SCHEME OF INSTRUCTION AND EVALUATION
I SEMESTER OF II YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME

ELECTRONICS & COMMUNICATION ENGINEERING

Course Number	Course	Hours of Instruction per week			Scheme of Evaluation			Total Marks
					External Evaluation		Sessionals	
		Lectures	Tutorials	Drawing / Practicals	Duration of Exam.	Max. Marks	Max. Marks	
MH 211	Mathematics – II	3	1	---	3 Hrs.	100	50	150
EI 213	Electronic Measurements & Instrumentation	3	1	---	3 Hrs.	100	50	150
EC 214	Switching Theory & Logic Design	3	1	---	3 Hrs.	100	50	150
EI 215	Electronic Devices & Circuits – I	3	1	---	3 Hrs.	100	50	150
EE 216	Electrical Technology	3	1	---	3 Hrs.	100	50	150
EE 218	Network Analysis and Synthesis	3	1	---	3 Hrs.	100	50	150
EE 219	Electrical Technology & Networks Lab	---	---	3	3 Hrs.	50	25	75
EI 2110	Electronic Devices & Circuits – I Lab	---	---	3	3 Hrs.	50	25	75
		18	**6**	**6**				**1050**

(6+2) Total: 30 Hours

MH 211 MATHEMATICS – II

Class: B.Tech. II/IV, I-Semester
Branch: CSE,IT, Mech, Civil, ECE, EEE, E&I
Duration of Univ. Examination: 3 Hrs.

Lectures: 3 Hrs, Tutorials:1
Univ. Examination : 100 marks
Sessionals: 50 marks

UNIT – I

COMPLEXINTEGRATION: Line integration in complex plan, Cauchy's integral theorem (simple proof only), Cauchy's integral formula. Taylor's series & Laurent's series expansion – Zeros and singularities. Residues – Residue theorem – Evaluation of real integrals using residue theorem (contours of the nature semicircle and circle only).

UNIT – II

LAPLACE TRANSFORMS: Laplace transforms – inverse transforms – Properties of Laplace transforms – Laplace transforms of unit step function, Impulse function and periodic functions – Convolution theorem. Solution of ordinary differential equation with constant coefficients and system of ordinary differential equations with constant coefficients and system of ordinary differential equations with constant coefficients using Laplace transforms.

UNIT – III

FOURIER SERIES: Fourier Series – Expansion in a given range – Fourier series even and odd functions – Half Range sine and cosine series expansions.

UNIT – IV

PARTIAL DIFFERENTIAL EQUATIONS: solution of wave equation, Heat equation and Laplace equation by the method of separation of variables and their application in problems of vibrating string, one dimensional unsteady heat flow and two dimensional steady heat flow (Problem based on Fourier – Trigonometric series only).

TEXT BOOKS:

1. B.Grewal, "Higher Engineering Mathematics", Khanna publishers, New Delhi.

REFERENCE BOOKS:

1. R.V.Churchill, "Complex Variables and its Applications", McGrawHill, Newyork.
2. Dr.M.K.Venkata Raman, "Engineering Mathematics", Vol.III, National Publishing Co., Madras.
3. E.Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Ltd, New Delhi.

EI 213 ELECTRONIC MEASUREMENTS & INSTRUMENTATION

Class: **II/IV B.Tech. I Semester**. Lectures: **3,** Tutorials: **1**
Branch: **ECE** University Examination: **100 marks**
Duration of University Examination: **3 hours** Sessionals: **50 marks**

UNIT-I

ELECTRONIC MEASUREMENTS: Significance of Measurement & block diagram of Measurement System – Accuracy, Precision, Percentage error and Linearity in Measurements – DC & AC Voltage measurements using Rectifier, Thermocouple & Electronic Voltmeters – block diagram approach for measurement of voltage, current and Resistance using Digital Multi Meter (DMM) – Basic Potentiometer Circuit – Q-meter.

BRIDGES: Wheatstone Bridge, Kelvins Double Bridge, Maxwell's Bridge, Schering bridge and Wien's Bridge. (9+3)

UNIT-II

OSCILLOSCOPES: Cathode Ray Tube (CRT), Electrostatic Deflection, Post Deflection and Acceleration of Electron Beam, Screens for CRT's Block diagram of CRO, Time-Base Generator, Free running and Triggered Sweeps, Attemators, Probes – Dual Beam Oscilloscope – Dual Trace Oscilloscope – Sampling Oscilloscope – Digital Storage Oscilloscope – Applications of CRO: Measurement of Phase and Frequency using Lissajous Patterns.

SIGNAL ANALYSIS INSTRUMENTS: Frequency Selective & Meterodyne Wave Spectrum Analyzers – Harmonic distortion Analyzers, Total Harmonic distortion – Elementary Magnetic tape Recorder. (9+3)

UNIT – III

TRANSDUCERS: Transducer and its classification, Ideal Requirements of Transducer – Resistive Transducers: Potentiometric type, Strain Gauge type (Gauge factor derivation, SG materials, Bonded and unbounded strain gauges) – Capacitive Transducers : Variable gap type, variable area type & variable Dielectric type – Inductive Transducers: Variable Reluctance type, LVDT type – Piezo Electric Transducers (Piezoelectric effect, Piezoelectric materials, Frequency Response of PZT) – Phot electric Transducers (LDR, Photo transistor, Photo Voltaic Cell). (9+3)

UNIT – IV

TRANSDUCER APPLICATIONS: Force Measurement using loadcells & Strain gauge – Acceleration Measurement using Piezoelectric Accelerometer – Temperature Measurement using Thermistor & Thermocouple – Pressure Measurement using Pressure sensing elements – Flow Measurement using Electro Magnetic Flow Meter – Fluid Velocity Measurement using Hot wire Anemometer – Ultrasonic Level Gauge – Sound Measurement (Sound Level Meter Block diagram, Capacitive Microphone). (9+3)

Text Books:

1. Helfrick. A.D and Cooper W.D.: "MODERN ELECTRONIC INSTRUMENTATION AND MEASUREMENT TECHNIQUES" – PHI
2. Golding E.W. and Wides.F.C.: "Electrical Measurements and Measuring Instruments" – wheeler Publications.
3. B.C.Nakra And K.K.Chowdary "Instrumentation Measurement and Analysis " – TMH, New Delhi.

Reference Books:

1. Sawhney A.K: "ELECTRICAL AND ELECTRONIC MEASUREMENT AND INSTRUMENTATION" – Dhanpat Rai & Sons.
2. Larry D.Jones and A.Foster Chin: "electronic Instruments and Measurements" – John Wiley & Sons.
3. Oliver and Cage: "ELECTRONIC MEASUREMENTS AND INSTRUMENTATION" – McGraw Hill International Edition.

EC 214 SWITCHING THEORY AND LOGIC DESIGN

Class: II/IV B.Tech. I-Semester
Branch: (Common to ECE and EIE)
Duration of Uni. Exams: 3 Hours

Lecturers : 3 Tutorials: 1
Uni. Examinations: 100 marks
Sessions: 50 Marks

UNIT – I

Number Systems and Codes: Review of Number systems, binary arithmetic – binary weighted and non weighted codes – error detecting and error correcting codes.

Boolean Algebra: Postulates and theorems – Logic gates and truth tables – Representation of switching functions – SOP & POS forms – Karnaugh Map representation – Minimization using K-Map. Quine Mc'Clusky method of minimization

UNIT – II

Design of Combinational Circuits:

Design of combinational circuits using conventional AND, OR, NOT, NAND, NOR & EX-OR gates – Adders / Subtractors: – Half Adder, Full Adder, Half Subtractor Full Subtractor, Parallel Adder, Serial Adder, Carry Look ahead Adder, BCD Adder, 1's complement subtractor, 2's complement subtractor, Decoders: BCD to 7 segment, BCD to decimal decoders. Encoders: Priority encoders, Multiplexers, Demultiplexers, Realization of switching functions using multiplexers and decoders.

UNIT – III

Sequential Circuits: Flip Flops – SR flip flop, JK flip flop, D flip flop, T flip flop, Excitation tables- Race around condition, Master slave flip flop, Excitation tables.

Design of Synchronous and Asynchronous counters, shift registers - Modes of operation, Bidirectional shift registers, Ring counters, Johnson counters. Glitches and delay problems in counters.

UNIT – IV

Synchronous Sequential Circuits and Iterative Networks: State table, state diagram, state assignment, state minimization, synthesis of synchronous, sequential circuits – Sequence detectors – Binary counters.

Capabilities and Minimization of Sequential Machines: Mealy and Moore Machines – Capabilities and limitations of finite state machine – state equivalence and machine minimization.

TEXT BOOKS:

1. Zvi. Kohavi, *Switching and Finite Automata Theory* , Tata McGraw-Hill, New Delhi.
2. Taub & Schilling, *Digital Integrated Circuits*, Tata McGraw-Hill, New Delhi.

REFERENCE BOOKS:

1. Moris Mano, *Digital Logic Design*, Prentice Hall of India, New Delhi.
2. Samuel.C.Lee & B.S.Sonde, *Digital Circuits & Logic Design*, Prentice Hall of India, New Delhi.

3. R.P. JAIN**, *Modern Digital Electronics,*** Prentice Hall of India, New Delhi

EI 215 ELECTRONIC DEVICES AND CIRCUITS – I

Class: II/IV B.Tech. I –Semester
Branch: ECE, E&I, EEE
Duration of University Examination: 3 Hours

Lectures: 3, Tutorial: 1
University Examination: 100 marks
Sessionals: 50 marks

UNIT – I

Review of semiconductor diodes. Continuity equation. Junction capacitance. Temperature dependence of p-n junction. Halfwave rectifier – and fullwave rectifier, Bridge rectifier – with and without filters. Ripple, Regulation. Series and shunt regulators. Introduction to SMPS.

UNIT – II

Transistors, current components in NPN and PNP transistors, Ebers-Moll model. Small Signal LF h-parameter model, Determination of h-parameters – Analysis of transistor amplifier using h-parameters in CE, CB and CC configuration –simplified analysis for these configurations. BJT as switch

UNIT – III

FETs : JFET-V-I characteristics, MOSFET – Enhancement and Depletion type MOSFETs. Small signal model – Analysis of CS, CD amplifier.
Principles, characteristics and applications of SCR, UJT, Tunnel diode, Varactor diode. Diac Triac LED, Photo diode and Photo Transistor.

UNIT – IV

Transistor biasing Thermal runway and thermal stabilization. The operating point stability Collector –to-base, self Bias. Stabilization against variations in V_{BE} and Beta for self bias circuits, FET biasing, Source self bias. Zero current drift biasing. Biasing against device variation. Biasing of enhancement type MOSFET.

TEXT BOOKS:

1. Jocob Millman & Christos C.Halkias, Electronic Devices and Circuit, McGraw Hill, 1991.
2. Robert Boylestad & Lowis Nashelsky, electronic Devices and Circuit theory, Prentice Hall of India, 5th Ed., 1993.
3. Donald L Schilling & Charles Belove, Electronic Circuits: Discrete & Integrated, McGraw Hill International Edition, 3rd Edition., 1989.

EE 216 ELECTRICAL TECHNOLOGY & THEORY

Class: II/IV B.Tech. II-Semester
Branch: ECE / EIE
Duration of Univ. Examination: 3 Hours

Lectures: 3, Tutorial: 1
Univ. Examination: 100 marks
Sessionals: 50 Marks

UNIT – I

Ohm's Law, Network Elements, Kirchhoff's Laws, Source Transformation, Mesh and Nodal Analysis, Power in Electric Circuits, Series, Parallel and Series Parallel and Combination of Resistances, network reduction by Star – Delta Transformation, Superposition, Thevenin's Norton's, and Maximum Power transfer theorems. (9+3)

UNIT – II

1 – Phase A.C. Circuits: Phasor representation of sinusoidal quantities, Average, R.M.S. values and Form factor, A.C. through Resistor, Inductor and Capacitor, Analysis of R-L-C series and parallel circuits, Power factor, power triangle, Series Resonance.

3-ϕ A.C. Circuits: Production of 3-ϕ Voltages, Voltage & Current relationships of Line and Phase values for Star and Delta Connections, 3-ϕ Power Measurement by two-wattmeter method for balanced loads. (9+3)

UNIT – III

Magnetic circuits: Self and Mutual Inductance, Dot Convention, Coefficient of Coupling. B-4 loop curve.

D.C.Machines: Constructional features, Methods of Excitation, Characteristics of Series, Shunt and Compound Generators and Applications, Torque development in D.C. motor, Characteristics of Series, Shunt and Compound motors and Applications.

Single Phase Transformers: Construction and operation principle, Development of No Load & On Load Phasor diagrams, Equivalent circuit, O.C. and S.C. tests, Losses and Efficiency, Voltage regulation. (9+3)

UNIT – IV

3-ϕ Induction Motor: Constructional features, Principle of Operation, Production of Rotating Magnetic Field, Torque – slip Characteristics, Applications.

1-ϕ Induction Motors: Production of Rotating Field in various type of 1-phase motors split phase, capacitor start, capacitor run, shaded pole motors and applications.

Synchronous Generators and Motors: Principal of Operation and its Applications. (9+3)

TEXT BOOKS:

1. Vinvent Del Toro "PRINCIPLES OF ELECTRICAL ENGINEERING" PHI.
2. Edward Hughes, "ELECTRICAL TECHNOLOGY", Pearson Publisher.

REFERENCE BOOKS:

1. M.S. Naidu & S.Kamakshaiah, "INTRODUCTION TO ELECTRICAL ENGINEERING.
2. B.L. Thereja, "ELECTRICAL TECHNOLOGY" S.Chand & Company Ltd.
3. Sudhakar and Shyam Mohan " NETWORK ANYLYSIS AND SYNTHESIS" TMH.
4. Nagrath and Kothari " BASIC ELECTRICAL ENGINEERING" TMH.

EE 218 NETWORK ANALYSIS & SYNTHESIS

Class: II/IV B.Tech. I-Semester
Branch: (Common to ECE, EEE and EIE)
Duration of Uni. Exams: 3 Hours

Lecturers : 3 Tutorials: 1
Uni. Examinations: 100 marks
Sessions: 50 Marks

UNIT – I

Network Topology: Topological description of networks – Lumped Vs Distributed circuits – Network graph theory – Tress, co-Tress and loops – Incidence matrix – Tie-Set and Cut-Set Matrices – Kirchoff's Laws and analysis of Networks.

Time response analysis of Networks: Transient analysis of R-L, R-C, R-L-C series & parallel networks with step, impulse, sinusoidal and pulse excitation – Initial conditions – Special signal wave form Ramp, Triangular train of pulses, delayed input.

P-SPICE: Introduction to P-SPICE representation of circuit elements – Analysis of Circuits using P-SPICE – Simple problems.

UNIT – II

Two port Networks: Characterisation of linear time invariant two port networks – open circuit impedance parameters – Short circuit admittance parameters – transmission parameters – Inverse transmission parameters – Hybrid parameters – Inverse Hybrid parameters – Inter relationship between parameters – Inter connections of two port networks – Ladder network – Bridged T, Parallel T and Lattice T networks – Network representation of element devices – Network transmission criteria.

UNIT – III

Network Functions: Network function for 1-port and 2-port networks and their relationships – Ladder Networks – General Networks – Poles and zeros of Network functions – Restrictions of pole zero locations for driving point functions.

Network Synthesis: Positive real function properties – Hurwitz Polynomials – Even and odd functions – Test for positive Real functions – Elementary synthesis operation – properties and Foster and Cauer forms of RL, RC and LC networks. (9+3)

UNIT-IV

Image and iterative impedance, transfer constants, insersion loss, attenuators,
Passive Filters: LPF,HPF,BPF and BRF constant K-and m derived filters, composite filters.

TEXT BOOKS:

1. M.E.Van Valkenberg " Network Analysis" PHI.
2. W.H.Hayt and Jr.Kemmerly "Engineering Circuit Analysis" TMH.
3. James W.Nilson " Electric Circuits" Pearson Education.
4. Muhammed H.Rasheed. " SPICE for circuits and Electronics Uning P-Spice"

REFERENCES:

1. J.Edminister & M.Nahvi. " Electric Circuits" Schaum's outlines, TMH.
2. D.Roy Choudhary "Networks analysis and Synthesis" New Age Publishers
3. K.A. Gangadhar "Circuit Theory" Khanna Publishers.

EE 219 ELECTRICAL TECHNOLOGY & NETWORKS LAB

Class: II/IV B.Tech. I-Semester
Branch: ECE
Duration of Univ. Examination: 2 Hours

Practicals: 2
University Examination: 50 Marks
Sessionals: 25 marks

LIST OF EXPERIMENTS

1. Verification of Kirchhoffs Laws
2. Verification of Superposition Theorem.
3. Verification of Thevenin's Theorem.
4. Voltage and Current relationships of line and phase values in star, delta connections and 3-phase power measurement by two-wattmeter method.
5. frequency response of R-L-C series circuit
6. Determination of Parameters of choke coil.
7. S.C. Tests on 1-phase transformer to determine the equivalent circuit parameters and predetermination of efficiency.
8. Efficiency and voltage Regulation of a 1-phase transformer by direct load test.
9. Speed control and Swinburne's test on D.C. shunt motor to predetermine efficiency as Motor and Generator
10. Brake test on 3-phae Induction Motor.
11. Load test on D.C. shunt Generator
12. Demonstration Experiments
    a) D.C. Motor
    b) D.C. Generator (O.C.C.)
    c) 1-phase Induction Motors
    d) Alternators.

EI 2110 ELECTRONIC DEVICES & CIRCUITS-I LAB

Class: **II/IV B.Tech. I Semester** *Practicals :* **2 Hrs**
Branch : **E&I, ECE** University *Examination:* **50 Marks**
Duration of University Examination: **2 Hrs** *Sessionals :* **25 Marks**

LIST OF EXPERIMENTS

1. Characteristics of a Semiconductor diode / Zener Diode.
2. Half-wave / Full – wave Rectifier with and without filters
3. Voltage Regulator
4. BJT Static Characteristics – CE, CB configurations.
5. FET Static Characteristics CS (Common Source
6. Biasing Circuits (BJT) fixed bias, collector to base bias, self-bias
7. Transistor as Switch.
8. SCR characteristics.
9. UJT characteristics.
10. LED / Photodiode / Photo transistor characteristics.

SCHEME OF INSTRUCTION AND EVALUATION
II SEMESTER OF II YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME

ELECTRONICS & COMMUNICATION ENGINEERING

Course Number	Course	Hours of Instruction per week			Scheme of Evaluation			Total Marks
					External Evaluation		Sessionals	
		Lectures	Tutorials	Drawing/ Practicals	Duration of Exam	Max Marks	Max Marks	
MH 221	Mathematics-III	3	1	-	3 hrs.	100	50	150
EC 222	Electro Magnetic Waves & Transmission lines	3	1	-	3 hrs.	100	50	150
EC 223	Digital Integrated Circuits	3	1	-	3 hrs.	100	50	150
EI 224	Electronic Devices & Circuits – II	3	1	-	3 hrs.	100	50	150
EC 225	Signals & Systems	3	1	-	3 hrs.	100	50	150
CS 2210	Programming and Data Structures	3	1	-	3 hrs	100	50	150
EI 228	Electronic Devices &Circuits-II Lab	-	-	3	3 hrs	50	25	75
EC 227	Digital Electronics Lab	-	-	3	3 hrs	50	25	75
		18	**6**	**6**				**1050**

(6+2) Total : 30 Hours

MH 221 MATHEMATICS – III

Class: B.Tech. II/IV, II-Semester lectures: 3 Hrs, Tutorials:
Branch: CSE, IT, Mech, Civil, ECE, EEE, E&I Univ. Examination : 100 Marks
Duration of Univ. Examination: 3 Hrs. Sessionals: 50 marks

UNIT – I

MATRICES: Rank of a matrix – Solution of System of Linear equations – Linear dependence and independence of vector – Characteristics roots and Characteristics vectors of a matrix-Cayley Hamilton Theorem 9without proof) – Reduction to diagonal form and normal form. Reduction of a quadratic form to canonical form. (8+3)

UNIT – III

PROBABILITY AND STATISTICS: Curve fitting – Method of least squares – Straight line and parabolic curves – Correlation Coefficient – Rank Correlation – Regression – Linear Regression equations. Random variables – Discrete and continuou distribution – Density and distribution functions – Illustrations through Binomial, poisson and normal distributions. (8+3)

UNIT – III

NUMERICAL ANALYSIS: Interpolation. Forward, Backward interpolation – Newton's and Lagrange's formulae.

NUMERACAL DIFFERENTIATION AND INTEGRATION: First and second derivatives using forward and backward interpolation. Numerical Integration-Trapezoidal and Simpson's rule. (8+3)

UNIT – IV

SOLUTION TO SYSTEM OF LINEAR EQUATIONS: Jacobi, Gauss Siedel iteration method – solution of algebraic and transcendental equations – Bisection method, Regula – Falsi method & Newton Raphson's Method.

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS: Taylor's methods, Euler's method, Runge – Kutta methods of second and fourth orders. (8+3)

TEXT BOOK:

1. B.S.Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi.

REFERENCE BOOKS:

1. S.S.Sastry, "Introductiory Numeriacal Analysis".
2. E.Kreyszic, "Advanced Engineering Mathematics", Wiley Eastern, New Delhi.
3. gupta and Kapoor, "Fundamentals of Mathematical Statistics" S.Chand and Co., New Delhi.

EC 222 ELECTRO MAGNETIC WAVES & TRANSMISSION LINES

Class: **II/IV B.Tech. II Semester**. *Lectures:***3,***Tutorials:***1**
Branch: **ECE** *University Examination:* **100 marks**
Duration of University Examination: **3 hours** *Sessionals:* **50 marks**

UNIT - I

ELECTRO STATICS: Coulomb's law, Electric field intensity, Field due to line charge and sheet of charge, Flux density Gauss's law and its applications, Electric Potential, potential gradient, Relation between E & V, Poissons's and Laplace's equation. Energy density, Boundary conditions between two dielectrics, capacitance - parallel plate , co-axial, spherical cable. **[9 + 3]**

MAGNETO STATICS: Biot-savart's law, Magnetic field strength, Flux density Ampere's circuit law, stokes theorem, Ampere's force law, Magnetic scalar and vector potentials, Magnetic boundary conditions, Energy stored in magnetic field.

UNIT - II

TIME-VARYING FIELDS : MAXWELLS EQUATIONS: Faraday's laws of Electro Magnetic Induction, continuity equation for time varying fields, In consistence of Ampere's law, Maxwells equations in differential & Integral forms, Boundary conditions for time varying fields. **[9 + 3]**

ELECTROMAGNETIC WAVES: Wave equations for free space and conducting medium, Uniform plane waves, Sinusoidal time varying fields, conductors and dielectric, wave propagation through good conductors and good dielectrics, Polarisation, Direction cosines, Reflection of EM waves by a perfect conductor, a perfect dielectric, surface impedance, skin effect.

UNIT – III

POYNTING VECTOR: Poynting theorem, Instantaneous, Average and complex poynting vectors, power loss in a plane conductor. **[9 + 3]**

GUIDED WAVES & WAVE GUIDES: Waves between parallel planes, TE, TM, TEM Waves characteristics of TE, TM & TEM Waves. Rectangular wave guides, TE & TM waves in wave guides, Impossibility of TEM waves in rectangular wave guides, introduction to circular wave guides. **[9+3]**

UNIT - IV

Transmission Lines : Primary & Secondary constants, Transmission Line equations, Phase and group velocities, loss less ness / Low Loss characterization, distortion and loading, expression for i/p impedance, SC & OC lines, UHF lines as circuit elements, $\lambda/8$, $\lambda/4$, $\lambda/2$, lines – impedance transformations, smith chart – its configuration and

applications, single and double stub matching techniques. Illustrative problems (Incl, of smith chart applications and single stub matching) (9+3)

TEXT BOOKS:

1. " ELECTRO MAGNETIC WAVES AND RADIATING SYSTEMS ."
- E.C. Jordan & K.G. Balman, Prentice Hall of India

2. "TRANSMISSION LINES AND NETWORKS" – By Umesh Sinha, .Satya Prakashan (Tech. India Publication) New Delhi.

3. "ENGINEERING ELECTROMAGNETICS."-Hayt William Jr,TMH Publishing

REFERENCE BOOKS:

1. Elements of Electromagnetics – by Mathew N.O. Sadiku, Oxford Univ Prem, 2/e.

EC 223 DIGITAL INTEGRATED CIRCUITS

Class: **II/IV B.Tech. II Semester**. Lectures:**3,**Tutorials:**1**
Branch: **ECE** University Examination: **100 marks**
Duration of University Examination: **3 hours** Sessionals: **50 marks**

UNIT-I

Logic Families: Detailed study of RTL, I^2L, DCTL, DTL, HTL, TTL, ECL, MOS & CMOS families and their properties and comparison.

UNIT-II

Programmable Logic Devices: PLAs, PALs, FPGAs, CPLDs.
Algorithmic State machines: ASM charts, ASM blocks, timing considerations, data path design, control logic design, design with MUXs and Flip flops, typical examples.

UNIT-III

EDA Tools: Introduction of HDL Simulation & Synthesis, VHDL – Basic Language elements and various modellings.

Behavioral Modeling: Process assignment statements, WAIT, IF, CASE, NULL, LOOP, EXIT, NEXT, ASSERTION, REPORT statements. Simple Programming.

UNIT-IV

DATA FLOW Modeling: Cuncurrent Vs sequential Signal assignment, multiple drivers, signal assignment statements, block statement simple programming.
Structural modeling: Component declaration, component instantiation, simple programming.
Generics and Configurations.

Text Books:

1. Digital Integrated Electronics: Tanb & Schiling –
2. Digital Design – M.Moris Mano – PHI.
3. VHDL Primer – J. Bhaskar – PHI.

References Books:

1. VHDL – Dougles . L. Perry. McGraw Hill.
2. Digital – B.S.Sonde.

EI 224 ELECTRONIC DEVICES & CIRCUITS – II

Class: **II/IV B.Tech. II Semester**. Lectures:**3,**Tutorials:**1**
Branch: **ECE , EIE, EEE** University Examination: **100 marks**
Duration of University Examination: **3 hours** Sessionals: **50 marks**

UNIT-I

SMALL SIGNAL LOW FREQUENCY TRANSISTOR AMPLIFIER CIRCUITS:
Analysis of Single Stage transistor amplifier circuits using h-parameters, RC coupled amplifier – Frequency response analysis, cascaded amplifiers.

HIGH FREQUENCY TRANSISTOR AMPLIFIER CIRCUITS:
High frequency model of a transistor α and β cut-off frequencies, single Stage and Multistage amplifiers at High frequencies Calculation of Band Width of single and multistage amplifiers.

UNIT-II

DC AMPLIFIERS:
DC amplifiers, drift compensation techniques, differential amplifiers.
FET AMPLIFIERS:
FET Low frequency and High Frequency models; Low and High frequency response of amplifier circuits, Analysis of Single and Multistage amplifier circuits.

UNIT-III

FEED BACK AMPLIFIERS:
Concept of feedback, Classification of feedback amplifiers, general characteristics of negative feedback amplifiers, effect of feedback on amplifier characteristics.
OSCILLATORS:
Condition for Oscillations, RC and LC type oscillators, crystal oscillators, frequency and amplitude stability of Oscillations.

UNIT-IV

POWER AMPLIFIERS:
Class A,B and AB power amplifiers: Push-Pull and Complementary push-pull amplifiers, design of heat sinks, power o/p efficiency, cross – over and Harmonic Distortion.

TUNED AMPLIFIERS:
Single tuned and Double tuned voltage amplifiers, Inter stage design, stability considerations, class B and Class C tuned Power amplifiers.

TEXT BOOKS:

1. Milman & halkas, “Integrated Electronics” TMH, New Delhi.
2. Robart Boylestad & Lowis Nashelsky, “Electronic Devices & Circuits”

REFERENCE BOOKS:

M.S.Gausi, “Electronic Circuits”, John Wiley & Sons, New york.

EC 225 SIGNALS & SYSTEMS

Class: **II/IV B.Tech. II Semester**. Lectures:**3,**Tutorials:**1**
Branch: **ECE, EIE, EEE** University Examination: **100 marks**
Duration of University Examination: **3 hours** Sessionals: **50 marks**

UNIT-I

Signals – Signals and their representation, classification of signals, singularity functions – Impulse, step, ramp functions, representation of signals withsingularity functions, exponential functions.

Systems: Definition, Classification of Systems, Convolution integral, graphical convolution.

Signal Approximation – Approximation of a function by a set of mutually orthogonal functions, mean square error, complete set of orthogonal functions orthogonality in complex functions, Trigonometirc and exponential Fourier series, representation of periodic functions by Fourier series, complex Fourier spectrum.

UNIT-II

Fourier Transforms and their applications to systems – Fourier transform definition, properties of F.Ts , energy spectral density, parsevals theorem, power spectral density, Hilbert transforms and properties.

Linear Systems – impulse response, response of a linear system, linear time invariant system, linear time variant system, transfer function of LTI system.

UNIT-III

Random Variables & Processes – Probability, Joint Probability, Statistical independence, Random Variables, cumulative distribution function, probability density function, relation between probability & probability density, joint commutative distribution, average valve of random variables, variance of a random variable, tchebycheffs inequality, the Gaussian probability density, the error function, Rayleigh probability density, mean & variance of the sum of random variables, correlation between random variables, central limit theorem.

UNIT-IV

Discrete Time Signals & Systems: Discrete time signals, representation, operations on sequences, Discrete time systems and classification, LTI systems, Linear Convolution, Difference equations.

Z-Transforms: ROC, properties of Z-Transforms Inverse Z-Transforms, Causality and stability.

Realization of Discrete Systems: Structural realization of discrete systems – Direct form – I, Direct form-II, Cascade and parallel forms.

TEXT BOOKS:

1. Simon & Haykins, Signals & Systems, Wiley Eastern Ltd.,
2. Zeimer, Signals & Systems, PHI.
3. Proakis, Digital Signal Processing: Principles, Algorithms and Applications.(PHI)
4. Simon & Haykin – " Signals & Circuits" – John Willey

REFERENCE BOOKS:

1. Oppenheim, Willsky & Young; Signals and Systems PHI, EEE, New Delhi.
2. P-Z Peebles – Probabilities, Random Variables and Random Signal Principles – TMH.
3. B.P. Lathi, Signals & Systems and Communication – BSP.

CS 2210 PROGRAMMING AND DATA STRUCTURES

Course: **II/IV B.Tech. II Semester** | Theory: **3 Periods/week**
Branch: **ECE** | Tutorial: **1 Period/week**
External Examination: **3 Hours** | External Evaluation: **100**
Internal Examination: **2 Hours** | Internal Evaluation: **50**

UNIT-I (9+3)

Basics of Data Structures: Data structure definition, Applications of data structures, Algorithms, Programs, Design and analysis steps, Time and Storage analysis.
Arrays: Representation of arrays, Memory allocation for arrays, Operations on arrays, Applications of arrays, Pointer arrays, Sparce matrix Operations, Polynomial operations.
Stacks: Stack model and operations, Stack implementation, Multiple stacks.
Stack applications: Infix, Prefix, Postfix notations, Conversion and evaluation of expressions, Recursion.

UNIT-II

Queues: Queue model and operations, Queue implementation, Circular queue, Circular queue implementation, Dequeues, Priority queues, Applications of queues. **(9+3)**
Linked Lists: Definition, Representation of a linked list in memory, Operations on single linked list, Double linked list, Operations on double linked list, Circular Linked list, Linked list operations with header node, Implementation of stacks and queues using linked lists.
Applications of linked lists: Polynomial representation, Polynomial operations, Dynamic storage Management, Generalized lists, Garbage collection and Memory compaction.

UNIT-III (9+3)

Trees: Basic terminologies, Binary trees representation using arrays, Binary tree representation using linked lists, Binary tree traversal algorithms: inorder traversal, preorder traversal, postorder traversal, Binary search tree, Binary search tree operations(addition of a node, deleting a node)

Graphs: Terminology, Graph representation methods: adjacency matrix, adjacency lists, adjacency multilists, Graph traversal algorithms: Depth first search, Breadth first search, spanning trees, Minimum spanning tree, Shortest paths.

UNIT-IV

Searching: Linear search algorithm, Binary search algorithm, Fibonacci search algorithm, Comparison of search algorithms. **(9+3)**
Sorting: Insertion sort algorithm, Shell sort algorithm, Quick sort algorithm, Merge sort algorithm, Two way merge sort algorithm, Heap sort algorithm.

(All above topics with intuitive notion of complexity of algorithms)

SUGGESTED TEXT / REFERENCE BOOKS:

1. Ellis Horowitz, Sartaj Sahani, Dinesh Metha, "Fundamentals of data Structures in C++", Galgotia Publications Pvt. Ltd., ISBN 81-7515-27, 2003.

2. D. Samanta, "Classic Data Structures", Prentice Hall India, ISBN 81-203-1874-9, 2002.

3. Mark Allen Weiss, "Data structure & algorithm analysis in C++", 2nd Edition, Pearson Education, ISBN 81-2808-670-0.

4. Yashvant P.Kanetkar, "Data structures through C++", First Edition, BPB Publications, ISBN-81-7656-707-8, 2003.

EC 227 DIGITAL ELECTRONICS LAB

Class: **III/IV B.Tech. I Semester** Practicals:**3Hrs.**
Branch: **ECE** Sessionals : **25 Marks**
Duration of University Examination: **3 hours** University Examination : **50 Marks**

LIST OF EXPERIMENTS

1. Logic gates: Aim: Realization of all logic gates using NAND / NOR gates and verfication of their truth tables.
2. Half and Full Adders: Aim: Realization of Half and Full adders using NAND gates and verification of their truth tables.
3. Half and Full subtractors: Aim: Realization of half and full subtractors using NAND gates and verification of their truth tables.
4. BCD Adder: Aim: Design of BCD Adder using 4 bit Full Adder (IC7483) and Logic gates and verification of its truth table.
5. "n" bit Ripple counter: Aim : Design of "n" bit ripple counter using JK/T FFS and verification of its function table.
6. Master Slave JK FF: Aim: Design of master slave JK FF with NAND gates and verification of its truth table.
7. 4 bit Ring and Johnson Counters: Aim: Design of 4 bit Ring and Johnson counters using DFFS (IC7474) and verification of their function tables.
8. Decade Counter and Decoders: Aim: Verification of the function table of Decade Counter (IC7490) and displaying its output in decimal form using decoders (IC7442-BCD to 7 segment and IC7446 – BCD to Decimal)
9. 4:1 MUX: Aim: Design of a 4 to 1 multiplexer using logic gates and verification of its function table.
10. 8:1 MUX : Aim: Realization of Boolean expressions using 8 to 1 MUX
11. 4 bit shift Register: Aim: Design of a 4 bit shift register and verification of its different modes of operation.
12. Transfer Characteristic of NAND gate: Aim: To experimentally plot the transfer characteristic of NAND gate and to find $\Delta 0$ and $\Delta 1$ Noise margins.

TEXT BOOK:

1. Zvi. Kohavi, *Switching and Finite Automatation*, Tata McGraw-Hill, New Delhi.

EI 228 ELECTRONIC DEVICES & CIRCUITS LAB-II

Class: **II/IV B.Tech. II Semester** University Examination: **50 Marks**
Practicals **: 2 Hours** Duration of University Examination: **2 Hours**
Branch : **ECE, E&I** Sessionals **: 25 Marks**

LIST OF EXPERIMENTS

1. Measurement of h-parameters
2. Single Stage BJT amplifier
3. Two stage BJT amplifier
4. FET amplifier
5. Differential amplifier
6. Voltage series feedback amplifier
7. Voltage shunt feedback amplifier
8. Current series feedback amplifier
9. Current shunt feedback amplifier
10. RC phase shift oscillator
11. Weinbridge oscillator
12. LC/crystal oscillator.
13. Class B Power amplifier
14. Single Tuned amplifier.

SCHEME OF INSTRUCTION AND EVALUATION
I SEMESTER OF III YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME

ELECTRONICS & COMMUNICATION ENGINEERING

Course Number	COURSE	Hours of Instruction per week			Scheme Evaluation			Total Marks
					External Evaluation		Sessionals	
		Lectures	Tutorials	Drawing /Practical	Duration of Exam	Max. Marks	Max. Marks	
HS 311	Economics, Management & Accountancy	4	-	-	3 Hrs	100	50	150
EC 311	Computer Architecture	4	-	-	3 Hrs	100	50	150
EC 312	Analog Communication Systems	3	1	-	3 Hrs	100	50	150
EE 319	Control System Engineering	3	1	-	3 Hrs	100	50	150
EC 313	Pulse and Digital Circuits	3	1	-	3 Hrs	100	50	150
EC 314	Linear Integrated Circuits	3	1	-	3 Hrs	100	50	150
EC 315	Pulse and Digital Circuits Lab	-	-	3	3 Hrs	50	25	75
EC 316	Linear Integrated Circuits lab	-	-	3	3 Hrs	50	25	75
	TOTAL	**20**	**4**	**6**		**700**	**350**	**1050**

(6+2) 30 Hours

HS 311 ECONOMICS MANAGEMENT AND ACCOUNTANCY
For B.Tech., III/IV, I-Semester
(Compulsory for All Branches)

Weekly No. of Hours: 04 Max.Marks: 150
Internal Exam: 50
Univ. Exam: 100 marks

ECONOMICS

UNIT – I

Economics: Meaning, Definition, Scope: Micro and Macro. Assumptions and Methods. Usefulness. (2 periods)

Factors of Production: Meaning and Definition, Characteristics of Land Labour, capital and Entrepreneurship. Division of Labour, Advantages and disadvantages. Formation of Capital. Forms of Business organization; Sole proprietaryship, parthnership concern, cooperative societies joint stock company. Types of partners, Types of joint Stock companies. Merits and Demerits. (6 periods)

MANAGEMENT

UNIT – II

Management: Meaning and Definition. Scope of management – Principles of Management. Scientific management: Definition, Characteristics and Criticism. (4periods)

Functions of Management: Planning; Definition and Process. Organizing Definition of Organization; Characteristics and types. Principles of Organization. Departmentation; Meaning and Fundamentals of Departmentation. Centralization and Decentralization; Definition; features Merits and Demerits. Communication; Process of Communication, Channels, media, and Barriers. (10 periods)

UNIT – III

Staffing: Meaning and Functions of Personnel Management. Coordination Definition, how to Achieve effective coordination. Controlling; Definition and Process (4 periods)

ACCOUNTANCY

UNIT - IV

Double Entry Book Keeping: definition. Journalization of Transactions. Ledger Posting and Balancing. Preparation of Trial Balance. (10 periods)

Preparation of Final Accounts: Trading Account, Profit and loss Account and Balance Sheet (with simple Adjustments) (7 periods)

REFERENCE BOOKS:

1. Modern Economic Theory – K.K.Dewett.
2. Principles and Practice of Management – L.M.Prasad.
3. Introduction to Accountancy – T.S.Grewal.
4. Business Organization and Management – Y.K.Bhushan.

EC 311 COMPUTER ARCHITECTURE

Class: **III/IV B.Tech. II Semester** *Lectures:* **3**
Branch : **ECE, EIE** *University Exam. :* **100 marks**
Duration of University Examination : **3 hours.** *Sessionals :* **50 marks**

UNIT – I

Introduction: Types of Computers: Analog, Digital and Hybrid. Generation of Computers and their comparison. Dissection of Computer into various blocks; Communication among the blocks; Common bus concept, design of bus lines using MUXs and tristate buffers.

The Arithmetic Logic Unit: General register organization, stack organization of CPU, Instruction formats, Instruction types, addressing modes; Introduction to Assembly Language Programming. BASIC, ALU design: Arithmetic Unit, Logic Unit, and Shift Unit, One stage ALU. Computer Arithmetic: Fixed point arithmetic and floating point arithmetic.

UNIT – II

Control Unit: Instruction sequencing, Instruction interpretation. Control Unit design. Methodologies: Hard wired Control Unit – Illustrative example; Micro programmed control unit; Control Memory, Address Sequencing, Micro Instruction format, Micro program sequencer design, concepts of RISC and CISC. **12**

Memory Unit: Memory hierarchy, Main Memory, RAM, ROM, Memory address mapping; Auxiliary Memory: Magnetic tapes & Discs. Associative Memories: Match logic, Read and Write logics, Cache Memory: Mapping techniques, R/W operations; Virtual Memory: Paging, Segmentation; Interleaved Memories. **8**

UNIT – III

Data Transfer Modes: Synchronous data transfer, Asynchronous data transfer, Strobe Control, Hand Shaking.

I/O Unit: Introduction to peripheral devices. I/O interface, I/O data transfer modes: Programmed I/O; Interrupt Driver I/O; Priority Interrupts; Hardware and Software; DMA controller and Data transfer, I/O Processor – CPU and IOP Communication. **8**

UNIT – IV

8085 CPU: 8085 Architecture, Instruction set addressing modes, Basic assembly language programming, pin configuration, timing diagrams, Interrupts. Basic Assembly Language Programmes – stacks, subroutine, strings. **8**

TEXT BOOK:

1. Morris Mano, *Computer System Architecture*, Prentice Hall of India, New Delhi.

REFERENCE BOOKS:

1. John P. Hayes, *Computer Organization and Architecture*, McGraw-Hill, New York.
2. W.Stallings, *Computer Organization and Architecture*, Prentice Hall of India, New Delhi.

EC 312 ANALOG COMMUNICATION SYSTEMS

Class:III/IV B.Tech. I –Semester
Branch: ECE
Duration of University Examination: 3 Hours

Lectures: 3, Tutorial: 1
University Examination: 100 marks
Sessionals: 50 marks

UNIT-I

Amplitude modulation: Time and frequency domain-description of AM, DSB, SSB & VSB singnals-Generation and demodulation AM, DSB, SSB and VSB signals-coherent demodulation-envelop detection-carrier recovery. AM transmitters.

UNIT-II

Angle Modulation: Instantaneous frequency –phase and frequency Modulation-Single tone FM and its spectral analysis – NBFM and WBFM band width – requirements of NBFM & WBFM – Generation of FM, FM Demodulatiors – Balanced slope detector, Phase – discriminator, Ratio Detector, FM transmitters.

UNIT-III

AM & FM Receivers: TRF, Superheterodyne receivers, RF, IF stages, AGC, AFC, Sensitivity, selectivity measurement. Communication receivers. Phase modulation. Sampling theorm, Analog pulse modulation PAM, PWM, PPM, TDM, FDM.

UNIT-IV

Noise in Communication System: Sources of Noise, types of Noise – quadrature components of noise – Time domain representation of narrow based noise- signal to noise ratio – Noise figure – Equivalent bandwidth. Noise in AM & FM. Calculation of Signal Power, Noise power. Signal to Noise ratio of SSB, DSB, FM Figure of merit.

TEXT BOOKS:

1. "Communication Systems" – Simon Haykin (John Wiley, 1988)
2. " Principles of Communications" – Taub and Schilling (McGraw Hill)
3. "Electronic Communication Systems" – George Kennedy & Bernard Davis (TMH)

REFERENCE BOOKS:

1. "Communication Systems" – Bruce Carlson (McGraw Hill, 1988)
2. "Analog Communication Systems" – P.Chakrabarthi (Dhanpatrai & Co.)
3. " Communication System" – R.P.Singh, S.D.Sapre (TMH)

EE 319 CONTROL SYSTEM ENGINEERING

Class: **III/IV B.Tech. I Semester** *Lectures:***3,** *Tutorials:**1***
Branch: **EEE, E&I,ECE** *University Examination: **100 marks***
Duration of University Examination: **3 hours** *Sessionals: **50 marks***

UNIT – I

INTRODUCTION: (9+3)

Types of systems, Properties of systems, Linearity, Time-inverience, Stability, Causality. Open loop control system, Closed loop control system, Effect of Feedback on over all gain, Stability and Sensitivity.

MATHEMATICAL MODES OF PHYSICAL SYSTEMS:

Electrical, Mechanical and Electromechanical systems, Transfer function of physical systems by Block diagram reduction techniques and signal flow graphs, Drawing a signal flow graph from a block diagram.

UNIT – II

CONTROL SYSTEM COMPONENTS: (9+3)

AC and DC servomotors, Synchros, Tacho generator and Potentiometer.

TIME DOMAIN ANALYSIS:

Design specifications, Typical test signals, Time response of first order and of 2^{nd} order systems, Time domain specifications, Basic control actions like P, PI, PD, PID and derivative feedback, Steady State error and error constants, Routh Hurwitz Criterion, Concept of root locus and construction of root loci, Effects of adding poles and zeros.

UNIT – III

FREQUENCY DOMAIN ANALYSIS: (9+3)

Frequency response of closed loop systems, Specifications, Correlation between frequency and time domain specifications, Polar plots, Gain Margin and Phase Margin, Bode plots, Nyquist stability criterion, Relative stability using Nyquist stability criterion

UNIT – IV

STATE VARIABLE ANALYSIS OF CONTINUOUS SYSTEMS: (9+3)

Concepts of state, State variables and state model, Derivation of state model from transfer function, Diagonolization, Derivation of transfer function from state model, Solution of state equations, State transition matrix, Concept of Controllability and Observability.

COMPENSATION: Elementary treatment of Compensation.

TEXT BOOKS

1. M. Gopal, *"Modern Control System Theory",* Wiley Eastern Publishers, New Delhi.
2. B.C. Kuo, *"Automatic Control Systems"* 7/e Prentice Hall of India. New Delhi.
3. K.Ogata, *" Modern Control Engineering"* Prentice Hall of India, New Delhi.

REFERENCES

1. I.J. Nagarth & M. Gopal, *"Control System Engineering",* New Age International Publishers, New Delhi.

EC 313 PULSE AND DIGITAL CIRCUITS

Class: **III/IV B.Tech. I Semester** Lectures: **3** , Tutorial: 1
Branch : **ECE** University Examination : **100 marks**
Duration of University Examination: **3 hours** Sessionals: **50 marks**

UNIT – I

WAVE SHAPING CIRCUITS: Clipping and clamping circuits, Differentiator and Integrator circuits, simulation of arbitrary transfer characteristics.

SWEEP CIRCUITS: Linearisation of Sweeps, Bootstrap and miller voltage sweep circuits, Principle of current sweep circuits.

UNIT – II

NEGATIVE RSISTANCE SWITCHING CIRCUITS: Voltage Controlled and current controlled negative resistance circuits, its application to switching (using tunnel diode, and UJT).

MULTIVIBRATORS: Switching characteristics and switching times of BJT's and FET's, Astable, Monostable and Bistable multivibrators; Symmetric and Asymmetric triggering and Schmitt trigger.

UNIT-III

BLOCKING OSCILLATOR CIRCUITS: A triggered transistor blocking oscillator (Base timing and emitter timing), Astable transistor blocking oscillator, applications of blocking oscillators.

SAMPLING GATES: Basic Operating Principle of gates, Unidirectional diode sampling gates, Bi-directional sampling gates (Using diodes and transistors).

UNIT-IV

SYNCHRONIZATION AND FREQUENCY DIVISION: Principles of Synchronization, Synchronization of Astable Multivibrator, Monostable relaxation circuits as dividers, stability of relaxation dividers (Phase delay and phase jitter), synchronization of a sweep circuit with symmetrical signals, sine-wave frequency division with a sweep circuit, synchronization of a sinusoidal oscillator with pulses.

TEXT BOOKS:

1. Millman and Taub, " Pulse, Digital and Switching Waveforms", Tata McGraw Hill.
2. Y.N.BAPAT, " Electronic Devices & Circuits" Discrete and Integrated", Tata McGraw Hill.

REFERENCE BOOKS:

1. L. Strauss, "Wave Generation and Shaping"
2. R.Venkata Raman, " Pulse and Digital Circuits & Computer fundamentals", Dhanpat Rai Publications.

EC 314 LINEAR INTEGRATED CIRCUITS

Class:III/IV B.Tech. I –Semester | Lectures: 3
Branch: ECE, E&I, EEE | University Examination: 100 marks
Duration of University Examination: 3 Hours | Sessionals: 50 marks

UNIT-I

Integrated circuits: Introduction, classification of Ics, Fabrication Techniques of Ics. Introduction to OPAMP: Introduction, Internal blocks of Op-Amps, Ideal & Practical characteristics of Op-Amps, Measurement of Op-Amp parameters, Analysis of Basic Inverting & Non-Inverting Amplifiers and voltage follower.

D.C. Characteristics of OPAMP: Open loop and closed loop frequency response, Op-Amp stability, Frequency compensation techniques. Ideal & Practical characteristics of IC-741.

UNIT-II

Applications of Operational Amplifiers: Summing and difference amplifiers, Integrator and differentiator, current to voltage and voltage to current converters, Instrumentation amplifier, sample and Hold circuit.

Non-Linear Applications: Precision Rectifiers – Half wave and full wave, log and antilog amplifiers.

Comparators and wave form generators: OPAMP comparators, Regenerative (Schmitt Trigger), R.C. phase shift and wiens bridge oscillators, Astable Mulitivibrator (Square wave generator) and Monostable Multivibrator.

UNIT-III

Active Filters: Introduction of filters, Ideal and Realistic frequency responses of various filters, Second Order filters: Analysis and design of I.G.M.F., V.C.V.S configuration of L.P.F, H.P.F., B.P.F. and notch filters.

Monolithic Timers and their applications: Introduction to IC 555 Timer, Functional Diagram, Design of Astable and Monostable multivibrators using 555timer.

UNIT-IV

Voltage regulators: Basic voltage regulator using Op-Amps, General purpose IC Regulator, uA723, Functional diagram, specifications, Design consideration of 723 as low & high voltage regulators. Current limit protection, current feed back, current bossting. Three terminal voltage (fixed) Regulators: Introduction and general features of three terminal regulators, Ic series of three terminal Regulators, their Design, current boosting.

Phase Locked Loops: Voltage controlled oscillator, Basic PLL operation, definitions related to PLL, Monolithic PLL and design considerations, transient response of PLL, typical PLL applications (FSK, AM detectors)

Analog multiplexers, DAC types (R-2R ladder weighted ladder and Inverted ladder), ADCs types (Successive Approximation, Dual-Slop, Flash types).

TEXT BOOKS:

1. Roy Choudhary, Shail Jain, Linear Integrated Circuits, New Age International, New Delhi.
2. Ramakant Gayakwad, Opamp and Linear Integrated Circuits, Pearson Education.
3. G.B. Clayton, Integrated Circuits & Applications, ELBS, Lodon.
4. Rodert F.Coughlin, Frederick F.Driscoll, Operational Amplifiers and Linear Integrated Circuits, Pearson Education, New Delhi.

REFERENCE BOOKS:

1. R.Botkar, Integrated Circuits, Khanna Publishers, New Delhi.
2. Franco, Integrated Circuits & Applications, McGraw Hill, New York.

EC 315 PULSE AND DIGITAL CIRCUITS LAB

Class: **III/IV B.Tech. I Semester** Practicals:**3Hrs.**
Branch: **E&I,EEE** Sessionals : **25 Marks**
Duration of University Examination: **3 hours** University Examination : **50 Marks**

LIST OF EXPERIMENTS

1. Linear Wave Shaping
2. Non-Linear Wave Shaping (Clipping and Clamping Circuits)
3. Boot Strap Sweep Circuits
4. Miller Sweep circuits
5. UJT as Relaxation Oscillator
6. Astable multivibrator
7. Monostable multivibrator
8. Bistable multivibrator
9. Schmitt Trigger.
10. Sampling gates.

EC 316 LINEAR INTEGRATED CIRCUITS LABORATORY

Class:III/IV B.Tech. I –Semester
Branch: ECE
Duration of University Examination: 3 Hours

Lectures: 3
University Examination: 50 marks
Sessionals: 25 marks

LIST OF EXPERIMENTS

1. Measurement of parameters of an operation Amplifier.

(i) Open Loop gain
(ii) I/P bias and offset currents.
(iii) I/P offset voltage.
(iv) Slow Rate and
(v) CMRR

2. Design of square wave generator for a specified frequency and duty cycle, using Op-Amp IC 741.
3. Design of a sinusoidal oscillator for specified frequency based on wiens bridge using IC 741.
4. Design and testing of precision rectifier.
5. Design and Testing of Instrumentation Amplifier.
6. Design and testing of Active

   (i) L.P.F.
   (ii) H.P.F
   (iii) B.P.F. for specified frequency.

7. Design a Astable multivibrator using IC 555 timer for a given frequency.
8. Design a Monostable Multivibrator using IC 555 timer for a specified width period.
9. Design a voltage regulator using IC 723 for a given O/P voltage and Load current.
10. Design and testing of PLL parameters using IC 565.

TEXT BOOKS:

1. Roy Choudary, Shail Jain, Linear Integrated Circuits, New Age International.
2. Ramakanth Gayakwad, Opamp and Linear Integrated Circuits, Prentic Hall of India, New Delhi.

SCHEME OF INSTRUCTION AND EVALUATION
II SEMESTER OF III YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME

ELECTRONICS & COMMUNICATION ENGINEERING

Course Number	COURSE	Hours of Instruction per week			Scheme Evaluation			Total Marks
					External Evaluation		Sessionals	
		Lectures	Tutorials	Drawing /Practical	Duration of Exam	Max. Marks	Max. Marks	
OE 321	Open Elective	4	-	-	3 Hrs	100	50	150
EC 322	Antennas & Wave Propagation	4	-	-	3 Hrs	100	50	150
EI 323	Micro Processors & Micro Controllers	3	1	-	3 Hrs	100	50	150
EC 324	Digital Communication Systems	3	1	-	3 Hrs	100	50	150
EC 325	TV and Radar Engineering	3	1	-	3 Hrs	100	50	150
EC 326	Digital Signal Processing	3	1	-	3 Hrs	100	50	150
EC 327	Analog & Digital Communication Systems Lab	-	-	3	3 Hrs	50	25	75
EI 328	Micro Processors & Micro Controllers Lab	-	-	3	3 Hrs	50	25	75
	TOTAL	**20**	**4**	**6**		**700**	**350**	**1050**

OE 321 Open Elective :

OE 321-A Operations Research
OE-321-B Management Information Systems
OE 321- C Entrepreneurship Development
OE-321-D Forex Foreign Trade

OE311 (A) OPERATIONS RESEARCH

Course *:* **B.Tech. III/IV I Semester** Theory*:* **3 periods/week**
Branch *:* **Common to all branches**
External Examination: **3 Hours** External Evaluation: **100**
Internal Examination: **2 Hours** Internal Evaluation: **50**

UNIT-I (9)

Linear Programming: Mathematical Model, assumptions of linear programming, principles of simplex method. Applications. Duality, Dual simplex method, revised simplex method.

UNIT-II (9)

Non-linear Programming: Unconstrained Optimization techniques, Random search methods, Decent methods, Steepest Decent method, variable metric method. Constrained optimization techniques. Cutting plane method.

UNIT-III (9)

Dynamic programming: Introduction, Multistage decision process, linear programming as a case of dynamic programming. Computational procedures in dynamic programming.
Special type of linear programming : Special type of linear programming problems - Transportation problems - balanced and unbalanced transportation, time transportation problem. Assignment problem - special case of transportation.

UNIT-IV (9)

Queuing Theory: Description of Queuing Models and applicability. Birth and Death Processes, Single server models with Poisson input and exponential service. Multiple service queuing models.

SUGGESTED TEXT / REFERENCE BOOKS:

1. Handy.A.Taha, "Operation Research" 4th Edn, McMillan, 1984.
2. Kanthiswaroop, etal, Opertions Research, S.Chand & Sons, New Delhi.
3. V.K.Kapoor, "Operation Research" 5th Revd.Edn. S.Chand & sons,1990
4. J.C.Pant, Introduction Optimization, Jain Brothers, New Delhi.
5. S.S.Rao, Optimization Techniques, New Age International, New Delhi.
6. G.Hadley, Linear Programming, Addison Wesley, New Delhi.
7. Gillett, Introduction to Operations Research, Mc.Graw Hill New,Delhi

OE 311 (B) MANAGEMENT INFORMATION SYSTEMS

Course: **III/IV B.Tech I Semester** Theory: **3 Periods/week**
Branch**: Common to all branches** External Evaluation:**100**
External Examination: **3 Hours** Internal Evaluation: **50**
Internal Examination: **2 Hours**

UNIT–I (9)

Management Information Systems (MIS): MIS Concept, Definition, Role and Impact of MIS, MIS and Computer, MIS and Academics, MIS and the User.

Role and Importance of Management: Introduction and Approaches to Management, Functions of Manager, Managers and the Environment, Management as a Control System, Management by Exception, MIS – A Support to the Management.

Process of Management: Management Effectiveness, Planning, Organizing, Staffing, Coordinating and Directing, Controlling, MIS – A Tool for the Management Process.

Organization Structure and Theory: Basic Model of Organization Structure, Modifications to the Basic Model of Organization Structure, Organizational Behavior, Organization as a System, MIS – Organization.

Strategic Management of Business: The Concept of Corporate Planning, Essentiality of Strategic Planning, Development of the Business Strategies, Short Range Planning, Tools of Planning, MIS – Business Planning.

UNIT-II (9)

Decision Making: Decision Making Concepts, Decision Methods, Tools and Procedures, Behavioral Concepts in Decision Making, Organizational Decision Making, MIS and Decision Making Concepts.

Information: Information Concepts, Information – A Quality Product, Classification of the Information, Methods of Data and Information Collection, Value of the Information, General Model of a Human as an Information Processor, Summary of Information Concepts and their Implications, Organization and Information, MIS and the Information Concepts.

Systems: Systems Concepts, Systems Control, Types of System, Handling System Complexity, Post Implementation Problems in a System, MIS and System Concepts.

System Analysis and Design: Introduction, The Need for System Analysis, System Analysis of the Existing System, System Analysis of a New Requirement, System Development Model, Structured System Analysis and Design (SSAD), computer System Design, MIS and System Analysis.

UNIT-III (9)

Development of MIS: Development of Long Range Plans of the MIS, Ascertaining the Class of Information, Determining the Information Requirement, Development and Implementation of the MIS, Management of Quality in the MIS, Organization for Development of the MIS, MIS: The Factors of Success and Failure.

Choice of Information Technology: Introduction: Nature of IT Decision, Strategic Decision, Configuration Design, Evaluation, Information Technology Implementation Plan, Choice of the ‘Information Technology’ and the ‘Management Information

System'.

Applications in Manufacturing Sector: Introduction, Personnel Management, Financial Management, Production Management, Materials Management, Marketing Management, Corporate Overview.
Applications in Service Sector: Introduction to the Service Sector, Creating a Distinctive Service, MIS Applications in Service Industry, MIS: Service Industry.

UNIT-IV (9)

Decision Support Systems: Concept and Philosophy, DSS: Deterministic Systems, Artificial Intelligence (AI) System, Knowledge Based Expert System (KBES), MIS and the Role of DSS.
Technology of Information Systems: Introduction, Data Processing, Transaction Processing, Application Processing, Information System Processing, TQM of Information Systems, Human Factors and User Interface, Real Time Systems and Design, Programming Languages for System coding, CASE Tools.
Business Process Re-engineering (BPR): Introduction, Business Process, Process Model of Organisation, Value Stream Model of Organization, Business Process Delays, Relevance of the Information Technology, MIS and BPR.
Overview of Database Management Systems, Object Oriented Technologies, Client-Server Architecture, Networks.
Case Studies in MIS.

SUGGESTED TEXT / REFERENCE BOOKS*:*

1. W.S.Jawadekar, "Management Information Systems", Tata McGraw Hill, 2nd Edition, ISBN: 0 – 07 – 044575 - 3, 2003.
2. Robert Schultheis, Mary Sumner, "Management Information Systems – The Manager's View", Fourth Edition, Tata McGraw Hill, ISBN: 0 – 07 – 463879 – 3, 2003.
3. Robert G.Murdick, Joel E.Ross, James R.Clagget, "Information Systems for Modern Management", Third Edition, Prentice Hall of India, ISBN: 81 – 203 – 0397 – 0, 2002.
4. Gordon B.Davis, Margrethe H.Olson, "Management Information Systems", Second Edition, Tata McGraw Hill, ISBN: 0 – 07 – 040267 – 1, 2000.
5. Jerome Kanter, "Managing with Information", Fourth Edition, Prentice Hall of India, ISBN: 81 – 203 – 1012 – 8, 2003.

OE 311(C) ENTREPRENEURSHIP DEVELOPMENT

Course: **III/IV B.Tech I Semester** Theory: **3 Periods/week**
Branch: **Common to all branches**
External Examination: **3 Hours** External Evaluation: **100**
Internal Examination: **2 Hours** Internal Evaluation: **50**

UNIT-I (9)

Entrepreneurship definition, Significance of Entrepreneurship. Role of Entrepreneurship in development advantages and limitations characteristics of a person to become an entrepreneur, human factor in Entrepreneurship, Motivation, Leadership qualities and the essential skills of communication etc., Role of women entrepreneurship, Agencies dealing with entrepreneurship and small scale Industries. Case studies of successful entrepreneurs. Identification of a variable business opportunity, Various methods.
Activity: Inputs from DIC, SFC, IIC & Nationalized Banks.

UNIT-II (9)

Business opportunity selection, Opportunities in various branches of Engineering. Sources of new ideas, New product, Service and Trade etc. Planning and Launching of an entrepreneurial activity. Screening, Feasibility studies and market survey. Forecasting the demand. Technical feasibility, Financial viability. Break even analysis. Preparation of preliminary and bankable project reports planning infrastructure, Raw materials and human resource, requirements, fiscal incentives. An introduction to patents process, Trade marks etc.
Activity: Visit to a small scale industry.

UNIT-III (9)

Project planning: Product planning and development process, Definition of a project, Sequential steps in executing the project, principles of layouts, Types of layouts, Factors influencing layouts. choosing an optimum layout suitable to the venture. Tenders, Call for quotations, Purchase orders, Procurement and installation of machinery and equipment, Utilities etc. Fundamentals of Production Management, PPC-Concepts, Functions, Long & short run problems. Marketing Management: Definition, Functions and Segments. Financial Management: Objectives & Functions
Activity: Interaction with Entrepreneurs in the field.

UNIT-IV (9)

Personal and Human resource management: Introduction, Definitions, Importance, Factors effecting Major functions of enterprise management. Selection, recruitment, training, placement, development, performance appraisal systems. Legal issues in Entrepreneurship, Intellectual property rights, Issues in setting up the organization.
Activity: Preparation of project report for variable business venture

SUGGESTED TEXT / REFERENCE BOOKS:

1. Robert D.Hisrich, Michael P. Peters, “Entrepreneurship”, Fifth Edition, Tata McGraw-Hill, 2002.
2. David H. Holt, Entrepreneurship New venture creation prentice hall of India.
3. Handbook for New Entrepreneurs, Entrepreneurship Development Institute of India, Ahmedabad.
4. T.R. Banga, Project Planning and Entrepreneurship Development, CBS Publishers, New Delhi.
5. Personnel efficiency in Entrepreneurship Development-A Practical Guide to Industrial Entrepreneurs, S. Chand & Co., New Delhi.

OE 321 (D) FOREX AND FOREIGN TRADE

Course**: III/IV B.Tech. I Semester** Theory: **3 Periods/week**
Branch**: Common to all Branches**
External Examination**: 3 Hours** External Evaluation**: 100**
Internal Examination**: 2 Hours** Internal Evaluation: **50**

UNIT-I (9)

Business: Nature and Scope. Classification of Business Activities. Functions of Commerce & Trade. Business System: Characteristics and Components of Business System. Objectives of Business: Concept, Significance and Classification of Objectives. Objections against Profit Maximization Objective

UNIT-II (9)

Foreign Trade: Introduction of International Trade: Basic of External Trade. Special Problems of Foreign Trade.

Stages In Import Procedure. Stages In Export Procedure. Bill of Lading, Mate's Receipt, Certificate of Origin. State Trading Corporation of India. Export Credit and Guarantee Corporation. Minerals and Metals Trading Corporation of India.

UNIT-III
(9)

Foreign Exchange: Meaning and Importance of Exchange Rate. Methods of Foreign Payments. The Demand And Supply of Foreign Exchange. The Equilibrium Rate of Foreign Exchange. Functions of Foreign Exchange Market. Determination of Foreign Exchange Rate Under Different Monetary Systems: Mint Policy Theory, Balance of Payment Theory.

UNIT-IV (9)

Objectives of Exchange Control: Characteristics – Advantages of Exchange Control – Methods of Exchange Controls. Intervention, Exchange Restriction; Multiple Exchange Rates; Exchange Clearing Agreements – Method of Operation – Exchange Clearing Agreements In Practice. Payments Agreements – Transfer Moratoria – Indirect Methods. Progress Towards Evaluation. Opposition To Exchange Control.

SUGGESTED TEXT / REFERENCE BOOKS:

1. Macro Economics by M.L.Seth Lakshmi Narayan Agarwal, Hospital Road, AGRA – 3.
2. Money Banking, Trade & Finance by K.P.M. Sundaram Sultan Chand And Sons, 23, Daryaganj, New Delhi -110 002.
3. Monetary Theory by M.C. Vaish, Ratan Prakashan Mandir, Educational & University Publishers, 21, Dayanand Marg Darya Ganj, Delhi – 2.
4. Business Organization and Modern Management By Y.K.Bhushan

5. Business Organization and Management by S.A. Sherlekhar.

6. Macro Economics by P.N.Chopra. Kalyani Pubnlishers, 1/1, Rajinder Nagar, Ludhiana-141 008.

7. Business Organization & Management by C.B.Gupta Sultan And Sons Publishers, 23. Daryaganj, New Delhi – 110 002.

EC 322 ANTENNAS & WAVE PROPAGATION

Class:III/IV B.Tech. II –Semester | Lectures: 3
Branch: ECE | University Examination: 100 marks
Duration of University Examination: 3 Hours | Sessionals: 50 marks

UNIT – I

ANTENNA FUNDAMENTALS: Basic concepts and Antenna Parameters – Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beamwidth, Beam Area, Radiation Intensity, Beam Efficiency, Directivity and Gain, Resolution, Aperture Concepts and types – Aperture area and efficiency, Effective height. Antenna Theorems Retarded Potentials, Radiation from Small Dipole, Quarterwave Monopole and Halfwave Dipole – Current Distribution, fields, power radiated, Radiation Resistance, D and Ae.

UNIT – II

ANTENNA ARRAYS: 2-element arrays – different cases, N-element Linear Arrays – Broadside, Endfire arrays Derivation of their characteristics and comparison. Principal of Multiplication of patterns, Binomial Arrays .

NON-RESONANT RADIATORS: Introduction, Traveling wave radiators – basic concepts, V-antennas, Rhombic antennas.

UNIT – III

VHF, UHF and MICROWAVE ANTENNAS: Arrays with parasitic elements, floded dipoles, yagi uda antenna. Plane sheet and corner reflectors, Paraboloidal Reflectors – Characteristics, types of feeds, spill over, aperture blocking, offset feed, Cassegrainian Feeds. Horn Antennas – Types, characteristics, optimum horns. Lens Antennas – features, dielectric and metal plate lenses, applications.

UNIT – IV

WAVE PROPAGATION: Concepts – factors involved. Ground Wave Propagation – Characteristics, wave tilt, flat and spherical earth considerations. Ionosphere –formation of layers and mechanism of propagation, reflection and refraction mechanisms, Critical Frequency, MUF, Optimum frequency, skip distance, Virtual Hight; Considerations in space wave propagation. M-Curves and Duct Propagation, Tropospheric Scattering.

TEXT BOOKS:

1. Antennas, by John D.Kraus and Ronald J.Marhefka, TMH.
2. Electromagnetic Waves and Radiating Systems, by E.C.Jordan and K.G.Balman, PHI.
3. Antenna Theory, by Constantine A. Balanis, John Wiley & Sons Publ.
4. Antennas and Wave Propagation, by K.D.Prasad, Satya Prakashan Publ.

REFERENCES:

1. Electronic and Radio engineering, by F.E.Terman, McGraw-Hill Publ.

EC / EI 323 MICROPROCESSORS & MICRCONTROLLERS

Class:III/IV B.Tech. II –Semester | Lectures: 3
Branch: ECE, E&I, EEE | University Examination: 100 marks
Duration of University Examination: 3 Hours | Sessionals: 50 marks

UNIT – I

Evolution of Microprocessors, 8085 MPU Architecture,
8086 Family Architecture: Organization of 8086 CPU, Concept of Memory Segmentation, Segment registers, physical and logical addressing, Instruction set, Addressing Modes.

9+3

UNIT – II

Assembly Language Programming: Assembler directives, simple Programming of 8086 Implementation of structures, time delays, strings, procedures, macros, pin configuration, Min/Max modes, timing diagrams. **8+3**

UNIT – III

Interfacing with 8086: ADC, DAC interfacing, Interfacing of switches, Keyboards, LEDs, Stepper motor; CRT interface, interfacing through devices like 8255, 8257 and 8253. Interrupts & Priority interrupt controller 8259. **9+3**

UNIT – IV

8051 Microcontroller: Architecture, Instruction set, addressing modes, Assembly language Programming, timers, I/o Ports, interrupts, serial ports, interfacing with LEDS Switches & Stepper Motor. Real Time Clock. **10+3**

TEXTBOOKS:

1. D.V.Hall, *Microprocessors & Interfacing*, Tata McGraw Hill, New Delhi.
2. Yuchangliu, Glen A.Gibson, *Microcomputer Systems. The 8086/8088 family, architecture, programming and design*, Prentice Hall of India, New Delhi.
3. Muhammed Ali Mazidi, *The 8051 Microcontrollers and Embedded systems*, Pearson, New Delhi.

REFERENCE BOOKS:

1. Kennet Ayala, *8086 Microprocessor: Programming & Interfacing with PC*, Penram Publications, Bombay.

2. Brey, Advanced Microprocessors, Prentice Hall of India, New Delhi.

3. Kennet Ayala, The Microcontroller Architecture, Programming and Applications, Penram Publications, Bombay.

EC 324 DIGITAL COMMUNICATION SYSTEMS

Class: B.Tech. III/IV – II Semester
Branch: ECE
Duration of Unit Examination : 3 Hours

Lectures: 3 Hours
Tutorials: 1
Univ. Examination: 100 marks
Sessionals: 50 marks

UNIT – I

Information and Channel Capacity: Measure of information and entropy – Encoding of the Source output – Shannon – Fano – Huffman coding – Discrete Communication Channel – Channel Capacity.
Elements of a Digital Communication Systems – Analysis and Design of Communication Systems.
Sampling theorem, PCM, DPCM, DM, ADM.

UNIT-II

Base Band Transmission: Base band binary PAM systems – duobinary Baseband PAM systems – Mary Signaling Schemes Shaping of Transmitted Signal Spectrum – Equalizers – Eye diagrams – Synchronization.

UNIT-III

Digital Carrier Modulation Schemes: Optimum Receiver for binary digital modulation schemes, coherent & Non Coherent binary ASK, PSK, FSK signaling Schemes, DPSK, QPSK, MSK Mary signaling Schemes, Synchronization Methods.

UNIT-IV

Error Control Coding: Linear Block Codes, Binary cyclic Codes, Convolution Codes and BCH codes.

TEXT BOOKS:

1. Digital and Analog Communications – Sam Shanmugam. (Unit-II) John Wiley.
2. Digital Communications – Siman Haykin John Wiley.
3. Digital Communications– John.G.Proakis – PHI.

EC 325 TV and RADAR ENGINEERING

Class: B.Tech. III/IV – II Semester
Branch: ECE
Duration of Unit Examination: 3 Hours

Lectures: 3 Hours
Tutorials: 1
Univ. Examination: 100 marks
Sessionals: 50 marks

UNIT-I

Introduction to TV: Basic Television Systems, Scanning systems, Composite video Signal, Television Standards (Indian)

TV CAMERA & PICTURE TUBES: Camera tube types – Image Orthicon – Vidicon, Plumbicon picture tubes - Electro Static deflection & Magneto Static Deflection.

UNIT- II

TV TRANSMITTERS & RECEIVERS: Block Schematic Diagram – Visual Exciter, Aural Exciter, Duplexer, Block Diagram of Monochrome TV Receiver, RF tuner, Video IF and Sound IF response characteristics, Vertical and Horizontal Synchronization Techniques, Keyed AGC.

COLOUR TV: Colour Characteristics, Colour Camera Tubes, Colour Picture Tubes, Colour TV Systems – NTSC, PAL, SECAM, Colour TV Receiver, Receiver Circuits & Alignment.

UNIT – III

INTRODUCTION TO RADAR: The nature of RADAR, Block Schematic of pulse Radar, Radar Range Equation, Radar frequencies Applications of Radars, Minimum detectable signal Integration of Radar Pulses.

CW and FMCW RADAR: Doppler effect, CW Radar – Block Diagram, applications, FMCW Radar – Block diagram and Characteristics.

UNIT – IV

MTI Radar, Limitations of MTI Radar, Blind Speed.

TRACKING RADAR: Tracking with radar, Sequential Lobing, Concial Scan, Mono Pulse Radar, Low angle tracking, Tracking in range Introduction to Radome, ECM, ECCM.

TEXT BOOKS:

1. Monochrome and Colour TV – by R.R. Gulati, New Age International Publication – 2002.
2. Introduction to Radar Systems – M.I. Skolink, McGraw Hill, - 2nd edition.

REFERENCE BOOKS:

1. Modern Television Practice – Principles, Technology and Servicing – by R.R.Gulati, New Age International Publications – 2002.
2. Colour Television and Practice – by S.P. Bali, TMH.

EC 326 DIGITAL SIGNAL PROCESSING

Class:III/IV B.Tech. II–Semester | Lectures: 3
Branch: ECE, E&I, EEE | University Examination: 100 marks
Duration of University Examination: 3 Hours | Sessionals: 50 marks

UNIT-I

Basic Elements of Digital Signal Processing, Discrete Time Fourier Transform (DTFT): Definition of DTFT, Properties of DTFT, Magnitude and phase transfer function, steady state response of LTI System to a sinusoidal input,

Discrete Fourier Transform (DFT):- Definition of DFT, Properties of DFT, Inverse Discrete Fourier Transform (IDFT), Relation between DTFT, DFT and z-transform.

Fast Fourier Transform (FFT):- Computational Complexity of DFT, Introduction to FFT, Radix-2 FFT Algorithms, Decimation-in-time FFT Algorithm, Decimation-in-Frequency FFT algorithm,

UNIT-II

Infinite Impulse Response (IIR) Filters: Realizability of Ideal Filter, Introduction to IIR Filters, Methods of converting analog transfer function H(s) to its digital equivalent, Necessity of Filter Approximation, IIR Digital filter design using Butterworth Approximation, IIR Digital Filter Design using chebyshev approximation, comparison of Butterworth and Chebyshev filters.

UNIT-III

Finite Impulse Response (FIR) Filters: Introduction to FIR filters, Inherent stability of FIR filters, Linear phase in FIR filters, Design of linear phase FIR filters using windows, Rectangular window, Triangular window, Hamming window, Hanning window and Kaiser window. Design of Linear phase FIR filter using frequency sampling method. Comparison of IIR and FIR filters.

UNIT-IV

DSP Architecture: Introduction to Programmable Digital Signal Processors; MAC, Bus structures and memory access schemes, multiported memory, multiple access memory, VLIW architecture, Pipelining, addressing modes, on-chip peripherals.

Architecture of TMS320C5X: Introduction, Bus Structure, Central Arithmetic Logic unit, registers, flags, on-chip memory and peripherals, assembly language instructions.

TEXT BOOKS:

1. John G.Proakis & D.G.Manolakis, Digital Signal Processing: Principles, Algorithms and Applications (PHI)
2. A.V.Oppenheim & R.W.Schafer, Discrete-Time Signal Processing (Pearson education, PHI)
3. Digital Signal Processors – B.Venkataramani, M. Bhaskar – TMH.

REFERENCE BOOKS:

1. Sanjit K.Mitra, Digital Signal Processing – A Computer Based Approach (TMH)
2. Lyons, Understanding DSP (Pearson Education)
3. Adreas Antanio, Digital filter Analysis and Design (TMH)
4. L.R. Rabiner & Bearnard Gold, Theory and Applications of Digital Signal Processing.(PHI).

EC 327 ANALOG AND DIGITAL COMMUNICATION SYSTEMS LABORATORY

Class:III/IV B.Tech. II –Semester | Practicals: 3
Branch: ECE | University Examination: 50 marks
Duration of University Examination: 3 Hours | Sessionals: 25 marks

LIST OF EXPERIMENTS

ANALOG COMMUNICATION

1) Amplitude modulation & Demodulation
2) Frequency Modulation & Demodulation
3) Balanced Modulator
4) Pulse Amplitude Modulation (PAM) & Demodulation
5) Pulse Width Modulation (PWM) & Demodulation
6) Pulse Position Modulation (PPM) & Demodulation

DIGITAL COMMUNICATION

7) Analog signal sampling and reconstruction.
8) Channel TDM pulse amplitude modulation and demodulation.
9) Pulse Code Modulation & De-Modulation, PCM Tx and Rx
10) Delta modulation and demodulation, linear, CSVD.
11) Digital Carrier modulation schemes.(ASK, BFSK, BPSK)

EI 328 MICROPROCESSORS & MICROCONTROLLERS LAB

Class:III/IV B.Tech. II –Semester Practicals: 3
Branch: ECE, E&I, EEE University Examination: 50 marks
Duration of University Examination: 3 Hours Sessionals: 25 marks

LIST OF EXPERIMENTS

Assembly Language Programming on 8086 Microprocessor

1. Study of 8086 kits
2. Finding Sum, Average, Multiplication.
3. Sorting (a) Ascending (b) Descending.
4. Transfer of bytes from DS to ES
5. Code Conversions (i) BCD to Binary (ii) Binary to BCD (iii) Binary to ASCII
6. String Comparison
7. Generation of time Delays – counters
   Interfacing with 8086
8. Wave form Generation using DAC modules (i) Square wave (ii) Sawtooth (iii) Triangular.
9. Stepper Motor interfacing
10. ADC interfacing
11. LED/LCD interfacing.
12. Traffic Controller
    ALP on 8031/51 Micro Controllers.
13. Study of Micro Controller kits, Assembly Language Programming
14. Multiplication, Division
15. Sorting
16. Code Conversion
17. Time delays – Counters
18. Stepper motor, LED, switches – interfacing.

TEXT BOOKS:

1. D.V.Hall, Microprocessors & Interfacing, Tata McGraw Hill, New Delhi.

SCHEME OF INSTRUCTION AND EVALUATION
I SEMESTER OF IV YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME

ELECTRONICS & COMMUNICATION ENGINEERING

Course Number	COURSE	Hours of Instruction per week			Scheme Evaluation			Total Marks
					External Evaluation		Sessionals	
		Lectures	Tutorials	Drawing/ Practical	Duration of Exam	Max. Marks	Max. Marks	
EC 411	Micro wave Engineering	4	-	-	3 Hrs	100	50	150
EC 412	Optical & Satellite Communication Systems	4	-	-	3 Hrs	100	50	150
EC 413	VLSI Design	4	-	-	3 Hrs	100	50	150
EC 414	Professional Elective-I	4	-	-	3 Hrs	100	50	150
EC 415	ECAD Lab	-	-	3	3 Hrs	25	50	75
EC 416	Micro wave Engineering Lab	-	-	3	3 Hrs	50	25	75
EC 417	Project	-	-	3	-	-	50	50
	TOTAL	**16**	**-**	**9**		**475**	**325**	**800**

Professional Elective – I EC: **(4+2)**

25 Hours

414A - Digital Image Processing
414B -Neural Networks and Fuzzy Logic
414C - Industrial Electronics
414D - Adaptive Signal Processing

EC 411 MICROWAVE ENGINEERING

Class: B.Tech. IV/IV – ISemester
Branch: ECE
Duration of Unit Examination : 3 Hours

Lectures: 4 Hours
Sessionals: 50 marks
Univ. Examination: 100 marks

UNIT – I

MICROWAVE TUBES: Introduction to Microwaves, Microwave region and bands, Applications, Limitations & losses of conventional tubes at UHF, Microwave tubes – O type & M type classifications.

O-type tubes: 2 cavity Klystrons – structure, velocity (Applegate) diagram, Small Signal Theory of Bunching, Principle of working and expressions for o/p power and efficiency. Reflex Klystrons – structure, Applegate diagram, Mathematical Theory of bunching, Principle of working, electronic admittance and expressions for o/p power and efficiency, Effect of repeller voltage, Oscillating modes and o/p characteristics, Electronic and Mechanical tuning.

Helix Traveling Wave Tubes: Significance & types of Slow Wave structures, TWT – features, Principle of Amplification (qualitative treatment), Suppression of oscillations.

O-type backward wave oscillator (Carcinotron) – Features, Principle of working, voltage tunability.

UNIT-II

M-Type tubes: Microwave cross field tubes(M type): Magnetrons – 8 cavity cylindrical Traveling Wave Magnetron – features, Mechanism of Oscillations, Hull cut-off conditions, PI-mode and its separation, o/p characteristics.

MICROWAVE SOLID STATE DEVICES: Introduction, Classification, types Gunn diode – principle, RWH theory, modes of operation and characteristics, Avalanche Transit Time devices – introduction, IMPATT diodes, TRAPATT diodes. Parametric amplifiers (descriptive treatment only) – applications.

UNIT –III

WAVEGUIDE COMPONENTS: Coupling probes & loops, Waveguide windows, Tuning Screws & Posts, Waveguide phase shifters and attenuators.

Microwave Hybrid Circuits: E-plane Tee, H-plane Tee and Magic Tee, Rat race. Directional couplers, Ferrites – composition and characteristics, Faraday rotation. Ferrite components – Circulator, isolator and Gyrator, their applications.

Scattering Matrix – Significance, formulation and properties, S-matrix of waveguide Tee junctions, Directional Coupler, Circulator and Isolator.

UNIT – IV

MICROWAVE MEASUREMENTS: Description of Microwave Bench – Different blocks and their features, Precautions; Microwave Power Measurement – Bolometer Method. Attenuation Measurement. Frequency, VSWR and Impedance Measurements.

TEXT BOOKS:

1. Microwave Devices and Circuits – by Samuel Y.Liao, PHI.
2. Microwave Principles – by Herbert J.Reich, J.G.Skolnik, P.F.Ordung and H.L.Krauss, Affiliated East West Press Pvt.Ltd, New Delhi.
3. Foundations for Microwave Engineering – by R.E.Collins, McGraw Hill Publ.
4. Electronic and Radio Engineering – by Frederic E.Terman, McGraw Hill Publ.

REFERENCES:

1. Microwave and Radar Engineering – by M.Kulkarni.
2. Electronic Communication Systems – by George Kennedy, McGraw Hill Publ.
3. Microwave Engineering – by Annapurna Das and S.K.Das, Tata McGraw Hill.

EC 412 OPTICAL & SATELLITE COMMUNICATION SYSTEMS

Class: B.Tech. IV/IV – I Semester
Branch: ECE
Duration of Unit Examination : 3 Hours

Lectures: 3 Hours
Tutorials: 1
Univ. Examination: 100 marks
Sessionals: 50 marks

OPTICAL COMMUNICATIONS

UNIT – I

INTRODUCTION TO OPTICAL COMMUNICATIONS: Elements of an Optical Communication System, Advantages of Optical Fiber Communication, Applications.

OPTICAL FIBER WAVE GUIDES: Basic Optical Laws, Fiber types, Rays and modes, Step index and graded index fibers, Ray Optics Representation, Mode theory of circular wave guides, wave equation in step index fiber, graded index fiber, fiber materials.

TRANSMISSION CHARACTERISTICS OF OPTICAL FIBERS: Attenuation – Absorptron, Scattering and bending losses in fibers, core and cladding losses, Signal distortion in optical wave guides.

Fiber splicing – splicing techniques optical fiber connectors – connector types.

UNIT – II

OPTICAL SOURCES AND DETECTORS: Light emitting diodes – LED structures.

Semi conductor Laser diode – Laser diode modes and threshold condition.

Photo detector – PIN Photo detector and Avalanche Photodiode.

OPTICAL RECEIVER AND DIGITAL TRAMMISSION SYSTEMS: Fundamental receiver operation, Point –to-point linkes, Link Power Budget, Rise Time budget, Wave Length division multiplexing.

SATELLITE COMMUNICATION

UNIT – III

ORBITAL ASPECTS OF SATELLITE COMMUNICATION: Orbital, Mechanics, Look angle determination, orbital perturbations, Orbit determination, Launches and launch vehicles, Orbital effects in communication system performance.

SPACE CRAFT: Introduction, Space Craft Subsystem, Attitude and orbit control system, telemetry, tracking and command, Power System Communication, Sub Systems Space Craft Antennas.

UNIT – IV

SATELLITE LINK DESIGN: Basic Transmission Theory, System noise temperature and G/T ratio, Design of down links, Up Link Design, Design of Satellite Links for Specified C/N Introduction to multiple access techniques.

TEXT BOOKS:

1. Optical Fiber Communication – Gerad Keiser, McGraw Hill.
2. Fiber Optic Communication – D.C. Agarwal.
3. Satellite Communication - Pratt, John Willey.
4. Satellite Communication – Robert M.Giglaid, CBS Publication.

REFERENCE BOOKS:

1. Optical Fiber Communication – John M. Senior – PHI.
2. Satellite Communication – Agarwal.

EC 413 VLSI DESIGN

Class: **IV/IV B.Tech. I Semester** *Lectures:* **4**
Branch: **ECE** *University Exam. :* **100 marks**
Duration of University Examination: **3 hours.** *Sessionals* **: 50 marks**

UNIT-I

Review of Micro electronics and introduction to MOS Technology: Introduction to IC technology, MOS Technology and VLSI, Basic MOS transistor, fabrication of NMOS, CMOS and BICOMS Transistors, thermal aspects of processing and production of E-beam marks. 9

UNIT – II

MOS and BIMOS Circuit Design Processors: MOS layers, stick diagrams, design rules and layout 2μm and 1.2 μm CMOS rules, layout diagrams and symbolic diagrams.
Basic Circuit Concepts: Sheet resistance, area capacities of layers, delay unit and choice of layers. 9

UNIT-III

Scaling of MOS Circuits: Scaling models and scaling factors, scaling factors for device parameters and limitations of scaling.
Subsystem Design and Layout: Architectural issues, switch logic, gate logic, examples of structured design clocked sequential circuits and system considerations. 9

UNIT-IV

System Design and Design Methods: Design Strategies, CMOS chip design options, design methods, design capture tools, verification tools and examples.
CMOS Testing: Need for Testing, manufacturing test principles, design strategies for test, chip level test techniques, system level test techniques. 9

TEXT BOOK:

1. **Dourglas A Pucknell & Kamran Eshraghian**, *Basic VLSI Design.*

REFERENCE BOOK:

1. **Neil H E Weste & Earman Eshraghian**, *Principles of CMOS VLSI Design.*

EC 414 A DIGITAL IMAGE PROCESSING

Class: **IV/IV B.Tech. II Semester** *Lectures:* **4**,
Branch : **ECE** *University Examination :* **100 marks**
Duration of University Examination: **3 hours**. *Sessionals*: **50 marks**

UNIT – I

Introduction: Elements of Digital Image Processing system, Digital Image representation, Image model, Sampling and Quantization, Neighbors of pixel, Connectivity, Distance measures, Arithmetic and Logical operations on images, Basic Transformations such as translation, Scaling, Rotation, Perspective Transformations

Image Transforms: Two dimensional DFT and its properties, Walsh Transform, Hodamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling (K-L) Transform **9+3**

UNIT – II

Image Enhancement: Brightness and contrast of an image, Simple intensity transformations – Image negatives, Linear mapping, logarithmic mapping, Gray level thresholding; Image histograms, histogram equalization, histogram specification, local enhancement; spatial filtering: smoothing filters – low pass, Rank filters, Median filters, min-max and range filters; sharpening filters – high pass, high boost and Derivative filters; Enhancement in frequency domain, Generation of spatial masks from frequency domain specification. **9+3**

UNIT – III

Image Compression: Redundancy – Coding redundancy, interpixel redundancy, Psychovisual redundancy; Root mean square error, Image compression system model, noiseless and noisy coding, error free compression – Huffman coding, Bit-plane coding, constant area coding, lossless predictive coding; Lossy compression – Lossy predictive coding, Transform coding **9+3**

UNIT – IV

Image Segmentation: Detection of discontinuities – Point detection, line detection, Edge detection, pixel connectivity; Region – Oriented segmentation – Region similarity, Region growing, Limitations of region growing, Region splitting and Merging

Morphological Image Processing: Structuring element, Fitting and hitting, Dilation, Erosion, Opening and closing, Hit–or–Miss Transform, Basic Morphological Algorithms, Grey Scale Morphology **9+3**

TEXT BOOKS:

1. R.C.Gonzalez and R.E. Woods, ***Digital Image processing***, Pearson Education, New Delhi.
2. B.chanda, D.Dutta Majumder, *Digital image processing and analysis*, Prentice Hall of India, New Delhi.

REFERENCE BOOKS:

1. Nick Efford, *Digital Image Processing Using Java* , Pearson Education, New Delhi.
2. Gregory Baxes, *Digital Image Processing: Principles and Applications*, John Wiley & Sons, New York.

EC 414 (B) NEURAL NETWORKS & FUZZY LOGIC

Class: **IV/IV B.Tech. I Semester** *Lectures:***4**
Branch: **ECE** *University Examination:***100marks**
Duration of University Examination: **3 hours** *Sessionals:* **50 marks**

UNIT – I

Biological Neural Networks: Neuron Physiology, Neuronal Diversity, Specifications of the brain, They Eye's Neural Network.
Concepts of Artificial Neural Networks: Neural Attributes, Modeling, Basic Model of Neuron, Learning in Artificial Neural Networks, Characteristics of ANNs, ANN Parameters, ANN Topologies, ANN adaptability, The stability Plasticity Dilemma. **9**

UNIT – II

Neural Network Paradigms: McCulloch – Pitts Model, The perception, ADALINE and MADALINE Models, Winner – Takes – All Learning algorithm, Back-propagation Learning Algorithm, Cerebellum Model Articulation Controller (CMAC), Adaptive Resonance Theory (ART) paradigm, Hopfield Model, Competitive Learning Model, Memory – Type paradigm, Linear Associative Memory, Real – Time Models, Linear Vector Quantization, Self-organizing Map, Probabilistic Neural Network, Radial Basis function, Time-Delay Neural Net, Congnitron and Neo congnitron Models, Simulated Annealing, Boltzmann Machine. **9**

UNIT – III

Fuzzy Logic: Propositional Logic, The Membership function, Fuzzy logic, Fuzzy Rule Generation, Defuzzification of Fuzzy Logic, Time – Dependent Fuzzy Logic, Crisp logics, Temporal Fuzzy logic (TFL), Time Invariant Membership function, Time-variant Membership function, Intervals, Semilarge Intervals, Interval operators, Temporal Fuzzy logic syntax, Applying Temporal Fuzzy operators, Defuzzification of Temporal Fuzzy logic, Applicability of TFL in communication systems **9**

UNIT – IV

Fuzzy Neural Networks: Fuzzy Artificial Neural Network (FANN), Fuzzy Neural Example, Neuro-Fuzzy control, Traditional control, Neural control, Fuzzy control, Fuzzy – Neural control.
Applications: Signal Processing, Image Data Processing, Hand written characteristics Recognition, Visual Image Recognition, Communication systems, Call processing, Switching, Traffic control Intelligent control, Optimization techniques. **9**

TEXT BOOK:

1. Stamatios V. Kartalopoulos, *Understanding Neural Networks & Fuzzy Logic*, Prentice Hall of Inida, (IEEE Press), New Delhi.

REFERENCE BOOKS:

1. Hassoun,*Fundamentals of Artificial Neural Networks*, Prentice Hall of India, New Delhi.
2. Anderson, *Introduction to Neural Networks*, Prentice Hall of India, New Delhi.
3. Kosko, *Neural Networks and Fuzzy Systems*, Prentice Hall of India, New Delhi.
4. Junhong Nie & Derek Linkens, *Fuzzy-Neural Control*, Prentice Hall of India, New Delhi.
5. George J.Klir & Bo Yuan, *Fuzzy sets and Fuzzylogic*, Prentice Hall of India, New Delhi.

EC 414 (C) INDUSTRIAL ELECTRONICS

Class: **III/IV B.Tech. II Semester** *Lectures:***4,**
Branch: **ECE.** *University Examination:* **100 marks**
Duration of University Examination: **3 hours** *Sessionals:* **50 marks**

UNIT – I

Characteristics of Power Devices: Introduction of power semi conductor devices like SCR, DIAC, TRAIC, GTO, MOSFET, UJT, IGBT and their characteristics. Two transistor modes of SCR, protection of SCR against over voltages, over current and voltage and current transients.
Gate Triggering circuits, Resistance, Resistance – capacitance Trigger circuits, UJT as relaxation oscillator, series and parallel operation of SCRs, String efficiency, Different methods of forced communication Techniques. **12**

UNIT – II

Phase controlled Rectifiers: Phase Angle control Single phase three phase, halfwave, full wave, Half controlled and Fully controlled with and without free wheeling diodes for resistive and inductive loads, effect of source inductance, Dual converters, Power factor improvements. **12**

UNIT – III

Choppers: Basic circuit, step-up step-down, classification of choppers on the basis of various quadrants, chopper commutation, Jones and Morgan chopper.''
Inverters: Series inverter, parallel inverter, voltage source inverters, and current source inverters, 1-phase and 3-Phase bridge inverters. **12**

UNIT – IV

AC Voltage Controllers: Single Phase AC Controllers with R and RL loads, Three Phase AC Voltage Controllers with Star and Delta connected loads.
Cyclo converters: Principle and operation of Single phase to single phase, single phase to 3-phase, 3-phase to 1-phase Cyclo converters.

Industrial Applications: Uninterrupted power supply, Switched mode power supply. Closed loop control of AC & DC drives and its applications. **12**

TEXT BOOK:

1. M.D. Singh & K.B. Kanchandani, *Power Electronics,* Tata McGraw Hill, New Delhi.
2. M.H. Rashid, *Power Electronics,* pearson , New Delhi.
3. P.S. Bhimbra, *Power Electronics,* Khanna Publishers, New Delhi.
4. Vedam Subramanium, *Power Electronics.*

REFERENCE BOOKS:

1. P.C. Sen, *Power Electronics,* Tata McGraw Hill, New Delhi.

EC 414 (D) ADAPTIVE SIGNAL PROCESSING

Class: **IV/IV B.Tech. II Semester** *Lectures:* **4**
Branch : **ECE** *University Examination :* **100 marks**
Duration of University Examination: **3 hours**. *Sessionals*: **50 marks**

UNIT – I

Multirate Digital Signal Processing: Multirate Signal processing, Decimation, Interpolation, Time domain and frequency domain characterization of sampling rate alteration devices, Fractional sampling rate conversion, Direct-form FIR structures, Polyphase filter structures, Time-variant filter structures, Multistage implementation of sampling rate conversion, Design of Phase shifters, Interfacing of digital system with different sampling rates, Implementation of Narrow band low pass filters, Implementation of digital filter banks, sub band coding of speech signals, Quadrature mirror filters, Transmultiplexers, oversampling ADCs and DACs. **9**

UNIT – II

Power Spectrum Estimation: Cross correlation and Auto correlation of discrete – time signals, power spectral density, periodogram, use of DFT in power spectrum estimation, non parametric methods for power spectrum estimation – Bartlett method, Welch method, Blackman & Tukey method; Parametric methods for power spectrum estimation – Autoregressive (AR), Moving average (MA) and Auto regressive – Moving average (ARMA) models, Yule-Walker method, Burg method, Unconstrained least squares method. **9**

UNIT – III

Adaptive Signal Processing: Adaptive Systems, Open and closed loop adaptations, General form of adaptive linear combines, performance surface, gradient and minimum mean-square error, input correlation matrix, eigen values and eigen vectors of correlation matrix, Gradient search methods, Simple gradient search algorithm and its solution, learning curve, newton method, Method of Steepest descent; Gradient component estimation – derivative measurement, Variance of gradient estimate, Weight-vector solution, mis adjustment. **9**

UNIT – IV

Adaptive Algorithms & Structures: Derivation of LMS algorithm, Convergence of weight vector, learning curve, noise in the weight-vector solution, mis adjustment, comparison of steepest descent and LMS algorithms, Z-transform in adaptive signal processing – Correlation function and power spectra, performance function, performance surfaces; LMS/Newton algorithm, sequential Regression (SER) algorithm, Linear Random Search (LRS), Adaptive recursive filters, Lattice Structures **9**

TEXT BOOKS:

1. John. G. Proakis, D.G. Manolakis, *Digital Signal Processing*: *Principles, Algorithms & Applications,*Prentice Hall India,New Delhi.
2. Bernard Widrow, S.D. Stearns, *Adaptive Signal Processing*, Pearson Publication, New Delhi.

REFERENCE BOOKS:

1. S. K. Mitra, Digital Signal Processing: A Computer Based Approach, Tata McGraw-Hill, New Delhi.
2. L.R. Rabiner & B. Gold, *Digital Signal Processing*, Prentice Hall of India, New Delhi.
3. A.V.Oppenheim & R.W. Schafer, *Digital Signal Processing*, Pearson Publication, New Delhi.

EC 415 E CAD LAB

Class : IV/IV B.Tech. I-Semester
Branch: ECE
Duration of Univ. Examination : 3 Hours

Practicals : 3 hours
Univ. Examination : 50 marks
Sessionals: 25 Marks

LIST OF EXPERIMENTS:

VHDL / Verilog: Design, Simulation, Synthesis, Implementation of

A. Combinational Circuits:

i) Adders / Sub factors / Parity Generators

ii) Multiplexers, Encoders, Decoders.

B. Sequential Circuits:

i) Flip Flops (SR, JK, D,T)

ii) Counters

a) Ripple Counters

b) Synchronous Counters

iii) Shift Registers.

C. ALU

D. MEMORIES

E. Layout design– Inverter, NAND and NOR (involves DRC, Spice netlistextraction, Spice Simulation, Using tools like LASI, Winspice)

EC 416 MICROWAVE ENGINEERING LAB

Class : IV/IV B.Tech. I-Semester — Practicals : 3 hours
Branch: ECE — Univ. Examination : 50 marks
Duration of Univ. Examination : 3 Hours — Sessionals: 25 Marks

LIST OF EXPERIMENTS:

1. Antenna demonstration.
2. Mode characteristics of reflex klystron
3. Gunn Oscillator characteristics and power measurement.
4. Wavelength and frequency measurements.
5. Measurement of VSWR
6. Measurement of impedance.
7. Measurement of radiation pattern and gain of an antenna.
8. Properties of circulators & Directional couplers, magic TEE junction.
9. Study of Optical sources, Detectors and Fiber characteristics.
10. Serial Data Link and Modem.

SCHEME OF INSTRUCTION AND EVALUATION
II SEMESTER OF IV YEAR OF 4-YEAR B.TECH. DEGREE PROGRAMME

ELECTRONICS & COMMUNICATION ENGINEERING

Course No.	Course	Hours of Instruction per week			Scheme Evaluation			Total Marks
					External Evaluation		Sessionals	
		Lectures	Tutorials	Drawing/ Practical	Duration of Exam	Max. Marks	Max. Marks	
EC 421	Cellular and Mobile Communication	4	-	-	3 Hrs	100	50	150
EC422	Data Communication Networks	4	-	-	3 Hrs	100	50	150
EC 423	Professional Elective-II	4	-	-	3 Hrs	100	50	150
EC 424	DSP Lab	-	-	3	3 Hrs	50	25	75
EC 425	Project Work & Seminar	-	-	8	Report & Viva Voice	100	150	250
	TOTAL	**12**	**-**	**11**		**450**	**325**	**775**

(3+1) 23 Hrs.

<u>Professional Elective-II</u>:

EC423A - Embedded System Design
EC423B - Digital System Design
EC423C - Mixed Signal Processing
EC423D - Radar Signal Processing

*During these 6 hours there will be no formal contact between the guide and the student group
* Based on report seminar and Viva -Voice

EC 421 CELLULAR AND MOBILE COMMUNICATION

Class: B.Tech. IV/IV – II Semester	Lectures: 4 Hours
Branch: ECE	Sessionals: 50 marks
Duration of Unit Examination : 3 Hours	Univ. Examination: 100 marks

UNIT-I

Introduction To Cellular Mobile Systems: Basic Cellular System, Operation of Cellular Systems, Analysis & Digital Cellular Systems, Uniqueness of Mobile Radio environment,

Elements of Cellular Radio System Design:
Max. number of Calls per hour per cell, Max. number of frequency Reuse channels, cochannel Interference Reduction factor, Cell Splitting.

UNIT-II

Co-Channel Interference Reduction:
Co-Channel Interference, Exploring Co-Channel interference Areas in a system, Design of an omnidirectional Antenna system (worst case), Design of Directional Antenna System, Reduction of Co-Channel Interference by means of a Notch in the tilted antenna pattern, Power Control.

Types Of Non Co-Channel Interference:
Adjacent Channel Interference, Near-End-Far-End Interference, cross talk, effects on coverage and Interference by power decrease, Antenna Height decrease, Beam tilting, Effects of Cell-Site Components, Interference between systems.

UNIT-III

Frequency Management and Channel Assignment:
Frequency Management, Set-Up Channels, Definition of Channel Assignment, Fixed channel Assignment.

Handoffs and Dropped Calls:
Initiation of a Hand off, Delaying a Handoff, forced Handoffs, Power-Difference Handoffs, Mobile Assisted Hand off (MAHO) and Soft Hand off, Cell-site Handoff only, Intersystem Handoff.

UNIT-IV

Cell Coverage for Signal and Traffic:
Mobile point-to-point model, propagation in Near-in distance, Long distance propagation, cell-site antenna Height and Signal Coverage Cells, mobile-to-mobile propagation.
Digital Cellular Systems: CSMA, CDMA, GSM

TEXT BOOKS:

1. William C.Y.Lee, "Mobile Cellular Telecommunications: (Analog and Digital systems), 2nd edition,

REFERENCE BOOKS:

1. William C.Y.Lee, “Mobile Communications Design Fundamentals”, - 2nd edition
2. William C.Y.Lee, “Mobile Communications Engineering” (Theory and Application), 2nd edition, - Mc Graw Hill, 1997.
3. Rappaport, “Wireless Communication” Pearson education, 2nd edition, 2002.
4. Jerney D. Gibson, “The Mobile Communication Hand Book”

EC 422 DATA COMMUNICATION NETWORKS

Class: **IV/IV B.Tech. II Semester** *Lectures:* **4**
Branch : **ECE** *University Examination :* **100 marks**
Duration of University Examination: **3 hours**. *Sessionals*: **50 marks**

UNIT – I

Introduction: A Communications model, Data Communications, Data Communications Networking, Protocol and Protocol Architecture, Standards.
Data link control: Flow Control, Error Detection, Error Control, High – Level Data Link Control (HDLC), Other Data Link Control Protocols.

Circuit Switching: Switched Networks, Circuit-Switching Networks, Switching Concepts, Routing in Circuit-Switched Networks, Control Signaling.

Protocols and Architecture: Protocols, OSI, TCP/IP Protocol Suite. **9**

UNIT – II

Packet Switching: Packet-Switching Principles, Routing, Congestion Control, X.25.
Frame relay: Background, Frame Relay Protocol Architecture, Frame Relay Call Control, User Data Transfer, Network Function, Congestion Control.
Asynchronous transfer mode: Protocol Architecture, ATM Logical Connections, ATM Cells, Transmission of ATM Cells, ATM Adaptation Layer, Traffic and Congestion Control. **9**

UNIT – III

LAN Technology: LAN Architecture, Bus/Tree LANs, Ring LANs, Star LANs, Wireless LANs.
LAN Systems: Ethernet and Fast Ethernet (CSMA/CD), Token Ring and FDDI, 100VG-AnyLAN, ATMLANs, Fiber Channel, Wireless LANs.
Bridges: Bridge Operation, Routing with Bridges, ATM LAN Emulation. **9**

UNIT – IV

Internetworking: Principles of Internetworking, Connectionless Internetworking, The Internet Protocol, Routing Protocol, Ipv6, ICMPv6.
Transport Protocols: Transport Services, Protocol Mechanisms, TCP, UDP.
Network Security: Security Requirements and Attacks, Privacy with Conventional Encryption, Message Authentication and Hash Functions, Public-Key Encryption and Digital Signatures, IPv4 and IPv6 Security. **9**

TEXT BOOK:

1. William Stallings, *Data and Computer Communications, 6/e*, Prentice Hall of India, New Delhi.
2. Tannenbaum - Computer Networks

EC 423 (A) EMBEDDED SYSTEMS

Class: B.Tech. IV/IV – II Semester — Lectures: 4 Hours
Branch: ECE — Sessionals: 50 marks
Duration of Unit Examination : 3 Hours — Univ. Examination: 100 marks

UNIT - I

Introduction to Embedded Systems : An Embedded Systems, Processor in the System, Other Hardware Units, Software Embedded into a System, Exemplary Embedded Systems, Embedded System-On-Chip (SOC) and in VLSI Circuit.

Processor and Memory Organization : Structural Units in a Processor, Processor Selection for an Embedded System, Memory Devices, Memory Selection for an Embedded System, Allocation of Memory to Program Segments and Blocks and Memory Map of a System, Direct Memory Access, Interfacing Processor, Memories and I/O Devices.

UNIT - II

Devices and Buses for Device Networks: I/O Devices, Timer and Counting Devices, Serial Communication Using the 'I^2C','CAN' and Advanced I/O Buses between the Networked Multiple Devices, Host System or Computer Parallel Communication between the Networked I/O Multiple Devices Using the ISA,PCI,PCI-X and Advanced Buses.

Device Drivers and Interrupts Servicing Mechanism: Device Drivers, Parallel Port Device Drivers in a System, Serial Port Device Drivers in a System, Device Drivers for Internal Programmable Timing Devices, Interrupt Servicing (Handling) Mechanism, Context and the Periods for Context-Switching, Deadline and Interrupt Latency.

UNIT - III

Program Modeling Concepts in Single and Multiprocessor Systems Software-Development Process : Modeling Processes for Software Analysis Before Software Implementation, Programming Models for Event Controlled or Response Time Constrained real Time Programs, Modeling of Multiprocessor Systems.

Software Engineering Practices in the Embedded Software Development Process: Software Algorithm Complexity, Software Development Life Cycle and its Models, Software Analysis, Software Design, Software Implementation, Software Testing **,** Validating and Debugging, Real Time Programming Issues During the Software Development Process, Software Project Management, Software Maintenance , Unified Modeling Language(UML).

UNIT-IV

Inter-Process Communication and Synchronisation of Processes, Tasks And Threads: Multiple Processes in an Application, Problem of Sharing Data by Multiple Tasks and Routines, Inter Process Communication.

Real Time Operating Systems: Operating System Services, I/O Subsystems, Network Operating Systems, Real-Time and Embedded System Operating Systems, Interrupt Routines in RTOS Environment : Handling of Interrupt Source Call by the RTOS's,

RTOS Task Scheduling Models, Interrupt Latency and Response Times of the Tasks as Performance Metrics, Performance Metric in Scheduling Models for Periodic , Sporadic and Aperiodic Tasks, IEEE Standard POSIX 1003.LB Functions for Standardization of RTOS and Inter_Task Communication Functions, List of Basic Actions in a Preemptive Scheduler and Expected Times Taken at a Processor, Fifteen-Point Strategy for Synchronisation between the Processes , ISR's , OS Functions and Tasks and for Resource Management, Embedded Linux Internals : Linux Kernel for the Device Drivers and Embedded System, OS Security Issues, Mobile OS.

TEXT BOOK:

1) "Embedded Systems", Raj Kamal, Tata McGraw Hill, 2003.

REFERENCE BOOKS:

1) "Fundamentals of Embedded Software-where C and Assembly meet", Daniel W.Lewis, Pearson Education, 2002.
2) "Programming Embedded Systems", Dream Tech Software Team, John Wiley Pub, 2004.

EC 423 (B) DIGITAL SYSTEM DESIGN

Class: B.Tech. IV/IV – II Semester | Lectures: 4 Hours
Branch: ECE | Sessionals: 50 marks
Duration of Unit Examination : 3 Hours | Univ. Examination: 100 marks

UNIT - I

Computer Aided Minimization Procedure: CAMP algorithm, Introduction to cube based Algorithms.

Design of Large Scale Digital Systems: ASM Chart Method. Hardware description language and control sequence method, Design using PLAs, PALs, ASICs, PLDs.

UNIT - II

Fault Diagnosis in combinational Circuits: Fault Classes and Models, fault detection and location experiments, Path Sensitization & Boolean difference methods, Kohavi algorithm. Failure Tolerant design, Introduction to Fault-Tolerant VLSI processor arrays.

UNIT - III

Fault Diagnosis in Sequential circuits: State Identification and Fault detection experiments. Machine identification, Design of fault Detection Experiment.

UNIT - IV

Programmable Logic arrays: PLA minimization and PLA folding.

Design for Testability: Faults in PLAs, Test Generation, DFT Schemes, Built in self-test.

TEXT BOOKS:

1. N.N.Biswa: Logic Design Theory (PHI)
2. Samuel C.Lee and B.S.Sonde: Digital Circuits And Logic Design – PHI, NewDelhi.
3. Zvi.Kohavi: Switching and Finite Automata Theory (TMH)

REFERENCE BOOKS:

1. Morris Mano: Digital Design
2. Lala: Digital system Design using PLSs.
3. Schaum's Serries: Digital Design
4. E.J.HILL & Peterson: Introduction to switching Theory and Logic Design (John Wiley 3rd Edn.)

EC 423 (C) MIXED SIGNAL DESIGN

Class: B.Tech. IV/IV – II Semester | Lectures: 4 Hours
Branch: ECE | Sessionals: 50 marks
Duration of Unit Examination : 3 Hours | Univ. Examination: 100 marks

UNIT – I

Building blocks for CMOS amplifiers-design of current mirrors, differential amplifiers;

UNIT - II

CMOS operational transconductance amplifiers – Design of signal ended telescopic cascade, folded cascade and two-stage amplifiers; Frequency compensation schemes – Miller compensation. Ahuja compensation and Nested-Miller compensation.
Design of fully deferential amplifiers, discussion of common mode feedback circuits.

UNIT - III

Switched capacitor circuits, design of switched capacitor amplifiers and integrators, Effect of op amp finite gain, bandwidth and offset, circuit techniques for reducing effects of op amp imperfections, switches and charge injection and clock feed-through effects.

Design of sample and holds and comparators.

UNIT – IV

Fundamentals of data converters; Nyquist rate A/D converters (Flash, interpolating, Over sampled A/D and D/A converters.
Design of PLL's and DLL's and frequency synthesizers.

Text Books:

1. Analog MOS integrated circuits for Signal processing, R. GREGORIAN AND TEMES.
2. Introduction to CMOS opamps and compators, R. GREGORIAN.
3. Analog integrated circuits design, D. JOHNS AND K. MARTIN.
4. VLSI Design Techniques for Aanalog and Digital Circuits, Randall L. Geiger, Phillip E. Allen and Noel R. Strader. McGraw-Hill.

Reference Books:

1. Monilithic Phase-locked loops and clock recovery circuits, B. RAZAVI.
2. Analog VLSI, MOHAMMED ISMAIL AND TERRI FIEZ, McGraw-Hill, 1994.

EC 423 (D) RADAR SIGNAL PROCESSING

Class: B.Tech. IV/IV – II Semester | Lectures: 4 Hours
Branch: ECE | Sessionals: 50 marks
Duration of Unit Examination : 3 Hours | Univ. Examination: 100 marks

UNIT - I

Introduction: Classification of Radars based on functions, principles of operation etc., performance measures and interplay between Radar parameters, Target parameters and Environment parameters.

Classical Detection and Estimation Theory, Binary Hypotheses Testing, Likelihood Ratio Test, Neymon square, MAP, Maximum Likehood Estimation of parameters, Cramer-Rao Bounds, Chemood Bounds.

UNIT - II

Representation of Signals , K-L expansion, Equivalent Low-pass representation of Bandpass signals and noise.

Detection of Slowly Fluctuating point Targets in white noise and colored noise. Swirling Target models. Optimum receivers. Correlator and Band pass M atohed Filter Receivers. PD –PF performance; Coherent and non-coherent Integration sub-optimum Receptor. Radar power – Aperture product.

UNIT - III

Range and Doppler Resolution: Ambiguity function and its properties. Local and Global Accuracy. Signal Design. LFM. Polyphase coded signals detection of a Doppler shifted slowly fluctuating point target return in a discrete scatterer environment.

UNIT - IV

Dobly Dispersive fading Target and Clutter models – scattering function description. Labd clutter-pluse length limited and Beam width limited slutter. Sea clutter.

Optimum/sub optimum reception of Range Spread / Doppler Spread / Doubly spread targets in the presence of noise and clutter. Introduction to adaptive detection and CFAR techniques.

TEXT BOOKS:

1. Di Franco.JV and Rubin, Wl., "Radar Detection", Artech House, 1980.
2. Gaspare Galati (Ed), "Advanced Radar Techniques and Systems", Peter perigrinus Ltd. 1993.
3. Ramon Nitzberg, "Radar Signal Processing and Adaptive Systems" , Artech House, 1999.

REFERENCES:

1. Auguts. W.Rihaczek "Principles of High Resolution Radar", Artech House,1996.
2. Lewis. BL and Frank, F.Kretschner, Jr and Wesley W.Sheldon, "Aspect of Radar signal processing", Artech House, 1986.
3. (ED) Simon Hay Kin and Allan Steinhardt, "Adaptive Radar Detection and Estimation', John Wiley ,1992.
4. Vantrees.H.L."Detection, Estimation and Modulation Theory", Wiley part-I, JohnWiley& Sons , 1968.

EC 424 DIGITAL SIGNAL PROCESSING LAB

Class : IV/IV B.Tech. II -Semester
Branch: ECE
Duration of Univ. Examination: 3 Hours

Practicals : 3 hours
Univ. Examination : 50 marks
Sessionals: 25 Marks

LIST OF EXPERIMENTS:

MAT LAB Programming:

i) Representation Signals

ii) Convolution, Correlation, DFT – Calculation.

iii) Filter Design

a) IIR

b) FIR

DSP Processor Programming:

i) Convolution, Correlation, DFT calculation.

ii) Filter Design

iii) Applications (Using code composer studio)