III B.Tech I Sem (Semester - V)

S. No	Category (Course Code)	Subjects	Hours Per week			Credits	Examinations			Category
			L	T	P	C	I	E	T	
1	19EC5T01	INTEGRATED CIRCUITS AND APPLICATIONS	3	0	0	3	40	60	100	PC
2	19EC5T02	ANTENNA AND WAVE PROPAGATION	3	0	0	3	40	60	100	PC
3	19EC5T03	DIGITAL COMMUNICATIONS	3	0	0	3	40	60	100	PC
4	19EE5T04	CONTROL SYSTEMS	3	0	0	3	40	60	100	ES
5	**PROFESSIONAL ELECTIVE I**									
	19EC5T04	1) OPTICAL COMMUNICATIONS	3	0	0	3	40	60	100	PE
	19EC5T05	2) CELLULAR AND MOBILE COMMUNICATIONS								
	19EC5T06	3) EMI/EMC								
6	**OPEN ELECTIVE I**									
	19OE5T08	1) OOPS THROUGH JAVA	3	0	0	3	40	60	100	OE
	19OE5T01	2) FUZZY AND NEURAL NETWORKS								
	19OE5T11	3) DATA STRUCTURES								
	19OE5T10	4**) SOFTCOMPUTING TECHENIQUES**								
7	19EC5P01	LAB I: DIGITAL COMMUNICATIONS LAB	0	0	2	1	40	60	100	PC
8	19EC5P02	LAB II: LINEAR & DIGITAL IC LAB	0	0	2	1	40	60	100	PC
9	19BS5T03	LOGICAL REASONING II	0	0	2	1	40	60	100	BS
10	19EC5J01	MINI PROJECT-II	0	0	0	1	20	30	50	PR
Total			**18**	**0**	**6**	**22**	**380**	**570**	**950**	

III Year - I Semester

L	P	T	C
3	0	0	3

INTEGRATED CIRCUITS AND APPLICATIONS

Course Objectives:

Enable the students to

- Tounderstandthebasicoperation&performance parametersofdifferential amplifiers.
- Tounderstand&learnthe measuring techniquesofperformanceparametersofOP-AMP.
- Tolearnthelinearandnon-linearapplicationsof operationalamplifiers.
- Tounderstandtheanalysis&designofdifferenttypesofactive filtersusing Op-Amps.
- Tolearntheinternalstructure,operationandapplicationsofdifferentAnalogICs.
- Toacquireskillsrequiredfordesigningandtestingintegratedcircuits.

Unit –I: Integrated Circuits

DifferentialAmplifier-DCandAC analysisofDualinputBalancedoutputConfiguration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single EndedInput– Balanced/UnbalancedOutput, Methods to improve CMRR

Unit –II: Characteristics of OP-Amps

Op-ampBlock Diagram, ideal and practical Op-amp Specifications, DC and AC characteristics,741 op-amp & its features, Op-Amp parameters & Measurement, Offset voltages & currents, slewrate,CMRR, PSRR, drift, FrequencyCompensation techniques.

Unit –III: Linear Applicationsof Op-Amps

Open loop and closed loop configurations,InvertingandNon-invertingamplifiers,Ideal and practical Integrator, Ideal and practical differentiator,Differenceamplifier,Instrumentationamplifier,V to I,I toVconverters,

Unit –IV: Non-Linear applications of op-Amps

Comparators, Schmitt trigger, Precision Rectifiers, Multivibrators, Log and Antilog Amplifiers,Sample and Hold Circuit, RC Phase shift/Wien bridge Oscillators.

Unit –V: Active Filters and IC 555

Active Filters: Design&Analysis of Butterworth active filters –1st order,2nd order Low pass, High pass, Band pass,Band reject and allpass filters.

IC 555 Timer: Introduction to 555 timer, functional diagram, Monostable and Astableoperations and applications, Schmitt Trigger.

Unit –VI: Digital to Analog and Analog to Digital Converters

Introduction, Basic DAC techniques,weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, Different types of ADCs –parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC.DAC and ADCSpecifications.

Textbooks:

1. LinearIntegratedCircuits–D.RoyChoudhury,NewAgeInternational(p) Ltd,2nd Edition,2003.
2. Op-Amps&LinearICs – RamakanthA.Gayakwad,PHI,1987.
3. OperationalAmplifiers–C.G.Clayton,Butterworth&CompanyPubl. Ltd./Elsevier,1971.

References:

1. OperationalAmplifiers &LinearIntegratedCircuits– SanjaySharma;SKKataria&Sons;2nd Edition,2010.
2. Design withOperationalAmplifiers&AnalogIntegratedCircuits– SergioFranco,McGrawHill,1988.
3. OPAMPSand LinearIntegratedCircuitsconceptsandApplications,JamesMFiore,CenageLearning IndiaLtd.
4. OperationalAmplifiers&LinearIntegratedCircuits– R.F.Coughlin&FredrickDriscoll,PHI,6thEdition.
5. OperationalAmplifiers&LinearICs–DavidABell,OxfordUni.Press,3rd Edition.

Course Outcomes:

- Design circuitsusingoperationalamplifiersforvariousapplications.
- AnalyzeanddesignamplifiersandactivefiltersusingOp-amp.
- Diagnoseandtrouble-shootlinearelectroniccircuits.
- Understandthe gain-bandwidthconceptandfrequencyresponseofthe amplifierconfigurations.
- Understandthoroughlytheoperationalamplifiers withlinearintegratedcircuits.

L	P	T	C
3	0	0	3

III Year - I Semester

ANTENNA AND WAVE PROPAGATION

Course Objectives:

The student will be able to

- Understand the applications of the electromagnetic waves in freespace.
- Introduce the working principles of various types ofantennas
- Discuss the major applications of antennas with an emphasis on how antennas are employed to meet electronic systemrequirements.
- Understand the concepts of radio wave propagation in theatmosphere.

Unit –I: Antenna Fundamentals

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

Unit –II: Thin Linear Wire Antennas

Retarded Potentials, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Field Components, Power Radiated, and Radiation Resistance.Comparison of far fields, near field and short dipole, Concept of short magnetic dipole.

Unit –III: Antenna Arrays

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

Unit –IV: Non-Resonant Radiators

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

Unit –V:VHF, UHF and Microwave Antennas

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

Horn Antennas – Types, Optimum Horns, Design Characteristics of Pyramidal Horns; Lens Antennas – Geometry, Features, Dielectric Lenses and Zoning, Applications.

Unit –VI: Wave Propagation

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

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

Text Books:

1. Antennas for All Applications – John D. Kraus and Ronald J. Marhefka, 3rd Edition, TMH,2003.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition,2000.

References Books:

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

Course Outcomes:

After going through this course the student will be able to

- Identify basic antennaparameters.
- Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and micro stripantennas.
- Quantify the fields radiated by various types ofantennas.

- Design and analyse antennaarrays.
- Analyze antenna measurements to assess antenna’sperformance.
- Identify the characteristics of radio wavepropagation.

L	P	T	C
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III Year - I Semester

DIGITAL COMMUNICATIONS

Course Objectives:

The main objectives of this course are to understand:

- Understand pulse digital modulation systems such as PCM, DPCM andDM.
- Understand various digital modulation techniques and able to analyze various systems for their performance in terms of probability oferror.
- Study the concepts of information theory and need for sourcecoding.
- Study Block codes, cyclic codes and convolutioncodes.

Unit –I: Pulse Digital Modulation

Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM).Delta modulation, Adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

Unit –II: Digital Modulation Techniques

Introduction, ASK, FSK, PSK, DPSK, QPSK, M-ary PSK, M-aryFSK, similarity of BFSK and BPSK.

Unit –III: Data Transmission

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

Unit –IV: Information Theory

Discrete messages,Information and its properties. Average information, Entropy and its properties.Information rate, Mutual information and its properties.

Source Coding: Introduction, Shannon's theorem, Shanon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels, Gaussian channel capacity, bandwidth –S/N trade off.

Unit –V: Linear Block Codes

Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes,

Unit –VI: Cyclic Codes

Binary cyclic codes, Algebraic structure, encoding, syndrome calculation.

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

Text Books:

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

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

References:

1. Principles of Communication Systems – H. Taub and D. Schilling, TMH,2003.

2. Digital Communications – John Proakis, TMH, 1983. Communication Systems Analog&Digital – Singh

&Sapre, TMH,2004.

3. Modern Digital and Analog Communication Systems –B.P.Lathi,ZhiDing,Hari Mohan Gupta,Oxford University Press, 4th Edition,2017.

Course Outcomes:

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

- Analyze various pulse digital modulation techniques and Apply different sampling and quantization techniques for A/D conversions.
- Analyze various digital modulation techniques.
- Evaluate the probability of error for digital modulation techniques.
- Compute and analyze Block codes, cyclic codes and convolutioncodes.
- Design a coded communicationsystem.

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III Year - I Semester

CONTROL SYSTEMS

Course objectives:

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

Unit –I: Introduction

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

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

Effects of Feedback - Feedback Characteristics and its advantages

Unit –II: Controller Components

DC Servomotor (Armature Controlled and Field Controlled) with necessary derivation for transfer function, AC Servomotor and its transfer function.

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

Unit –III: Concepts of Stability and Algebraic Criteria

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

The Root Locus Technique - Introduction, The Root Locus concepts, Construction of Root Loci

Unit –IV: Frequency response analysis

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

Unit –V: Introduction to Controllers

Introduction to Proportional, Proportional Integral, Proportional Derivative, and PID controllers, and Effect on Gain Margin and Phase Margin by using Proportional, Proportional Integral, Proportional Derivative, and PID controllers

Unit –VI: State Variable Analysis and Design

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

Text Books:

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

Reference Books:

1. Katsuhiko Ogata, "Modern Control Engineering," Pearson, FifthEdition.
2. S. Salivahanan, R. Rengaraj, and G. R. Venkata Krishnan, "Control Systems Engineering," Pearson, FirstImpression.
3. Benjamin C. Kuo, FraridGolnaraghi, "Automatic Control Systems," Wiley Student Edition, Eigth Edition.
4. PadmaRaju and Reddy,"Instrumentation and Control Systems ", McGrawHill Education, 2016.

Course Outcomes:

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

L	P	T	C
3	0	0	3

III Year - I Semester

OPTICAL COMMUNICATIONS

Course Objectives:

The main objectives of this course are:

- To study about the various optical fiber modes, configuration and transmission characteristics of optical fibers.
- To learn about the various optical sources, detectors and transmission techniques.
- To explore various idea about optical fiber measurements and various coupling techniques.
- To enrich the knowledge about optical communication systems and network.

Unit –I: Overview of Optical Fiber Communication

Introduction, , optical fiber waveguides, Ray theory, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Cylindrical fibers- Modes, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index,. Optical Fibers: fiber materials, photonic crystal, fiber optic cables specialty fibers. Related problems

Unit –II: Transmission Characteristics of Optical Fibers

Introduction, Attenuation, absorption, scattering losses, bending loss, Core and Cladding losses, dispersion, Intra modal dispersion, Inter modal dispersion,Related problems

Unit –III: Optical Fiber Connectors

Connector types, Single mode fiber connectors, Connector return loss, Fiber Splicing- Splicing techniques, Splicing single mode fibers, Fiber alignment and joint loss- Multimode fiber joints, single mode fiber joints.

Unit –IV: Optical Sources and Detectors

Introduction, LED's, LASER diodes, Quantum efficiency, Power, Modulation, Power bandwidth product. Photo detectors, principles of PIN and APD detectors, Photo detector noise, Response time, double hetero junction structure, comparison of photo detectors.

Unit –V: Power Launching

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Quantum limit.

Unit –VI: Optical System Design

Point-to- point links- Component choice and considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, WDM- Necessity& Principles, Eye pattern.

Text Books:

1. Optical Fiber Communications by Gerd Keiser, Mc Graw-Hill Internationaledition, 3rdEdition,
2. Optical Fiber Communications by John M. Senior, PHI, 2nd Edition, 2002.

References:

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

Course Outcomes:

On successful completion of the course, students will be ableto:

- Apply knowledge to understand· Mode theory of optical communication.

· Losses in optical fibers.· Optical sources and detectors.· Power Launching and coupling techniques.· Optical links.· WDM concepts.· Optical Networks.

- Analyze Problems in analog and Digital Links.
- Design and Develop Optical Sources, Detectors and Links.
- Provide valid solutions to overcome losses in optical fibers.
- Select appropriate optical components to suit advanced optical communications and Networks.
- Assess and propose cost effective solutions to minimize the radiation hazards caused by wireless links.

L	P	T	C
3	0	0	3

III Year - I Semester

CELLULAR AND MOBILE COMMUNICATIONS

Course Objectives:

The main objectives of this course are to understand:

- Basic cellular concepts like frequency reuse, cell splitting, cell sectoring etc., and various cellular systems.
- Effect of Co-channel and non-co channelinterferences oncellular and mobile communications.
- Frequency management, channel assignment, concept of handoff and types of handoffs
- in cellular environment.
- Different types antennas used at cell site and mobile.
- Architectures of GSM and 3G&4G cellular systems.

Unit –I: Introduction to Cellular and Mobile Systems

Cellular Mobile System, uniqueness of mobile radio, environment, operation of cellular systems, consideration of the components of Cellular system, Hexagonal shaped cells, Analog and Digital Cellular systems.

CellularSystem Basics: Evolution of Cellular systems, frequency reuse and its ratio, Number of channels in a cellular system, Cellular traffic: trunking and blocking, Grade of Service; Different cellular structures; Cell splitting, Cell sectoring.

Unit –II: Interference

Types of interferences, Introduction to Co-Channel Interference, real time Co-Channelinterference, Co-Channel measurement, Co-channel Interference Reduction Factor, desired C/I from a normal casein an omni directional Antenna system, Design of Antenna System, Antenna Parameters and their Effects, diversity receiver, different types of non-co channel interference.

Unit –III: Frequency management and channel assignment

Numbering and grouping, setup access and paging channels, channel assignments to cell sites and mobile units: fixed channel and non-fixed channel assignment, channel sharing and borrowing, over laid cells.

Cell coverage for signal and traffic: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, straight line path loss slope, 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 –IV: Cellsite 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, mobile antennas.

Unit –V: Handoff concepts

Basic conceptualization of Handoff, types of handoff, handoff initiation, delaying handoff, forced handoff, mobile assigned handoff, intersystem handoff, vehicle locating methods, dropped call rates and their evaluation.

Unit –VI: Digital cellular networks

GSM architecture, GSM channels, multiple access schemes; TDMA,CDMA, OFDMA; architecture of 3G &4G cellular systems.

Textbooks:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn., 2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International 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.
5. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.

Course Outcomes:

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

- Understand the basic concept and limitations/advancements of conventional mobile telephone systems, cellular mobile systems and advanced generations of cellular wireless systems.
- Identify and understand the effect of interference in cellular mobile communication.
- Explore the frequency management, channel assignment strategies and antennas in cellular systems.
- Understand the concept of handoff and architectures of various cellular systems.
- Familiarized with the concept of cell coverage for signal and traffic, diversity techniques and mobile antennas.

L	P	T	C
3	0	0	3

III Year - I Semester

EMI/EMC

Course Objectives:

The main objectives of this course are to understand:

- Understand the root causes for Electromagnetic Noise (EMI), its sources.
- Understand the effects of EMI and the required precautions to be taken/to be discussedwith his peer group.
- Understand the different measurement techniques of EMI (for conducted and normal) and their influences in detail.
- Understand different compatibility techniques (EMC)to reduce/suppress EMI.
- Understand different standards being followed acrossthe world in the fields of EMI/EMC.

UNIT-I: Natural and Nuclear sources of EMI / EMC

Introduction, Electromagnetic environment, History, Concepts, Practical experiences and concerns, frequency spectrum, conservations.An overview of EMI / EMC,Natural and Nuclear sources of EMI.

UNIT-II: EMI from apparatus, circuits and open area test Sites

Electromagnetic emissions, noise from relays and switches, non-linearity's in circuits, passive inter modulation, cross talk in transmission lines, transients in power supply lines, electromagnetic interference (EMI). Open area test sites and measurements.

UNIT-III: Radiated and conducted interference measurements

Anechoic chamber, TEM cell, GH TEM Cell, characterization of conduction currents / voltages, conducted EM noise on power lines, conducted EMI from equipment, Immunity to conducted EMI detectors and measurements.

UNIT-IV: ESD, Grounding, shielding, bonding and EMI filters

Principles and types of grounding, shielding and bonding, characterization of filters, power lines filter design. ESD, Electrical fast transients / bursts, electrical surges.

UNIT-V: Cables, connectors, components

Introduction, EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, opto-isolators, Transient and Surge Suppression Devices. Electronics & Communication Engineering.

UNIT-VI: EMC standards- National / International

Introduction, Standards for EMI and EMC, MIL-Standards, IEEE/ANSI standards,CISPR/IEC standards, FCC regulations, Euro norms, British Standards,EMI/EMC standards in JAPAN, Conclusions.

Text Books:

1. Engineering Electromagnetic Compatibility by Dr. V.P. Kodali, IEEEPublication, Printed in India by S.
Chand & Co. Ltd., New Delhi,2000.
2. Electromagnetic Interference and Compatibility IMPACT series, IIT –Delhi, Modules 1 – 9.

Reference Books:

1. Introduction to Electromagnetic Compatibility, NY, John Wiley, 1992,by C.R. Pal.Outcomes-

Course Outcomes:

At the end of this course the student can able to

- Students shall be able to distinguish effects of EMI and counter measures by EMC-techniques.
- Students shall apply the knowledge gained in selecting proper gadget/device/appliance/system, as per EMC- norms specified byregulating authorities.
- Students shall choose career in the fields of EMI/EMC as anEngineer/Researcher/Entrepreneur in India/abroad.

L	P	T	C
3	0	0	3

III Year - I Semester

OOPS THROUGH JAVA

Course Objectives:

- Implementing programs for user interface and application development using core javaprinciples.
- Focus on object-oriented concepts and java program structure and its installation.
- Comprehension of java programming constructs, control structuresin Java ProgrammingConstructs.
- Implementing Object oriented constructs such as various class hierarchies, interfacesand exception handling.
- Understanding of Thread concepts and I/O inJava.
- Understanding of Various Components of Java Swing and write Code Snippets using them.

UNIT-I: Introduction to OOP

Introduction, Need of Object-Oriented Programming, Principles of Object-Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program Structures, Variables, Primitive Data types, Identifiers- Naming Conventions, Keywords, Literals, Operators- Binary, Unary and Ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of Control-Branching, Conditional Loops.

UNIT-II: Classes and Objects

Classes, Objects, Creating Objects, Methods, Constructors-Constructor Overloading, Cleaning up Unused Objects-Garbage Collector, Class Variable and Methods, Static Keyword, this keyword.

UNIT-III: Inheritance

Types of Inheritance, Deriving Classes using Extends Keyword, Method Overloading, Super Keyword, Final Keyword, Abstract Class.Interfaces, Packages: Interface-Extending Interface, Interface Vs Abstract Classes, Packages-Creating Packages, Using Packages, Access Protection, java.lang Package.

UNIT-VI: Exceptions

Introduction, Exception Handling Techniques-try...catch, throw, throws, finally block, User Defined Exception.**Multi-Threading:**java.lang.Thread, the main Thread, Creation of New Threads, Thread Priority, Multithreading- Using is Alive () and join (), Synchronization, Suspending and Resuming Threads, Communication between Threads.

UNIT-V: Input/ Output

File I/O: Reading data from files and writing data to files, accessing data from CSV and Excel files.

String Handling: String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Methods for Comparison of Strings, Methods for Modifying Strings, Methods for Searching Strings, Data Conversion and Miscellaneous Methods, Class String Buffer, Class String Builder.

UNIT-VI: Event Handling

Event Delegation Model, Sources of Event, Event Listeners, Adapter Classes, Inner Classes.

Swings: Introduction, JFrame, JApplet, JPanel, Components in Swings, Layout Managers, List and JScroll Pane, SplitPane, JTabbedPane, JTree, DialogBox, Pluggable Look and Feel.

Text Books:

1. The Complete Reference Java, 11th edition, Herbert Schildt,TMH.
2. Programming in JAVA, Sachin Malhotra, SaurabhChoudhary, and Oxford.

References Books:

1. JAVA Programming, K.Rajkumar,Pearson.
2. Core JAVA, Black Book, Nageswara Rao, Wiley, DreamTech.
3. Core JAVA for Beginners, RashmiKantaDas,Vikas.
4. Object Oriented Programming through JAVA , P Radha Krishna , UniversityPress.
5. Object oriented programming with JAVA, Essentials and Applications, RajKumarBhuyya, Selvi, ChuTMH.
6. Introduction to Java Programming, 7th edition, Y Daniel Liang, Pearson.

Course Outcomes:

- Write, compile, execute and troubleshoot Java programming for networking concepts.
- Build Java Application for distributed environment.
- Design and Develop multi-tier applications.
- Identify and Analyse Enterprise applications.

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III Year - I Semester

FUZZY AND NEURAL NETWORKS

UNIT-I: Classical & Fuzzy Sets

Introduction to classical sets – properties, Operations and relations; Fuzzysets, Membership, Uncertainty, Operations, Properties, fuzzy relations,cardinalities, membership functions.

UNIT-II: Fuzzy Logic System Components

Fuzzification, Membership Value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

Applications Neural network applications: Process identification, Fraction Approximation, Control and Process Monitoring, Fault diagnosis and Load forecasting. Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

UNIT-III: Introduction to Neural Networks Introduction

Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Potential Applications of ANN. Essentials of Artificial Neural Networks Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANNConnectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

UNIT-IV: Feed Forward Neural Networks Introduction, Perceptron Models

Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron, Convergence theorem, Limitations of the Perceptron Model, Applications. Multilayer Feed Forward Neural Networks Credit Assignment Problem, Generalized Delta Rule, Derivation of Back propagation (BP) Training, Summary of Back-propagation Algorithm, Kolmogorov Theorem,Learning Difficulties and Improvements.

UNIT-V: Associative Memories Paradigms of Associative Memory

Pattern Mathematics, Hebbian Learning,General Concepts of Associative Memory Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory, Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem. Architecture of Hopfield Network: Discrete and Continuous versions, Storage and Recall Algorithm, Stability Analysis, Capacity of the Hopfield Network.

UNIT-VI: Self-Organizing Maps (SOM) and Adaptive Resonance Theory (ART) Introduction

Competitive Learning, Vector Quantization, Self-Organized Learning Networks, Kohonen Networks, Training Algorithms, Linear Vector Quantization, Stability- Plasticity Dilemma, Feed forward competition, Feedback Competition, Instar, Outstar, ART1, ART2, Applications.

Text Books:

1. Neural Netwroks, Fuzy logic, Gnenetic algorithms: synthesis andapplications by Rajasekharan and Rai-
PHI Publication.
2. Introduction to Artificial Neural Systems- Jacek M.Zurada, JaicoPublishing House, 1997.

Reference Books:

1. Neural and Fuzzy Systems: Foundation, Architectures andApplications, - N. Yadaiah and S. Bapi Raju,
Pearson Education
2. Neural Netwroks – James A Freeman and Davis Skapura, Pearson, 2002
3. Neural Netwroks – Simon Hykins, Pearson Education.
4. Neural Engineering by C. Eliasmith and CH. Anderson, PHI.Neural Netwroks and Fuzzy Logic System
by Brok Kosko, PHIPublications.

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III Year - I Semester

DATA STRUCTURES

Course Objectives:

The objective of the course is to

- Introduce the fundamental concept of data structures and abstract data types.
- Emphasize the importance of data structures in developing and implementing efficient algorithms.
- Describe how arrays, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms.

UNIT-I: Data Structures

Definition, Classification of Data Structures, Operations on Data Structures, Abstract Data Type (ADT), Preliminaries of algorithms.Time and Space complexity. Searching - Linear search, Binary search. Sorting- Insertion sort, Selection sort, Exchange (Bubble sort, quick sort), distribution (radix sort), merging (Merge sort) algorithms.

UNIT-II: Linked Lists

Introduction, Single linked list, Representation of Linked list in memory, Operations on Single Linked list-Insertion, Deletion, Search and Traversal,Reversing Single Linked list, Applications and Advantages and Disadvantages of Single Linked list, Double Linked list-Insertion, Deletion, Circular Linked list-Insertion, Deletion.

UNIT-III: Stacks

Introduction to Stacks, Array Representation of Stacks, Operations on Stacks, Linkedlist Representation of Stacks, Operations on Linked Stack,Applications-Reversing list, Infix to Postfix Conversion, Evaluating Postfix Expressions.

UNIT-IV: Queues

Introduction to Queues, Representation of Queues-using Arrays and using Linked list, Implementation of Queues-using Arrays and using Linked list,Applications of Queues-Circular Queues, Dequeues.

UNIT-V: Trees

Basic Terminology in Trees, Binary Trees-Properties, Representation of Binary Trees using Arrays and Linked lists. Binary Search Trees- Basic Concepts, BST Operations: Insertion, Deletion, Tree Traversals, Applications.

UNIT-VI: Graphs

Basic Concepts, Representations of Graphs-Adjacency Matrix and using Linked list, Graph Traversals (BFT & DFT), Applications- Minimum Spanning Tree Using Prims &Kruskals Algorithm, Dijkstra's shortest path.

Text Books:

1. Data Structures Using C. 2nd Edition.ReemaThareja, Oxford.
2. Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.

Reference Books:

1. Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.
2. Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.
3. Data Structures with C, Seymour Lipschutz TMH.

Course Outcomes:

By the end of the course, the students should be able to:

- Understand basic concepts of data structures and apply algorithm analysis for various searching and soring techniques.
- Understand the concept of linked lists and be use it in various applications.
- Be able to use Stacks and Queues in various applications.
- Understand the concept of Trees & Graphs and perform various operations on it.
- Understand the concept of Hashing & different types of Hashing Techniques.

III Year - I Semester

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DIGITAL COMMUNICATIONS LAB

List of Experiments (Any 12 Experiments)

- **Using Hardware Kits: (Any 7 Experiments)**

1. Time Division Multiplexing.
2. Pulse Code Modulation and Demodulation.
3. Differential Pulse Code Modulation and De modulation.
4. Delta Modulation and Demodulation.
5. Frequency Shift Keying Methods.
6. Phase Shift Keying.
7. Differential Phase Shift Keying.
8. Linear Block Code-Encoder andDecoder
9. Binary Cyclic Code - Encoder andDecoder
10. Convolution Code - Encoder andDecoder

- **Simulation using MATLAB: (Any 5 Experiments)**

1. Pulse Code Modulation and Demodulation.
2. Differential Pulse Code Modulation and De modulation.
3. Delta Modulation and Demodulation.
4. Amplitude Shift Keying.
5. Frequency Shift Keying Methods.
6. Phase Shift Keying.
7. Differential Phase Shift Keying.
8. Companding.

Equipment required for Laboratories:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 MHz.
3. Function Generators - 0 – 1 MHz
4. RF Generators - 0 – 1000 M Hz./0 – 100 MHz.
5. Rated Voltmeters andAmmeters
6. Lab Experimental kits for DigitalCommunication
7. Components
8. Breadboards and Multimeters
9. PC loaded with Matlab Software.

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III Year - I Semester

LINEAR & DIGITAL IC LAB

List of Experiments :(Minimum of twelve Experiments has to be performed)

1. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
2. Integrator and Differentiator Circuits using IC 741.
3. Active Filter Applications – LPF, HPF (first order)
4. Active Filter Applications – BPF
5. IC 741 Oscillator Circuits – Phase Shift Oscillators.
6. Function Generator using OP AMPs.
7. Schmitt Trigger Circuits – using IC 741 and IC 555.
8. Three Terminal Voltage Regulators – 7805, 7809, 7912.
9. Realization of Logic Gates
10. Design of Full Adder using 3 modeling styles
11. 3 to 8 Decoder -74138
12. 8 x 1 Multiplexer-74151 and 2x 4 De-multiplexer-74155
13. 4- Bit comparator-7485
14. D Flip-Flop-7474
15. Decade counter -7490
16. Shift registers-7495

Equipment Required For Laboratories:

- **Hardware**

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

- **Software**

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

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III Year - I Semester

LOGICAL REASONING II

Course Objectives:

Enable the students to

- Analyze the given data and interpret the required values.
- Identify the logic and find the missing/odd term/object.
- Understand the pattern and complete/form a new object.
- Apply the logic to find the figure to insert, group and count number of objects.
- Understand the concept of sets and relation between sets and Venn diagrams.
- Calculate ages of persons in a family using the given data.

UNIT –I: Data Interpretation

Line & Bar Graphs- Pie Charts/Graphs- Table – Based Problems.

UNIT – II: Analogies &Odd One Out

Relationship with the third word-figures-pair relationship- Finding Odd word- number –pairs.

UNIT –III: Non –Verbal Reasoning-I

Pattern Completion-Series-Figure Formation-Classification.

UNIT –IV: Non –Verbal Reasoning-II

Embedded Images- Grouping of Images- Shape Construction-Counting Number of Figures.

UNIT –V: Logical Venn Diagrams

Venn Diagrams Basics-Relationship among the classes-Number of objects of a category.

UNIT –VI: Ages

Ratio Based - Proportion Based - Equation Based – Average Based - Age Problems.

Text Books:

Dr. R.S. Aggarwal , A Modern Approach to Verbal & Non-Verbal Reasoning Sultan Chand Publications, 2018.

Reference Books:

1. B.S.Sijwali and Indu Sijwali, A New Approach to Reasoning Verbal & Non-Verbal, Arihant Publishers, 2016.

2. M.K. Pandey, Analytical Reasoning , BSC Publishing Co. Pvt. Ltd 2009.

Course Outcomes:

After completing this course, the students will be able to

- Analyze the given chart / table and interpret the results from the given data.
- Identify the logic the given objects follow and identify the missing or similar one and the different one.
- Understand the pattern and select the figure which completes the series and form a new object.
- Apply the logic to find the figure that can be inserted, group the similar objects and count number of objects in the given figure.
- Estimate the number of persons/objects belonging to a specified category using the concept of Venn diagram.
- Deduce the ratios/ equations corresponding to ages of persons of a family and calculate the corresponding ages.