepts of RTOS Windows CE, RTOS OSEK, RTOS Linux 2.6.x and RTOS RT Linux.

UNIT-IV: DESIGN EXAMPLES AND CASE STUDIES OF PROGRAM MODELING WITH RTOS-I

Case study of embedded system design and coding for an Automatic Chocolate Vending Machine (ACVM) Using Mucos RTOS, case study of digital camera hardware and software architecture, case study of coding for sending application layer byte streams on a TCP/IP Network Using RTOS Vx Works.

UNIT-V: DESIGN EXAMPLES AND CASE STUDIES OF PROGRAM MODELING WITH RTOS-II

Case Study of Communication, Orchestra, Robots, Embedded System in Automobile, Case Study of Embedded System for an Adaptive Cruise Control (ACC) System in Car, Case Study of Embedded System for a Smart Card, Case Study of Embedded System of Mobile Phone Software for Key Inputs.

UNIT-VI: TARGET IMAGE CREATION

Off-The-Shelf Operating Systems, Operating System Software, Target Image

Creation for Window XP Embedded, Porting RTOS on a Micro Controller based Development Board.

UNIT-VII: PROGRAMMING IN LINUX

Overview and programming concepts of Unix/Linux Programming, Shell Programming, System Programming.

UNIT-VIII: PROGRAMMING IN RTLINUX

Overview of RT Linux, Core RT Linux API, Program to display a message periodically, semaphore management, Mutex, Management, Case Study of Appliance Control by RT Linux System.

TEXT BOOKS:

1. Dr. K.V.K.K. Prasad: "Embedded/Real-Time Systems" Dream Tech Publications, Black pad book.
2. Rajkamal: "Embedded Systems-Architecture, Programming and Design", Tata McGraw Hill Publications, Second Edition, 2008.

REFERENCES:

1. Labrosse, "Embedding system building blocks ", CMP publishers.
2. Rob Williams," Real time Systems Development", Butterworth Heinemann Publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

IV Year B. Tech. Electronics and Communication Engineering – II Sem.

TELEVISION ENGINEERING
(ELECTIVE–IV)

UNIT I

INTRODUCTION : TV transmitter and receivers, synchronization. Television Pictures: Geometric form and aspect ratio, image continuity, interlaced scanning, picture resolution, Composite video signal: Horizontal and vertical sync, scanning sequence. Colour signal generation and Encoding: Perception of brightness and colours, additive colour mixing, video signals for colours, luminance signal, colour difference signals, encoding of colour difference signals, formation of chrominance signals, PAL encoder.

UNIT II

TV SIGNAL TRANSMISSION AND PROPAGATION : Picture signal transmission, positive and negative modulation, VSB transmission, sound signal transmission, standard channel BW, TV transmitter, TV signal propagation, interference, TV broadcast channels, TV transmission Antennas.

UNIT III

TV CAMERAS : Camera tube types, Vidicon, Silicon Diode Array Vidicon, Monochrome TV camera, color camera. CCD Image Sensors.

UNIT IV

PICTURE TUBES : Monochromatic Picture tube, Electrostatic focussing, Beam deflection, picture tube characteristics and specifications, colour picture tubes. TV Standards: American 525 line B&W TV system, NTSC colour system, 625-line monochrome system,b PAL colour system, TV standards.

UNIT V

MONOCHROME TV RECEIVER : RF tuner, IF subsystem, video amplifier, sound section, sync separation and processing, deflection circuits, scanning circuits. PAL-D Colour Receiver: Electron tuners, IF subsystem, Y-signal channel, Chroma decoder, Separation of U & V Colour Phasors, synchronous demodulators, Subcarrier generation, raster circuits.

UNIT VI

VISION IF SUBSYSTEM : AGC, noise cancellation, video and intercarrier

sound signal detection, vision IF subsystem of Black and White receivers, Colour receiver IF subsystem. Receiver sound system: FM detection, FM Sound detectors, typical applications. TV Receiver Tuners: Tuner operation, VHF and UHF tuners, digital tuning techniques, remote control of receiver functions.

UNIT VII

COLOUR SIGNAL DECODING : PAL – D decoder, chroma signal amplifiers, separation of U and V signals, Color burst separation, Burst phase discriminator, ACC amplifier, Reference oscillator, Indent and colour killer circuits, RO phase shift and 180o PAL–SWITCH circuitry, U & V demodulators, Colour signal mixing.

UNIT VIII

SYNC SEPARATION, AFC AND DEFLECTION OSCILLATORS : Synchronous separation, k noise in sync pulses, separation of frame and line sync pulses. AFC, single ended AFC circuit. Deflection Oscillators, deflection drive Ics. Receiver Antennas. DIGITAL TV Digital Satellite TV, Direct to Home Satellite TV, Digital TV Receiver, Digital Terrestrial TV.

TEST BOOKS :

1. Modern Television Practice – Principles, Technology and Service – R.R. Gulati, New Age International Publication, 2002.
2. Television and Video Engineering - A.M. Dhake, 2nd Edition
3. Monochrome and Colour TV – R.R. Gulati, New Age International Publication, 2002.

REFERENCES :

1. Colour Television Theory and Practice – S.P. Bali, TMH, 1994.
2. Basic Television and Video Systems – B. Grob and C.E. Herndon, McGraw Hill, 1999.