PRIST UNIVERSITY
VALLAM, THANJAVUR

DEPARTMENT OF
ELECTRONICS & COMMUNICATION ENGINEERING

PROGRAM HANDBOOK

B.TECH ECE(PART-TIME)

[REGULATION 2017]
[for candidates admitted to B.Tech (Part Time) ECE program from June 2017 onwards]

PONNAIYAH RAMAJAYAM INSTITUTE OF SCIENCE & TECHNOLOGY

PRIST UNIVERSITY

(Under Section 3 of UGC Act 1956)
ISO9001:2008 CERTIFIED
VALLAM, THANJAVUR.

SCHOOL OF ENGINEERING AND TECHNOLOGY
(Department of Electronics & Communication Engineering)

PROGRAM EDUCATIONAL OBJECTIVES AND OUTCOMES

The department of ECE prepares young leaders working in a highly dynamic and global environment at the forefront of Engineering and pursues research to advance the state-of-the-art in Electrical and Computer Engineering and Engineering Education.

PROGRAM EDUCATIONAL OBJECTIVES:

Our alumni will:

1. continue as valued, dependable, and competent employees in a wide variety of fields
   and industries, in particular as electrical/computer engineers,
2. succeed in graduate and professional studies, such as engineering, science, or business.
3. pursue life-long learning and professional development for a successful and rewarding career.
4. provide leadership in their profession, in their communities, and in the global society,
   and
5. function as responsible members of society with an awareness of the social and ethical ramifications of their work.

PROGRAM OUTCOMES:

At graduation, our students will have:

1. the ability to apply knowledge of mathematics, science, and engineering
2. the ability to design and conduct experiments, as well as to analyze and interpret data
3. the ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
4. the ability to function on multi-disciplinary teams
5. the ability to identify, formulate, and solve engineering problems
6. the understanding of professional and ethical responsibility
7. the ability to communicate effectively
8. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
9. a recognition of the need for, and an ability to engage in life-long learning
10. a knowledge of contemporary issues
11. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

MAPPING BETWEEN PEOS & POS:

PO/PEO	1	2	3	4	5	6	7	8	9	10	11
1	√	√		√	√						
2			√					√			
3							√				√
4									√	√	
5						√					

SEMESTER-I

S.NO	SUB CODE	**SUBJECT NAME**	**L**	**T**	**P**	**C**
1	17148S11P	Transforms and Partial Differential Equations	**4**	**1**	**0**	**4**
2	17152H12P	Electromagnetic Theory	**4**	**1**	**0**	**4**
3	17152H13P	Digital Electronics	**4**	**1**	**0**	**4**
4	17152H14P	Electronic Circuits - I	**4**	**1**	**0**	**3**
5	17152H15P	Signals and Systems	**4**	**1**	**0**	**4**
TOTAL CREDITS						**19**

SEMESTER-II

S.NO	SUB CODE	**SUBJECT NAME**	**L**	**T**	**P**	**C**
1	17148S21P	Numerical Methods	**4**	**1**	**0**	**4**
2	17153S22P	Electrical Engineering and Control Systems	**4**	**1**	**0**	**4**
3	17152H23P	Linear Integrated Circuits	**4**	**1**	**0**	**4**
4	17152H24P	Electronic Circuits - II	**4**	**1**	**0**	**3**
5	17152H25P	Transmission Lines and Waveguides	**4**	**1**	**0**	**4**
TOTAL CREDITS						**19**

SEMESTER-III

S.NO	SUB CODE	**SUBJECT NAME**	**L**	**T**	**P**	**C**
1.	17148S31P	Probability and Random Processes	**4**	**1**	**0**	**4**
2.	17152H32P	Microprocessor Interfacing and Applications	**4**	**1**	**0**	**4**
3.	17152H33P	Digital Signal Processing	**4**	**1**	**0**	**4**
4.	17152H34P	Communication Theory	**4**	**1**	**0**	**4**
5.	17152L35P	Digital signal processing and Micro processor Lab	**0**	**0**	**3**	**2**
TOTAL CREDITS						**18**

SEMESTER-IV

S.NO	SUB CODE	SUBJECT NAME	L	T	P	C
1	17152H41P	Digital Communication	**4**	**1**	**0**	**4**
2	17152H42P	Antenna and Wave Propagation	**4**	**1**	**0**	**4**
3	17152H43P	Computer Networks	**4**	**0**	**0**	**4**
4	171__E44_P	**Elective-I**	**4**	**0**	**0**	**4**
5	17152L45P	Networks and Communication Lab	**0**	**0**	**3**	**2**
TOTAL CREDITS						**18**

SEMESTER-V

S.NO	SUB CODE	SUBJECT NAME	L	T	P	C
1	17152H51P	Optical Communication and Networks	**4**	**0**	**0**	**4**
2	17152H52P	Microwave Engineering	**4**	**0**	**0**	**4**
3	17152H53P	VLSI Design	**4**	**1**	**0**	**4**
4	171_E54_P	**Elective II**	**4**	**1**	**0**	**4**
5	17152L55P	Optical communication and Microwave Lab	**0**	**0**	**3**	**2**
TOTAL CREDITS						**18**

SEMESTER-VI

S.NO	SUB CODE	SUBJECT NAME	L	T	P	C
1	17152H61P	Mobile and Wireless Communication	**4**	**0**	**0**	**4**
2	17152H62P	Medical Electronics	**4**	**1**	**0**	**4**
3	17152H63P	Micro Controller and Embedded systems	**4**	**1**	**0**	**4**
4	171_E64_P	**Elective III**	**4**	**0**	**0**	**4**
5	17152L65P	VLSI and Embedded systems Lab	**0**	**0**	**3**	**2**
TOTAL CREDITS						**18**

SEMESTER-VII

S.NO	SUB CODE	SUBJECT NAME	L	T	P	C
1	17160S71P	Total Quality Management	**4**	**0**	**0**	**3**
2	17152H72P	Wireless Networks	**4**	**1**	**0**	**4**
3	17152H73P	Telecommunication Switching and Networks	**4**	**0**	**0**	**4**
4	171_E74_P	**Elective IV**	**4**	**0**	**0**	**3**
5	17152P75P	Project Work & Viva Voce	**0**	**0**	**12**	**6**
TOTAL CREDITS						**20**

ELECTIVES-I (SEMESTER-IV)

S.No	Sub Code	Sub Name	L	T	P	C
1	17152E44AP	High Speed Networks	**4**	**0**	**0**	**4**
2	17152E44BP	Advanced Digital Signal Processing	**4**	**0**	**0**	**4**
3	17152E44CP	Speech Processing	**4**	**0**	**0**	**4**
4	17152E44DP	Fuzzy Logic and Neural Networks	**4**	**0**	**0**	**4**
5	17152E44EP	Advanced Electronic System Design	**4**	**0**	**0**	**4**

ELECTIVES-II (SEMESTER-V)

S.No	Sub Code	Sub Name	L	T	P	C
1	1758E54AP	Environmental Science and Engineering	**4**	**0**	**0**	**4**
2	17152E54BP	Optoelectronic Devices	**4**	**0**	**0**	**4**
3	17152E54CP	Radar and Navigational Aids	**4**	**0**	**0**	**4**
4	17152E54DP	Digital Image Processing	**4**	**0**	**0**	**4**
5.	17152E54EP	Engineering Acoustics	**4**	**0**	**0**	**4**

ELECTIVES-III(SEMESTER-VI)

S.No	Sub Code	Sub Name	L	T	P	C
1	17160E64AP	Principles Of Management	**4**	**0**	**0**	**4**
2	17152E64BP	Satellite Communication	**4**	**0**	**0**	**4**
3	17152E64CP	Robotics	**4**	**0**	**0**	**4**
4	17152E64DP	Remote sensing	**4**	**0**	**0**	**4**
5.	17150E64EP	Network Security	**4**	**0**	**0**	**4**

ELECTIVES-IV(SEMESTER-VII)

S.No	Sub Code	Sub Name	L	T	P	C
1	17152E74AP	Power Electronics	**4**	**0**	**0**	**3**
2	17152E74BP	Advanced Microprocessors	**4**	**0**	**0**	**3**
3	17152E74CP	Electromagnetic Interference and Compatibility	**4**	**0**	**0**	**3**
4	17152E74DP	Solid State Electronic Drives	**4**	**0**	**0**	**3**
5	17152E74EP	Computer Hardware and Interfacing	**4**	**0**	**0**	**3**

HOD **DEAN**

17148S11P **SEMESTER I**

TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS **4 1 0 4**

(Common to CSE, IT, ECE)

AIM

The course aims to develop the skills of the students in the areas of boundary value problems and transform techniques. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

OBJECTIVES

At the end of the course the students would

- Be capable of mathematically formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results.
- Have gained a well founded knowledge of Fourier series, their different possible forms and the frequently needed practical harmonic analysis that an engineer may have to make from discrete data.
- Have obtained capacity to formulate and identify certain boundary value problems encountered in engineering practices, decide on applicability of the Fourier series method of solution, solve them and interpret the results.
- Have grasped the concept of expression of a function, under certain conditions, as a double integral leading to identification of transform pair, and specialization on Fourier transform pair, their properties, the possible special cases with attention to their applications.

UNIT I FOURIER SERIES **9**

Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identify – Harmonic Analysis.

UNIT II FOURIER TRANSFORM **9**

Fourier integral theorem (without proof) – Sine and Cosine transforms – Properties (without Proof) – Transforms of simple functions – Convolution theorem – Parseval's identity – Finite Fourier transform – Sine and Cosine transform.

UNIT III Z -TRANSFORM AND DIFFERENCE EQUATIONS 9

Z-transform - Elementary properties (without proof) – Inverse Z – transform – Convolution theorem -Formation of difference equations – Solution of difference equations using Z - transform.

UNIT IV PARTIAL DIFFERENTIAL EQUATIONS 9

Solution of First order partial differential equation reducible to standard forms – Lagrange's linear equation – Linear partial differential equations of second order and higher order with constant coefficients.

UNIT V BOUNDARY VALUE PROBLEMS 9

Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

TUTORIAL :15 TOTAL: 60

TEXT BOOKS

1. Andrews, L.A., and Shivamoggi B.K., "Integral Transforms for Engineers and Applied Mathematicians", Macmillen , New York ,1988.
2. Grewal, B.S., "Higher Engineering Mathematics", Thirty Sixth Edition, Khanna Publishers, Delhi, 2001.
3. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., "Engineering Mathematics Volume III", S. Chand & Company ltd., New Delhi, 1996.

REFERENCES

1. Narayanan, S., Manicavachagom Pillay, T.K. and Ramaniah, G., "Advanced Mathematics for Engineering Students", Volumes II and III, S. Viswanathan (Printers and Publishers) Pvt. Ltd. Chennai, 2002.
2. Churchill, R.V. and Brown, J.W., "Fourier Series and Boundary Value Problems", Fourth Edition, McGraw-Hill Book Co., Singapore, 1987.

17152H12P **SEMESTER I**

ELECTROMAGNETIC THEORY

4-1-0-4

AIM

To familiarize the student to the concepts, calculations and pertaining to electric, magnetic and electromagnetic fields so that an in depth understanding of antennas, electronic devices, Waveguides is possible.

OBJECTIVES

- To analyze fields a potentials due to static changes
- To evaluate static magnetic fields
- To understand how materials affect electric and magnetic fields
- To understand the relation between the fields under time varying situations
- To understand principles of propagation of uniform plane waves.

UNIT I STATIC ELECTRIC FIELDS 9

Vector field. Introduction to Co-ordinate System – Rectangular – Cylindrical and Spherical Co-ordinate System –calculation of length area and volume. Definition of Curl, Divergence and Gradient – Meaning of Strokes theorem and Divergence theorem .

Coulomb's Law– Definition of Electric Field Intensity –Electric Field due to discrete charges – charges distributed uniformly on an infinite line –
Electric Scalar Potential – Relationship between potential and electric field - Potential due to infinite uniformly charged line –Electric Flux Density – Gauss Law – Proof of Gauss Law.

UNIT II STATIC MAGNETIC FIELD 9

The Biot-Savart Law in vector form –Magnetic field and Magnetic flux density- Magnetic Field intensity due to a infinite wire carrying a current I – Magnetic field intensity on the axis of a circular and rectangular loop carrying a current I –Calculation of field using Ampere's circuital law for symmetrical distributions a) infinitely long solenoid and b) coaxial cable. The Lorentz force equation for a moving charge and applications –Scalar and Vector Magnetic Potential.

UNIT III ELECTRIC AND MAGNETIC FIELDS IN MATERIALS 9

Poisson's and Laplace's equation – Electric Polarization- Definition of Capacitance – Capacitance of various geometries using Laplace's equation – Electrostatic energy and energy density – Boundary conditions for electric fields – Electric current – Current density – point form of ohm's law –

Definition of Inductance - Inductance of loops– Definition of mutual inductance. Energy density in magnetic fields – Nature of magnetic materials – magnetization and permeability - magnetic boundary conditions.

UNIT IV TIME VARYING ELECTRIC AND MAGNETIC FIELDS 9

Faraday's law – Displacement current – Generalization of Ampere's circuital law. Maxwell's Equation in integral form from Faraday's Law – Maxwell's Equation expressed in point form from Faraday's Law.
Poynting Vector Poynting Theorm and the flow of power – Power flow in a co-axial cable – Instantaneous Average and Complex Poynting Vector.

UNIT V ELECTROMAGNETIC WAVES 9

Derivation of Wave Equation –. Properties of Uniform Plane Wave — Wave equation for a conducting medium– Plane waves Propagation in good dielectrics ---- Plane waves Propagation in good conductors – Skin effect.

Linear, Elliptical and circular polarization –normal incidence and Oblique incidence – Reflection of Plane Waves by a perfect dielectric Brewster angle .Surface impedance
TUTORIAL 15

TOTAL : 60

TEXTBOOKS

1. William H.Hayt : "Engineering Electromagnetics" TATA 2003 (Unit I,II,III).
2. E.C. Jordan & K.G. Balmain "Electromagnetic Waves and Radiating Systems." Prentice Hall of India 2nd edition 2003. (Unit IV, V). McGraw-Hill, 9th reprint

REFERENCES

1. Ramo, Whinnery and Van Duzer: "Fields and Waves in Communications Electronics" John Wiley & Sons (3rd edition 2003)
2. .Narayana Rao, N : "Elements of Engineering Electromagnetics" 4th edition, Prentice Hall of India, New Delhi, 1998.
3. M.N.O.Sadiku: "Elements of Engineering Electromagnetics" Oxford University Press, Third edition.
4. David K.Cherp: "Field and Wave Electromagnetics - Second Edition-Pearson Edition.
5. David J.Grithiths: "Introduction to Electrodynamics- III Edition-PHI.

17152H13P **SEMESTER I**

DIGITAL ELECTRONICS

4-1-0-4

AIM

To learn the fundamental concepts those are useful for designing digital systems or circuits.

OBJECTIVES

- To introduce number systems and codes
- To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions
- To introduce the methods for simplifying Boolean expressions
- To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits
- To introduce the concept of memories devices.

UNIT I: BOOLEAN ALGEBRA AND MINIMIZATION 9

Basic theorems – Boolean functions – Canonical and Standard forms – Minimization techniques – K-map up to five variables – NAND and NOR implementation – Exclusive-OR function - Hardware Description Language (HDL).

UNIT II: DIGITAL LOGIC FAMILIES 9

Switching operation of PN junction diode – bipolar and MOS devices – Bipolar logic families – RTL – DTL – DCTL – HTL – TTL – ECL – MOS and CMOS – Tristate logic –Interfacing of CMOS and TTL families.

UNIT III: COMBINATIONAL LOGIC DESIGN 9

Design using gates – BCD arithmetic circuits – Binary adder – Subtractor – Multiplier – Divider – Design using MSI devices – Multiplexer and Demultiplexer as logic elements – Encoder and decoder – Parity checker – Parity generator – Code converter – Magnitude comparator.

UNIT IV: SEQUENTIAL LOGIC DESIGN 9

Flip Flops and their conversions – Analysis and synthesis of synchronous sequential circuits – Excitation table – State table and state diagram – Design of synchronous counters – Analysis of asynchronous sequential circuits – Reduction of state and flow table – Race free state assignment – Design of Asynchronous counters – Timing diagram – Shift registers and their applications.

UNIT V : MEMORY DEVICES 9

Classification of memories – ROM organization – PROM – EPROM – EEPROM – EAPROM – RAM organization – Write operation – Read operation – Memory cycle – Timing wave forms – Memory decoding – Memory expansion – Static RAM Cell-Bipolar RAM cell – MOSFET RAM cell – Dynamic RAM cell – Programmable Logic Devices – Programmable Logic Array (PLA) – Programmable Array Logic (PAL) –Field Programmable Gate Arrays (FPGA).

TUTORIAL 15 **TOTAL : 60**

TEXT BOOKS

1. Morris Mano M., "Digital Design", 3rd Edition, Pearson Education, 2007.
2. John M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2002.

REFERENCES

1. John F.Wakerly, "Digital Design", 4th Edition, Pearson/PHI, 2006
2. Charles H.Roth, " Fundamentals of Logic Design", Thomson Learning, 2003.
3. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition, TMH, 2003.

17152H14P **SEMESTER I**

ELECTRONIC CIRCUITS –I 4-1-0-3

AIM

The aim of this course is to familiarize the student with the analysis and design of basic transistor Amplifier circuits and power supplies.

OBJECTIVE

On completion of this course the student will understand

- The methods of biasing transistors
- Design of simple amplifier circuits
- Mid – band analysis of amplifier circuits using small - signal equivalent circuits to determine gain input impedance and output impedance
- Method of calculating cutoff frequencies and to determine bandwidth
- Design of power amplifiers and heat sinks
- Analysis and design of power supplies

UNIT – I TRANSISTER BIASING & STABILIZATION 9

Biasing circuits for BJT- DC load line-AC load line – Stability factor- Methods of Transistor Biasing- Bias Compensation – Thermal runaway- heat sink- FET Biasing

UNIT-II LOW FREQUENCY AMPLIFIER ANALYSIS & DESIGN 9

Transistor- FET amplifiers - Low frequency Small signal hybrid parameter model : $C_{B,}C_{E,}$Cc Amplifier- Analysis of Transistor Amplifier Using h-parameter.
JFET as an Amplifier- Analysis of low frequency common Source & Common Drain Amplifier Using h-parameter.

UNIT – III MULTISTAGE AMPLIFIERS 9

Cascading of BJT Amplifiers- Analysis of RC coupled Amplifiers Methods of Increasing Input impedance using Darlington and Boot strapping- Emitter coupled Differential Amplifier,Differential gain, CMRR, Transfer Characteristics – Cascode amplifier.

UNIT – IV HIGH FREQUENCY ANALYSIS OF THE AMPLIFIERS 9

Frequency response-Effect of Coupling and Bypass capacitor- Effect of internal transistor capacitance-Miller Effect – High Frequency π model for C_E Amplifier-C_E Short circuit Current gain- Cut off frequencies f_α, f_β ,f_T - Gain Band Width product.

UNIT – V POWER SUPPLIES 9

Haif wave,Full Wave, Rectifiers- Capacitor Filter- Linear Regulator :Shunt Regulator, Series Regulator- Shunt Regulator using Zener Diode- Switch Mode Power Supply.

TUTORIAL 15 TOTAL : 60

TEXT BOOK

1. Millman and Halkias.c."Integrated Electronics" Tata McGraw -Hill,1991

REFERENCE BOOKS

1. David A. Bell,"Electonic Devices And Circuits " Prentic Hall of India,1998.
2. Donal L. Schilling, Charles ,Belove "Electronic Circuits" Third Edition 2002.
3. Salivahanan "Electonic Devices And Circuits"
4. Boylestead, Robert L. and Louis Nasheresky- "Electonic Devices And Circuit
    a. Theory"-Pearson Education
5. J.B.Gupta - "Electonic Devices And Circuits"-S.K.Kataria and sons 2004.

17152H15P **SEMESTER I**

SIGNALS AND SYSTEMS

(Common to ECE & IT) **4-1-0-4**

AIM

To study and analyze the characteristics of continuous, discrete signals and systems.

OBJECTIVES

- To study the properties and representation of discrete and continuous signals.
- To study the sampling process and analysis of discrete systems using z-transforms.
- To study the analysis and synthesis of discrete time systems.

UNIT I CLASSIFICATION OF SIGNALS AND SYSTEMS 9

Continuous time signals (CT signals), discrete time signals (DT signals) - step, Ramp, Pulse, Impulse, Exponential, Classification of CT and DT signals - periodic and aperiodic, Random signals, Classification of systems (CT systems and DT systems)- Linear time invariant systems.

UNIT II ANALYSIS OF CT SIGNALS 9

Fourier Transform and Laplace Transform in Signal Analysis. Fourier series, Fourier Transform and Laplace Transform properties, Parseval's relation.

UNIT III LTI-CT SYSTEMS 9

Differential equation, Block diagram representation, Impulse response, Convolution Integral, Frequency response, Fourier Methods and Laplace transforms in analysis.

UNIT IV SAMPLING THEOREM AND ANALYSIS OF DT- SIGNALS 9

Sampling theorem – Reconstruction of a Signal from its samples, aliasing – discrete time processing of continuous time signals, sampling of band pass signals

z-transform definition – region of convergence – properties of ROC – Properties of z-transform – Poles and Zeros – inverse z-transform, Relationship between z-transform and Fourier transform.

UNIT V LTI-DT SYSTEMS 9

Difference equations, Block diagram representation, Impulse response, Convolution SUM, Frequency response, Z-transform analysis.

TUTORIAL 15 **TOTAL : 60**

TEXT BOOK

1. AlanV.Oppenheim, Alan S.Willsky with S.Hamid Nawab, Signals & Systems, 2nd edn., Pearson Education, 1997.

REFERENCES

1. M.J.Roberts, Signals and Systems Analysis using Transform method and MATLAB, TMH 2003.
2. Simon Haykin and Barry Van Veen, Signals and Systems, John Wiley, 1999
K.Lindner, "Signals and Systems", McGraw Hill International, 1999.

17148S21P **SEMESTER II**

NUMERICAL METHODS **4 1 0 4**

(Common to CSE, IT, ECE)

AIM

With the present development of the computer technology, it is necessary to develop efficient algorithms for solving problems in science, engineering and technology. This course gives a complete procedure for solving different kinds of problems occur in engineering numerically.

OBJECTIVES

At the end of the course, the students would be acquainted with the basic concepts in numerical methods ,

- The roots of nonlinear (algebraic or transcendental) equations, solutions of large system of linear equations and eigenvalue problem of a matrix can be obtained numerically where analytical methods fail to give solution.
- When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.
- The numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.
- Since many physical laws are couched in terms of rate of change of one/two or more independent variables, most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations. The methods introduced in the solution of ordinary differential equations and partial differential equations will be useful in attempting any engineering problem.

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 9

Newton Raphson's method – Iteration method – Solution of linear system by Gaussian elimination and Gauss-Jordon methods- Iterative methods: Gauss Jacobi and Gauss-Seidel methods- Inverse of a matrix by Gauss Jordon method – Eigenvalue of a matrix by power method.

UNIT II INTERPOLATION 9

Newton's forward and backward difference formulas – Central difference formula: Bessels and Stirling's formula - Lagrangian Polynomials – Divided difference method .

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9

Derivatives from difference tables – Divided differences and finite differences – Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Double integrals using trapezoidal and Simpson's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9

Single step methods: Taylor series method – Euler and modified Euler methods – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

TUTORIAL 15 TOTAL : 60

TEXT BOOKS

1. Gerald, C.F, and Wheatley, P.O, "Applied Numerical Analysis", Sixth Edition, Pearson Education Asia, New Delhi, 2002.
2. Kandasamy, P., Thilagavathy, K. and Gunavathy, K., "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2003.

REFERENCES

1. Burden, R.L and Faires, T.D., "Numerical Analysis", Seventh Edition, Thomson Asia Pvt. Ltd., Singapore, 2002.
2. Balagurusamy, E., "Numerical Methods", Tata McGraw-Hill Pub.Co.Ltd, New Delhi, 1999.

17153S22P **SEMESTER II**

ELECTRICAL ENGINEERING AND CONTROL SYSTEMS

4 1 0 4

AIM

To familiarize the students with concepts related to the operation analysis and stabilization of control systems

OBJECTIVES

- To understand the operation of Electrical machines and transformers
- To understand the open loop and closed loop (feedback) systems
- To understand time domain and frequency domain analysis of control systems required for stability analysis.
- To understand the compensation technique that can be used to stabilize control systems

UNIT-I: D.C MACHINES AND TRANSFORMERS 12

Construction and operation of D.C. generators – emf equation – characteristics – principle of operation of D.C. motors. Principle of operation of transformers -parameters of transformers – regulation, losses and efficiency - introduction to three phase transformers.

UNIT-II SPECIAL MACHINES 9

Constructional details and principle of operation of single phase induction motors and Three Phase Induction motors– servomotor, stepper motor, variable reluctance motors.- applications.

UNIT III INTRODUCTION TO CONTROL THEORY 6

The control problem – differential equation of physical systems – control over system dynamics by feedback – regenerative feedback – transfer function – block diagram - algebra – signal flow graphs.

UNIT IV TIME RESPONSE AND FREQUENCY RESPONSE ANALYSIS 12

Time response of first and second order system – steady state errors – error constants – design specification of second order systems – state variable analysis – simple problems. Correlation between time and frequency response – polar plots , Bode plots – stability in frequency domain using Nyquist stability criterion – simple problems.

UNIT V STABILITY **6**

Concept of stability – stability conditions and criteria – Hurwitz and Routh criterian – relative Stability analysis.

TUTORIAL :15 **TOTAL :60**

TEXT BOOK

1. D.P.Kothari and I.J. Nagrath "Basic Electrical Engineering", Tata McGraw Hill Ltd, second edition, 2002.
2. I.J.Nagrath and M.Gopal "Control system Engineering" New age International Publishing Company Ltd, third edition 2003.

REFERENCES

1.Stephen J.Chapman "Electrical Machinery Fundamentals", McGraw Hill Publishing Company Ltd, third edition, 1999.
2.K.Murugesh Kumar, "Electric Machines", Vikas Publishing House (P) Ltd, 2002.
3.M.Gopal "Control Systems – Principle and Design", McGraw Hill Publishing company Ltd, second edition, 2003.

17152H23P **SEMESTER II**

LINEAR INTEGRATED CIRCUITS 4 1 0 4

AIM

To teach the basic concepts in the design of electronic circuits using linear integrated circuits and their applications in the processing of analog signals.

OBJECTIVES

- To introduce the basic building blocks of linear integrated circuits.
- To teach the linear and non-linear applications of operational amplifiers.
- To introduce the theory and applications of analog multipliers and PLL.
- To teach the theory of ADC and DAC
- To introduce a few special function integrated circuits.

UNIT I OP AMP CHARACTERISTICS AND APPLICATIONS 9

Ideal op amp, IC op amp, DC characteristics: bias, offset and drift, AC characteristics: bandwidth, slew rate, noise and frequency compensation, basic op amp application: scale changer, inverter and non inverter, summer & subtractor, , differentiator & integrator, instrumentation amplifier, V to I and I to V converter, RC active filters: low pass and band pass filters op amp circuits using diodes: precision rectifier, clipper and clamper,

UNIT II COMPARATORS AND SIGNAL GENERATORS 9

Comparator and applications of comparator, regenerative comparator (Schmitt trigger), square wave generator (astable multivibrator), monostable multivibrator Triangular wave generator, saw tooth wave generator sine wave generators

UNIT III ANALOG MULTIPLIER AND PLL 9

Multiplier, Applications of multiplier: multiplying DC voltages, frequency doubling, phase angle detection, AM modulation/demodulation. PLL: Basic principles, analog and digital phase detector and comparator Voltage controlled Oscillator, Applications of PLL

UNIT IV ADC AND DAC 9

Analog switches, High speed sample and hold circuits, characteristics DAC, Types of D/A converter, Current driven DAC, Switches for DAC, characteristics of A/D converter Types of A/D converter, - Single slope, Successive approximation.

UNIT V SPECIAL FUNCTION ICS 9

555 timer functional diagram,Astable and Monostable Multivibrators using 555 Timer, Voltage regulators-linear and switched mode types, Switched capacitor filter, Frequency to Voltage converters, and Isolation Amplifiers, Fiber optic ICs and Opto-couplers.

TUTORIAL 15 TOTAL : 60

TEXT BOOK

Sergio Franco, 'Design with operational amplifiers and analog integrated circuits', McGraw-Hill, 1997.

D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 2000.

REFERENCES

1. J.Michael Jacob, 'Applications and Design with Analog Integrated Circuits', Prentice Hall of India, 1996.
2. Ramakant A.Gayakwad, 'OP-AMP and Linear IC's', Prentice Hall / Pearson Education, 1994.
3. K.R.Botkar, 'Integrated Circuits'. Khanna Publishers, 1996.
4. Millman.J. and Halkias.C.C. 'Integrated Electronics', McGraw-Hill, 1972. William D.Stanely, 'Operational Amplifiers with Linear Integrated Circuits' Pearson Education, 2004.

17152H24P **SEMESTER II**

ELECTRONIC CIRCUITS -II **4 1 0 3**

AIM

The aim of this course is to familiarize the student with the analysis and design of feed back amplifiers, oscillators, tuned amplifiers, wave shaping circuits, multivibrators and blocking oscillators.

OBJECTIVES

On completion of this course the student will understand

- The advantages and method of analysis of feed back amplifiers
- Analysis and design of RC and LC oscillators, tuned amplifiers, wave shaping circuits, multivibrators, blocking oscillators and time based generators.

UNIT I : POWER AMPLIFIERS **9**

Classification, Efficiency of Class A , RC coupled, Transformer coupled, Class B push pull, Complementary symmetry power amplifier, Power Output, Efficiency and Power Dissipation, cross over distraction & Elimination, Heat sink.

UNIT II: FEEDBACK AMPLIFIERS **9**

Feedback concept, Four basic types of feedback, Equivalent Circuits of voltage amplifier, Current Amplifier ,Trans conductance, Trans resistance amplifier, Transfer ratio for negative feedback, Effect of feedback on noise, distortion gain input & output, impedance of the amplifier. Method of identifying feedback topology, Analysis of four types of feedback amplifier.

UNIT III: OSCILLATORS **9**

Theory of Oscillator, Closed loop gain of the circuits, Barhausen Criterion. Analysis & Design of RC Phase Shift Oscillators, Wien Bridge Oscillator, Hartley Oscillator Colpitts Oscillator, crystal Oscillator, frequency Stability.

UNIT IV: TUNED AMPLIFERS **9**

Tuned Circuit, Resonance, Q factor, Classification of tuned amplifier, Analysis of single tuned amplifier, Capacitance coupling, Effect of cascading single tuned amplifier on Band width, Double tuned amplifier, instability of tuned amplifiers- stabilization techniques, Narrow band neutralization using coil, Class C tuned amplifiers and their applications. Efficiency of Class C tuned Amplifier.

UNIT V: WAVE SHAPING, SWEEP & MULTIVIBRATOR CIRCUTS 9

RL & RC Integrator and Differentiator circuits. Voltage sweep circuit , Miller sweep generator, UJT saw tooth generator, current time base generator, Collector coupled Astable Multivibrator, Collector coupled Monosatble Multivibrator - Bistable Multivibrator - Schmitt trigger circuits.

TUTORIAL 15 **TOTAL : 60**

Text Books:

1. Millman J. and Halkias C.C., " Integrated Electronics ", McGraw Hill 1991
2. Schilling Charles Belove, " Electronic Circuits ", Third Edition, 2002.
3. Millman J. and Taub H., " Pulse Digital and Switching waveform ",
4. McGraw Hill International.
5. Robert L. Boylest and Louis Nasheresky, “Electronic Devices and Circuits theory” 8th edn., PHI, 2002.

References:

1. Sedra / Smith, “Micro Electronic Circuits” Oxford University Press, 2004.
2. David A.Bell, “Solid State Pulse Circuits”, Prentice Hall of India, 1992.

17152H25P **SEMESTER II**

TRANSMISSION LINES AND WAVEGUIDES 4 1 0 4

AIM

To lay a strong foundation on the theory of transmission lines and wave guides by highlighting their applications.

OBJECTIVES

- To become familiar with propagation of signals through lines
- Understand signal propagation at Radio frequencies
- Understand radio propagation in guided systems
- To become familiar with resonators

UNIT I TRANSMISSION LINE THEORY 9

Different types of transmission lines – Definition of Characteristic impedance and Propagation Constant, General Solution of the transmission line –wavelength and velocity of propagation. Waveform distortion – distortion less transmission line –Input impedance of lossless lines – reflection on a line not terminated by Z_o - reflection factor and reflection loss – Numerical problems.

UNIT II THE LINE AT RADIO FREQUENCIES 9

Standing waves and standing wave ratio on a line – One-eighth wave line – The quarter wave line and impedance matching – the half wave line.
– The Smith Chart – Application of the Smith Chart – Problems using smith chart (how to use smith chart and mark impedances, finding input impedance, SWR, reflection coefficient, finding load impedance) single stub matching - Numerical problems.

UNIT III GUIDED WAVES 9

Waves between parallel planes of perfect conductors – Transverse electric and transverse magnetic waves – characteristics of TE and TM Waves – Transverse Electromagnetic waves – Velocities of propagation. – Wave impedances – Numerical problems.

UNIT IV RECTANGULAR WAVEGUIDES 9

Transverse Magnetic Waves in Rectangular Wave guides – Transverse Electric Waves in Rectangular Waveguides – characteristic of TE and TM Waves – cut-off wavelength and phase velocity - Dominant mode in rectangular waveguide –Wave impedance, Characteristic impedance - Numerical problems.

UNIT V CIRCULAR WAVE GUIDES AND RESONATORS 9

TM and TE waves in circular guides – wave impedances and characteristic impedance – Dominant mode in circular waveguide – excitation of modes – Microwave cavities, Rectangular cavity resonators, circular cavity resonator – Q factor of cavity resonator for TE101 mode - Numerical problems.

TUTORIAL 15 TOTAL: 60

TEXT BOOKS

1. J.D.Ryder "Networks, Lines and Fields", PHI, New Delhi, 2003. (Unit I & II)
2. E.C. Jordan and K.G.Balmain "Electro Magnetic Waves and Radiating System, PHI, New Delhi, 2003. (Unit III, IV & V)

REFERENCES

1. Ramo, Whineery and Van Duzer: "Fields and Waves in Communication Electronics" John Wiley, 2003.
2. David M.Pozar: Microwave Engineering – 2nd Edition – John Wiley.
3. David K.Cheng,Field and Waves in Electromagnetism, Pearson

17148S31P **SEMESTER III**

PROBABILITY AND RANDOM PROCESSES

(Common to ECE & BM) **4-1-0-4**

AIM

This course aims at providing the necessary basic concepts in random processes. A knowledge of fundamentals and applications of phenomena will greatly help in the understanding of topics such a estimation and detection, pattern recognition, voice and image processing networking and queuing.

OBJECTIVES

At the end of the course, the students would

- Have a fundamental knowledge of the basic probability concepts.
- Have a well – founded knowledge of standard distributions which can describe real life phenomena.
- Acquire skills in handling situations involving more than one random variable and functions of random variables.
- Understand and characterize phenomena which evolve with respect to time in probabilistic manner.
- Be able to analyze the response of random inputs to linear time invariant systems.

UNIT I PROBABILITY AND RANDOM VARIABLE 9

Axioms of probability - Conditional probability - Baye's theorem- Random variable - Probability mass function - Probability density function - Properties - Moments - Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTIONS 9

Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions and their properties - Functions of a random variable (excluding theorm).

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 9

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression (for distributions only) - Transformation of random variables - Central limit theorem.

UNIT IV CLASSIFICATION OF RANDOM PROCESSES 9

Definition and examples - first order, second order, strictly stationary, wide – sense stationary and Ergodic processes - Markov process - Binomial, Poisson and Normal processes - Sine wave process.

UNIT V CORRELATION AND SPECTRAL DENSITIES 9

Auto correlation - Cross correlation - Properties – Power spectral density – Cross spectral density - Properties – Relationship between cross power spectrum and cross correlation function – Auto correlation and cross correlation functions of input and output.

TUTORIAL 15 TOTAL : 60

TEXT BOOKS

1. Ross, S., "A First Course in Probability", Fifth edition, Pearson Education, Delhi, 2002.
2. Peebles Jr. P.Z., "Probability Random Variables and Random Signal Principles", Tata McGraw-Hill Pubishers, Fourth Edition, New Delhi, 2002. (Chapters 6, 7 and 8).

17152H32P **SEMESTER III**

MICROPROCESSOR, INTERFACING AND APPLICATIONS 4 1 0 4

AIM

To learn the architecture programming ,interfacing and applications of microprocessors.

OBJECTIVES

- To introduce the architecture and programming of 8085 microprocessor.
- To introduce the interfacing of peripheral devices with 8085 microprocessor.
- To introduce the architecture and programming of 8086 microprocessor.
- To introduce the applications, programming with 8085 microprocessor.

UNIT I 8085 CPU 9

8085 Architecture – Instruction set – Addressing modes — Assembly language programming – Interrupts – Memory interfacing – Interfacing, I/O devices.

UNIT II PERIPHERALS INTERFACING 9

Interfacing Serial I/O (8251) - parallel I/O (8255) –Keyboard and Display controller (8279) – ADC/DAC interfacing –

UNIT III 8086 CPU 9

Intel 8086 Internal Architecture – 8086 Addressing modes- Instruction set- 8086 Assembly language Programming–Interrupts.

UNIT IV 8086 SYSTEM DESIGN 9

8086 signals and timing – MIN/MAX mode of operation – Addressing memory and I/O – Multiprocessor configurations – System design using 8086

UNIT V 8085 APPLICATIONS 9

Stepper motor control – DC motor control –Traffic light control —Digital Clock – Square wave generation –

TUTORIAL 15 **TOTAL : 60**

TEXT BOOKS

1. Ramesh S Gaonkar, Microprocessor Architecture, Programming and application with 8085, 4th Edition, Penram International Publishing, New Delhi, 2000. (Unit I, II)
2. John Uffenbeck, The 80x86 Family, Design, Programming and Interfacing, Third Edition. Pearson Education, 2002.
3. S.P.Chowdhury , Sunetra Chowdhury,Microprocessor & Peripherals ,First Edition ,Scitech Publications(INDIA)Pvt. Ltd.(Unit V)

REFERENCES

1. A.K. Ray and K.M.Burchandi, Intel Microprocessors Architecture Programming and Interfacing, McGraw Hill International Edition, 2000(Unit III,IV)
2. Kenneth J Ayala, The 8051 Microcontroller Architecture Programming and Application, 2nd Edition, Penram International Publishers (India), New Delhi, 1996.
3. M. Rafi Quazzaman, Microprocessors Theory and Applications: Intel and Motorola prentice Hall of India, Pvt. Ltd., New Delhi, 2003.

17152H33P **SEMESTER III**

DIGITAL SIGNAL PROCESSING 4 1 0 4

AIM

To study the signal processing methods and processors.

OBJECTIVES

- To study DFT and its computation
- To study the design techniques for digital filters
- To study the finite word length effects in signal processing
- To study the non-parametric methods of power spectrum estimations
- To study the fundamentals of digital signal processors.

UNIT I FAST FOURIER TRANSFORM 9

Discrete Time Fourier Transform (DTFT), Introduction to DFT – Efficient computation of DFT Properties of DFT – FFT algorithms – Radix-2 and Radix-4 FFT algorithms – Decimation in Time – Decimation in Frequency algorithms

UNIT II IIR FILTER DESIGN 9

Structure of IIR – System Design of Discrete time IIR filter from continuous time filter – IIR filter design by Impulse Invariance. Bilinear transformation – Approximation derivatives – Design of IIR filter in the Frequency domain.

UNIT III FIR FILTER DESIGN 9

Symmetric & Antisymteric FIR filters – Linear phase filter – Windowing technique – Rectangular, Hamming– Frequency sampling techniques

UNIT IV FINITE WORD LENGTH EFFECTS 9

Quantization noise – derivation for quantization noise power – Fixed point and binary floating point number representation – comparison – over flow error – truncation error – co-efficient quantization error - limit cycle oscillation – signal scaling –

UNIT V POWER SPECTRUM ESTIMATION 9

Computation of Energy density spectrum – auto correlation and power spectrum of random signals. Periodogram – use of DFT in power spectrum estimation – Non parametric methods for power spectral estimation: Bartlett methods –Application of DSP – Model of Speech Wave Form – Vocoder.

TUTORIAL 15 **TOTAL : 60**

TEXT BOOK

1. John G Proakis and Dimtris G Manolakis, "Digital Signal Processing Principles, Algorithms and Application", PHI/Pearson Education, 2000, 3rd Edition.

REFERENCES

1. Alan V Oppenheim, Ronald W Schafer and John R Buck, "Discrete Time Signal Processing", PHI/Pearson Education, 2000, 2nd Edition.
2. Johny R.Johnson, "Introduction to Digital Signal Processing", Prentice Hall of India/Pearson Education, 2002.
3. Sanjit K.Mitra, "Digital Signal Processing: A Computer – Based Approach", Tata McGraw-Hill, 2001, Second Edition.

17152H34P **SEMESTER III**

COMMUNICATION THEORY 4 1 0 4

AIM

To study the various analog communication fundamentals viz., Amplitude modulation and demodulation, angle modulation and demodulation. Noise performance of various receivers and information theory with source coding theorem are also dealt.

OBJECTIVE

- To provide various Amplitude modulation and demodulation systems.
- To provide various Angle modulation and demodulation systems.
- To provide some depth analysis in noise performance of various receiver.
- To study some basic information theory with some channel coding theorem.

UNIT 1 AMPLITUDE MODULATION SYSTEMS 10

Review of spectral characteristics of periodic and non-periodic signals – Generation and demodulation of AM, DSBSC, SSB and VSB signals – Comparison of amplitude modulation systems – Frequency translation – FDM – Non-linear distortion.

UNIT II ANGLE MODULATION SYSTEMS 8

Phase and frequency modulation – Single tone – Narrow band and wideband FM – Transmission bandwidth – Generation and demodulation of FM signal.

UNIT III NOISE THEORY 8

Review of probability – Random variables and random process – Gaussian process –Noise – Shot noise – Thermal noise and white noise – Narrow band noise – Noise temperature – Noise figure.

UNIT IV PERFORMANCE OF CW MODULATION SYSTEMS 10

Superheterodyne radio receiver and its characteristic – SNR – Noise in DSBSC systems using coherent detection – Noise in AM system using envelope detection FM system – FM threshold effect – Pre-emphasis and de-emphasis in FM – Comparison of performances.

UNIT V INFORMATION THEORY 9

Discrete messages and information content – Concept of amount of information – Average information – Entropy – Information rate – Source coding to increase average information per bit – Shannon-fano coding – Huffman coding – Lempel-Ziv (LZ) coding – Shannon's theorem – Channel capacity – Bandwidth – S/N trade-off – Mutual information and channel capacity – Rate distortion theory – Lossy source coding.

TUTORIAL 15 **TOTAL : 60**

TEXT BOOKS

1. Dennis Roddy and John Coolen., "Electronic Communication", 4th Edition, PHI,1995.
2. Herbert Taub and Donald L Schilling., "Principles of Communication Systems", 3rd Edition, TMH, 2008.

REFERENCES

1. Simon Haykin., "Communication Systems", 4th Edition, John Wiley and Sons, 2001.
2. Bruce Carlson., "Communication Systems", 3rd Edition, TMH, 1996.
3. Lathi, B. P., "Modern Digital and Analog Communication Systems", 3rd Edition, Oxford Press, 2007.
4.John G. Proakis, Masoud Salehi., "Fundamentals of Communication Systems", 5th Edition, Pearson Education, 2006.

17152L35P **SEMESTER III**

DIGITAL SIGNAL PROCESSING AND MICRO PROCESSOR LAB 0 0 3 2

PART-I DSP LAB

Using Processor & MATLAB:

1. Study of various addressing modes of DSP using simple programming examples
2. Sampling of input signal and display
3. Implementation of FIR filter
4. Calculation of FFT
5. Linear & Circular Convolution

PART –II MICROPROCESSOR LAB

1. Programs for 8/16 bit Arithmetic operations (Using 8085).
2. Programs for Sorting and Searching (Using 8085, 8086).
3. Parallel Communication between two MP Kits using Mode 1 and Mode 2 of 8255.
4. Interfacing and Programming 8253
5. Serial Communication between two MP Kits using 8251.

Interfacing and Programming of Stepper Motor and DC Motor Speed control

17152H41P **SEMESTER IV**

DIGITAL COMMUNICATION **4 1 0 4**

AIM

To introduce the basic concepts of Digital Communication modulation to baseband, passband modulation and to give an exposure to error control coding and finally to discuss about the spread spectrum modulation schemes.

OBJECTIVES

- To study pulse modulation and discuss the process of sampling, quantization and coding that are fundamental to the digital transmission of analog signals.
- To learn baseband pulse transmission, which deals with the transmission of pulse-amplitude, modulated signals in their baseband form.
- To learn error control coding which encompasses techniques for the encoding and decoding of digital data streams for their reliable transmission over noisy channels.

UNIT I: Digital communication Introduction and Pulse modulation 9

Block Diagram of digital communication systems Advantages, Disadvantages, Sampling, Aliasing, Pulse Amplitude Modulation, Pulse Duration and Pulse position Modulation, Pulse Coded Modulation, Delta Modulation, TDM

UNIT II: Baseband Pulse Transmission 9

Matched Filters , ,Intersymbol Interference , Nyquist Pulse Shaping, M-ary PAM Transmission
Linear Equalizers , Adaptive Equalizers

UNIT III: Digital Bandpass Transmission 9

Representations of Bandpass Signals and Systems Correlation, Signal-space representations ,Detection of Known Signals in AWGN , Generation ,detection, spectra, applications, signal space diagram of FSK, PSK, MSK

UNIT IV: Spread Spectrum Communications 9

Advantages, characteristic of Spread Spectrum Communication. Direct Sequence spreqad spectrum systems, Frequency Hopping spread spectrum communication, Psedu Noise sequences: Types and Characteristics, code-division multiplexing (CDM). Application to CDMA wireless communication systems

UNIT V: Error Control coding 9

Linear block codes, convolutional codes, Hamming codes

TUTORIAL 15 TOTAL: 60

Textbook:

1. S. Haykin, Communication Systems, Fourth Edition, Wiley, 2001. TK5101.H37 2000

Reference:

1. L.W. Couch II, *Digital and Analog Communication Systems,* Sixth Edition, Prentice-Hall,2001.
2. B.P. Lathi, *Modern Digital and Analog Communication Systems*, Oxford University Press, 1998. TK5101.L333
3. John Proakis "Digital Communications" , McGraw-Hill Science/Engineering/Math; 4 edition 2000

17152H42P **SEMESTER IV**

ANTENNA AND WAVE PROPAGATION **4 1 0 4**

AIM

To enable the student to study the various types of antennas and wave propagation.

OBJECTIVES

- To study radiation from a current element.
- To study antenna arrays
- To study aperture antennas
- To learn special antennas such as frequency independent and broad band antennas.
- To study radio wave propagation.

UNIT I : RADIATION 9

Concept of Vector potentials- Modification for Time varying , retarded case- Fields and radiation resistance of an alternating current element- -Radiation resistance –Effective length – Radiation intensity-Gain and Directivity-Field patterns- Beamwidth – Effective area-Relation between gain, effective length and radiation resistance.

UNIT II: ANTENNA ARRRAYS 9

Arrays of two point sources- Broadside array and End fire arrays – Binomial arrays - Pattern multiplication- Uniform linear array-

UNIT III : SPECIAL PURPOSE ANTENNAS 9

Radiation from traveling wave on wire- Rhombic antenna – Loop antennas- Three element Yagi antenna- Log periodic antenna- Horn antenna -

UNIT IV: PROPAGATION 9

Ground wave propagation: Attenuation characteristics – Calculation of field strength –
Sky wave Propagation: Structure of Ionosphere – Effective dielectric constant of ionized region-Mechanism of Refraction and Refractive index- Critical Frequeny- Skip distance-Maximum usable frequency –Fading and Diversity Techniques.
Space Wave Propagation: Calculation of Field strength –-Duct propagation.

UNIT V : MEASUREMENTS 9

Impedance – Field Pattern and Gain of Antennas- Radiation Pattern –Ionospheric measurements-Vertical incidence measurements of the ionosphere- Relation between oblique and vertical incidence transmission.

TUTORIAL 15 **TOTAL: 60**

Text Books:

1. EDWARD C.JORDAN- Electromagnetic waves and Radiation systems – Asia Publication House, PHI, 1978, Reprint 2003.

Reference Books:

1. Jhon .D. Kraus and Ronalatory Marhefka- Antenna-T McGraw Hill – 2002
2. R.E.Collins-Antennas and Radio Propagation- McGrawhill- 1987
3. Ballany – Antenna Theory- Jhon wiley & sons – 2nd edition 2003.

17152H43P **SEMESTER IV**

COMPUTER NETWORKS **4 0 0 4**

AIM

To introduce the concept, terminologies, and technologies used in modern data communication and computer networking.

OBJECTIVES

- To introduce the students the functions of different layers.
- To introduce IEEE standard employed in computer networking.
- To make students to get familiarized with different protocols and network components.

UNIT I DATA COMMUNICATIONS 8

Components – Direction of Data flow – networks – Components and Categories – types of Connections – Topologies –Protocols and Standards – ISO / OSI model – Transmission Media – Coaxial Cable – Fiber Optics – Line Coding – Modems – RS232 Interfacing sequences.

UNIT II DAT LINK LAYER 12

Error – detection and correction – Parity – LRC – CRC – Hamming code – Flow Control and Error control: stop and wait – go back N ARQ – selective repeat ARQ- sliding window techniques – HDLC.

LAN: Ethernet IEEE 802.3, IEEE 802.4, and IEEE 802.5 – IEEE 802.11–FDDI, SONET – Bridges.

UNIT III NETWORK LAYER 10

Internetworks - Packet Switching and Datagram approach – IP addressing methods – Subnetting – Routing – Distance Vector Routing – Link State Routing – Routers.

UNIT IV TRANSPORT LAYER 8

Duties of transport layer – Multiplexing – Demultiplexing – Sockets – User Datagram Protocol (UDP) – Transmission Control Protocol (TCP) – Congestion Control – Quality of services (QOS) – Integrated Services.

UNIT V APPLICATION LAYER 7

Domain Name Space (DNS) – SMTP, FDP, HTTP, WWW – Security – Cryptography.

TOTAL : 45

TEXT BOOKS

1. Behrouz A. Foruzan, "Data communication and Networking", Tata McGraw-Hill, 2004.

REFERENCES

1. James .F. Kurouse & W. Rouse, "Computer Networking: A Topdown Approach Featuring", Pearson Education.
2. Larry L.Peterson & Peter S. Davie, "COMPUTER NETWORKS", Harcourt Asia Pvt. Ltd., Second Edition.
3. Andrew S. Tannenbaum, "Computer Networks", PHI, Fourth Edition, 2003.
4. William Stallings, "Data and Computer Communication", Sixth Edition, Pearson Education, 2000.

17152L45P **SEMESTER IV**

NETWORKS AND COMMUNICATION LAB 0-0-3-2

Part I: NETWORKS

1. PC to PC Communication
   Parallel Communication using 8 bit parallel cable
   Serial communication using RS 232C
2. Ethernet LAN protocol
   To create scenario and study the performance of CSMA/CD protocol ethrol simulation
3. Token bus and token ring protocols
   To create scenario and study the performance of token bus and token ring protocols through simulation
4. Wireless LAN protocols
   To create scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
5. Implementation and study of stop and wait protocol

Part II: COMMUNICATION

1. Modulation and Demodulation Characteristics of AM/FM Transmitter And Reciever.
2. Pulse modulation- PAM / PWM /PPM
3. Pulse code modulation
4. Digital modulation –ASK, PSK, QPSK, FSK
5. Experiments on Antenna:
   To plot and analyse the radiation patterns of the following antennas.
   - Dipole
   - Half Wave Dipole
   - Monopole
   - Yagi Antenna
6. Experiments on Coaxial Line Section:
   - Measurement of VSWR
   - Stub matching

ELECTIVE - I

17152E44AP **SEMESTER IV**

HIGH SPEED NETWORKS 4-**0-0-4**

AIM

To highlight the features of different technologies involved in High Speed Networking and their performance.

OBJECTIVES

- Students will get an introduction about ATM and Frame relay.
- Students will be provided with an up-to-date survey of developments in High Speed Networks.
- Enable the students to know techniques involved to support real-time traffic and congestion control.

Students will be provided with different levels of quality of service (Q.S) to different applications.

UNIT I HIGH SPEED NETWORKS 9

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM Cell – ATM Service Categories – AAL.
High Speed LANs: Fast Ethernet, Gigabit Ethernet, Wireless LANs: applications, requirements – Architecture of 802.11

UNIT II LAN SWITCHING TECHNOLOGY 9

Switching concepts, switch forwarding techniques, switch path control, LAN switching, cut through forwarding, store and forward, Virtual LANs

UNIT III TCP AND ATM CONGESTION CONTROL 9

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm — Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats,– GFR traffic management.

UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES 9

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services

UNIT V IP SWITCHING 9

Addressing model, IP Switching types-flow driven and topology driven solutions, IP Over ATM address and next hop resolution, multicasting,

TOTAL : 45

TEXT BOOK

William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

REFERENCES

1. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
2. Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003

17152E44BP **SEMESTER IV**

ADVANCED DIGITAL SIGNAL PROCESSING 4 0 0 4

AIM

To introduce the student to advanced digital signal processing techniques.

OBJECTIVES

- To study the parametric methods for power spectrum estimation.
- To study adaptive filtering techniques using LMS algorithm and to study the applications of adaptive filtering.
- To study multirate signal processing fundamentals.
- To study the analysis of speech signals.
- To introduce the student to wavelet transforms.

UNIT I DISCRETE RANDOM SIGNAL PROCESSING

Discrete Random Processes-, Autocorrelation and Auto covariance matrices. Parseval's Theorem, Wiener - Khintchine Relation- Power Spectral Density-Periodogram -, Parameter estimation: Bias and consistency.

UNIT II SPECTRUM ESTIMATION

Non-Parametric Methods-Correlation Method, Periodogram Estimator, Performance Analysis of Estimators –Unbiased Consistent Estimators-; Bartlett, Blackman –Tukey method.

Parametric Methods - AR, MA, and ARMA model based spectral estimation.

UNIT III LINEAR ESTIMATION AND PREDICTION

Linear prediction- Forward and backward predictions, - Levinson-Durbin algorithms. Least mean squared error criterion -Wiener filter for filtering and prediction, FIR Wiener filter and Wiener IIR filters, Discrete Kalman filter

UNIT IV ADAPTIVE FILTERS

FIR adaptive filters -adaptive filter based on steepest descent method-Widrow-Hoff LMS adaptive algorithm Adaptive recursive filters (IIR). RLS adaptive filters-Exponentially weighted RLS-sliding window RLS.

UNIT V MULTIRATE DIGITAL SIGNAL PROCESSING

Mathematical description of change of sampling rate - Interpolation and Decimation, Decimation by an integer factor - Interpolation by an integer factor, Filter implementation for sampling rate conversion- Application to sub band coding and Filter bank implementation of wavelet expansion of signals.

REFERENCES:

1. Monson H.Hayes, Statistical Digital Signal Processing and Modeling, John Wiley and Sons, Inc., Singapore, 2002.
2. John G. Proakis, Dimitris G.Manolakis, Digital Signal Processing Pearson Education, 2002.
3. John G. Proakis et.al.,'Algorithms for Statistical Signal Processing', Pearson Education, 2002.
4. Dimitris G.Manolakis et.al.,'Statistical and adaptive signal Processing', McGraw Hill, Newyork,2000.

17152E44CP **SEMESTER IV**

SPEECH PROCESSING **4 0 0 4**

AIM

To introduce the characteristics of Speech signals and the related time and frequency domain methods for speech analysis and speech compression

OBJECTIVE

- To introduce the models for speech production
- To develop time and frequency domain techniques for estimating speech parameters
- To introduce a predictive technique for speech compression
- To understand speech recognition, synthesis and speaker identification.

UNIT I: NATURE OF SPEECH SIGNAL 9

Speech production mechanism – Classification of speech – Sounds – Nature of speech signal – Models of speech production
Speech Signal Processing: Purpose of speech processing – Digital models for speech signal – Digital processing of speech signals – Significance – Short time analysis.

UNIT II: TIME DOMAIN METHODS FOR SPEECH PROCESSING 9

Time domain parameters of speech – Methods for extracting the parameters – Zero crossings – Auto correlation function – Pitch estimation.

UNIT III: FREQUENCY DOMAIN METHODS FOR SPEECH PROCESSING 9

Short time fourier analysis – Filter bank analysis – Spectrographic analysis – Format extraction – Pitch extraction – Analysis – Synthesis systems.

UNIT IV: LINEAR PREDICTIVE CODING OF SPEECH 9

Formulation of linear prediction problem in time domain – Solution of normal equations – Interpretation of linear prediction in auto correlation and spectral domains.

UNIT V: HOMOMORPHIC SPEECH ANALYSIS 9

Central analysis of speech – Format and pitch estimation – Applications of speech processing – Speech recognition – Speech synthesis and speaker verification.

Total: 45

TEXTBOOK

1. Rabiner L.R. and Schafer R.E, "Digital Processing of Speech Signals", Prentice Hall, 1978.

REFERENCES

1. Flanagan J.L, "Speech Analysis Synthesis and Perception", 2nd Edition, Springer
2. Vertag, 1972.
Witten I.H., "Principles of Computer Speech", Academic Press, 1983.

17152E44DP **SEMESTER IV**

FUZZY LOGIC AND NEURAL NETWORKS **4 0 0 4**

AIM

To introduce the techniques of soft computing and adaptive neuro-fuzzy inferencing systems which differ from conventional AI and computing in terms of its tolerance to imprecision and uncertainty.

OBJECTIVES

- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems
- To provide the mathematical background for carrying out the optimization associated with neural network learning
- To familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations
- To introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing

UNIT I: Primer on Fuzzy Sets **9**

Crisp sets, from crisp sets to fuzzy sets , Linguistic variables ,Membership functions Some terminology , Set theoretic operations for crisp sets , Set theoretic operations for fuzzy sets , membership functions

UNIT II: Fuzzy Logic Systems **9**

Introduction , Rules , Fuzzy Inference Engine , Fuzzification and Its Effect on Inference Fuzzifier , Fuzzy inference engine, Defuzzification, Centroid defuzzifier , Center-of-sums defuzzifier

UNIT III: Neural Nets Introduction and Overview **9**

Perceptrons,Least Mean Square Learning Systems , Multilayer Neural Networks Back-Propagation The Practical Application of Back-Propagation
Error Rate and Complexity Fit Estimation Improving on Standard Back-Propagation

UNIT IV: Radial Basis Function Networks **9**

Ill-Posed Problems and the Regularization Technique , Stabilizers and Basis Functions, Generalized Radial Basis Function Networks, Moving Centers Learning, Regularization with Nonradial Basis Functions, Orthogonal Least Squares, Optimal Subset Selection by Linear

UNIT V: ANFIS: Adaptive Neuro-Fuzzy Inference Systems **9**

Introduction , ANFIS Architecture , Hybrid Learning Algorithm , Learning Methods that Cross-fertilize ANFIS and RBFN , ANFIS as a Universal Approximator

TOTAL : 45

Textbook:

1. Bart Kosko, Neural networks and fuzzy systems: a dynamical systems approach to machine intelligence, Prentice-Hall, Inc., Upper Saddle River, NJ, 1991

Reference:

1. Kin, S. (1999), Neural Networks: A Comprehensive Foundation, 2nd ed.,Upper Saddle River, NJ: Prentice Hall, ISBN 0-13-273350-1.
2. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani (1997)" Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence, | Prentice Hall

17152E44EP **SEMESTER IV**

ADVANCED ELECTRONIC SYSTEM DESIGN 4 0 0 4

AIM

To get knowledge about usage of electronic devices in Communication Engineering and Power supplies.

OBJECTIVE

- To study RF component such as resonator, filter, transmission lines, etc…
- To learn design of RF amplifiers using transistors.
- To study modern Power Supplies using SCR and SMPS technology
- To learn about signal shielding & grounding techniques and study of A/D and D/A Converters.
- To learn knowledge about fabrication of PCBs using CAD.

UNIT I: INTRODUCTION TO RF DESIGN 9

RF behaviour of passive components – Chip components and circuit board considerations – Review of transmission lines – Impedance and admittance transformation – Parallel and series connection of networks – ABCD and scattering parameters – Analysis of amplifier using scattering parameter – RF filter – Basic resonator and filter configurations – Butterworth and chebyshev filters – Implementation of microstrip filter design – Band pass filter and cascading of band pass filter elements.

UNIT II: RF TRANSISTOR AMPLIFIER DESIGN 9

Impedance matching using discrete components – Microstrip line matching networks – Amplifier classes of operation and biasing networks – Amplifier power gain– Unilateral design(S_{12} =0) – Simple input and output matching networks – Bilateral design – Stability circle and conditional stability – Simultaneous conjugate matching for unconditionally stable transistors – Broadband amplifiers – High power amplifiers and multistage amplifiers.

UNIT III: DESIGN OF POWER SUPPLIES 9

DC power supply design using transistors and SCR's – Design of crowbar and foldback protection circuits – Switched Mode Power Supplies(SMPS) – Forward – Fly back-buck and boost converters – Design of transformers and control circuits for SMPS.

UNIT IV: DESIGN OF DATA ACQUISITION SYSTEMS 9

Amplification of low level signals – Grounding – Shielding and guarding techniques – Dual slope – Quad slope and high speed A/D converters – Microprocessors compatible A/D converters – Multiplying A/D converters and logarithmic A/D converters – Sample and hold – Design of two and four wire transmitters.

UNIT V: DESIGN OF PRINTED CIRCUIT BOARDS 9

Introduction to technology of Printed Circuit Boards (PCB) – General lay out and rules and parameters – PCB design rules for digital – High frequency – Analog – Power electronics and microwave circuits – Computer Aided Design(CAD) of PCB's.

Total: 45

TEXT BOOKS

1. Reinhold Luduig and Pavel Bretchko, "RF Circuit Design – Theory and Applications", Pearson Education, 2000.
2. Sydney Soclof, "Applications of Analog Integrated Circuits", PHI, 1990.
3. Walter C. Bosshart, "Printed Circuit Boards – Design and Technology", TMH, 1983.

REFERENCES

1. Keith H. Billings, "Handbook of Switched Mode Supplies", TMH Publishing Co., 1989.
2. Michael Jaacob, "Applications and Design with Analog Integrated Circuits", PHI, 1991.
3. Otmar Kigenstein, "Switched Mode Power Supplies in Practice", John Wiley and Sons, 1989.
4. Muhammad H. Rashid, "Power Electronics – Circuits, Devices and Applications",

17152H51P **SEMESTER V**

OPTICAL COMMUNICATION AND NEWORKS **4 0 0 4**

AIM

- To introduce the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber.
- To study about various optical sources and optical detectors and their use in the optical communication system. Finally to discuss about digital transmission and its associated parameters on system performance.

OBJECTIVES

- To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
- To understand the different kind of losses, signal distortion in optical wave guides and other signal degradation factors. Design optimization of SM fibers, RI profile and cut-off wave length.
- To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes and different fiber amplifiers.
- To learn the fiber optical receivers such as PIN APD diodes, noise performance in photo detector, receiver operation and configuration.
- To learn fiber slicing and connectors, noise effects on system performance, operational principles WDM and solutions.

UNIT I INTRODUCTION TO OPTICAL FIBERS 9

Evolution of fiber optic system- Element of an Optical Fiber Transmission link- Ray Optics-Optical Fiber Modes and Configurations –fiber types Mode theory of Circular Wave guides- Overview of Modes- Key model concepts- Linearly Polarized Modes – Single Mode Fibers-

UNIT II SIGNAL DEGRADATION OPTICAL FIBERS 9

Attenuation – Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides-Information Capacity determination – Group Delay-Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers -Mode Coupling

UNIT III FIBER OPTICAL SOURCES AND COUPLING 9

Direct and indirect Band gap materials-LED structures –Quantum efficiency Modulation of a LED, lasers Diodes-Modes and Threshold condition Fiber amplifiers- Power Fibre – to- Fibre joints, Fibre splicing.

UNIT IV FIBER OPTICAL RECEIVERS 9

PIN and APD diodes –Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise –Comparison of Photo detectors –Fundamental Receiver Operation – preamplifiers, Error Sources –Receiver Configuration –Probability of Error –

UNIT V DIGITAL TRANSMISSION SYSTEM 9

Point-to-Point links System considerations –Link Power budget –Rise - time budget – Noise Effects on System Performance-Operational Principles of WDM, Solitons-. Basic on concepts of SONET/SDH Network. .

TOTAL : 45

TEXT BOOK

1. Gerd Keiser, "Optical Fiber Communication" McGraw –Hill International, Singapore, 3rd ed., 2000

REFERENCES

1. J.Senior, "Optical Communication, Principles and Practice", Prentice Hall of India, 1994.
2. J.Gower, "Optical Communication System", Prentice Hall of India, 2001.

17152H52P **SEMESTER V**

MICROWAVE ENGINEERING **4 0 0 4**

Aim

To enable the student to become familiar with active & passive microwave devices & components used in Microwave communication systems.

Objectives

- To study passive microwave components and their S- Parameters.
- To study Microwave semiconductor devices & applications.
- To study Microwave sources and amplifiers.

Unit – I: Introduction **9**

Radio Spectrum – Microwave Frequency and its characteristics – Transmission media for microwave signals – Waveguides – Scattering Parameters for microwave network (two ports)

Unit – II: Passive Microwave Devices **9**

Isolators, Attenuators, Directional Couplers – Waveguide Tees – E- plane, H-Plane and Magic Tee –- Matched Terminators – S – parameters for all the components

Unit – III: Microwave Sources **9**

Klystron Oscillator – Magnetron Oscillator– TWTA Amplifier – Power output and efficiency equations for all the devices

Unit – IV: Semiconductor Microwave Devices **9**

PIN Diode – Varactor Diode (Manley – Rowe Power Relation) – Tunnel Diode – Gunn Diode – Applications of all the diodes –

Unit – V Microwave Measurements **9**

Power Measurements – Frequency Measurements – VSWR Measurements (High and Low VSWR) – Attenuation Measurements – Insertion Loss Measurements

TOTAL : 45

Text Book:

1. Samuel Y.LIAO : Microwave Devices and Circuits – Prentice Hall of India – 3rd Edition (2003)
2. Annapurna Das and Sisir K.Das: Microwave Engineering – Tata McGraw-Hill (2000) (UNIT V)

Reference:

R.E. Collin : Foundations for Microwave Engg. – IEEE Press Second Edition (2002)
David M.POZAR : Microwave Engg. – John Wiley & Sons – 2nd Edition (2003)
P.A.RIZZI – Microwave Engg. (Passive)

17152H53P **SEMESTER V**

VLSI DESIGN **4 1 0 4**

AIM

To introduce the technology, design concepts and testing of Very Large Scale Integrated Circuits.

OBJECTIVES

- To learn the basic CMOS circuits.
- To learn the CMOS process technology.
- To learn techniques of chip design using programmable devices.
- To learn the concepts of designing VLSI subsystems.
- To learn the concepts of modeling a digital system using Hardware Description Language.

UNIT I CMOS TECHNOLOGY 9

An overview of Silicon semiconductor technology, Basic CMOS technology : nwell, P well, Twin tub and SOI Process. Interconnects, circuit elements: Resistors, capacitors, Electrically alterable ROMs, bipolar transistors, Latch up and prevention.

UNIT II MOS TRANSISTOR THEORY 9

NMOS, PMOS Enhancement transistor, Threshold voltage, Body effect, MOS DC equations, channel length modulation, Mobility variation, MOS models, small signal AC characteristics, complementary CMOS inverter DC characteristics, Noise Margin, Rise time, fall time

UNIT III SPECIFICATION USING VERILOG HDL 9

Basic Concepts: VLSI Design flow, identifiers, gate primitives, value set, ports, gate delays, , Behavioral and RTL modeling: Operators, timing controls, Procedural assignments conditional statements, Data flow modeling and RTL. Structural gate level description of decoder, equality detector, comparator, priority encoder, D-latch, D-ff, half adder, Full adder, Ripple Carry adder.

UNIT IV CMOS CHIP DESIGN 9

Logic design with CMOS: MOSFETS as switches, Basic logic gates in CMOS, Complex logic gates, Transmission gates: Muxes and latches, CMOS chip design options: Full custom ASICs, Std. Cell based ASICs, Gate Array based ASICs Channelled, Channelless and structured GA, Programmable logic structures; 22V10, Programming of PALs, ASIC design flow.

UNIT V CMOS TESTING 9

Need for testing, Design strategies for test, Chip level and system level test techniques.

TUTORIAL 15 **TOTAL : 60**

TEXT BOOKS

1. Weste & Eshraghian: Principles of CMOS VLSI design (2/e) Addison Wesley, 1993 for UNIT I through UNIT IV.
2. Samir Palnitkar; Verilog HDL – Guide to Digital design and synthesis, III edition, Pearson Education, 2003 for UNIT V

REFERENCES

1. M.J.S.Smith : Application Specific integrated circuits, Pearson Education, 1997.
2. Wayne Wolf, Modern VLSI Design, Pearson Education 2003.
3. Bob Zeidmin ; Introduction to verilog, Prentice Hall, 1999
4. J . Bhaskar : Verilog HDL Primer, BSP, 2002.

17152L55P **SEMESTER V**

OPTICAL COMMUNICATION AND MICROWAVE LAB **0 0 3 2**

Part I: Experiments pertaining to Fiber optics

1. Numerical aperture determination for fibers and Attenuation Measurement in Fibers.
2. Mode Characteristics of Fibers – SM Fibers.
3. Coupling Fibers to Semi-Conductor Sources – Connectors & Splices.
4. Fiber optic communication links.
5. LED & Photo Diode Characteristics.

Part II: Experiments pertaining to Microwave

1. VSWR Measurements – Determination of terminated impedance
2. Determination of guide wavelength, frequency measurement.
3. Radiation Pattern of Horns, Paraboloids.
4. Microwave Power Measurement.
5. Characteristics of Gunn diode Oscillator.

ELECTIVE- II

17158E54AP **SEMESTER V**

ENVIRONMENTAL SCIENCE AND ENGINEERING 4 0 0 4

UNIT:I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 9

Definition, Scope and importance − Need for public awareness − Forest resources −Water resources − Energy resources − Land resources − Role of an individual in conservation of natural resources − Equitable use of resource for sustainable life styles.

UNIT:II ECOSYSTEM AND BIODIVERSITY 9

Concept of an ecosystem − structure and Function of An ecosystem - Producers, consumers and decomposers − Energy flow in the ecosystem − Ecological succession − Food chains Food web and ecological pyramids. Introduction to Biodiversity − Value of Biodiversity − Biodiversity at global, National and local levels − India as a mega − diversity nation Hot spots of Biodiversity − Threats to Biodiversity Endangered and endemic species of India − Insitu and Excitu conservation of Biodiversity.

UNIT:III ENVIRONMENTAL POLLUTION 9

Definition − Causes, effects and control measure of **:** - Air pollution - Water Pollution - Soil Pollution - Marine Pollution - Noise Pollution -Thermal Pollution - Nuclear hazard − Solid Waste management − Role of Individual in prevention of pollution − Disaster management.

UNIT:IV SOCIAL ISSUES AND THE ENVIRONMENT 9

From Un sustainable to sustainable development − water conservation,Rain water harvesting, water shed Management − Global warming − Ozone layer Depletion − Acid rain − Nuclear Accidents and holocaust − Environment Protection Act, Issues involved in enforcement legislation.

UNIT :V HUMAN POPULATION AND THE ENVIRONMENT 9

Population growth − Population explosion − Family welfare programme − Environment and human health − Human rights − value education − HIV/AIDS− Role of Information Technology in Environment and human health.

Total = 45

TEXT BOOK

1. Gilbert M Masters,“ Introduction to Environmental Engineering and science, ”Second Edition , Pearson Education Pvt, Ltd, 2007.

2. Miller T.G.Jr. “ Environmental science,”, Wadworth Publishing Co.

REFERENCES

1. Kurian Joseph, ”Essentials of Environmental studies”, First edition, Pearson Education, 2004.

BharuchaErach, “ The Biodiversity of India ,” Mapin Publishing Pvt,Ltd.

17152E54BP **SEMESTER V**

OPTO ELECTRONIC DEVICES **4 0 0 4**

AIM

To learn different types of optical emission, detection, modulation and opto electronic integrated circuits and their applications.

OBJECTIVE

- To know the basics of solid state physics and understand the nature and characteristics of light.
- To understand different methods of luminescence, display devices and laser types and their applications.
- To learn the principle of optical detection mechanism in different detection devices.
- To understand different light modulation techniques and the concepts and applications of optical switching.
- To study the integration process and application of opto electronic integrated circuits in transmitters and receivers.

UNIT I: ELEMENTS OF LIGHT AND SOLID STATE PHYSICS 9

Wave nature of light – Polarization – Interference – Diffraction – Light source – Review of quantum mechanical concept – Review of solid state physics – Review of semiconductor physics and semiconductor junction device.

UNIT II: DISPLAY DEVICES AND LASERS 9

Introduction – Photo luminescence – Cathode luminescence – Electro luminescence – Injection luminescence – Injection luminescence – LED – Plasma display – Liquid Crystal Display (LCD) – Numeric displays – Laser emission – Absorption – Radiation – Population inversion – Optical feedback – Threshold condition – Laser modes – Classes of lasers – Mode locking – Laser applications.

UNIT III: OPTICAL DETECTION DEVICES 9

Photo detector – Thermal detector – Photo devices – Photo conductors – Photo diodes – Detector performance.

UNIT IV: OPTOELECTRONIC MODULATOR 9

Introduction – Analog and digital modulation – Electro-optic modulators – Magneto optic devices – Acoustoptic devices – Optical – Switching and logic devices.

UNIT V: OPTOELECTRONIC INTEGRATED CIRCUITS 9

Introduction – Hybrid and monolithic integration – Application of opto electronic integrated circuits – Integrated transmitters and receivers – Guided wave devices.

Total: 45

TEXTBOOK

1. Wilson J and Haukes J., "Opto Electronics – An Introduction", PHI Pvt. Ltd., 1995.

REFERENCES

1. Bhattacharya, "Semiconductor Opto Electronic Devices", PHI Pvt Ltd., 1995.
2. Jasprit Singh, "Opto Electronics – As Introduction to Materials and Devices", TMH International Edition, 1998.

17152E54CP **SEMESTER V**

RADAR AND NAVIGATIONAL AIDS **4 0 0 4**

AIM

To make the student understand the principles of Radar and its use in military and civilian environment

Also to make the student familiar with navigational aids available for navigation of aircrafts and ships.

OBJECTIVES

- To derive and discuss the Range equation and the nature of detection.
- To apply doppler principle to radars and hence detect moving targets, cluster, also to understand tracking radars
- To refresh principles of antennas and propagation as related to radars, also study of transmitters and receivers.
- To understand principles of navigation, in addition to approach and landing aids as related to navigation
- To understand navigation of ships from shore to shore.

UNIT I **INTRODUCTION TO RADAR** **9**

Basic radar – The simple form of the radar equation – Radar block diagram – Radar frequencies – Applications of radar – The origins of radar – The radar equation – Introduction – Detection of signals in noise – Receiver noise and the signal-to-noise ratio – Probability density functions – Probabilities of detection and false alarm – Integration of radar pulses – Radar cross section of targets – Radar cross section fluctuations – Transmitter power – Pulse repetition frequency – Antenna parameters – System losses – Other radar equation considerations

UNIT II: **MTI AND PULSE DOPPLER RADAR** **9**

Introduction to Doppler and MTI radar – Delay-line cancellers – Staggered pulse repetition frequencies – Doppler filter banks – Digital MTI processing – Moving target detector – Limitations to MTI performance – MTI from a moving platform (AMIT) – Pulse Doppler radar – Other Doppler radar topics – Tracking with radar – Mono pulse tracking – Conical scan and sequential lobing – Limitations to tracking accuracy – Low – Angle tracking – Tracking in range – Other tracking radar topics – Comparison of trackers – Automatic tracking with surveillance radars (ADT).

UNIT III **9**

Detection of signals in noise – Introduction – Matched – Filter receiver – Detection – Detectors – Automatic detector – Integrators – Constant – False – Alarm rate receivers – The radar operator – Signal management – Propagation radar waves – Atmospheric – Standard propagation – Nonstandard propagation – The radar antenna – Reflector antennas – Electronically steered phased array antennas – Phase shifters – Frequency – Scan arrays – Radar transmitters – Introduction – Linear beam power tubes – Solid state RF power sources – Magnetron – Crossed field amplifiers – Other RF power sources – Other aspects of radar transmitter – Radar receivers – The radar receiver – Receiver noise figure – Super heterodyne receiver – Duplexers and receiver protectors – Radar displays.

UNIT IV **9**

Introduction – Four methods of navigation – Radio direction finding – The loop antenna – Loop input circuits – An aural null direction finder – The goniometer – Errors in direction finding – Adcock direction finders – Direction finding at very high frequencies – Automatic direction finders – The commutated aerial direction finder – Range and accuracy of direction finders – Radio ranges **–** The Lf/Mf four course radio range – Vhf omni directional range (Vor) – Vor receiving equipment – Range and accuracy of Vor – Recent developments – Hyperbolic systems of navigation (loran and decca) **–** Loran-A equipment – Range and precision of standard loran – Loran-C – The decca navigation system – Decca receivers – Range and accuracy of decca – The omega system

UNIT V **9**

DME and TACAN – Distance measuring equipment – Operation of DME – TACAN – TACAN equipment – Aids to approach and landing – Instrument landing system – Ground controlled approach system – Microwave Landing System (MLS) – Doppler navigation – The Doppler effect – Beam configurations – Doppler frequency equations – Track stabilization – Doppler spectrum – Components of the Doppler navigation system – Doppler range equation – Accuracy of Doppler navigation systems –Inertial navigation – Principles of operation – Navigation over the earth – Components of an inertial navigation system – Earth co-ordinate mechanization – Strapped – Down systems – Accuracy of inertial navigation systems – Satellite navigation system – The transit system – Navstar Global Positioning System (GPS)

Total: 45

TEXTBOOK

1. Merrill I. Skolnik , “Introduction to Radar Systems”, 3rd Edition, TMH, 2003

REFERENCES

1. Peyton Z. Peebles, “Radar Principles”, John wiley, 2004
2. Toomay J.C, “Principles of Radar”, 2nd Edition, PHI, 2004

17152E54DP **SEMESTER V**

DIGITAL IMAGE PROCESSING 4 0 0 4

AIM

To introduce the student to various image processing techniques.

OBJECTIVES

- To study the image fundamentals and mathematical transforms necessary for image processing.
- To study the image enhancement techniques
- To study image restoration procedures.
- To study the image compression procedures.
- To study the image segmentation and representation techniques.

UNIT - I: DIGITAL IMAGE FUNDAMENTALS 9

Elements of visual perception – Image sampling, Quantization – Basic relationship between pixels- monochrome vision model- color space model-convolution.

UNIT – II IMAGE TRANSFORM 9

Basic geometric transforms-Introduction to Fourier transform and DFT – properties of 2d Fourier transform – FFT- Separable image transforms – Walsh – Hadamard- Discrete cosine and Haar Transfroms

UNIT-III:IMAGE ENHANCEMENT AND RESTORATION TECHNIQUES 9

Spatial domain methods- Basic gray level transformation-Histogram equalization-Spatial filtering-Laplacian filtering- Frequency Domain filters- homomorphic filtering-Model of image degradation/Restoration process- Noise models.

UNIT IV:IMAGE COMPRESSION 9

Lossless compression-: Variable length coding- LZW coding- -Predictive coding-DPCM. Lossy compression- Transform coding-– Image compression standards-JPEG,MPEG.

UNIT – V:IMAGE SEGMENTATION & REPRESENTATION 9

Edge detection – Thresholding- region based segmentation- Boundary representation – chair codes- Boundary segments – boundary descriptors-: simple descriptors-Fourier descriptors- Regional descriptors- Texture.

TOTAL : 45

Text Book:

Rafeel C. Gonzalez,Richard E woods 2nd edition – Digital Image processing – Pearson education 2003.

Reference books:

1. William K.Pratt, Digital Image processing, John Wiley (2001)
2. Image processing Analysis and Machine Vision - Millman Sonka ,Vaclav hlavac,Roger Boyle,Broos/Colic,Thompson Learnfy(1999)
3. A.K.Jain PHI,(1995) – Fundamentals of Digital Image processing

17152E54EP **SEMESTER V**

ENGINEERING ACOUSTICS **4 0 0 4**

AIM

This course aims at providing an overview of engineering acoustics.

OBJECTIVE

- To provide mathematical basis for acoustics waves
- To introduce the concept of radiation reception absorption and attenuation of acoustic waves.
- To present the characteristic behaviour of sound in pipes, resonators and filters.
- To introduce the properties of hearing and speech
- To describe the architecture and environmental inclusive of reverberation and noise.
- To give a detailed study on loud speakers and microphones.

UNIT I:

Acoustics waves – Linear wave equation – Sound in fluids – Harmonic plane waves – Energy density – Acoustics intensity – Specific acoustic impedance – Spherical waves – Describer scales.

Reflection and Transmission: Transmission from one fluid to another normal and oblique incidence – Method of images.

UNIT II: RADIATION AND RECEPTION OF ACOUSTIC WAVES 9

Radiation from pulsating sphere – Acoustic reciprocity – Continuous line source – Radiation impedance – Fundamental properties of transducers.

Absorption and attenuation of sound: Absorption from viscosity – Complex sound speed and absorption – Classical absorption co-efficient

UNIT III: PIPE RESONATORS AND FILTERS 9

Resonance in pipes – Standing wave pattern absorption of sound in pipes – Long wavelength limit – Helmoltz resonator – Acoustic impedance – Reflection and transmission of waves in pipe – Acoustic filters – Low pass, high pass and band pass.

Noise, Signal detection, Hearing and speech: Noise, spectrum level and band level – Combing band levels and tones – Detecting signals in noise – Detection threshold – The ear – Fundamental properties of hearing – Loudness level and loudness – Pitch and frequency – Voice.

UNIT IV: ARCHITECTURAL ACOUSTICS 9

Sound in endosure – A simple model for the growth of sound in a room – Reverberation time – Sabine, sound absorption materials – Measurement of the acoustic output of sound sources in live rooms – Acoustics factor in architectural design.

Environmental Acoustics: Weighted sound levels speech interference – Highway noise

1. Noise induced hearing loss – Noise and architectural design specification and measurement of some isolation design of portions.

UNIT V: TRANSDUCTION 9

Transducer as an electives network – Canonical equation for the two simple transducers transmitters – Moving coil loud speaker – Loudspeaker cabinets – Horn loud speaker, receivers – Condenser – Microphone – Moving coil electrodynamics microphone Piezoelectric microphone – Calibration of receivers.

Total: 45

TEXT BOOK

2. Lawerence E. Kinsler, Austin R. Frey, Alan B. Coppens and James V. Sanders, "Fundamentals of Acoustics", 4th Edition, Wiley, 2000.

REFERENCE

1.Berarek L., "Acoustics", TMH, 2002.

17152H61P **SEMESTER VI**

MOBILE AND WIRELESS COMMUNICATION 4 0 0 4

AIM

To introduce the concepts of wireless / mobile communication using cellular environment. To make the students to know about the various modulation techniques, propagation methods, coding and multi access techniques used in the mobile communication. Various wireless network systems and standards are to be introduced.

Objectives

- It deals with the fundamental cellular radio concepts such as frequency reuse and handoff. This also demonstrates the principle of trunking efficiency and how trunking and interference issues between mobile and base stations combine to affect the overall capacity of cellular systems.
- It presents different ways to radio propagation models and predict the large – scale effects of radio propagation in many operating environment. This also covers small propagation effects such as fading, time delay spread and Doppler spread and describes how to measures and model the impact that signal bandwidth and motion have on the instantaneous received signal through the multi-path channel.
- It provides idea about analog and digital modulation techniques used in wireless communication. It also deals with the different types of equalization techniques and diversity concepts.
- It provides an introduction to speech coding principles which have driven the development of adaptive pulse code modulation and linear predictive coding techniques are presented. This unit also describes the time, frequency code division multiple access techniques as well as more recent multiple access technique such as space division multiple access.
- It deals with second generation and third generation wireless networks and worldwide wireless standards.

UNIT I: PRINCIPLES OF WIRELESS COMMUNICATION 10

Digital modulation techniques – Linear modulation techniques – Spread spectrum modulation – Performance of modulation – Multiple access techniques – TDMA – FDMA – CDMA – SDMA – Overview of cellular networks – Cellular concept – Handoff strategies – Path loss – Fading and Doppler effect.

UNIT II: WIRELESS PROTOCOLS 11

Issues and challenges of wireless networks – Location management – Resource management – Routing – Power management – Security – Wireless media access techniques – ALOHA – CSMA – Wireless LAN – MAN – IEEE 802.11 (a–b–e–f–g–h–i) – Bluetooth. Wireless routing protocols – Mobile IP – IPv4 – IPv6 – Wireless TCP. Protocols for 3G & 4G cellular networks – IMT – 2000 – UMTS – CDMA2000 – Mobility management and handover technologies – All-IP based cellular network

UNIT III: TYPES OF WIRELESS NETWORKS 9

Mobile networks – Ad-hoc networks – Ad-hoc routing – Sensor networks – Peer-Peer networks – Mobile routing protocols – DSR – AODV – Reactive routing – Location aided routing – Mobility models – Entity based – Group mobility – Random way – Point mobility model.

UNIT IV: ISSUES AND CHALLENGES 9

Issues and challenges of mobile networks – Security issues – Authentication in mobile applications – Privacy issues – Power management – Energy awareness computing. Mobile IP and Ad-hoc networks – VoIP applications.

UNIT V: SIMULATION 6

Study of various network simulators (GloMoSim – NS2 – Opnet) – Designing and evaluating the performance of various transport and routing protocols of mobile and wireless networks using network simulator (any one).

Total: 45

REFERENCES

1. Theodore S. Rappaport, "Wireless Communications, Principles and Practice", Prentice Hall, 1996.
2. Stallings W., "Wireless Communications & Networks", Prentice Hall, 2001.
3. Schiller J., "Mobile Communications", Addison Wesley, 2000.
4. Lee W. C. Y., "Mobile Communications Engineering: Theory and Applications", 2nd Edition, TMH, 1997.
5. Pahlavan K. and Krishnamurthy P., "Principles of Wireless Networks", Prentice Hall, 2002.
6. Black U. D., "Mobile and Wireless Networks", PHI, 1996.
7. Charles E. Perkins, "Ad – Hoc Networking", Addison – Wesley, December 2000
8. IEEE Journals and Proceedings

17152H62P **SEMESTER VI**

MEDICAL ELECTRONICS **4 1 0 4**

AIM

To make students to understand the applications of electronics in diagnostic and therapeutic area.

OBJECTIVE

- To study the methods of recording various biopotentials
- To study how to measure biochemical and various physiological information
- To understand the working of units which will help to restore normal functioning
- To understand the use of radiation for diagnostic and therapy
- To understand the need and technique of electrical safety in Hospitals

UNIT I ELECTRO– PHYSIOLOGY AND BIO– POTENTIAL RECORDING 9

The origin of bio-potentials – Bio-potential electrodes – Biological amplifiers – ECG – EEG – EMG – PCG – EOG – Lead systems and recording methods – Typical waveforms and signal characteristics.

UNIT II BIO– CHEMICAL AND NON ELECTRICAL PARAMETER MEASUREMENT 9

PH – PO2 – PCO2 – PHCO3 – Electrophoresis – Colorimeter – Photometer – Auto analyzer – Blood flow meter – Cardiac output – Respiratory measurement – Blood pressure – Temperature – Pulse – Blood cell counters.

UNIT III ASSIST DEVICES AND BIO– TELEMETRY 9

Cardiac pacemakers – DC defibrillator – Telemetry principles – Frequency selection – Bio-telemetry – Radio – Pill and tele-stimulation.

UNIT IV RADIOLOGICAL EQUIPMENTS 9

Ionosing radiation – Diagnostic X-ray equipments – Use of radio isotope in diagnosis – Radiation therapy.

UNIT V RECENT TRENDS IN MEDICAL INSTRUMENTATION 9

Thermo graph – Endoscopy unit – Laser in medicine – Diathermy units – Electrical safety in medical equipment.

TUTORIAL 15 **TOTAL: 60**

TEXTBOOK

1. Leislie Cromwell, “Biomedical Instrumentation and Measurement”, PHI, 2002.

REFERENCES

1. Khandpur R.S., “Handbook of Biomedical Instrumentation”, TATA McGraw-Hill, 1997.

2.Joseph J. Carr and John M. Brown, “Introduction to Biomedical Equipment Technology”, John Wiley and Sons, 1997.

17152H63P **SEMESTER VI**

MICRO CONTROLLER AND EMBEDDED SYSTEMS 4 1 0 4

Aim

To make students familiar about microcontroller, programming and its applications.

Objective

- To study 8051 architecture
- To write assembly language programming
- To study the embedded architecture and real time applications.

UNIT I 8051 MICROCONTROLLER 9

8051 Micro controller hardware- I/O pins, ports and circuits- External memory –Counters and Timers-Serial Data I/O- Interrupts-

UNIT II 8051 PROGRAMMING AND APPLICATIONS 9

8051 instruction set – Addressing modes – Assembly language programming – I/O port programming -Timer and counter programming – Serial Communication – Interrupt programming –8051 Interfacing:, Stepper Motors,.

UNIT III INTRODUCTION TO EMBEDDED SYSTEMS 9

Definition and Classification – Overview of Processors and hardware units in an embedded system – Software embedded into the system – Exemplary Embedded Systems – Embedded Systems on a Chip (SoC)

UNIT IV DEVICES AND BUSES FOR DEVICES NETWORK 9

I/O Devices - Device I/O Types– Synchronous - Iso-synchronous and Asynchronous Communications from Serial Devices -Communication Devices - UART and HDLC - Parallel Port Devices - Timer and Counting Devices - '12C', 'CAN' - I/O Serial high speed buses- ISA,

UNIT V EMBEDDED ARCHITECTURE 9

Embedded computers, characteristics of embedded, computing applications- challenges in embedded computing systems design, embedded design process, requirements and specifications, architectural design

TUTORIAL 15 **TOTAL : 60**

TEXT BOOKS

1. Ramesh S.Gaonkar, "Microprocessor - Architecture, Programming and Applications with the 8085", Penram International publishing private limited, fifth edition.
2. A.K. Ray & K.M.Bhurchandi, "Advanced Microprocessors and peripherals-Architectures, Programming and Interfacing", TMH, 2002 reprint.
3. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, First reprint Oct. 2003

REFERENCES

1. Douglas V.Hall, "Microprocessors and Interfacing: Programming and Hardware", TMH, Third edition
2. Yu-cheng Liu, Glenn A.Gibson, "Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design", PHI 2003
3. Mohamed Ali Mazidi, Janice Gillispie Mazidi, "The 8051 microcontroller and embedded systems", Pearson education, 2004.
4. Steve Heath, Embedded Systems Design, Second Edition-2003, Newnes,
5. David E.Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.
6. Wayne Wolf, Computers as Components; Principles of Embedded Computing System Design – Harcourt India, Morgan Kaufman Publishers, First Indian Reprint 2001

17152L65P **SEMESTER VI**

VLSI AND EMBEDDED SYSTEMS LAB 0 0 3 2

PART –I: VLSI LAB

1. Study of Simulation using tools using Digital Logic Circuits.
2. Study of Synthesis tools using Digital Logic Circuits.
3. Study of development tool for FPGA using Verilog and Schematic Entry.
4. Design and Simulation of 8bit Signed Multiplier.
5. Place and Root and back annotation for FPGA.

PART-II: EMBEDDED LAB

1. Programming using Arithmetic, instruction of 8051microcontroller.
2. Programming and verifying Timer operations in 8051 microcontroller.
3. ARM-7 based On board LED testing
4. ARM 7 Based ADC testing
5. ARM 7 based DAC testing

ELECTIVE -III

17160E64AP **SEMESTER VI**

PRINCIPLES OF MANAGEMENT

(Common to all Branches) **4-0-0-4**

UNIT I - Nature of Management

Definitions, meaning, scope, administration and management - Science and art Mgmt as a profession, University of management Hierarchy (Top, middle and supervisory, Levels), Principles of Management

UNIT II - Development of Management Thought **9**

Taylor and Scientific Management, Principles of Scientific Management Contributions of fayol,Barnard and social system theory, Contributions of Herbert Simon, Contributions of Peter Drucker, Contributions of behavioral scientists ,Contribution of system scientists

UNIT III - Planning and organizing **9**

Definition and features of planning, Nature of planning, Importance of planning
Types of planning, Steps in planning. Management by objectives, Strategies and policies, Definition of organization, Importance of organization, Principles of organization, Span of management

UNIT IV - Direction and Coordination **9**

Meaning, definition, principles of direction, Techniques of direction - Meaning of supervision, Functions of supervisor, Meaning of coordination Element and features of coordination, Importance of coordination Cooperation and coordination systems approach Steps for effective coordination Meaning and causes of conflicts, Management of conflicts

UNIT V – Controlling **9**

Definition, Meaning .elements, steps in establishing control procedure Control Techniques, Requirements of good control systems Budget –meaning, definitions, types Zero based budgeting, responsibility accounting, budgetary control, Report –meaning types PERT and CPM Management by Exception

TOTAL : 45

Textbooks:

1. Prasad L.M ., Principles and practice of Management ,New Delhi Sultan Chand and sons ,1998

References:

1. saxena ,s.c principles and practice of management Agra : sahitya bhawan 1998
2. Koontz Harold and others ,Management New York :McGraw Hill 1980
3. stoner james and others ,Management ,New Delhi :PHI ,1997
4. Dale Yoder : Personnel Management and industrial Relations ,New Delhi
5. PHI 1974

17152E64BP **SEMESTER VI**

SATELLITE COMMUNICATION **4 0 0 4**

AIM

To enable the student to become familiar with satellites and satellite services.

OBJECTIVES

- Overview of satellite systems in relation to other terrestrial systems.
- Study of satellite orbits and launching.
- Study of earth segment and space segment components
- Study of satellite access by various users.
- Study of DTH and compression standards.

UNIT I : ELEMENTS OF ORBITAL MECHANICS 9

Equation of motion – Orbital elements – Orbital perturbation – Tracking and orbit determination – orbit control.
Satellite Launch systems: Fundamentals of Rocket propulsion – Multistage rockets – Huffman transfer orbit circularization

UNIT II: ELEMETS OF COMMUNICATION SATELLITE DESIGN 9

Space environment – Spacecraft configuration – Spacecraft subsystems – Payload – Reliability consideration – Spacecraft integration – Testing facilities – Spacecraft operations.

UNIT – III : SATELLITE COMMUNICATION SYSTEMS 9

Types of systems – FSS,BSS- Noise interference ,inter modulation –CDMA- Packet satellite networks – The INSAT system - The INTELSAT/INMARSAT system.

UNIT – IV:EARTH STATION DESIGN 9

Earth station configuration option – Site selection – Antenna systems – Tracking systems – Receiver subsystems – Low noise amplifiers – Down converters – Transmitter subsystems – Up converters- High power amplifiers - Terminal equipment .

UNIT - V: PERFORMANCE MEASUREMENTS 9

Spacecraft checkout – Ground station measurements –System coordination and control .Elements of Frequency coordination and management : The ITU/IFRB requirements – Satellite system characterization – Ground system characteristics .

TOTAL : 45

Text book:

1. B.N.AGARWAL :Deign of Geosynchronous spacecraft, Prentice Hall

Reference Books:

1. R.F.FILIPOWASKY and E.K.MUCHIDORF: Space communication Systems ,Mcgraw Hill
2. DENNIS RODDY – Satellite communication
3. K.MIYA :Satellite communication technology – Lattice and company

17152E64CP **SEMESTER VI**

ROBOTICS **4 0 0 4**

AIM

Robots are slowly and steadily replacing human beings in many fields. The aim of this course is to introduce the students into this area so that they could use the same when they enter the industries.

OBJECTIVES

- The course has been so designed to give the students an overall view of the mechanical components and mathematics associated with the same.
- Actuators and sensors necessary for the functioning of the robot.

UNIT I: ROBOT ORGANIZATION 9

Coordinate transformation, kinematics and inverse kinematics – Trajectory planning and remote manipulation.

UNIT II: ROBOT HARDWARE 9

Robot sensors – Proximity sensors – Range sensors – Visual sensors – Auditory sensors – Robot manipulators – Manipulator dynamics – Manipulator control – Wrists – End efforts – Robot grippers.

UNIT III: ROBOT AND ARTIFICIAL INTELLIGENCE 9

Principles of AI – Basics of learning – Planning movement – Basics of knowledge representations – Robot programming languages.

UNIT IV: ROBOTIC VISION SYSTEMS 9

Principles of edge detection – Determining optical flow and shape – Image segmentation – Pattern recognition – Model directed scene analysis.

UNIT V: ROBOT CONTROL AND APPLICATION 9

Robot control using voice and infrared – Overview of robot applications – Prosthetic devices – Robots in material handling, processing assembly and storage.

Total: 45

REFERENCES

1. Koren, “Robotics for Engineers”, TMH International Company, 1995.
2. Vokopravotic, “Introduction to Robotics”, Springer, 1988.
3. Rathmill K., “Robot Technology and Application”, Springer, 1985.
4. Charniak and Mc Darmott, “Introduction to Artificial Intelligence”, TMH, 1986.
5. Fu K.S, Gonzally R.C, Lee C.S.G., “Robotics Control, Sensing, Vision and Intelligence”, TMH Book Company, 1997.
6. Barry Leatham and Jones, “Elements of Industrial Robotics”, Pittman Publishing, 1987.
7. Mikell P. Groover, Mitchell Weiss, Roger N. Nagel, Nicholas G. Odrey, “Industrial Robotic Technology Programming and Applications”, TMH Book Company, 1986.
8. Bernard Hodges and Paul Hallam, “Industrial Robotics”, British Library Cataloguing Publication, 1990.

17152E64DP **SEMESTER VI**

REMOTE SENSING **4 0 0 4**

AIM:

To understand the basics for REMOTE SENSING

OBJECTIVES:

- Introduce the principles of remote sensing and fundamental knowledge on the physics of remote sensing, aerial photographic techniques, photogrammetry, multispectral, hyperspectral and thermal imaging, and RADAR and LIDAR image analysis.
- The newest technology in the field will also be discussed.
- The course will be taught with an emphasis on the geographical applications of remote sensing; however, in certain instances other disciplines will be introduced as well.

UNIT I : REMOTE SENSING 9

Definition – Components of Remote Sensing - Energy, Sensor, Interacting Body – Active and Passive Remote Sensing – Platforms – Aerial and Space Platforms – Balloons, Helicopters, Aircraft and Satellites – Synoptivity and Repetivity – Electro Magnetic Radiation (EMR) – EMR spectrum – Visible, Infra Red (IR), Near IR, Middle IR, Thermal IR and Microwave – Black Body Radiation – Planck's law – Stefan-Boltzman law.

UNIT II: EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS 9

Atmospheric characteristics – Scattering of EMR – Raleigh, Mie, Non-selective and Raman Scattering – EMR Interaction with Water vapour and ozone – Atmospheric Windows – Significance of Atmospheric windows – EMR interaction with Earth Surface Material – Radiance, Irradiance, Incident, Reflected, Absorbed and Transmitted Energy – Reflectance – Specular and Diffuse Reflection Surfaces – Spectral Signature – Spectral Signature curves – EMR interaction with water, soil and Earth Surface: Imaging spectrometry and spectral characteristics.

UNIT – III : OPTICAL AND MICROWAVE REMOTE SENSING 9

Satellites – Classification – Based on Orbits and purpose – Satellite Sensors – Resolution – Description of Multi Spectral Scanning – Along and Across Track Scanners – Description of Sensors in Land sat, SPOT, IRS series – Current Satellites – Radar Speckle – Back Scattering – Side Looking Airbome Radar – Synthetic Aperture Radar – Radiometer – Geometrical characteristics ; Sonar remote sensing systems.

UNIT – IV: GEOGRAPHIC INFORMATION SYSTEM 9

GIS – Components of GIS – Hardware, Software and Organisational Context – Data – Spatial and Non-Spatial – Maps – Types of Maps – Projection – Types of Projection – Data Input – Digitizer, Scanner – Editing – Raster and Vector data structures – Comparition of Raster and Vector data structure – Analysis using Raster and Vector data –Retrieval, Reclassification, Overlaying, Buffering – Data Output – Printers and Plotters.

UNIT - V: MISCELLANEOUS TOPICS 9

Visual Interpretation of Satellite Images – Elements of Interpretation – Interpretation Keys Characteristics of Digital Satellite Image –Image enhancement – Filtering – Classification – Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Urban Applications – Integration of GIS and Remote Sensing – Application of Remote Sensing and GIS – Water resources – Urban Analysis – Watershed Management – Resources Information Systems. Global positioning system – an introduction.

TOTAL : 45 PERIODS

TEXT BOOK:

1. M.G. Srinivas(Edited By), Remote Sensing Applications, Narosa Publishing House, 2001. (Units 1& 2).
2 Anji Reddy, Remote Sensing and Geographical Information Systems, BS Publications 2001 (Units 3, 4, & 5).

REFERENCE BOOKS:

3. Jensen, J.R., Remote Sensing of the environment, Prentice Hall, 2000.
4. Kang-Tsung Chang, "Introduction to Geographic Information Systems" , TMH, 2002
5. Lillesand T.M. and Kiefer R.W., "Remote Sensing and Image Interpretation", John Wiley and Sons, Inc, New York, 1987.
6. Burrough P A, "Priciples of GIS for land resource assessment", Oxford
7. Mischael Hord, "Remote Sensing and Methods and Applications" , John Wiley & Sons, New York, 1986.
8. Signal, "Remote Sensing", Tata McGraw-Hill, NewDelhi, 1990.
9. Floyd F. Sabins, Remote Sensing, "Priciples and interpretation", W H Freeman and Company 1996.

17150E64EP **SEMESTER VI**

NETWORK SECURITY **4 0 0 4**

AIM

To understand the principles of encryption algorithms; conventional and public key cryptography. To have a detailed knowledge about authentication, hash functions and application level security mechanisms.

OBJECTIVES

- To know the methods of conventional encryption.
- To understand the concepts of public key encryption and number theory
- To understand authentication and Hash functions
- To know the network security tools and applications.
- To understand the system level security used.

UNIT I: SYMMETRIC CIPHERS 9

Overview – Classical encryption techniques – Block ciphers and data encryption standard – Finite fields – Advanced encryption standard – Contemporary symmetric ciphers – Confidentiality using symmetric encryption.

UNIT II: PUBLIC-KEY ENCRYPTION AND HASH FUNCTIONS 9

Number theory – Public-key cryptography and RSA – Keym – Diffie-hellman key exchange – Elliptic curve cryptography – Message authentication and hash functions – Hash algorithms – Digital signatures and authentication protocols.

UNIT III: NETWORK SECURITY PRACTICE 9

Authentication applications – Kerberos-X.509 authentication service – Electronic mail security – Pretty good privacy – S/MIME – IP security – IP security architecture – Authentication header – Encapsulating security payload – Key management.

UNIT IV: SYSTEM SECURITY 9

Intruders – Intrusion detection – Password management – Malicious software – Firewalls – Firewall design principles – Trusted systems.

UNIT V: WIRELESS SECURITY 9

Wireless LAN security standards – Wireless LAN security factors and issues.

Total: 45

TEXT BOOK

1. William Stallings, “Cryptography and Network Security – Principles and Practices”, 3rd Edition, Pearson Education, 2003.

REFERENCES

1. Atul Kahate, “Cryptography and Network Security”, 2nd Edition, TMH, 2007.
2. Bruce Schneier, “Applied Cryptography”, 2nd Edition, John Wiley and Sons Inc, 2001.
3. Stewart S. Miller, “Wi-Fi Security”, TMH, 2003.
4. Charles B. Pfleeger and Shari Lawrence Pfleeger, “Security in Computing”, 3rd Edition, Pearson Education, 2003.

17160S71P **SEMESTER VII**

TOTAL QUALITY MANAGEMENT **4 0 0 3**

OBJECTIVE

- To understand the Total Quality Management concept and principles and the various tools available to achieve Total Quality Management.
- To understand the statistical approach for quality control.
- To create an awareness about the ISO and QS certification process and its need for the industries.

1. INTRODUCTION **9**

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

2. TQM PRINCIPLES **9**

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.

3. STATISTICAL PROCESS CONTROL (SPC) **9**

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

4. TQM TOOLS **9**

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

5. QUALITY SYSTEMS **9**

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, TS 16949, ISO 14000 – Concept, Requirements and Benefits.

TOTAL : 45

TEXT BOOK

1. Dale H.Besterfiled, et al., Total Quality Management, Pearson Education, Inc. 2003. (Indian reprint 2004). ISBN 81-297-0260-6.

REFERENCES

1. James R.Evans & William M.Lidsay, The Management and Control of Quality, (5th Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).
2. Feigenbaum.A.V. "Total Quality Management, McGraw-Hill, 1991.
3. Oakland.J.S. "Total Quality Management Butterworth – Hcinemann Ltd., Oxford. 1989.
4. Narayana V. and Sreenivasan, N.S. Quality Management – Concepts and Tasks, New Age International 1996.
5. Zeiri. "Total Quality Management for Engineers Wood Head Publishers, 1991

17152H72P **SEMESTER VII**

WIRELESS NETWORKS **4 1 0 4**

AIM

To study some fundamental concepts in wireless networks.

OBJECTIVES

- To understand physical as wireless MAC layer alternatives techniques.
- To learn planning and operation of wireless networks.
- To study various wireless LAN and WAN concepts.
- To understand WPAN and geo-location systems.

UNIT I: PHYSICAL AND WIRELESS MAC LAYER ALTERNATIVES 9

Wired transmission techniques: Design of wireless modems – Power efficiency – Out of band radiation – Applied wireless transmission techniques – Short distance base band transmission – VWB pulse transmission – Broad modems for higher speeds – Diversity and smart receiving techniques – Random access for data oriented networks – Integration of voice and data traffic.

UNIT II: WIRELESS NETWORK PLANNING AND OPERATION 9

Wireless networks topologies – Cellular topology – Cell fundamentals signal to interference ratio calculation – Capacity expansion techniques – Cell splitting – Use of directional antennas for cell sectoring – Micro cell method – Overload cells – Channels allocation techniques and capacity expansion FCA – Channel borrowing techniques – DCA – Mobility management – Radio resources and power management securities in wireless networks.

UNIT III: WIRELESS WAN 9

Mechanism to support a mobile environment – Communication in the infrastructure – IS-95 CDMA forward channel – IS-95 CDMA reverse channel – Pallert and frame formats in IS-95, IMT-2000 – Forward channel in W-CDMA and CDMA-2000 – Reverse channels in W-CDMA and CDMA-2000 – GPRS and higher data rates – Short Messaging Service in GPRS mobile application protocols.

UNIT IV: WIRELESS LAN 9

Historical overviews of the LAN industry – Evolution of the WLAN industry – Wireless Home Networking – IEEE 802.11 – The PHY layer – MAC layer – Wireless ATM –

HYPER LAN – HYPER LAN – 2.

UNIT V: WPAN ANDGEOLOCATION SYSTEMS 9

IEEE 802.15 WPAN – Home RF – Bluetooth – Interface between luetooth and 802.11 –

Wireless geolocation technologies for wireless geolocation – Geolocation standards for E.911 service.

Tutorial:15 **Total: 60**

TEXT BOOK

1. Kaveh Pahlavan, Prashant Krishnamoorthy, "Principles of Wireless Networks, – A United Approach", Pearson Education, 2002.

REFERENCES

1. Jochen Schiller, "Mobile Communications", 2nd Edition, Person Education, 2003.
2. Wang X. and Poor H.V., "Wireless Communication Systems", Pearson Education, 2004.
3. Mallick M., "Mobile and Wireless Design Essentials", Wiley Publishing Inc. 2003.
4. Nicopolitidis P, Obaidat M.S, Papadimitria G.I, Pomportsis A.S., "Wireless Networks", John Wiley and Sons, 2003.

17152H73P **SEMESTER VII**

TELECOMMUNICATION SWITCHING AND NETWORKS 4 0 0 4

AIMS

- To introduce fundamentals functions of a telecom switching office, namely, digital multiplexing, digital switching and digital subscriber access.
- To introduce a mathematical model for the analysis of telecommunication traffic.

OBJECTIVES

- To introduce the concepts of Frequency and Time division multiplexing.
- To introduce digital multiplexing and digital hierarchy namely SONET / SDH
- To introduce the concepts of space switching, time switching and combination switching, example of a switch namely No.4 ESS Toll switch.
- To introduce the need for network synchronization and study synchronization issues. To outline network control and management issues.
- To study the enhanced local loop systems in digital environment. To introduce ISDN, DSL / ADSL, and fiber optic systems in subscriber loop.
- To introduce statistical modeling of telephone traffic. To study blocking system characteristics and queuing system characteristics.
- To characterize blocking probability holding service time distributions for in speech and data networks.

UNIT I EVOLUTION OF TELECOMMUNICATION SWITCHING AND CIRCUITS 9

Evolution of Public Switched Telecommunication Networks Strowger exchange, Crossbar exchange,– Basic Tele communication equipments – Telephone handset, , Echo suppressors and cancellors, PCM coders, Modems and Relays.

UNIT II ELECTRONIC SWITCHING 9

Circuit Switching, Message switching, Centralized stored programme switching, Time switching, Space switching,– Digital switching system hardware configuration,

UNIT III TELECOMMUNICATION SIGNALLING AND TRAFFIC 9

Channel associated signaling, Common channel signaling, SS7 signaling protocol, SS7 protocol architecture, , Grade of service, Modeling switching systems, Blocking models and Delay systems.

UNIT IV INTEGRATED DIGITAL NETWORKS 9

Subscriber loop characteristics, Local access wire line and wire less PCM / TDM carrier standards transmission line codes, Synchronous, Asynchronous, SONET / SDH, Integrated Digital Network (IDN) environment – Principles of Integrated Services Digital Network (ISDN) –

UNITV DATA NET WORKS 9

Data transmission in PSTN – Connection oriented and Connection less protocols – packet switching – ISO-OSI architecture-Satellite based data networks –LAN, WAN – standards – TCP / IP – Internet –

TOTAL : 45

TEXT BOOKS:

1. Viswanathan. T, "Telecommunication Switching System and Networks", Prentice Hall of India Ltd., 1994.
2. Behrouz Forouzan, "Introduction to Data Communication and Networking", McGraw-Hill, 1998.

REFERENCES

1. L.S.Lawton, "Integrated Digital Networks, Galgotta Publication Pvt., Ltd., New Delhi,1996.
2. Syed R. Ali, "Digital Switching Systems", McGraw-Hill Inc., New York, 1998.

ELECTIVE – IV

17152E74AP **SEMESTER VII**

POWER ELECTRONICS 4 0 0 3

AIM

Application of Electronic knowledge in industry for rectification of polyphase supply voltage and for control of motor speed and for thermal heating.

OBJECTIVES

- To study about power electronic circuits for voltage and current control and protection.
- To learn the switching characteristics of transistors and SCRs. Series and parallel functions of SCRs, Programmable triggering methods of SCR.
- To learn controlled rectification AC supplies.
- To study of converters and inverters.
- To learn about motor control, charges, SMPS and UPS.

UNIT I POWER SEMICONDUCTOR DEVICES 9

Power transistors, Thyristors, Power TRIAC, MOSFET, IGBT, GTO characteristics, rating, Protection circuits,.

UNIT II POWER SUPPLIES 9

Single Phase and Three Phase Controlled rectifiers, Design of Trigger circuits, Switching mode regulators – Boost, Buck, Buck-Boost and Cuk regulators, AC voltage regulator.

UNIT III INVERTERS 9

Voltage and current source inverters, Resonant, Series inverter, PWM inverter.

UNIT IV CHOPPERS 9

Type A, B, C and D choppers, Pulse width modulation - Gating requirements.

UNIT V MOTOR CONTROL & Applications 9

Single Phase DC series motor drives, Induction and Synchronous motor drives, Switched reluctance motor Drive, SMPS and UPS

TOTAL: 45

TEXT BOOK:

1. M.D.Singh, K.B. Khanchandani, "Power Electronics", Tata McGraw-Hill, 1998.

REFERENCES:

1. Ned Mohan, Tore M.Undeland, William P.Robbins, "Power Electronics, Converters, Applications and Design", John Wiley & Sons, 1994.
2. Muhamed H.Roshid, "Power Electronics Circuits, Devices and Application", Prentice Hall of India, 1995.
3. B.K.Bose, "Modern Power Electronics", Jaico Publishing House, 1999.
4. Sen, Power Electronics", Tata McGraw-Hill, 1987

17152E74BP **SEMESTER VII**

ADVANCED MICROPROCESSORS **4 0 0 3**

AIM

To learn the architecture and programming of advanced Intel family microprocessors and microcontrollers.

OBJECTIVES

- To introduce the concepts in internal programming model of Intel family of microprocessors.
- To introduce the programming techniques using MASM, DOS and BIOS function calls.
- To introduce the basic architecture of Pentium family of processors.
- To introduce the architecture programming and interfacing of 16 bit microcontrollers.
- To introduce the concepts and architecture of RISC processor and ARM.

UNIT I ADVANCED MICROPROCESSOR ARCHITECTURE 9

Internal microprocessor architecture – Real mode memory addressing – Protected mode memory addressing – Memory paging – Data addressing modes – Program memory addressing modes – Stack memory addressing modes – Data movement instructions – Program control instructions – Arithmetic and logic instructions.

UNIT II MODULAR PROGRAMMING AND ITS CONCEPTS 9

Modular programming – Using keyboard and video display – Data conversions – Disk files – Interrupt hooks – Using assembly languages with C/ C++

UNIT III PENTIUM PROCESSORS 9

Introduction to pentium microprocessor – Special pentium registers – Pentium memory management – New pentium instructions – Pentium processor – Special pentium pro features – Pentium IV processor

UNIT IV 16– BIT MICRO CONTROLLER 9

8096/8097 architecture – CPU registers – RALU – Internal program and data memory timers – High speed input and output – Serial interface – I/O ports – Interrupts – A/D converter – Watch dog timer – Power down feature – Instruction set – External memory interfacing – External I/O interfacing.

UNIT V RISC PROCESSORS AND ARM 9

The RISC revolution – Characteristics of RISC architecture – The berkeley RISC – Register windows – Windows and parameter passing – Window overflow – RISC architecture and pipelining – Pipeline bubbles – Accessing external memory in RISC systems – Reducing the branch penalties – Branch prediction – ARM processors – ARM registers – ARM instructions – ARM built-in shift mechanism – ARM branch instructions – Sequence control – Data movement and memory reference instructions.

TOTAL: 45

TEXT BOOKS

1.Barry B. Brey, "The Intel Microprocessors 8086/8088, 80, 86, 80286, 80386 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, Architecture, Programming and Interfacing", PHI Private Limited, 2003.
2. John Peatman, "Design with Microcontroller", TMH Publishing Co Ltd, 2003.
3. Alan Clements, "The Principles of Computer Hardware", 3rd Edition, Oxford University Press, 2003.

REFERENCES

1. Rajkamal, "The Concepts and Feature of Micro Controllers 68HC11, 8051 and8096", S Chand Publishers, 2000.

17152E74CP **SEMESTER VII**

ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY 4 0 0 3

AIM

To understand different electromagnetic Interference problems occurring in Intersystem and in inter system and their possible mitigation techniques in Electronic design

OBJECTIVES

- To understand EMI Sources, EMI problems and their solution methods in PCB level / Subsystem and system level design.
- To measure the emission. immunity level from different systems to couple with the prescribed EMC standards

UNIT I BASIC CONCEPTS 9

Definition of EMI and EMC with examples – Classification of EMI/EMC – CE – RE – CS – RS – Units of parameters – Sources of EMI – EMI coupling modes – CM and DM – ESD phenomena and effects – Transient phenomena and suppression.

UNIT II EMI MEASUREMENTS 9

Basic principles of RE, CE, RS and CS measurements – EMI measuring instruments – Antennas – LISN – Feed through capacitor – Current probe – EMC analyzer and detection technique open area site – Shielded anechoic chamber – TEM cell.

UNIT III EMC STANDARD AND REGULATIONS 8

National and intentional standardizing organizations – FCC – CISPR – ANSI – DOD – IEC – CENEEC – FCC – CE and RE standards – CISPR – CE and RE standards – IEC/EN – CS standards – Frequency assignment – Spectrum conversion.

UNIT IV EMI CONTROL METHODS AND FIXES 10

Shielding – Grounding – Bonding – Filtering – EMI gasket – Isolation transformer – Opto-isolator.

UNIT V EMC DESIGN AND INTERCONNECTION TECHNIQUES 9

Cable routing and connection – Component selection and mounting – PCB design – Trace routing – Impedance control – Decoupling – Zoning and grounding

TOTAL: 45

TEXT BOOKS

1. Prasad Kodali V., "Engineering Electromagnetic Compatibility", S. Chand and Co, 2000.
2. Clayton R. Paul, "Introduction to Electromagnetic Compatibility" , Wiley and sons ,1992

REFERENCES

1. Keiser, "Principles of Electromagnetic Compatibility", 3rd Edition, Artech House , 1994
3. Donwhite Consultant Incorporate , "Handbook Of EMI / EMC" , Vol I , 1985

17152E74DP **SEMESTER VII**

SOLID STATE ELECTRONIC DRIVES 4 0 0 3

AIM

To have fundamental knowledge about structure of devices, VI characteristics of devices like PN Junction diode, Zener diode, MOSFET, BJT and Opto electronic.

OBJECTIVES:

- To learn crystal structures of elements used for fabrication of semiconductor devices.
- To study energy band structure of semiconductor devices.
- To understand fermi levels, movement of charge carriers, Diffusion current and Drift current.
- To study behavior of semiconductor junction under different biasing conditions. Fabrication of different semiconductor devices, Varactor diode, Zener diode, Schottky diode, BJT, MOSFET, etc.
- To study the VI Characteristics of devices and their limitations in factors like current, power frequency.
- To learn photoelectric effect and fabrication of opto electronic devices.

UNIT I: CRYYSTAL PROPERTIES AND GROWTH SEMICONDUCTORS 9

Semiconductor materials – periodic Structures – Crystal Lattices – Cubic lattices – Planes and Directions – Diamond lattice – Bulk Crystal Growth – Starting Material – Growth of Single Crystal Ingots – Wafers – Doping – Epitaxial Growth – Lattice Matching in Epitaxial Growth – Vapor – Phase Epitaxy – Atoms and Electronics – Introduction to Physical Models – Experimental Observations – Photoelectric Effect – Atomic spectra – Bhr model – Quantum Mechanics – Probability and Uncertainty Principle – Schrodinger Wave Equation – Potential Well Equation – Potential well Problem – Tunneling.

UNIT II: ENERGY BANDS AND CHARGE CARRIERS IN SEMICONDUCTORS AND JUNCTIONS 9

Energy bands in Solids, Energy Bands in Metals, Semiconductors, and Insulators – Direct and Indirect Semiconductors – Variation of Energy Bands with Alloy Composition - Charge Carriers in Semiconductors – Electrons and Holes – Electrons and holes in Quantum Wells – Carrier Concentrations –Femi Level – Electron and Hole Concentrations at Equilibrium – Temperature Dependence of Carrier Concentrations – Compensation and Space Charge Neutrality – Drift of Carrier in Electric and Magnetic Fields conductivity and Mobility – Drift and Resistance – Effects of Temperature and Doping on Mobility – High Field effects – Hall Effect – invariance of Fermi level at equilibrium – Fabrication of p-n junctions, Metal semiconductor junctions.

UNIT III: METAL OXIDE SEMICONDUCTOR FET 9

GaAS MESFET – High Electron Mobility Transistor – Short channel Effects – Metal Insulator Semiconductor FET – Basic Operation and Fabrication – Effects of Real Surfaces – Threshold Voltage – MOS capacitance Measurements – Current – Voltage Characteristics of MOS Gate Oxides – MOS Field Effect Transistor – Output Characteristics – Transfer characteristics - Short Channel MOSFET V-I characteristics – Control of Threshold Voltage – Substrate Bias Effects - Sub threshold characteristics – Equivalent Circuit for MOSFET –MOSFET Scaling and Hot Electron Effects – Drain – Induced Barrier Lowering – short channel and Narrow width Effect – Gate Induced Drain Leakage.

UNIT IV: OPTO ELECTRON DEVICES 9

Photodiodes – Current and Voltage in illuminated Junction – Solar Cells – Photo detectors – Noise and Bandwidth of Photo detectors – Light Emitting Diodes – Light Emitting Material – Fiber Optic Communication Multilayer Heterojunctions for LEDS – Lasers – Semiconductor lasers – Population Inversion at a Junction Emission Spectra for p-n junction – Basic Semiconductor laser – Materials for Semiconductor laser.

UNIT V HIGH FREQUENCY AND HIGH POWER DEVICES 9

Tunnel Diode, IMPATT Diode, operation of TRAPATT and BARITT Diodes, Gunn Diode – transferred – electron mechanism, formation and drift of space charge domains, p-n-p-n diode, Semiconductor Controlled Rectifier, Insulated Gate Bipolar Transistor.

TOTAL: 45

TEXT BOOKS

1. Ben. G. Streetman & Sanjan Banerjee, Solid State Electronic Devices, 5th Edition, PHI, 2003.

REFERENCES

2. Donald A. Neaman, Semiconductor Physics and Devices, 3rd Edition, TMH, 2002.
3. Yannis Tsividis, Operation & Mode line of MOS Transistor, 2nd Edition, Oxford University Press, 1999.
3. Nandita Das Gupta & aamitava Das Gupta, Semiconductor Devices Modeling a Technology, PHI, 2004.
4. D.K. Bhattacharya & Rajinish Sharma, Solid State Electronic Devices, Oxford University Press, 2007.

17152E74EP **SEMESTER VII**

COMPUTER HARDWARE AND INTERFACING 4 0 0 3

AIM

To enable the student to get a detailed knowledge of all the hardware components that make up a computer and to understand the different interfaces required for connecting these hardware devices.

OBJECTIVES

- To introduce issues related to CPU and memory.
- To understand the components on the motherboard
- To understand different storage media
- To introduce the features of different I/O peripheral devices and their interfaces.

UNIT I CPU AND MEMORY 9

CPU essentials – processor modes – modern CPU concepts – Architectural performance features – the Intel's CPU – CPU over clocking – over clocking requirements – over clocking the system – over clocking the Intel processors – Essential memory concepts – memory organizations – memory packages – modules –memory.

UNIT II MOTHERBOARDS 9

Pentium4 mother board -form factor – upgrading a mother board – chipsets – north bridge – south bridge –motherboard BIOS – POST – BIOS features – BIOS and Boot sequences – BIOS shortcomings and compatibility issues – power supplies and power management – concepts of switching regulation – potential power problems – power management.

UNIT III STORAGE DEVICES 9

The floppy drive – magnetic storage – magnetic recording principles – data and disk organization – floppy drive – hard drive – data organization and hard drive – sector layout –CDROM electronics – DVD-ROM – DVD media – DVD drive and decoder.

UNIT IV I/O PERIPHERALS 9

Parallel port – signals and timing diagram – IEEE1284 modes – asynchronous communication - serial port signals – video adapters – graphic accelerators – 3D graphics accelerator issues –

UNIT V BUS ARCHITECTURE 9

Buses – Industry standard architecture (ISA), peripheral component Interconnect (PCI) – Accelerated Graphics port (AGP) – plug-and-play devices – SCSI concepts – USB architecture.

TOTAL: 45

TEXT BOOK

1. Stephen J.Bigelow, "Trouble Shooting, maintaining and Repairing PCs", Tata McGraw-Hill, New Delhi, 2001.

REFERENCES

1. Craig Zacker & John Rourke, "The complete reference:PC hardware", Tata McGraw-Hill, New Delhi, 2001.
2. Mike Meyers, "Introduction to PC Hardware and Trouble shooting", Tata McGraw-Hill, New Delhi, 2003.
3. B.Govindarajulu, "IBM PC and Clones hardware trouble shooting and maintenance", Tata McGraw-Hill, New Delhi, 2002.