SYLLABUS

For

M.Sc. [5 Year Integrated Course]
ELECTRONICS & TELECOMMUNICATION

(w.e.f. 2023-24 session onwards)

M.Sc. ETC [Semester VII TO X]

KHALLIKOTE UNITARY UNIVERSITY
BERHAMPUR-760 001

COURSE STRUCTURE OF P.G. ELECTRONICS

SEMESTER: VII

PAPER CODE	TITLE OF THE PAPER	MARKS		CREDIT
		SEM.END	INTERNAL	
701	Electromagnetic Waves & Antenna Theory	80	20	04
702	Pulse & Digital Circuits	80	20	04
703	Optical Fiber & Satellite Communication	80	20	04
704	RDBMS with SQL Server	80	20	04
705	Linear ICs & Applications	80	20	04
706	Advanced Communication Lab	40	10	02
707	RDBMS Lab.	40	10	02

SEMESTER: VIII

PAPER CODE	TITLE OF THE PAPER	MARKS		CREDIT
		SEM.END	INTERNAL	
801	Software Engineering	80	20	04
802	Data Communication & Networking	80	20	04
803	Control System.	80	20	04
804	Microwave Tech. & Radar.	80	20	04
805	OOP's with Java Programming	80	20	04
806	Data communication Lab	40	10	02
807	OOP's Lab	40	10	02

SEMESTER: IX

PAPER CODE	TITLE OF THE PAPER	MARKS		CREDIT
		SEM.END	INTERNAL	
901	Internet & Web Technology	80	20	04
902	Digital Signal Processing	80	20	04
903	Advanced Microprocessor & Microcontroller	80	20	04
904	Digital Image & Speech Processing	80	20	04
905	VLSI Design	80	20	04
906	DSP MATLAB	40	10	02
907	Web Development Lab	40	10	02

SEMESTER: X

PAPER CODE	TITLE OF THE PAPER	MARKS		CREDIT
		SEM.END	INTERNAL	
1001	Broadband communication	80	20	04
1002	Wireless Mobile Comm.	80	20	04
1003	Embedded System	80	20	04
1004	Soft Computing	80	20	04
1005	Project (Major)	200		08

SEMESTER – VII
ELECTROMAGNETIC WAVES & ANTENNA THEORY (ETC – 701)
Full Marks: 100 (Internal-20, End Term 80)

MODULE-I

Electrostatics: Potential gradient, electric dipole, equipotential surfaces, energy stored in an electrostatic field, Gauss'law, boundary conditions, capacitors and capacitances, Poisson's and Laplace's equations, method of images.

Electromagnetism: Biot-Savart law, Ampere's circuit law, torque exerted on a current carrying loop by a magnetic field, magnetic vector potential, magnetic field intensity and Ampere's circuit law, boundary conditions, magnetic materials, energy in magnetic field, magnetic circuits.

MODULE -II

Maxwell's equations from Ampere's and Gauss's laws, Maxwell's equations in differential and integral forms, equation of continuity, concept of displacement current, electromagnetic boundary conditions, Poynting's theorem, time-harmonic EM fields, application to transformer.

MODULE -III

Plane wave propagation: Helmholtz wave equation, plane wave solution, plane wave propagation in lossless and lossy dielectric medium and conducting medium, plane wave in good conductor, surface resistance, depth of penetration, polarization of EM wave - linear, circular and elliptical polarization, normal and oblique incidence of linearly polarized wave at the plane boundary of a perfect conductor, dielectric – dielectric interface, reflection and transmission co-efficient for parallel and perpendicular polarizations, Brewster angle.

MODULE - IV

Antennas: Physical concept of radiation from an antenna, wave equations in terms of potential functions, the concept of retarded vector potential, Hertzian dipole, near zone fields, radiation fields, radiation resistance, directive gain and directivity, magnetic dipole, short dipole antenna, half wave dipole antenna, monopole antenna, pattern multiplication antenna arrays, linear antenna arrays, antenna types (horn, helical, yagi, log periodic, disc).

Text Books:

1. B. S. Guru & Huseyn:Electromagnetic Field Theory, Fundamental,
2. J.D.Krauss: Electromagentic fields & Antenna Theory,
3. E. C. Jordan & K. G. Balmin: Electromagnetic waves and Radiating Systems, 2nd Edition. PHI Pvt.Ltd.
4. W.H.Hayt Jr: Electromagnetic fields,
5. Saddique Electromagnetic Theory ,

PULSE & DIGITAL CIRCUITS (ETC – 702)

Full Marks: 100 (Internal-20, End Term 80)

MODULE-I

Multivibrators using negative resistance devices: Stable states, fixed biased and self-biased transistor, commutating capacitors, symmetrical/unsymmetrical triggering, emitter coupled multivibrators, Gate width collector coupled multivibrators, waveforms triggering.

MODULE-II

Time base generator:

Voltage time base generator: Exponential sweep circuit, fixed amplitude sweep, basic principles of Miller and Bootstrap time base generator.

Current time base generator: Simple current sweep, linearity correction, coil capacitance, effect of omission of impulse component.

MODULE– III

Pulse transformers: Pulse transformer models and equivalent circuits, transformer impedances, rise time response, pulse response of the transformer, triggered transistor blocking oscillator with base and emitter timing.

MODULE– IV

Sampling gates: Operating principle, unidirectional diode gate, bidirectional gate using diodes and transistors, reduction of pedestal in gate circuits, balance condition in bidirectional gates, signal input resistance, four-diode gate, six diode gates.

Synchronization and frequency division: Pulse synchronization, Frequency division in sweep circuits, synchronization with symmetrical signals, frequency division with sweep circuits, stability of a relaxation divider.

Text Book:

1. Jacob Millman and Herbert, Taub: Pulse , Digital and switching Waveforms ,TMH Publication
2. A. Anand Kumar, PHI: Pulse and Digital Circuits,
3. Ramakanta A. Gayakward: OP-Amp & Linear Integrated circuit,

OPTICAL FIBER & SATELLITE COMMUNCATION (ETC – 703)

Full Marks: 100 (Internal-20, End Term 80)

MODULE-I

Int. to optical communication, principles of light transmission, optical fiber modes and configuration, Optical sources: L.E.D's, LASER Diodes, Power Launching & Coupling, Population Inversion, Fiber splicing, optical connector, photo detector: PIN, Avalanche, Modulation Techniques: Misalignment, Fiber to Fiber joints.

MODULE -II

Signal Degradation in optical fibers, Attenuation losses, signal distortion in optical waveguides, material dispersion, chromatic dispersion, Intermodal distortion, mode coupling, Advance fiber design: Dispersion shifted, Dispersion flattened, Dispersion compensating fiber, Design optimization of single mode fibers. Coherent optical fiber communication,

MODULE -III

WDM concepts and components, operation, Tunable Filters, Directional coupler, Dispersion Management. Optical Amplifiers – EDFA, Photonic Switching, Optical Networks: SONET/SDH, Optical Interfaces, Ring Topology, Star Architecture

MODULE -IV

Evolution of Satellite Technology, Communication Satellites, Orbital Mechanics, kepler's Laws of planetary motion, Specialization to Geostationary satellites, Orbital perturbations, Low Earth and Medium orbits, Satellite Link design: Introduction, System Noise Temperature and G/T Ratio, Noise Temperature, Link Budgets, Carrier to Noise ratios in Uplink and Downlink.
Satellite multiple access methods. FDMA, TDMA, CDMA Systems, DS-SSCDMA, Rain attenuation, Antennas: Radiation pattern, half wave Dipole, VSAT systems: Overview, Network architecture, Basic Techniques, Satellite Mobile services, Radarsat, Global positioning Satellite System

Text Books:

1. G. Keiser, "Optical Fiber Communication (3rd Edition) ", Mc Graw Hill International, 2000.
2. A. Ghatak and K. Thyangarajan: "Int. to fiber optics"Cambridge University press, 1998.
3. Dennis Roddy PHI : Satellite Communication ,
4. Richharia, M: Satellite communication,
5. Timotty Pratt: Satellite communication,
6. Senior. (PHI): Optical Fibre Communication,

RDBMS WITH SQL SERVER (ETC – 704)

Full Marks: 100 (Internal-20, End Term 80)

MODULE-I

Database: Introduction, File based approach & Database approach, Basic Components of database design.

DBMS: Introduction, Features, Merits, Limitations, Applications, Components of Database Environment, Roles of DBA, Components of Database Language (DDL, DQL, DML, DCL, TCL).

RDBMS: Introduction, Features, Comparison of DBMS & RDBMS.

Database System Architecture – Data Abstraction, 3-Level Architecture, Data Independence,

Data models – Hierarchical Model, Relational Model, Entity Relationship (ER) Model, Network Model.

Constraints: Introduction & Types.

MODULE -II

Relational Algebra: Introduction & Operations

Relational Query Languages, Relational Calculus: Tuple and Domain Relational Calculus, SQL and QBE. Relational Database Design: Domain and Data dependency, Armstrong's Axioms, Comparison of Oracle & DB2

Normal Forms: Introduction, Types (1NF, 2NF, 3NF, BCNF, 4NF, 5NF, Dependency Preservation, Lossless design.

MODULE -III

Concepts of Database Transaction, ACID properties, Transaction states, Serializability, Concurrency control in DB systems, Locking and Timestamp based Schedulers, Lock based protocols, 2PL, Failure & Recovery of DB systems. Shadow Paging.

MODULE -IV

Advanced topics: Object-Oriented and Object Relational databases, Mobile Database, Web Databases, Distributed Databases, Data Warehouse and Data Mining.

Text Books: -

1. Elmaski & Navathe: Fundamentals of Database Systems, 4th Edition, Pearson Education
2. C.J.Date : An introduction to Database Systems, Pearson Education
3. Bipin Desai: An introduction to Database System, Galgotia Publication.

LINEAR IC & APPLICATIONS (ETC – 705)

Full Marks: 100 (Internal-20, End Term 80)

MODULE-I

Integrated circuits: Introduction, Types of ICs, Development of ICs, IC Package types, Pin Identification, Temperature Range, Power supplies for ICs

Waveform generator: Phase shift oscillator, Wien bridge oscillators, Quadrature oscillators, square wave generator, triangular wave generator and saw tooth wave generator, voltage-controlled oscillators

Comparators: Basic Comparator, zero-crossing detector, Schmitt trigger, voltage limiter

MODULE -II

Signal Convertors: Sample and hold circuits, voltage to frequency and frequency to voltage conversion, Analog to digital convertors [successive approximation & Monolithic/Hybrid], digital to analog convertors [binary weighted resistors & R and 2R resistors & Monolithic/Hybrid], Clipper and clamper circuits using OPAMP

MODULE -III

Voltage regulators: fixed voltage regulators, adjustable voltage regulators, switching regulators, Special regulators: Voltage references, Voltage inverter.

Specialized IC applications: Universal active filters, Switched capacitor filter, 555-timers & its application, frequency multiplication and division.

MODULE -IV

Phase-Locked Loops: Operating Principles, Monolithic phase locked loops, 565- phase locked loop and its application

Power Amplifiers: Power amplifiers using Power Boosters, Monolithic Power amplifiers, Application of LM380 Power amplifier, Digital DC Motor Speed Control

Text Books:

1. R F Coughlin: Op-amps and Linear Integrated circuits, Pearson Education/PHI
2. R A. Gayakwad: Op-amps and Linear integrated Circuits,

References:

1. Milliman Halkis : Integrated Electronics,

ADVANCED COMUNICATION LAB (ETC – 706)

Full Marks: 100 (Internal-10, End Term 40)

1. Measurement of Refractive Index profile, Numerical Aperture attenuation and dispersion in a multimode optical fiber.
2. Establishing and Testing an optical Fiber Communication Link.
3. Designing an optical fiber communication link to a given specification.
4. Simulating Program in MATLAB for Unit Impulse & Ramp.
5. Simulation program in MATLAB for Sine & Square wave.
6. Simulation program in MATLAB for Cosine & Triangle wave.
7. Simulation program in MATLAB for Sawtooth wave.

RDBMS LAB (ETC – 707)

Full Marks: 100 (Internal-40, End Term 40)

1. SQL Statements: DDL, DQL, DML, DCL, TCL (Syntax with Example.)
2. SQL Operators, Clauses, Functions
3. SQL Constraints
4. SQL Set Operators & Joins
5. SQL Objects: Synonyms, Views, Sequences and Index
6. Security Management using SQL (DCL Commands)
7. PL/SQL: Simple Statements, Conditional, Iterative, Sequential, Case
8. PL/SQL Cursors
9. PL/SQL Functions & Procedures.

SEMESTER-VIII

SOFTWARE ENGINEERING (Paper- 801)

Full Marks: 100 (Internal-20, End Term 80)

MODULE-I

Software Engineering: Introduction, Importance, Evolution, Applications.

Software Development Life Cycle: Introduction, Stages with Examples.

Software Development Models, Capability Maturity Model, Modeling the System Architecture.

MODULE -II

Software Requirement Analysis, Software Requirement Specification.

Software Design: Types Design methods.

Software Testing: Types of Testing Tools.

MODULE -III

Software Project Management:

Software Project Planning, Software Management Activities, Software Management Structures, Programmer Productivity, Different types of project metrics, Software project estimation, Models for estimation, Automated tools for estimation Project Scheduling, Estimating efforts and lines scales, Algorithmic cost modeling, The COCOMO model

Software Quality Assurance: Criteria for Software Quality, Software Reliability, Software Standards, Software Metrics, Software validation, Testing Techniques and Strategies, Software Maintenance, Software Configuration Management

MODULE -IV

CASE Tools & Environment

Project Management Tools, Documentation Tools, Analysis and Design Tools, Programming Tools, Integration and Testing Tools, Projecting Tools, Maintenance Tools, Integrated CASE Environment.

Text Book:

1. Rajib Mall: Fundamentals of software Engineering, (PHI – 2nd Edition) .
2. R.Pressman : Text book on software Engineering,

DATA COMMUNICATION & NETWORKING (Paper- 802)

Full Marks: 100 (Internal-20, End Term 80)

MODULE –I

Overview of Data Communications and Networking :
Analog and Digital, Analog Signals, Digital Signals, Analog versus Digital, Data Rate Limits, Transmission Impairment, More about signals.
Digital Transmission : Line coding, Block coding, Sampling, Transmission mode.
Analog Transmission: Modulation of Digital Data; Telephone modems, modulation of Analog signals.
Multiplexing : FDM 150, WDM 155, TDM 157,
Transmission Media : Guided Media, Unguided media (wireless)
Circuit switching and Telephone Network

MODULE –II

Overview of OSI Model, Data Link Layer
Error Detection and correction : Type of Errors, Detection, Error Correction
Data Link Control and Protocols:
Flow and error Control, Stop-and-wait ARQ. Go- Back. N ARQ, Selective Repeat ARQ, HDLC.

MODULE –III

Point-to – Point Access : PPP
Point –to- Point Protocol, PPP Stack,
Multiple Access :
Random Access, Controlled Access, Channelization.
Local area Network : Ethernet.

MODULE –IV

Traditional Ethernet, Fast Ethernet, Gigabit Ethernet.
Wireless LANs: IEEE 802.11, Bluetooth virtual circuits: Frame Relay and ATM.
Network Layer : Host to Host Delivery: Internetworking, addressing and Routing
Network Layer Protocols: ARP, IPVA, ICMP, IPV6 ad ICMPR6
Transport Layer : Process to Process Delivery : UDP; TCP congestion control and Quality of service.

Application Layer : Client Server Model, Socket Interface Domain Name System (DNS):
Electronic Mail (SMTP) and file transfer (FTP) HTTP and WWW.
Security : Cryptography, Message security, User Authentication.

Text Book :

1. Behrouz A. Forouzan Tata Mc Graw-Hill : Data Communications and Networking, Third Edition. Publishing company Limited.
2. William Stallings : Computer networks,
3. A.S. Tannenbum : Computer Network,

CONTROL SYSTEM (Paper- 803)

Full Marks: 100 (Internal-20, End Term 80)

MODULE–I

Basic concepts of control systems, Open loop and closed loop systems, difference between open loop and closed loop systems, classifications

Mathematical model of physical systems, transfer function, block diagram algebra, signal flow graph (SFG), Mason's gain formula, application of SFG to control systems

Feedback theory,: Types of feedbacks, effect of degenerative feedback on control system, regenerative feedback.

MODULE–II

Time domain analysis: Standard test signals, Step, ramp, parabolic and impulse signals, Time response of first order systems to unit step and unit ramp inputs, Time response of second order systems to unit step input, Time response specifications, Steady state errors and error constants of different types of control systems, Generalised error series method.

Concepts of stability: Necessary conditions of stability, Hurwitz stability criterion, Routh stability criterion, application of Routh stability criterion to linear feedback systems, relative stability.

Root locus techniques: Root locus concepts, rules for construction of root loci, determination of roots from root locus, root contours, systems with transportation lag

MODULE- III

Frequency domain analysis of systems, advantages and limitations, co-relation between time domain and frequency domain, Bandwidth, Bode plots for systems, Nyquist plots for systems.

Compensation of control system: Types of compensation, compensating networks, Lead and Lag compensator, Compensation using root-locus.

State variable analysis: state model of linear systems, State-Space representation using physical phase and canonical variables, Transfer function for State model, Solutions to state models.

MODULE–IV

Controller Principles: Properties and classification of controllers, Proportional controllers, Integral controllers, Derivative controllers, Composite controllers, PI, PD and PID controller, effet of controllers on first order and second systems.

Text Books:

1. I J. Nagrath, M. Gopal : Control Systems Engineering, Third Edition, New Age International Publishers.
2. K. Ogata : Modem Control Engineering, PHI
3. B.C.KUO: ADVANCED CONTROL SYSTEM,

MICROWAVE TECHNOLOGY & RADAR (Paper- 804)

Full Marks: 100 (Internal-20, End Term 80)

MODULE – I

Introduction to Microwave: History, microwave region & band descriptions, advantages of microwave, applications of microwave.

Electromagnetic: Introduction, Maxwell's equation, amperes law, faradays law, gauss's law.

Transmission Lines:- Introduction, two wire parallel transmission line, voltage & current relationship, characteristic impedance, reflection co-efficient, propagation constant, input impedance, standing waves, voltage standing wave ratio, impedance at a voltage minimum & at a voltage maximum, impedance matching, stub matching.

MODULE – II

Waveguides (single line) , types of wave guides , propagation of waves in rectangular wave guide , propagation of TEM waves, TE and TM modes, propagation of TM waves in rectangular wave guide , Boundary conditions , Guide wavelength , Group velocity and phase velocity, expression for phase velocity and group velocity, relation between TM modes in rectangular waveguide, propagation of TE waves in a rectangular wave guide, Te modes in rectangular wave guide.

MODULE – III

Semiconductor Microwave Tubes: Klystrones: (Two cavity, reflex), magnetrons

Semiconductor Microwave Devices: - Introduction, varactor diodes : construction, equivalent circuit & applications, parametric amplifier, PIN diode : operation & applications, schottky barrier diode, tunnel diode, gunn diode, IMPATT diode, MASER & Laser.

Microwave Communication Systems:-Introduction, propagation modes, microwave systems, analog microwave communication (LOS system, OTH system, transmission interference & signal damping, duet propagation, fading in troposphere and its effect on troposcatter propagation, digital microwave communication microwave antenna (Horn antenna, parabolic reflectors, lens antenna)

MODULE – IV

Radar Fundamentals:- Introductions; Basic concepts, Advantages, limitations, applications, Block diagram of a simple radar, classification (continuous wave and pulsed radar), radar range equation, factors affecting range of a radar, pulsed radar system, radar receivers, plan position indicator, scanning & tracking with a radars, CW doppler radar, moving target indicator (MTI) radar, radar antennas.

Text Books :

1 M. Kulkarni : Microwave & Radar Engineering ,
2. A.K. Maini: Microwave & Radar Systems,

Reference Books :

1. Reich, Oudong and Others: Principles of Microwave Engineering,
2. Sammuel Y., Liao, Perason: Microwave Device and Circuit, 3rd Edition,

OBJECT ORIENTED PROGRAMING WITH JAVA PROG (Paper- 805)
Full Marks: 100 (Internal-20, End Term 80)

MODULE – I

Fundamentals of Object – oriented programming. Introduction, concepts of object – oriented programming: Object & Classes, data abstraction & encapsulation, Inheritance, Polymorphism, Dynamic binding & message communication. Introduction to Java, Java features, hardware & software requirements, java environment. An overview of Java:- Simple java program, JVM, command line arguments, constants, variables, data types, arrays, operators, control statements (Branching & Looping).

MODULE – II

Classes, Objects & Methods :- Introduction, defining a class, adding variables, methods, creating objects, constructors, method overloading, this keyword, garbage collection, finilize ( ) method, access control (static, final), Nested & inner classes. Inheritance: Basics, superclass & subclass, method overriding, abstract classes,
final classes.Package :- Introduction, Java API packages, creating package, accessing & using a package. Interfaces :- Introduction, defining interfaces, extending interfaces, implementing interfaces.

MODULE – III

Multithreaded Programming :- Introduction, creating threads, extending the thread class, stopping & blocking thread, lifecycle of a thread.Exception Handling:- Exceptions, types of exceptions, try & catch, throw, throwe, finalyStrings:- Strings constructors, length, operations, character extractions, comparison, searching, modifying, string buffer class, string tokenizer & date class.

MODULE – IV

Java.lang:-Number, character, math & throwable. **Java. io :-** Introduction, concept of stream, stream classes, byte stream classes ; Input stream, output stream, character stream : reader stream, writer stream.**Java.applet :-** Introduction, applet lifecycle, passing parameters to applets. **Graphics Class :**- Introduction, graphics class, line & rectangles, circle & ellipses, ace drawing, drawing polygons, font settings. **Java.awt :-** Text component class, text field, scroll bar, text area, menubar & menu class, button class, label class, applet with buttons and labels, buttons in action, check box, check box group, choice class, list menu. **Event Handling :-** Event classes, event listener, key events, mouse event. **Java Database Connectivity:-** Introduction, JDBC Driver, statements, caching database results.

Text Books:

1. **E. Balagurusamy : Programming with Java ,**
2. **C. Xavier : Programming with Java2,**

Reference Books:

1. **Java 2 Complete reference (TMH)**

DATA COMM. LAB.(Paper- 806) Total Marks 50

1. Study of Amplitude Shift Keying
2. Study of Frequency Shift Keying.
3. Study of Phase Shift Keying.
4. Study of Pulse Code Modulation.
5. Study of AM type Transmitter.
6. Study of AM type Receiver.
7. Study of SSB Transmitter.
8. Study of SSB Receiver.
9. Computer Networks (Ethernet)

OOP'S LAB (Paper- 807) Total Marks 50

1. Programs on concept of classes and objects.

2. Programs using inheritance.

3. Programs using polymorphism.

4. Programs on use of operator overloading.

5. Programs on use of object management.

6. Programs on exception handling and use of templates

7. Programs on File handling in JAVA.

8. Design problem on stock and accounting of a small organization, railway reservation, payroll preparation and optimization problem.

SEMESTER - IX
INTERNET &WEB TECHNOLOGY Paper- 901
Full Marks: 100 (Internal-20, End Term 80)

MODULE – I

Introducommunication **:** Dial-up connection, ISDN connection, DSL connection, client server model & typction to Internet **:** Modem, characteristics of a modem, connectivity for es.
Protocol**:** SMTP, POP3, PPP / SLIP, TCP / IP, HTTP, FTP, WAP, internet IP Address, Domain name, browser, URL, internet services, electronic mail & its advantages & disadvantages, World Wide Web, E-commerce & Electronic Data Interchange (EDI)

MODULE – II

Introduction to HTML, HTML tags, documents, header section, body section, headings, formatting characters (text), font tag, image & pictures, listing, link documents using anchor tag, table handling in HTML, creating frames & forms (Frameset definition, frame definition, nested frameset, HTML forms, elements of a form).

MODULE – III

Introduction to JavaScript, client-side JavaScript and server-side JavaScript, advantages of JavaScript, writing JavaScript into HTML, Elements of JavaScript**:** Data types, variables, operators, conditional statements, array objects, date objects, string objects, Objects & Events: Document object, Image object, forms & elements, event handling & data validation.
Functions in JavaScript**:**(Built in function, declaring functions, passing parameters, recursive functions) Dialog boxes: (Alert, prompt, & confirm dialog boxes).

MODULE – IV

Introduction to JSP, Client responsibility, server responsibility, JSP architecture, JSP server, JSP tags, request object, response object, business processing with JSP.
JSP with JDBC : creating ODBC data source, introduction to JDBC, prepared statement class, reading from database table, resultset class , extracting data from resultset object, creating new row in a table ,update data in a table & deleting rows from the table, Examples.

Text Books :

1. **C. Xavier : Unit- I, II, III & IV ---- Web Technology & Design,**
2. **Ivan Bayross : Unit-,V ------Web Technologies (part-I) , (BPB)**

DIGITAL SIGNAL PROCESSING Paper- 902

Full Marks: 100 (Internal-20, End Term 80)

MODULE – I

Discrete Time Signals and System : Discrete Time Signals (Elementary examples , classification : periodic and a periodic Signals energy and Power signals , Even and Odd Signals).

Discrete Time System : Block diagram representation of discrete time systems, classification of discrete time systems time variant and time – invariant, linear and non-linear, casual and anti-casual, stable and unstable.

MODULE -II

Analysis and response (convolution sum) of discrete - time linear LTI system, Recursive and Non-recursive discrete time system. Constant coefficient differences equations and their solutions, impulse response of LTI system , structures of LTI systems Recursive and Non-recursive realization of FIR system.

The Z transform : The Z-transform and one-sided Z-transform, properties of Z-transform , inverse of the Z-transform , Solution of difference equations.

MODULE -III

The Discrete Fourier Transform :The DFT and IDFT, relationship , DFT with Z- transform , the DFT as a linear transformation Relationship of DFT with Z-transform , properties of DFT: periodicity, linearity, summery and time reversal of a sequence.

Circular convolution, and correlation by DFT method, Overlap add and save filtering by DFT method.

MODULE -IV

Fast Fourier Transform : Operation counts by direct copulation of DFT, Radix – 2 FFT algorithm-Decimation –in-time (DIT) and Decimation – in frequency (DIF) algorithm, Efficient computation DFT of Two real sequences , Efficient Computation of DFT of a 2 N-pt real sequences.

Design and Digital Filters:
Casually and its implication, Design of linear phase FIR filters using different windows. Design of IIR filters – Impulse Invariance Method and Bilinear transformation method.

Implementation of Discrete Time System structure of FIR systems – Direct form, cascaded form.
Structure IIR Systems - Direct form I & II realizations

Text Books :

1. J. G. Proakis and D. G. Manolakis : Digital Signal Processing – Principles, Algorithms and Applications, 3rd Edition, Pearson.
2. S. Salivahanan, TMH : Digital Signal Processing,

Reference Book :

Digital Signal Processing , schaums Outlines series
Ramesh babu : DSP,
Oppen Ham & Shaffer : DSP,

ADVANCED MICROPROCESSOR & MICROCONTROLLER Paper- 903

Full Marks: 100 (Internal-20, End Term 80)

MODULE-I

Review of 8086 microprocessor, memory addressing, interrupt mechanism and types of instruction.

80186 and 80286 microprocessor architecture, memory organization, interrupt mechanism, types of instructions, and modes of operation.

MODULE-II

80386 and 80486 microprocessor architecture, memory organization, interrupt mechanism, DMA mechanism.

Memory addressing, virtual memory, paging and segmentation

MODULE-III

RISC and CISC architecture, Superscalar architecture, floating point unit and MMX unit in Pentium processors, Pentium architecture, Hyperthreading, Cache memory organization, Virtual memory, Interrupt mechanism, DMA mechanism Types of instructions.

Multicore processor architectures.

MODULE-IV

ARM microprocessor architecture, types instructions, interrupt mechanism and DMA mechanism

Digital Signal Processor (TMS 320 series) architecture, types instructions, interrupt mechanism, DMA mechanism

Motorola 680X0 processor architecture, types of instruction interrupt mechanism, DMA mechanism

Case studies: Traffic control system, Electronic weighing scale, Barcode reader.

TEXT BOOKS :

1. A.K.Ray and K.M. Bhruchandi : Advanced microprocessors and peripherals,
2. Hamacharvranesic and Zaky : Computer organization ,
3. Bary B Brey : Intel microprocessors ,

DIGITAL IMAGE & SPEECH PROCESSING Paper- 904

Full Marks: 100 (Internal-20, End Term 80)

MODULE-I

Different stages of Image processing & Analysis Scheme. Components of Image processing System, A Review of various Mathematical Transforms.Fuzzy sets and properties: Mathematical Morphology, Image Formation: Geometric Model, Image Digitization: A review of Sampling and quantization process. A digital Image.

MODULE-II

Image Enhancement: Contrast Intensification, Smoothing, Image sharpening. Restoration: Minimum Mean-Square Error Restoration Restoration by HomomorphicFiltering.Image Compression: Schematic diagram of data Compression Procedure, Lossless Compression-Coding ,Geometric Transformation.

2-D DFT &IDFT.ImageSegmentation:Detection&Discontinuty,Edge Linking & boundary detection, Thresholding Region based Segmentation, Wavelet Transform: Perception of colour, Processing of colour images.

MODULE-III

The Fundamentals of Digital Speech Processing ,Digital Representations of Speech Waveform.Sampling speech signals, Time –Domain Methods for Speech Processing.Time- Dependent processing of speech, Short-time energy and Average Magnitude, Short time Average Zero- Crossing Rate.

Statistical Model, Instantaneous quantization, Instantaneous Companding, Quatatization for optimum SNR, Adaptive Quantatization, Feed-Forward and Feedback adaptations.

MODULE-IV

Linear predictive Coding Speech.

Block diagram of simplified Model for speech production, Basic principle of Linear Predictive Analysis The Auto Correlation Method. The predictive Error Signal.

Digital Speech Processing for Man-Machine Communication by Voice, Speaker Recognitions System- Speaker verification and speaker Identification systems.

Textbook: (Digital Image Processing)
B.Chanda & D.DuttMajumdar : Digital Image Processing and Analysis , PHI,2001, Selected persons from Chapter 1-10.
Anil K Jain : Fundamentals of Digital Image Processing , Pentice Hall of India- 2002.
Rafael C. Gonzalez and Richard E. Woods : Digital Image Processing- 2nd Edition , Pearson Education.
Additional Reading
R.C. Gonzalez, R.E. Woods and Steven L. Eddins : Digital Image Processing using MAT LAB , Pearson Education.
Textbook: (Digital Speech Processing)

VLSI DESIGN Paper- 905

Full Marks: 100 (Internal-20, End Term 80)

UNIT I

INTRODUCTION: Introduction to IC Technology, VLSI Design Methodology, Y-Chart, VLSI Design Flow, Design Hierarchy, Concept of Regularity, Modularity and Locality, VLSI Process Technology: Photolithography, Oxidation, Diffusion, Ion Implantation, Etching, Metallization, Packaging, MOS Transistor: Structure, Structure & Operation of MOS transistor, V-I Characteristics Of MOSFET, MOSFET Scaling, MOSFET Capacitances, MOSFET Threshold Voltage

UNIT II

CMOS Logic Design: Design of CMOS Inverter, Design of CMOS NAND gate, NOR gate, XOR gate, XNOR gate, AND gate, OR gate, BiCMOS Inverter, VLSI CIRCUIT DESIGN PROCESSES: Stick Diagrams, Design Rules and Layout, 2m CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for CMOS Inverters and Gates, GATE LEVEL DESIGN : Logic Gates and Other complex gates

UNIT III

Combinational MOS logic circuits, CMOS logic circuits, Complex logic circuits, Pass transistor Logic, Sequential Logic Circuit-Introduction, SR latch, Clocked latch & Flip Flop Circuits, CMOS D latch and edge triggered flip flop, Dynamic logic circuits: Dynamic logic, Basic principles, High performance dynamic CMOS circuits, Dynamic RAM, SRAM, Flash Memory.

UNIT IV

SUBSYSTEM DESIGN: Subsystem Design, Shifters, Adders, ALUs, Multiplexers and Comparators, Semiconductor integrated circuit design: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Digital Design Using VHDL: Introduction, Modeling in VHDL: Combinational & sequential circuit design Using Dataflow, Behavioral and Structural Modeling, Design capture tools, Design Verification Tools, VLSI TESTING : Introduction, Importance of Testing, Fault Models & Simulation, Design for Testability, Boundary Scan Test, Built-In Self Test,

Text Book:
Sung Mo-Kang & Yussuf Leblebici : Digital Integrated Circuits- Analysis & Design , TMH.
Perry : VHDL Programming by example , TMH.
Reference Books:
Rabey et.ai : Digital Integrated Circuits: A Design Perspective, Pearson Education.
Geiger et.AI.McGraw Hill : VLSI design Techniques for analog and digital circuits,
Puckneln & Eshagraine : VLSI , (PHI)

DSP MATLAB Paper- 906

Total Marks 50

1. Different types of Signal generation using Matlab. (both continuous and discrete.)
2. Linear Convolution of sequences. (Without using the inbuilt function (conv) available in Matlab.)
3. Circular Convolution of two Sequences Comparison of result with the result obtained from Linear convolution.
4. i) Finding Auto correlation of a sequence
ii) Finding cross correlation of 2 sequences .
iii) Finding power spectral density of a sequence .
5. Finding the convolution of periodic sequence using DFT and IDFT.
6. Implementation of FFT (Fast Fourier Transform) algorithm
i) Decimation in Tane (DIT)
ii) Decemation in Frequency (DIF)
7. Design of FIR filter (lowpass, highpass,bandpass). Using windowing technique (harming window, hamming, window rectangular window, Kaiser window.
8. Design of IIR filter. (Design of Butterworth Filter Design of Chebyshev filter)
9. Convolution of long duration sequences using overlap add, overlab save meter.
10. Working with a DSP processor. (fixed point -TMS320C-5X / Floating point) series.
i) Implement convolution (Linear & circular convolution)
ii) FIR & IIR implementation .

Lab. Reference :

Schucer C, Mohesh Chgave : Digital Signal Processing a hands –on approach , (TMH)

Sanjit Mitra , DSP – using MATLAB ,

WEB DEVELOPMENT LAB Paper- 907

Total Marks 50

Internet Concepts & Browsing

HTML programming.

JavaScript /VB script programming.

JSP Programming

Servlet Programming

XML programming.

SEMESTER-X
BROADBAND COMMUNICATION Paper- 1001
Full Marks: 100 (Internal-20, End Term 80)

UNIT-I

Telecommunication Concepts: Components of Broadband Communication Systems, Communication Network Architecture & Cable Broadband Data Network Architecture & its Importance, Internetworking, Intranet & Extranet: Overview, technologies, Applications, Design Issues, Power-Law Rule for Intranet & extranet

UNIT-II

Integrated Service Digital Network (ISDN): ISDN Devices & Interfaces, Services, Architecture, BISDN: Interface & Terminals, ATM technology, ATM Standards & Network, BISDN Architecture and its application
Virtual Private Network: General Architecture, Dial-In VPN, Advantages & Disadvantages, VPN Standards & Security Issues

UNIT-III

Cellular Communication: Fundamental Features, Cellular Network, Cellular Standards, Cellular Digital Packet data network Architecture & its application, Fax Machine-Introduction to various working and operational Techniques, Important Features, Application, Cable Modem technology, External & Internal Cable Modem, Cable Modem systems Standards compliance

UNIT-IV

Introduction to New technologies: Wi-fi, Wi-Max, IPTV, Wireless ATM

Networking Technologies: X.25 Technology: X.25 devices, X.25 Virtual Circuits, X.25 Protocol Suite, Benefits and Drawbacks of X.25, Frame Relay Technology: Frame Relay Protocol Data Unit, Advantages & disadvantages, Frame relay Versus X.25, Application of Frame relay

Internet-Based Networks: internet protocol Suite, IPv6, Applications and services, Voice over IP: VoIP network, applications & benefits, Internet security, Flow control

Digital Subscriber Line Systems (DSL) Technology, IDSL, CDSL, VDSL

BOOKS:

1: C.M.Akujuobi, M.N.O. Sadiku : Broadband communication Systems , PHI Publications

WIRELESS MOBILE COMMUNICATION Paper- 1002

Full Marks: 100 (Internal-20, End Term 80)

MODULE-I

A brief introduction to Mobile Telephony, Technologies and Choices.

Cellular Concept – System Design: Fundamentals: Frequency reuse, Channel Assignment, Handoff Strategies, Interferences and System Capacity, Trunking and Grade of Service; Improving coverage and capacity in Cellular Systems – Cell Splitting, Sectoring, Repeaters and Range Extension, Microcell & Picocell Zone Concept. Antennas for Base Station and hand held Cellular phone.

MODULE -II

Mobile Radio Propagation: Large –Scale path loss, Ground Reflection Model , Diffraction, Scattering. Outdoor propagation Model – Okumura Model; Indoor Propagation Model: Partition loses, Log distance Path loss Model.

Small Scale Fading and Multipath, Dopper Shift . Types of Small Scale Fading and their effect on received signal.

MODULE -III

Wireless Networking: Various Generations of Wireless Networks, Fixed Network Transmission Hierarchy, Traffic Routing in Wireless Networks – Circuit Switching, Packet Switching. The X . 25 Protocol.

Global System for Mobile (GSM): features, architecture, channel types, Frame Structure in GSM. Signal processing in GSM , CDMA Architecture.

MODULE -IV

Wireless Application Protocol (WAP) : The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML), Wireless Local Loop (WLL) : Introduction to WLL Architecture, wireless Local Loop Technologies.

Third Generation (3G) Mobile Services : Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision,

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes, Mobile Data Communication; WLANs (Wireless LANs) IEEE 802.II standard, Mobile IP.

Text Books :

1. Theodore S. Rappaport , Wireless Communication, 2nd Edition , Pearson Publication.
2. William C. Y. Lee Mc Graw : Mobile Communication Engg., 2nd Edition , Hill International Edition.
3. William C. Y. Lee Mc Graw : Mobile Cellular Communications, 2nd Edition , Hill International Edition.
4. Jocken Schiller : Mobile Communication, 2nd Edition , Pearson Education.
5. Andreas F. Molisch : Wideband Wireless Digital Communication , Editor Pearson Education.

EMBEDDED SYSTEM Paper- 1003

Full Marks: 100 (Internal-20, End Term 80)

MODULE-I

Introduction: An embedded system, Processor in the system, other hardware units, software embedded into a systems, exemplary embedded system-on-chip (SOC) and VLSI circuit

Devices and Device Drivers: I/O devices, Timer and counting devices, serial communication using the IC, CAN and advance I/O buses between the networked multiple devices, Host system or computer parallel communication between the networked I/O multiple devices using the ISA, PCI, PCI-X and advance buses, Device drivers, Parallel port devices drivers in a system, Serial port devicedrives in a system, Interrupt servicing (Handling) mechanism.

MODULE -II

Software and Programming Concept : Processor selection for an embedded system, memory selection for an embedded system, Embedded programming in C ++, Embedded programming in JAVA, Unified modeling language (UML), Multiple processes and application, problem of sharing data by multiple tasks and routines, Inter process communication.

MODULE -III

Real time Operating System: Operating system services, I/O subsystem, Network operating system, Real Time and embedded system, Need of well tested and debugged Real time operating system (RTOS), Introduction to C/ OS- II.

MODULE -IV

Case studies of programming with RTOS: Case study of an embedded system for a smart card Hardware and Software Co-design : Embedded system project management, Embedded system design and co-design issues in system development process, design cycle in the development phase for an embedded system, Use of software tools for development of an embedded system, Issues in embedded system design.

Text Books:

1. Raj Kamal : Embedded System Architecture, Programming and Design, TMH

2. Ralf Niemann : Hardware Software Codesign of Embedded System , Kulwer Academic

3. Sriram V. Iyer and PankajGupat : Embedded Real time system Programming , TMH

SOFT COMPUTING Paper- 1004

Full Marks: 100 (Internal-20, End Term 80)

MODULE-I

Basic tools of soft computing**:** Fuzzy logic, Neural Networks and Evolutionary Computing, Non-linear Error surface and optimization. Fuzzy Logic Systems: Basic of fuzzy logic theory, Crisp and fuzzy sets, Basic Operations of Crisp and Fuzzy Set. Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference, Defuzzification.

MODULE -II

Fuzzy Logic Control; Mamdani and Takagi - Sugeno Architectures, Applications to pattern Reorganization.
Neural Networks: Single and Multi layer Neural networks, Perceptron Network, Activation functions, ADALINE: Its training Algorithm and capabilities, Weights learning, Multilayer Perceptrons: Error Back propagation, Generalized delta rule, Radial Basis Function Networks.

MODULE -III

Least-Square training algorithm, Kohenen Self-organizing map and Learning vector Quantization networks. Recurrent Neural networks, Simulated Annealing Neural Networks, Adaptive Neuro-Fuzzy Inference System (**ANFIS**), Applications to control and pattern reorganization.

MODULE -IV

Evolutionary Computing: Genetic algorithms: Basic concepts, Encoding, Fitness function, Reproduction, Crossover: Single, Two points and Ordered Crossover. Differences of GA and Traditional Optimizations Methods. Basic Genetic Programming concepts and Applications.

Books of prescribed:

Neuro-fuzzy and soft computing J.S.R. jang. C.T. SUN and E. Mizutani, PHI Pvt. Ltd., New Dellhi

Books of Reference:

1. S.N.Sivanandan & S.N.Deepa : Principles of Soft Computing , Wiley India Pvt.Ltd.

2. S. Haykins : "Neural networks: a comprehensive foundations", Pearson Education,

PROJECT (MAJOR) Paper- 1005

Total Marks 200

Every student will have to do project report in any area of Information Science & Telecommunication detailed in the curriculum under the guidance of regular / guest faculty/ Industry experts. It should be research based to create new knowledge in any area of Information Science & Telecommunication. The student shall submit the project report before the Term – End examination. Marks will be awarded (out of 100) for the project report after viva internally.

Mark Distribution:

1. Project Demo - 100(4 Credit)
2. Presentation / Seminar – 50 (4 Credit)
3. Viva - 50 (2 Credit)