Course Title	MANAGEEMNT SCIENCE					B. Tech. ECE VII Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1525701	Humanities and social sciences	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	--	--	3	30	70	100
Mid Exam Duration: 90 Min.					End Exam Duration: 3Hrs			

Course Objectives:

- Provide a basic understanding of management science including analytical problem solving and communications skills.
- Prepare for practice in a field that sees rapid changes in tools, problems and opportunities.
- Prepare for graduate study and self-development over an entire career.
- Provide ability to use the techniques, skills and modern engineering tools necessary for engineering practices.
- The broad education necessary to understand the impact of engineering solutions in a global and societal context.
- Background necessary for admission to top professional graduate engineering or business programs.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Know** the principles and functions of management
CO 2	**Understand** the various concepts, approaches and theories of management in the real situation.
CO 3	**Compare and contrast** organization structure designs and charts diligently with theoretical learning concepts
CO 4	**To be aware** of the role, functions and functioning of human resource department of the organizations.
CO 5	**Identify** the elements of Operations management and **develop** PERT/CPM Charts for projects of an enterprise and estimate time & cost ofproject.
CO 6	**Analyze** the concept of strategic planning and implementation and apply on the decisions in strategic management.

UNIT- I

Introduction to Management: Concept of Management-Administration, Organization-Function of Management, Evolution of Management Thought-Organization: Principles of Organization-Types-Organization charts-managerial objectives and Social responsibilities of Management.

UNIT – II

Strategic Management: Corporate Planning-mission, objectives and programmes-SWOT Analysis-Strategy Formulation and Implementation.-Plant location and Plant Layout concepts-Production control.

UNIT – III

HRM and Inventory Management: Human Resource Management –Manpower Planning-Personnel Management-Basic functions of Personnel Management, Job Evaluation and Merit Rating-Incentive plans.

Inventory Management: Need for Inventory Control; EOQ, ABC Analysis, Purchase Procedure, Maintaining Store Records.

UNIT-IV

Operations Management: Productivity- Job, Batch and Mass Production-Work Study-Basic procedure involved in Method Study and Work Measurement. Statistical Quality Control-c chart, p chart, R chart, Acceptance sampling Deming's contribution to Quality.

UNIT-V

Project Management: Network Analysis to project management- PERT/CPM- Application of network techniques to engineering problems-Cost Analysis-Project Crashing.

Text Books:

1. Aryasri: Management Science,TMH,2008.
2. Koontz&Weihrich: Essentials of Management,6/e,TMH,2005
3. Kanishka Bedi: Production and Operations Management, Oxford University Press,2004
4. Parnell: Strategic Management, Biztantra, 2003.
5. LS Srinath: PERT/CPM,Affiliated East-West Press,2005

Reference Books:

1. Idustrial Engineering management science :Banga T Rshama SC Agarwal N K, Cambridge
2. Management science: Kumthekar MM hukeri Nand Kumar ,EP
3. Practical management secience:Winston Wayne LchristianAlbroghtSBroadie mark,Cengage
4. Management Science, Logistics ,and operation research; John wang(montaclair state university, USA),IGI

Course Title	VLSI DESIGN				B. Tech. ECE VII Sem			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1504702	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		4	--	--	3	30	70	100
Mid Exam Duration: 1Hr 30 Min					End Exam Duration: 3Hrs			

Course Objectives:

- The main objective of the course is to introduce the concepts of IC fabrication technologies and their corresponding Stick Diagrams
- The course will also introduce scaling techniques of CMOS devices and their effects
- The course will also familiarize the students with CAD/EDA tools

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Describe** the design rules and scaling concepts
CO 2	**Understand** the various IC technologies and fabrication steps
CO 3	**Apply** the basic functional modules for sub system design
CO 4	**Analyze** the basic electrical properties of MOS and BICMOS logic circuits
CO 5	**Understand** the models of integrated circuit design and testing techniques

UNIT-I

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & Bi-CMOS technologies-Substrate preparation, Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation, Probe testing, Integrated Resistors and Capacitors.

UNIT-II

Basic Electrical Properties: Basic Electrical Properties of MOS and Bi-CMOS Circuits: $I_{ds}VsV_{ds}$ relationships, MOS transistor threshold Voltage, g_m, g_{ds}, Figure of merit, Pass transistor, NMOS Inverter, Various pull ups and Pull downs, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT-III

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2μ CMOS Design rules for wires, Contacts and transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

UNIT-IV

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Basic circuit concepts, Sheet Resistance(R_S) concept and Sheet Resistance R_S in MOS, Area Capacitance Units, Calculations Delays, Driving large Capacitive Loads, Wiring Capacitances.

Subsystem Design: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Counters, High Density Memory Elements.

UNIT-V

Semiconductor Integrated Circuit Design: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic(PLA'S), Design Approach.

CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level

Test Techniques, System-level Test Techniques, Layout Design for improved Testability.

Text Books:

1. Kamran Eshraghian, EshraghianDougles and A. Pucknell, Essentials of VLSI circuits and systems,PHI, 2005 Edition.
2. Weste and Eshraghian, Principles of CMOS VLSI Design, Pearson Education, 1999.
3. Douglas A. Pucknell& Kamran Eshraghian, Basic VLSI Design, PHI 3rd Edition (original Edition – 1994).
4. Neil H.E. Weste, David Harris, Ayan Banerjee, CMOS VLSI Design- A Circuits and Systems Perspective, 3rd Edition, Pearson Education.

Reference Books:

1. John .P. Uyemura, Introduction to VLSI Circuits and Systems, JohnWiley, 2003.
2. John M. Rabaey, Digital Integrated Circuits, PHI, EEE, 1997.
3. Sung-Mo Kang, Yusuf Leblebici, CMOS Digital Integrated Circuits - Analysis and Design, McGraw-Hill, Fourth Edition, 2014.
4. Wayne Wolf, Pearson Education, Modern VLSI Design, 3rd Edition, 1997.
   S.M. SZE, VLSI Technology, 2nd Edition, TMH, 2003.

Course Title	ELECTRONIC MEASUREMENTS AND INSTRUMENTATION				B. Tech. ECE VII Sem			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1504703	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		4	--	--	3	30	70	100
Mid Exam Duration: 1Hr 30Min					End Exam Duration: 3Hrs			

Course Objectives:

- The presentation of fundamental measurement concepts and measurement methodologies including the description of basic instruments that are the technological implementation of general methodologies.
- Understanding about the transducers and to help the students analyze various signals using CRO.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Define** the performance characteristics of an instrument.
CO 2	**Understand** theprinciple of analog, digital voltmeters and wave analyzers
CO 3	**Explain** different types of oscilloscopes
CO 4	**Use** AC and DC bridges for relevant parameter measurement.
CO 5	**Apply** the complete knowledge of various electronic transducers to measure the physical Quantities in the field of science and technology

UNIT I

Performance characteristics of Instruments: Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity. Errors in Measurement, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamic error.

Analog Instruments: Transistor Voltmeter, Micro Voltmeter (Chopper type) – DC Differential voltmeter – AC voltmeters – Multi meter -wave analyzers (AF & RF) – Harmonic distortion analyzer- Spectrum analyzer.

UNIT II

Digital Instruments: Digital Voltmeters (Ramp, Dual slope, stair case, successive approximation types) Digital multi meter, Universal counter, Digital tachometer, Digital Phase meter.

UNIT III

Cathode Ray Oscilloscopes: Motion of electron in electronic field and in magnetic field-Block diagram of CRO, CRT, Electrostatic deflection sensitivity – Vertical and Horizontal deflection systems – Principle of operation of dual beam, dual trace, sampling and storage CRO's- Measurements with CRO (Voltage, Current, time, frequency, Phase angle, lissajous figures)

UNIT IV

Bridges: Wheat stone bridge, Kelvin Bridge, Measurement of inductance- Maxwell's bridge, Anderson Bridge. Measurement of capacitance-Schearing Bridge, Wien Bridge Errors and precautions in using bridges- Q meter and measurement methods

UNIT V

Transducers: Active & passive transducers**,** Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors. Measurement of physical parameters force, pressure, velocity, humidity, moisture, speed, proximity and displacement.Data acquisition systems.

Text Books:

1. H.S. Kalsi, Electronic instrumentation, second edition - Tata McGraw Hill, 2004.
2. A.D. Helfrick and W.D. Cooper, Modern Electronic Instrumentation and Measurement Techniques –PHI, 5th Edition, 2002.
3. A.K. Sawhney, "A Course In Electrical And Electronic Measurements And Instrumentation", DhanpatRai Publications, 2012.
4. Golding, E.W. and Widdis, F.C., Electrical Measurements and Measuring Instruments, A.H.Wheeler and Co, 5th Edition, 2011.

References:

1. David A. Bell, Electronic Instrumentation & Measurements - PHI (OUP), 2nd Edition, 2003.
2. Robert A.Witte, Electronic Test Instruments, Analog and Digital Measurements - Pearson Education, 2nd Ed., 2004.
3. K. Lal Kishore,Electronic Measurements & Instrumentations, Pearson Education – 2005.
4. Ernest.O.Doebelin and Dhanesh.N.Manik, Doebelin's Measurement Systems, McGraw Hill Education, 6th Edition, 2011.

Course Title	OPTICAL COMMUNICATIONS				B. Tech. ECE VII Sem			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1504704	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		4	--	--	3	30	70	100
Mid Exam Duration: 1 Hr 30Min					End Exam Duration: 3Hrs			

Course Objectives:

- To understand the functionality of each of the components of fiber optic communication system
- To understand the properties and principles of different types of optical fibers, and losses that occur in fibers.
- To understand the working and principle of optical sources (LED and LASER) and power launching schemes.
- To analyze the operation of various optical detectors (PIN & APD) and optical receiver
- To understand the design of optical systems, WDM and Measurements

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Identify** the structures of Optical fibers based on modes, refractive index and fiber materials.
CO 2	**Analyze** the different kind of losses in fibers and optical fiber link design parameters
CO 3	**Categorize** the types of optical sources and optical detectors on the basis of physical construction and principle of operation.
CO 4	**Explain** the necessity for using splices, couplers and connectors in energy transmission.
CO 5	**Discuss** WDM concepts, Optical Amplifiers, Optical System design and Measurements

UNIT-I

Introduction and Optical fiber waveguides: Historical Development, The General System, Advantages of Optical Fiber Communications, Ray Theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew Rays, Cylindrical Fiber – Modes, V Number, Mode coupling, Step Index fibers, Graded Index Fibers Single mode fibers - Cut off wavelength, Mode Field Diameter, Effective Refractive Index.

UNIT-II

Fiber Materials - Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers, Mechanical Properties of Fibers, Fiber Optic Cables.

Transmission Characteristics of optical fibers -Attenuation, Material Absorption Losses in Silica Glass Fibers, Linear Scattering Losses, Fiber Bend Loss, Dispersion, Chromatic dispersion, Intermodal dispersion, Overall fiber dispersion, Polarization – Fiber Birefringence, Polarization Mode Dispersion.

UNIT-III

Power launching and Coupling-Source to Fiber Power Launching – Source output pattern, power coupling calculation, power launching versus wavelength, Equilibrium Numerical Aperture, **Lensing schemes for Coupling Improvement** -non imaging microsphere, Laser diode to fiber coupling, LED coupling to single mode fibers. **Fiber-to-fiber Joints** – Mechanical misalignments, Fiber related losses, Fiber end face preparation, **Fiber Splicing** – Splicing techniques, splicing single mode fibers, **Optical Fiber Connectors** – Connector types, Single mode fiber connectors- Connector return losses, **Passive components** – The 2 x 2 fiber coupler, Star couplers

UNIT-IV

Optical Sources: Light Emitting Diodes (LEDs) - LED Structures, Light Source Materials, Quantum efficiency and LED Power, Modulation of LED. **LASER Diodes**- Laser Diode Modes and Threshold Conditions, Laser Diode Rate Equations, External Quantum Efficiencies, Resonant Frequencies. **Photo Detectors: Physical principles of photo diodes**- The PIN and Avalanche photo diode (APD), detector response time, structures for InGaAs APDs, temperature effect on avalanche gain, comparisons of photo detectors.

UNIT-V

Optical receiver operation: Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, **Optical system design** - Point to point links, system considerations, Link Power budget, Rise time budget, Transmission distance, **Operational principles of WDM** - Types, Fiber grating filters. **Measurements** – Optical Time domain Reflectometer (OTDR). Attenuation Measurements, dispersion Measurements, EYE Patterns.

Text Books:

1. Gerdkeiser, Optical fiber communications- McGraw Hill International Edition, 4th Edition, 2010.
2. John M. Senior, Optical fiber communications- PHI, 3rd Edition, 2010.
3. Oseph C. Plais, Fiber Optic Communication, Pearson Education, 4th Ed, 2004.
4. Govind P. Agrawal, Fiber Optic Communication Systems, John Wiley, 3rd Edition, 2004.

Reference Books:

1. Max Ming-Kang Liu, Principles and Applications of Optical Communications, TMH, 2010.
2. S. C. Gupta, Optical fiber communication and its applications- PHI, 2005.
3. Donald J.Sterling Jr., Introduction to Fiber Optics, Cengage learning, 2004.
4. DjaferKmynbaev Lowell L. Scheiner, Fiberoptic communications Technology- Pearson Education pte. Ltd.

Course Title	DIGITAL IMAGE PROCESSING				B. Tech. ECE VII Sem			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1504705	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		4	--	--	3	30	70	100
Mid Exam Duration: 2Hrs					End Exam Duration: 3Hrs			

Course Objectives:

- To study the image fundamentals and transforms necessary for image processing
- To learn the concepts of filtering in spatial and frequency domain
- To study different noise models and restoration filters
- To understand different redundancies and lossy and lossless compression techniques.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Define** various image processing parameters
CO 2	**Explain** image filtering, segmentation and compression
CO 3	**Compare** different 2D transforms Color models and image restoration techniques
CO 4	**Apply** the concepts of image processing techniques in various applications.
CO 5	**Analyze** mathematical operations, coding and filtering methods in image processing.

UNIT-I

Introduction: Fields that use digital image processing, fundamental Steps in Digital Image Processing, Components of an Image processing system, elements of Visual Perception. Image sensing and Acquisition, Image formation model, Image Sampling and Quantization - Representing digital images, spatial and intensity resolution. Relationship between pixels - neighbours of a pixel, Adjacency, Connectivity, Regions and boundaries, distance measures, Mathematical tools in digital image processing – Array versus matrix operations, Linear and Nonlinear Operations, Arithmetic operations, geometrical spatial transformations and image registration.

UNIT-II

Image Transforms: General approach for operating in the linear transform domain, 2-D DFT and Properties, Walsh transform, Hadamard Transform, Discrete cosineTransform, Haar transform, Slant transform, KL Transform or Hotelling transform

UNIT-III

Image Enhancement: Image enhancement in Spatial domain - Some Basic Intensity Transformations, Histogram Processing, Enhancement, Basics of Spatial filtering, Smoothing spatial filtering, sharpening spatial filters, Combining spatial enhancement methods.

Image enhancement in the Frequency Domain –Basics of filtering in frequency domain, Image smoothing and sharpening in frequency domain, homomorphic filters. Color image processing, Color fundamentals, color models.

UNIT-IV

Image Restoration: Degradation model, Noise models, Restoration in the presence of noise only – spatial filtering, Periodic noise reduction by frequency domain filtering, Linear position-Invariant degradation, Inverse filtering, least mean square (Wiener) filters, Constrained Least Squares filtering.

Image Segmentation: Point, Line and Edge detection, Edge linking and boundary detection, Thresholding, Region based segmentation – Region growing, Region splitting and merging.

UNIT-V

Image Compression: Redundancies in images, Fidelity criteria, Image compression models, Error free compression – Variable length coding, Huffman coding, Arithmetic coding, LZW coding, Bit-plane coding, loss less and lossy predictive coding, Transform coding, Image Compression standards.

Text Books:

1. R.C. Gonzalez & R.E. Woods, Digital Image processing –Addison Wesley/ Pearson Ed., 2nd Edition, 2002.
2. A.K.Jain, Fundamentals of Digital Image processing –Prentice Hall of India.
3. ScotteUmbaugh, Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools - 2nd Ed, CRC Press, 2011
4. Somka, Hlavac, Boyle , Digital Image Processing and Computer Vision –- Cengage Learning (Indian edition) 2008.

Reference Books:

1. Rafael C. Gonzalez, Richard E Woods and Steven L., Digital Image processing using MAT LAB –Edition, PEA, 2004.
2. Adrian low, Introductory Computer Vision Imaging Techniques and Solutions-Adrian low, 2008, 2 nd Edition
3. William K. Pratt, Digital Image Processing –John Wiley, 3rd Edition, 2004.
4. Jayaraman, S. Esakkirajan and T. Veerakumar, Digital Image Processing, Tata McGraw Hill Education, 2010.

Course Title	EMBEDDED REAL TIME OPERATING SYSTEMS				B. Tech. ECE VII Sem			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1504706	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		4	--	--	3	30	70	100
Mid Exam Duration: 1Hr 30Min					End Exam Duration: 3Hrs			

Course Objectives:

- The main objective of the course is to get students familiar with the typical problems and constraints that arise when designing and developing embedded systems
- The course will also introduce theoretical and practical solutions to these typical problems that the students are expected to master and be able to apply to realistic case studies.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Describe** the fundamentals of Embedded System
CO 2	**Illustrate** the basic programming models
CO 3	**Contrast** the different interfaces and protocols
CO 4	**Use of** RTOS and its Tasks
CO 5	**Demonstrate** different case studies of ERTOS.

UNIT I

Introduction: History of Embedded Systems, classification of Embedded Systems,skills required for Embedded Systems designer, Major Application Areas of Embedded Systems, Purpose of Embedded Systems, Core of the Embedded System, Sensors and Actuators, Communication Interface, Embedded Firmware, Characteristics of an Embedded System, Quality Attributes of Embedded Systems.

UNIT II

Hardware Software Co-Design and Programme Modeling: Fundamental Issues in Hardware Software Co-Design, Computational Models in Embedded Design, Introduction to Unified Modeling Language (UML), Hardware Software Trade-offs.

Embedded Hardware Design and Development: Analog Electronic Components, Digital Electronic Components, VLSI and Integrated Circuit Design, Electronic Design Automation (EDA) Tools.

UNIT III

Devices and Communication Buses: IO Types and Examples, Serial Communication Devices, Parallel Device Ports, Sophisticated Interfacing Features in Device Ports, Wireless Devices, Timer and Counting Devices, Watchdog Timer, Real Time Clock, Networked Embedded Systems, Serial Bus Communication Protocols, Parallel Bus Device Protocols-Parallel Communication Network Using ISA, PCI, PCI-X and Advanced Buses, Internet Enabled Systems- Network Protocols, Wireless and Mobile System Protocols.

UNIT IV

Real-Time Operating Systems (RTOS) Based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling :Putting them Altogether, Task Communication, Task Synchronization, Interrupt Routines in RTOS

Environment and Handling of Interrupt Source Calls, OS Security Issues, Device Drivers, How to Choose an RTOS

UNIT V

Design Examples and Case Studies of Program Modeling and Programming With RTOS: Case study of Communication between Orchestra Robots, Embedded Systems in Automobile, Case study of an Embedded System for an Adaptive Cruise Control(ACC) System in a Car, Case study of an Embedded System for a Smart Card, Case study of a Mobile Phone Software for Key Inputs.

Text Books:

1. Shibu KV,Introduction to Embedded System- Mc-Graw Hill Higher Edition.
2. Raj Kamal,Embedded Systems Architecture, Programming and Design- Second Edition, McGraw-Hill Companies.
3. Peter Marwedel,Embedded System Design, Springer.
4. Marilyn Wolf, Computers as Components: Principles of Embedded Computing System Design, Morgan Kaufman Publishers, 2001.

Reference Books:

1. Frank Vahid, Tony D. Givargis, Embedded System Design – A Unified Hardware/Software Introduction- John Wiley, 2002.
2. KVKK Prasad, Embedded/ Real Time Systems- Dreamtech Press, 2005.
3. David E. Simon, An Embedded Software Primer- Pearson Ed. 2005
4. Jonathan W.Valvano, Embedded Microcomputer systems real time interfacing, Third edition, Cengage Learning, 2012.

Course Title	NEURAL NETWORKS AND FUZZY LOGIC				B. Tech. ECE VII Sem			
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
1504707	**PJ**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		4	--	--	3	30	70	100
Mid Exam Duration: 1Hr 30Min					**End Exam Duration: 3Hrs**			

Course Objectives:

- To provide an introduction to biological neuron, construction of artificial neuron from biological neurons, neural network topologies and various learning rules.
- To make students to get familiarized with supervised learning, linearly separable patterns, linearly non separable patterns and different training algorithms.
- To Know the Concepts of unsupervised learning rule with examples & the applications of neural networks.
- To provide an introduction to fuzzy set theory and various operations of fuzzy sets.
- To make the students to get familiarized with the design of fuzzy logic system with examples.
- that the students are expected to master and be able to apply to realistic case studies.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Understand** theworkingofbiological and artificial neural networks.
CO 2	**Analyze** different training methods.
CO 3	**Illustrate** the basic concepts of Fuzzy systems and relations**.**
CO 4	**Describe** the concepts of adaptive fuzzy systems and fuzzy associative memories.

UNIT-I

Biological Neural Networks: Organization of human brain, Neuron functions, Cell body, Axon, Dendrites, Cell membrane, Computers and human brain.

Artificial Neural Networks: Artificial neuron, Mc Culloah-Pitts neuron model, Characteristics, activation functions, Architectures (single layer and multi layer) and applications of ANNs. Training: supervised and unsupervised, Different learning rules.

Perceptrons: Perceptron representation, Ex – OR problem, Linear separability, Learning, Training algorithm, Advanced algorithm (Back propagation) and applications.

UNIT-II

Counter Propagation Networks: Introduction, Network structure, Normal operation, Weight selection, Training Kohenen and Grossberg layers, Full counter propagation network, applications.

Hopfield Networks: Recurrent network configurations, Applications

UNIT-III

Statistical Methods: Training, application, Boltzman training, Back propagation and Cauchy`s training.

Bidirectional Associative Memories (BAM):BAM structure, Retrieving a stored association, Encoding association, Memory capability, Types of BAM: Continuous, Adaptive, Competitive.
Adaptive Resonance Theory: ART architecture, Implementation, Training example, Characteristics.

UNIT-IV

Introduction To Fuzzy Systems: Classical (Crisp) sets, Notation, Basic concepts, Fuzzy sets , basic concepts, Properties of fuzzy sets, Fuzzy operations: Compliment, Union, Intersection.
Fuzzy Relations: Binary relations review, Equivalence and similarity relations, Compatibility relations, Orderings and Morphisms.
Fuzzy Measures: Belief and plausibility measures, Probability, Possibility and necessity measures.

UNIT-V

Adaptive Fuzzy Systems: Neural and fuzzy machine intelligence, Fuzzyness as multi-variance, Fuzzyness in probabilistic world, randomness Vs ambiguity, Sets as points in cube.
Fuzzy Associative Memories (FAM): Fuzzy systems as between cube mappings, Fuzzy and neural function estimators, Neural Vs fuzzy representation of structured knowledge, FAMs as mappings, Fuzzy Hebb FAMS: Bidirectional FAM theorem, Superimposing FAM rules, FAM system architecture.

Text Books:

1. Philip D. Wasserman, Neural Computing, Theory and Practice, Van Nostrand Reinhold.
2. George I. Klir and Tina A. Folger, Fuzzy Sets, Uncertainty and Information ,PHI
3. Bart Kosko, Neural Networks and Fuzzy Systems , PHI.
4. S. Haykin, Neural Networks: A Comprehensive Foundation, Prentice- Hall India, 2nd Edition, 1999.

Reference Books:

1. Jacek M. Zurada, Introduction to Artificial Neural Systems, Jaico Publishing House.
2 . Laurence Fausett, Fundamentals of Neural Networks, Architectures, Algorithms and Applications, Pearson Ed.
3. Timothy Ross, Fuzzy Logic with Engineering Applications, TMH.
4. Fakhreddine O. Karray, Clarence De Silva, Soft Computing and Intelligent Systems Design, Pearson Ed.

Course Title	DATA COMMUNICATIONS				B. Tech. ECE VII Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks	
1504708	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		4	--	--	3	30	70	100
Mid Exam Duration: 1Hr30min					End Exam Duration: 3Hrs		

Course Objectives:

- Main objective of this course is to provide insight about the data communication and networks.
- Students are able to learn Digital multiplexing techniques and its hierarchy.
- To make familiarize wireless communications and cellular telephone systems.
- To familiarize the design of BCH, Convolution codes both encoding and decoding.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Describe** the network layer model
CO 2	**Apply** various error correction and detection methods in communication.
CO 3	**Understand** various multiplexing techniques and operation of Wireless networks
CO 4	**Illustrate** different telephone circuits and modems

UNIT I

Introduction to Data Communications and Networking: Standards Organizations for Data Communications, Layered Network Architecture, Open Systems Interconnection, Data Communications Circuits, Serial and parallel Data Transmission, Data communications Circuit Arrangements.

Metallic Cable Transmission Media: Metallic Transmission Lines, Transverse Electromagnetic Waves, Characteristics of Electromagnetic Waves, Transmission Line Classifications, Metallic Transmission Line Types, Metallic Transmission Line Equivalent Circuit, Wave Propagation on Metallic Transmission Lines, Metallic Transmission Line Losses.

UNIT II

Multiplexing and T Carriers: Time- Division Multiplexing, T1 Digital Carrier System, North American Digital Multiplexing Hierarchy, Digital Line Encoding, T Carrier systems, European Time- Division Multiplexing, Statistical Time – Division Multiplexing, Frame Synchronization, Frequency-Division Multiplexing, Wavelength- Division Multiplexing, Synchronous Optical Network.

UNIT III

Wirless Communications Systems: Electromagnetic Polarization, Rays and Wave fronts, Electromagnetic Radiation, Spherical Wave front and the Inverse Square Law, wave Attenuation and Absorption, Optical Properties of Radio Waves, Terrestrial Propagation of Electromagnetic Waves, Skip Distance, Free-Space Path Loss, Microwave Communications Systems, Satellite Communications Systems.

Cellular Telephone Systems: Concepts – Frequency reuse- Cell splitting – Network components – Call Processing - First- Generation Analog Cellular Telephone, Personal

Communications system, Second-Generation Cellular Telephone Systems, N-AMPS, Digital Cellular Telephone, Global system for Mobile Communications.

UNIT IV

Telephone Instruments and Signals: The Subscriber Loop, Standard Telephone Set, Basic Telephone Call Procedures, Call Progress Tones and Signals, Cordless Telephones, Caller ID, Electronic Telephones, Paging systems.

The Telephone Circuit: The Local Subscriber Loop, Telephone Message- Channel Noise and Noise Weighting, Units of Powers Measurement, Transmission Parameters and Private-Line Circuits, Voice-Frequency Circuit Arrangements, Crosstalk.

UNIT V

Data Communications Codes, Error Control, and Data Formats: Data Communications Character Codes, Bar Codes, Error Control, Error Detection, Error Correction, Character Synchronization.

Data Communications Equipment: Digital Service Unit and Channel Service Unit, Voice-Band Data Communication Modems, Bell Systems- Compatible Voice- Band Modems, Voice- Band Modern Block Diagram, Voice- Band Modem Classifications, Asynchronous Voice-Band Modems, Synchronous Voice-Band Modems, Modem Synchronization, ITU-T Voice- Band Modem Specifications, 56K Modems, Modem Control: The AT Command Set, Cable Modems, Probability of Error and Bit Error Rate.

Text Books:

1. Wayne Tomasi, Introduction to Data Communications and Networking, Pearson Education.
2. Andrew S Tanenbaum, Computer Networks, 4th Edition. Pearson Education, PHI.
3. S. Keshav, An Engineering Approach to Computer Networks, 2nd Edition, Pearson Education.
4. Kurose James F, Keith W, Computer Networking A Top-Down Approach –6th Edition, Pearson.

Reference Books:

1. Behrouz A Forouzan, Data Communications and Networking, 4th Edition, TMH.
2. Gallow, Computer Communications and Networking Technologies, 2nd edition, Thomson.
3. Fred Halsll, Lingana Gouda Kulkarni, Computer Networking and Internet, 5th Edition, Pearson Edu. Society.
4. William Stallings, Data and Computer Communication, Sixth Edition, Pearson Education, 2000

Course Title	MICROWAVE & OPTICAL COMMUNICATIONS LAB				B. Tech. ECE VII Sem		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
1504709	**PJ**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		--	--	3	2	50	50	100
						End Exam Duration: 3Hrs		

Course Objectives:

- To provide knowledge on various types of waveguides.
- To find the S-matrix of different Junctions and to obtain Gun Diode and RKO characteristics.
- To find numerical aperture and bending losses of given optical fiber.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Analyze** the characteristics of different microwave sources.
CO 2	**Measure** the parameters of wave guide and microwave junctions.
CO 3	**Examine** the characteristics of optical fiber and sources.
CO 4	**Verify** the characteristics of microwave antennas

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 Measurement.
7. Waveguide parameters measurement.
8. Scattering parameters of Directional Coupler.
9. Scattering parameters of Magic Tee.

Part – B (Any 5 Experiments):

1. Characterization of LED.
2. Characterization of Laser Diode.
3. Intensity modulation of Laser output through an optical fiber.
4. Measurement of Data rate for Digital Optical link.
5. Measurement of NA.
6. Measurement of losses for Analog Optical link.
7. Radiation Pattern Measurement of Antennas (at least two antennas).

Course Title	VLSI LAB				B. Tech. ECE VII Sem		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1504710	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		--	--	3	2	50	50	100
						End Exam Duration: 3Hrs		

Course Objectives:

- To provide knowledge on various types of combinational and sequential circuits.
- To improve the knowledge on Verilog programming.
- To find RTL schematic and synthesis reports.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	**Apply** switching theory in the design of logic circuits. (L3)
CO 2	**Analyze** the combinational logic circuits and sequential logic circuits. (L4)
CO 3	**Model** various digital circuits using Verilog HDL. (L5)
CO 4	**Synthesize** different logic circuits and debug using FPGA/CPLD.

Software required: Xilinx ISE simulator

List of Experiments

Combinational Design Exercises:

1. Design of 8:3 Priority Encoder.
2. Design of 4 Bit Binary to Gray code Converter.
3. Design of 4 Bit Binary to BCD Converter using sequential statement.
4. Design an 8 Bit parity generator (with for loop and Generic statements).
5. Design of 2"s Complementary for 8-bit Binary number using Generate statements.
6. Design Arithmetic Logical Unit (ALU) using VHDL.

Sequential Design Exercises:

1. Design of all type of Flip-Flops using (if-then-else) Sequential Constructs.
2. Design of 8-Bit Shift Register with shift Right, shift Left, Load and Synchronous reset.

3. Design of Synchronous 8-Bit universal shift register (parallel-in, parallel-out) with 3 state output (IC 74299).
4. Design counters (MOD 3, MOD 5, MOD 8, MOD 16).
5. Design a decimal up/down counter that counts up from 00 to 99 or down from 99 to 00.
6. Design 3-line to 8-line decoder with address latch.
Note: Implement at least two combinational and two sequential designs using FPGA/CPLD trainer kit.

Course Title	CELLULAR & MOBILE COMMUNICATIONS				B. Tech. ECE VIII Sem		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
1504801	**PJ**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		4	--	--	3	30	70	100
Mid Exam Duration: 1Hr 30 Min					**End Exam Duration: 3Hrs**			

Course Objectives:

- The main objective of the course is to provide a comprehensive knowledge in the area of mobile communication
- This course provides the overview of Digital mobile telephony and Digital Cellular systems

Course Outcomes: On successful completion of this course, the students will be able to	
CO 1	Describe the Elements of Cellular Radio System Design
CO 2	Analyze radio propagation losses at different cell site and mobile antennas.
CO 3	Distinguish the CO-Channel and adjacent channel interference.
CO 4	Describe various handoffs and different channel assignment.
CO 5	Under stand the different digital cellular systems and multiple access techniques.

UNIT-I

Introduction to Cellular Mobile Systems: A basic Cellular System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning a cellular system, Hexagonal shaped cells, Analog and Digital Cellular systems.

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 an omni directional Antenna system, Cell splitting, consideration of the components of Cellular system

UNIT-II

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, and 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-III

Interference: Introduction to Co-Channel Interference, real time Co-Channel interference, design of Antenna system, diversity receiver, types of non-co-channel interference.

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-IV

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.

Handoffs: 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-V

Digital Cellular and Mobile Networks: GSM architecture, GSM channels, multiple access schemes, TDMA, CDMA.

Text Books:

1. W.C.Y. Lee, Mobile Cellular Telecommunications, McGraw Hill, 2nd Ed, 1989.
2. T.S Rappaport, Wireless Communications, Pearson Ed., 2nd Ed., 2002.
3. Gordon L. Stuber, Principles of Mobile Communications –Springer International, 2nd Edn., 2001.
4. Simon Haykin, Michael Moher, Modern Wireless Communications- Pearson Eduction, 2005.

Reference Books:

1. R. Blake, Wireless Communication Technology –Thompson Asia Pvt. Ltd., 2004.
2. Jon W. Mark and Zhqung, Wireless Communication and Networking, PHI, 2005.
3. Andrea Goldsmith, Wireless Communications –Cambridge University Press, 2005.
4. Asrar U. H .Sheikh, Wireless Communications Theory and Techniques, Springer, 2004.

Course Title	SATELLITE COMMUNICATIONS				B. Tech. ECE VIII Sem		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
1504802	**PJ**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		4	--	--	3	30	70	100
Mid Exam Duration: 1Hr 30 Min					**End Exam Duration: 3Hrs**			

Course Objectives:

- To give familiarity with Satellite communications, Spread Spectrum techniques.
- Make to understand Satellite link design and Satellite multiple access techniques.
- To understand Satellite subsystems.

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Describe the concepts of Satellite Communication in space research.
CO 2	Understand the orbital aspects involved in space communication applications.
CO 3	Design various satellite links
CO 4	Analyze the concepts of multiple access techniques
CO 5	Design large Antennas, Tracking and Small Earth Station Antennas

UNIT I

Introduction: The origin of satellite communication, a brief history of satellite communications, the current state of satellite communications

Orbital Aspects of satellite communications: Orbital mechanics look angle determination, orbital perturbation, Orbital determination, Launches and launch vehicles, Orbital effects in communication system performance.

UNIT II

Space Craft: Introduction, space craft sub system, attitude and orbit control system, telemetry, tracking and command, power systems, communication sub systems, space craft antennas.

UNIT III

Satellite link design: 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.

UNIT IV

Multiple Access: Frequency division multiple access (FDMA), Single and Multiple channel per carrier, FDM/FM/FDMA link ,Time division Multiple access (TDMA), TDMA frame structure and frame efficiency, TDMA super frame structure, Frame acquisition and synchronization, Code Division Multiple access(CDMA), PN sequence, Direct sequence and Frequency hopped spread spectrum system, Demand assignment multiple access, Demand assignment TDMA, SCPC-DAMA, SPADE.

UNIT V

Earth Station Technology: Earth Station Design, Design of large Antennas, Tracking, Small Earth Station Antennas, Equipment for Earth Stations.

Text Books:

1. Timothy Pratt, Charles Bostian and Jeremy Allnutt, Satellite Communications , Wiley Publications, 2nd Edition, 2003.
2. Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, Satellite Communications Engineering ,Pearson Publications, 2nd Edition, 2003.
3. M. Richharia, Satellite Communications: Design Principles, BS Publications, 2nd Edition, 2003.
4. D.C Agarwal, Satellite Communication, Khanna Publications, 5th Ed.

References

1. Robert M.Giglardi, Satellite Communication, CBS Publication
2. K.N. Raja Rao, Fundamentals of Satellite Communications –PHI, 2004
3. Dennis Roddy, Satellite Communications , McGraw Hill, 4th Edition, 2009.
4. Tri T. Ha, Digital Satellite Communications, 2nd Ed., MGH, 1990.

Course Title	RADAR SYSTEMS				B. Tech. ECE VIII Sem.			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1504803	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		4	--	--	3	30	70	100
Mid Exam Duration: 1Hr 30 Min					End Exam Duration: 3Hrs			

Course Objectives:

- The objective of the course is to acquaint the knowledge about radar subsystems, their performance and key functions.
- This course also provides the in depth knowledge and issues related various tracking radars

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the essential principles of operation of radar systems.
CO 2	Describe the various Radar components
CO 3	Analyze different Radar systems
CO 4	Analyze differentradio navigation systems .

UNIT-I

Fundamentals: Radar block diagram and operation, Radar frequencies, simple form of radar equation, Minimum detectable signal, Receiver noise and S/N ratio, Probability density functions, Integration of Radar pulses, Radar cross-Section of targets, PRF.

UNIT-II

Radar components: RF amplifier, TWT, CFA, Modulators, Mixers-Conversion loss, Noise figure, Types of Mixers, Duplexers-Branch type, Balanced and Solid state Duplexers, Displays-CRT displays, A, B, C, E-scopes, PPI, RHI.

UNIT-III

Radar systems: CW radar, FMCW radar, Multiple frequency C.W radar, MTI radar-Delay line cancellers, Pulse repetition frequencies, range gated Doppler filters, tracking radar-Range and angle tracking, Sequential lobbing and Conical scanning,

UNIT-IV

Radio direction finding and ranging: The loop antenna, the goniometer, errors in direction finding, The LF/MF four course radio ranges, VHF-VOR, VOR receiving equipment.

UNIT-V

Hyperbolic systems of navigation &DME: Loran-A, Loran-C, Decca navigation system, Decca receivers, DME-operation, TACAN&TACAN equipment.

Text Books:

1. Merrill I. Skolnik, Introduction to Radar Systems, TMH Special Indian Edition, 2nd Ed., 2007.
2. N.S. Nagaraja, "Elements of electronic navigation, 2nd edition-TMH 1996.
3. Byron Edde, Radar: Principles, Technology, Applications –Pearson Education, 2004.
4. Peebles Jr., P.Z. Wiley, Radar Principles, New York,1998

References

1. M. Kulkarni, Microwave and Radar Engineering, Umesh Publications, 1998.
2. Mark A. Richards, James A. Scheer, William A. Holm, Principles of Modern Radar: Basic Principles –Yesdee, 2013
3. Merrill I. Skolnik, Radar Handbook - 3rd Ed., McGraw Hill Education, 2008
4. M.I. Skolnik, Introduction to Radar Systems, 3rd edition –MC GRAW HILL EDUCATION, 2005

Course Title	SPEECH PROCESSING				B. Tech. ECE VIII Sem.		
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**	
1504804	**PJ**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		4	--	--	3	30	70	100
Mid Exam Duration: 1Hr 30 Min					**End Exam Duration: 3Hrs**		

Course Objectives:

- This course seeks to familiarize students with Fundamental concepts of speech production and speech perception
- Mathematical foundations of signal processing and pattern recognition, Computational methods for speech analysis, recognition, synthesis, and modification

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Apply the Fundamental concepts of speech production and speech perception in speech signal processing.
CO 2	Describe the mechanisms of human speech production.
CO 3	Choose appropriate features of speech for speech recognition.
CO 4	Design speech recognition system using statistical models.

UNIT-I

The Speech Production mechanism: Physiological and Mathematical Model, Relating the physiological and mathematical model, Categorization of Speech Sounds based on the source-system and the articulatory model.

UNIT- II

Basic Speech Signal Processing Concepts: Discrete time speech signals, relevant properties of the fast Fourier transform and Z-transform for speech recognition, convolution, linear and non linear filter banks,

Spectral estimation of speech using the Discrete Fourier transform, Pole-zero modeling of speech and linear prediction (LP) analysis of speech, Homomorphic speech signal deconvolution, real and complex cepstrum, application of cepstral analysis to speech signals.

UNIT-III

The Speech Recognition Front End: Feature extraction for speech recognition, Static and dynamic features for speech recognition, robustness issues, discrimination in the feature space, feature selection.Mel frequency cepstral co-efficients (MFCC), linear prediction cepstral coefficients (LPCC), Perceptual LPCC.

UNIT-IV

Distance measures for comparing speech patterns: Log spectral distance, cepstral distances, weighted cepstral distances, distances for linear and warped scales, Dynamic Time Warping for Isolated Word Recognition.

UNIT-V

Statistical models for speech recognition: Vector quantization models and applications in speaker recognition, Gaussian mixture modeling for speaker and speech recognition, Discrete

and Continuous Hidden Markov modeling for isolated word and continuous speech recognition.

Text books:

1. Thomas F Quatieri, ―Discrete-Time Speech Signal Processing – Principles and Practice‖, Pearson Education, 2004.
2. Lawrence Rabiner and Biing-Hwang Juang, ―Fundamentals of Speech Recognition‖, Pearson Education, 2003.
3. Daniel Jurafsky and James H Martin, ―Speech and Language Processing – An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition‖, Pearson Education, 2002.
4. Lawrence R.Rabiner& Ronald W.Schafer, Digital Processing of Speech Signals, Pearson

Reference Books:

1. Claudio Becchetti and LucioPrinaRicotti, ―Speech Recognition‖, John Wiley and Sons, 1999.
2. Ben Gold and Nelson Morgan, ―Speech and Audio Signal Processing, Processing and Perception of Speech and Music‖, Wiley- India Edition, 2006.
2. Steven W. Smith, ―The Scientist and Engineer‟s Guide to Digital Signal Processing‖, California Technical Publishing, 1997.
3. T. Dutoit, F. Marqués, L.R. Rabiner, Applied signal processing: a MATLAB-based Proof of Concept, Springer
4. Ben Gold & Nelson Morgan,Speech & Audio Signal Processing- 1st Ed., Wiley

Course Title	OBJECT-ORIENTED PROGRAMMING THROUGH JAVA				B. Tech. ECE VIII Sem.			
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
1504805	**PJ**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		4	--	--	3	30	70	100
Mid Exam Duration: 1Hr 30 Min					**End Exam Duration: 3Hrs**			

Course Objectives:

To know the standard tools and techniques for software development, using object oriented approach, use of a version control system, an automated build process, an appropriateframework for automated unit and integration tests.

Course Outcomes: On successful completion of this course, the students will be able to	
CO 1	Understand simple abstract data types and design implementations
CO 2	Describe the features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity
CO 3	Apply some common object-oriented design patterns and give examples of their use.
CO 4	Design applications with an event-driven graphical user interface

UNIT I

Overview of programming: Programming paradigms, Basics of object oriented programming, Brief history of java, Structure of a java program-token comments, identifiers, keywords, literals, input& output mechanisms, Java development and runtime environment setup.

UNIT II

Statements: Labeled, Expression, Null and Compound Statements, Control statements-Conditional, Unconditional Control Transfers, Loops.

Arrays: Declaration, and Creation, Accessing array elements, Initialization and assigning values, Assigning array to another array, Library methods for arrays, Multidimensional arrays, Characters array, passing array to functions.

UNIT III

Methods or functions: Declaration, definition and a call of method or function, Main method arguments, Reference variables. Method overloading, parameter passing, Recursion, Scope of variables. Return from methods.

Data abstraction through classes: class, class and Member modifiers, Constructors, Dynamic memory management, The keyword, Static members, Scope of variables, interfaces, implementing and Extending, packages, Exception handling.

UNIT IV

Class relationships: Inheritance, Polymorphism, Object class, controlling access to members of class, Direct and indirect super-classes- Access rights in subclasses and packages, Constructor calling sequence, multiple inheritance, per class protection, Dynamic binding of methods, Operator instance of Abstract class, over ridding, Shadowing and Hiding, Finalize, aggregation and composition.

Multi threading: processes and threads, Life cycle of a thread. Thread methods, Creating and naming a thread, priority threads, Sleep and joining a thread, Thread synchronization, and Thread groups.

UNIT V

Java standard packages and classes: Java standard packages-java. lang, java.util, java. math; Java classes-String Buffer, String Tokenizer classes, Wrapper classes for primitive types-Date, Calendar, Random classes, Exception class, Assert Statement, Formatter class, Interface collection and collection framework with Vector, ArrayList, LinkedList, Stack, Arrays, Hashtable classes.

Applets: Basics, skeleton, Initialization and termination, Repainting, Status window, Passing parameters.

Text Books:

1. Jana D, Java and Object-Oriented Programming paradigm, PHI,2005.
2. Herbert Schildt and Dale Skrien ,"Java Fundamentals - A Comprehensive Introduction", Special IndianEdition, McGrawHill, 2013.
3. Herbert Schildt, "Java The Complete Reference" Oracle press,8th Edition, TataMcGraw Hill. 2011,
4. Cay S. Horstmann, Gary Cornell, "Core Java : Volume I – Fundamentals, The Sun Micro Systems Press

Reference Books:

1. B.Eswara Reddy, P.Raghavan, "Programming with Java" T.V.Suresh Kumar, Pearson Edition.
2. Programming in Java, S.Malhotra and S.Choudhary, Oxford Univ. Press
3. Paul Deitel, Harvey Deitel, "Java – How to Program", PHI.
4. NageswarRao, "Core Java", Wiley Publishers.
5. Bruce Eckel, "Thinking in Java", Pearson Education.
6. Mughal, Rasmussen, "A Programmers Guide to Java SCJP", Third Edition, Pearson.
7. David Flanagan, "Java in Nutshell", O.Reilly

Course Title	DATA ACQUISITION SYSTEMS				B. Tech. ECE VIII Sem.			
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
1504806	**PJ**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		4	--	--	3	30	70	100
Mid Exam Duration: 1Hr 30 Min					**End Exam Duration: 3Hrs**			

Course Objectives:

- To understand concepts of acquiring the data from transducers/input devices, their interfacing and instrumentation system design.

Course Outcomes: On successful completion of this course, the students will be able to	
CO 1	Choose the elements of data acquisition techniques.
CO 2	Design and simulate signal conditioning circuits.
CO 3	Describe various data transfer techniques.
CO 4	Understand the components of data acquisition system.

UNIT-I

Data Measurement: Transducers – measurement of displacement – measurement of acceleration and vibration: Seismic accelerometer, piezo-electric accelerometer, vibration transducers, feedback transducers – measurement of angular velocities – Fluid flow measurements – Light transducers – acoustic transducers.

UNIT-II

Pre Processing: Signal amplification : - Instrumentation amplifiers, Capacitive amplifiers, the charge – compensating amplifier, the sample – and – hold amplifier. Filters : Analog active filters, software digital filters, hard ware digital filters – Decimation – Calibration methods.

UNIT-III

Data Acquisition: INK – ON – PAPER Recording : pen recorders, 'penless' chart recording, potentiometric recorders, the X – Y plotter – Analog Instrumentation Tape recording : Direct recording, FM recording, Magnetic recording – Digital recording and storage. Tape recording, disc and drum recording, Digital recording methods.

UNIT-IV

Digitisation: Sampling & quantization – A/D Converters picture digitisation.
Data Acquisition Systems: Data display systems – Data recording systems – Data processing systems – Integrated data systems – Microprocessors in data acquisition systems.

UNIT-V

Remote Data Acquisition : Passive remote sensing – Active remote sensing – telemetry.
Multiplexers : Multiplexers & Concentrators – Statistical multiplexers.

Text Books:

1. K.G.Beauchamp&C.K.Yuen, 'Data Acquisition for signal Analysis, Allen &Unwin Ltd,London (1980).
2. Trevor Housley, 'Data communications and Teleprocessing systems' – PHI – 2nd Edn.
3. Hermann Schmid, Electronic Analog/ Digital conversions ,Tata McGraw Hill.
4. H. S. Kalsi , Electronic Instrumentation, TMH, 2nd Edition 2004

References

1. T.R. Padmanabham, Industrial Instrumentation: Springer 2009.
2. S.Gupta and J.P Gupta, "PC interfacing for Data Acquisition and Process Control", Instrument society of America, 1994.
3. John W Webb & Ronald A Reis, "Programmable logic controllers: Principles and Applications", Prentice Hall India, 2003.
4. G.B.Clayton, Data Converters The Mac Millian Press Ltd., 1982.

Course Title	SPREAD SPECTRUM COMMUNICATIONS				B. Tech. ECE VIII Sem.			
Course Code	**Category**	**Hours/Week**			**Credits**	**Maximum Marks**		
1504807	**PJ**	**L**	**T**	**P**	**C**	**Continuous Internal Assessment**	**End Exams**	**Total**
		4	--	--	3	30	70	100
Mid Exam Duration: 1Hr 30 Min					**End Exam Duration: 3Hrs**			

Course Objectives:

- To make familiarize the Spread Spectrum communications and various modulation schemes.
- To learn the spread spectrum signals generation and detection.

Course Outcomes: On successful completion of this course, the students will be able to	
CO 1	Understand Fundamentals of Spread Spectrum
CO 2	Analysis of Direct Sequence and Avoidance – Type Spread Spectrum Systems
CO 3	Detect the spread spectrum signals.
CO 4	Describe the applications of Spread Spectrum to Communications
CO 5	Understand Code Division Multiple Access Digital Cellular Systems

UNIT-I

Fundamentals of Spread Spectrum: General concepts, Direct sequence (DS), Pseudo Noise (PN), Frequency Hopping, Time Hopping, Comparison of Modulation methods, Hybrid Spread spectrum systems, Chirp spread spectrum, Baseband modulation techniques.

Analysis of Direct Sequence Spread Spectrum Systems: Properties of PN sequences, Classes of periodic sequences, Properties of m sequences, Partial Co–relation, PN signal from PN sequences, Partial co – relation of PN signals, The PN Signal, De-spreading the PN signal, Interference rejection, Output signal to noise ratio, Antijam characteristics, Interception, Energy bandwidth efficiency.

UNIT-II

Analysis of Avoidance – Type Spread Spectrum Systems: The frequency hopped signal, Interference rejection in a frequency hopping receiver, the time hopped signal.

Generation of Spread Spectrum Signals: Shift register sequence generators, Discrete frequency synthesizers, SAW device PN generators, Charge coupled devices, Digital tapped delay lines.

UNIT-III

Detection of Spread Spectrum Signals -Tracking: Coherent direct sequence receivers, other method of carrier tracking, Delay lock loop analysis, Tau – Dither loop, Coherent carrier tracking, Non coherent frequency hop receiver.

Detection of Spread Spectrum Signals - Acquisition: Acquisition of spread spectrum signals, Acquisition cell by cell searching, Reduction of acquisition time, Acquisition with matched filters, Matched filters for PN sequences, Matched filters for frequency hopped signals, Matched filters with acquisition - aiding waveform.

UNIT-IV

Application of Spread Spectrum to Communications: General capabilities of spread spectrum, Multiple access considerations, Energy and bandwidth efficiency in multiple access, Selective calling and Identification, Antijam considerations, Error correction coding, Intercept consideration (AI), Miscellaneous considerations, Examples of spread spectrum systems.

UNIT-V

Code Division Multiple Access Digital Cellular Systems: Introduction, Cellular radio concept, CDMA Digital cellular systems, Specific examples of CDMA digital cellular systems.

Text Books:

1. George. R. Cooper and Clare D. McGillem, ―Modren Communications and Spread Spectrum‖, McGraw hill Book Company.
2. Rodger E Ziemer, Roger L. Peterson and David E Borth – "Introduction to Spread Spectrum Communication- Pearson, 1st Edition, 1995.
3. Mosa Ali Abu-Rgheff – "Introduction to CDMA Wireless Communications." Elsevier Publications, 2008.
4. Andrew j. Viterbi – "CDMA: Principles of spread spectrum communication," Pearson Education, 1st Edition, 1995.

References

1. D. Torrieri, " Principles of Spread-Spectrum Communication Systems," Springer, 2005.
2. V. P.Ipatov," SpreadSpectrumandCDMA:principlesandapplications,"Wiley, 2005.
3. R. C. Dixon, " Spread Spectrum Systems with Commercial Applications," 3rd Ed., John Wiley & Sons, Inc., 1994
4. S. Verdu, Multiuser Detection, Cambridge University Press, 1998.

Course Title	BIO-MEDICAL INSTRUMENTATION				B. Tech. ECE VIII Sem.			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
1504808	PJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		4	--	--	3	30	70	100
Mid Exam Duration: 1Hr 30 Min					End Exam Duration: 3Hrs			

Course Objectives:

- To understand the functioning of Human Cell and its electrical characteristics.
- To get sufficient knowledge about cardiovascular measurement and circulatory System of heart
- To get familiarize with pace makers and Defibrillators
- To understand about the electrical hazards that may occur during the usage of medical instruments

Course Outcomes: On successful completion of this course, the students will be able to

CO 1	Understand the functioning of Human Cell and its electrical characteristics
CO 2	Describe Organization of cell and various potentials
CO 3	Describe various bio-electrodes
CO 4	understand the functioning of cardiovascular measurement and circulatory System of heart
CO 5	Analyze the electrical hazards that may occur during the usage of medical instruments.

UNIT I

Components of Medical Instrumentation System: Bio-amplifier, Static and dynamic characteristics of medical instruments. Bio-signals and characteristics. Problems encountered with measurements from human beings.

UNIT II

Organization of cell: Derivation of Nernst equation for membrane Resting Potential Generation and Propagation of Action Potential, Conduction through nerve to neuro-muscular junction.

UNIT III

Bio Electrodes: Bio-potential Electrodes-External electrodes, Internal Electrodes. Biochemical Electrodes.Mechanical function, Electrical Conduction system of the heart, Cardiac cycle.Relation between electrical and mechanical activities of the heart. Pacemaker, Defibrillator

UNIT IV

Cardiac Instrumentation Blood pressure and Blood flow measurement: Specification of ECG machine. Einthoven triangle, Standard 12-lead configurations, Therapeutic equipment, Shortwave diathermy.

Respiratory Instrumentation: Mechanism of respiration, Spirometry, Pnemuotacho graph Ventilators.

UNIT V

Patient electrical safety: Types of hazards, natural protective mechanism, leakage current, patient isolation, hazards in operation rooms, grounding conditions in hospital environment.

Text Books:

1. Leslie Cromwell and F.J. Weibell, E.A. Pfeiffer,Biomedical Instrumentation and Measurements –PHI, 2nd Ed, 1980.
2. John G. Webster, Medical Instrumentation, Application and Design –John Wiley, 3rd Ed., 1998.
3. Carr & Brown, Biomedical Equipment Technology ,Pearson.
4. B. C. Nakra, K.K. Choudhury, "Instrumentation, Measurement and Analysis" -3 rd Edition, Tata McGraw, 2009

Reference Books:

1. L.A. Geoddes and L.E. Baker, Principles of Applied Biomedical Instrumentation – John Wiley, 1975.
2. R.S. Khandpur, Hand-book of Biomedical Instrumentation –TMH, 2nd Ed., 2003.
3. Mackay, Stuart R., Biomedical Telemetry –John Wiley, 1968.
4. M. Armugam, Biomedical Instrumentation, Anuradha agencies publications.