Department of Electronics and Communication Engineering
AU College of Engineering (Autonomous)

Scheme of Instruction, Examination and Syllabus

B.E. (Electronics and Communication) – 4 Year Degree Course

Common Scheme of Instruction & Examination
I/IV B.E./B.Tech (Four Year Course) – Semester System
(with effect from 2006 – 2007 admitted batch onwards)

B.E. 3rd Semester

B.E. 2nd Year 1st Semester

Code No.	*Subject*	*Credits*	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
			Theory	*Tutorial*	*Lab*				
EEM 211	Mathematics-III	4	3	1	-	3	30	70	100
EME 212	Engineering Mechanics and Strength of Materials	4	3	1	-	3	30	70	100
EEE 213	Network Theory	4	3	1	-	3	30	70	100
ECE 214	Electrical Machines	4	3	1	-	3	30	70	100
ECE 215	Electronic Devices and Circuits	4	3	1	-	3	30	70	100
EEP 216	Material Science	4	3	1	-	3	30	70	100
ECE 217	Network Laboratory	2	-	-	3	3	50	50	100
ECE 218	Electronic Devices and Circuits Laboratory	2	-	-	3	3	50	50	100
	Total	28	18	6	6	-	280	520	800

B.E. 4th Semester

B.E. 2nd Year 2nd Semester

Code No.	*Subject*	*Credits*	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
			Theory	*Tutorial*	*Lab*				
EEM 221	Mathematics – IV	4	3	1	-	3	30	70	100
ECE 222	Electromagnetic Field Theory & Transmission Lines	4	3	1	-	3	30	70	100
ECE 223	Analog Electronic Circuits	4	3	1	-	3	30	70	100
ECE 224	Probability Theory & Random Process	4	3	1	-	3	30	70	100
ECE 225	Signals and Systems	4	3	1	-	3	30	70	100
ECE 226	Advanced Network Theory	4	3	1	-	3	30	70	100
ECE 227	Environmental Studies	3	3	-	-	3	30	70	100
ECE 228	Electrical Machines Laboratory	2	-	-	3	3	50	50	100
ECE 229	Analog Electronic Circuits Laboratory	2	-	-	3	3	50	50	100
	Total	31	21	6	6	-	310	590	900

B.E. 5th Semester

B.E. 3rd Year 1st Semester

Code No.	*Subject*	*Credits*	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
			Theory	*Tutorial*	*Lab*				
ECE 311	Pulse and Digital Circuits	4	3	1	-	3	30	70	100
ECE 312	Linear ICs and Applications	4	3	1	-	3	30	70	100
ECE 313	Analog Communication	4	3	1	-	3	30	70	100
ECE 314	Computer Architecture and Organization	4	3	1	-	3	30	70	100
ECE 315	Switching Theory and Logic Circuits	4	3	1	-	3	30	70	100
ECE 316	Antennas and Wave Propagation	4	3	1	-	3	30	70	100
ECE 317	Linear ICs and Pulse Circuit Laboratory	2	-	-	3	3	50	50	100
ECE 318	Digital ICs Laboratory	2	-	-	3	3	50	50	100
ECE 319	Soft Skills	1	-	-	3	-	100	-	100
	Total	29	18	6	9	-	380	520	900

B.E. 6th Semester

B.E. 3nd Year 2nd Semester

Code No.	*Subject*	*Credits*	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
			Theory	*Tutorial*	*Lab*				
EEE 321	Control Systems	4	3	1	-	3	30	70	100
ECE 322	Microprocessors and Applications	4	3	1	-	3	30	70	100
ECE 323	Data Structures (Common with Metallurgy)	4	3	1	-	3	30	70	100
ECE 324	Computer Network Engineering	4	3	1	-	3	30	70	100
ECE 325	Digital Communication	4	3	1	-	3	30	70	100
ECE 326	Elective – I	4	3	1	-	3	30	70	100
ECE 327	Analog communication Laboratory	2	-	-	3	3	50	50	100
ECE 328	Microprocessors & Applications Laboratory	2	-	-	3	3	50	50	100
	Total	28	18	6	6	-	280	520	800

Elective – I

1. Cellular and Mobile Communications
2. EMI / EMC
3. Micro Electronics
4. Electronic Measurements and Instrumentation

B.E. 7th Semester
B.E. 4th Year 1st Semester

Code No.	*Subject*	*Credits*	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
			Theory	*Tutorial*	*Lab*				
ECE 411	Digital Signal Processing	4	3	1	-	3	30	70	100
ECE 412	Information Theory and Coding	4	3	1	-	3	30	70	100
ECE 413	TV and Satellite Communication	4	3	1	-	3	30	70	100
ECE 414	Microwave Engineering	4	3	1	-	3	30	70	100
ECE 415	Elective – II	4	3	1	-	3	30	70	100
ECE 416	Digital Communication Laboratory	2	-	-	3	3	50	50	100
ECE 417	Digital Signal Processing Laboratory	2	-	-	3	3	50	50	100
ECE 418	Industrial Training and Seminar	2	-	-	-	-	100	-	100
	Total	26	15	5	6	-	350	450	800

Elective – II

1. VLSI Design and Embedded Systems
2. Information Networks
3. Image Processing and Pattern Recognition
4. Software Engineering
5. Advanced Microprocessors

B.E. 8th Semester
B.E. 4th Year 2nd Semester

Code No.	*Subject*	*Credits*	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
			Theory	*Tutorial*	*Lab*				
EHM 421	Engineering Economics and Management	4	3	1	-	3	30	70	100
ECE 422	Radar Engineering and Navigational Aids	4	3	1	-	3	30	70	100
ECE 423	Data Communications	4	3	1	-	3	30	70	100
ECE 424	Fiber – Optic Communications	4	3	1	-	3	30	70	100
ECE 425	Microwave Engg. & Antenna Laboratory	2	-	-	3	-	50	50	100
ECE 426	Project	8	-	-	16	-	50	50	100
	Total	26	12	4	19	-	220	380	600

NOTE:

EHM indicates that the course is drafted by the Department of Humanities.
EME indicates that the course is drafted by the Department of Mechanical Engineering.
ECE indicates that the course is drafted by the Department of Electronics and Communication Engineering.
EEE indicates that the courses is drafted by Department of Electrical Engineering.
EEM indicates that the courses is drafted by Engineering Mathematics Department.
EEP indicates that the course is drafted by Engineering Physics Department

ECE 319 Soft Skills is common for all Branches

B.E. 2nd Year 1st SemesterEEM

211 MATHEMATICS-III

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Vector Calculus

Differentiation of vectors, curves in space, Velocity and acceleration, Relative velocity and acceleration, Scalar and Vector point functions, Vector operator ∇, ∇ applied to scalar point functions, Gradient, ∇ applied to vector point functions, Divergence and curl, Physical interpretations of ∇, F and $\nabla \times F$, ∇ applied twice to point functions, ∇ applied to products of point functions, integration of vectors, Line integral, Circulation, Work, Surface integral-flux, Green's theorem in the plane, Stoke's theorem, Volume integral, Divergence theorem, Irrotational and solenoidal fields, Green's theorem, Introduction of orthogonal curvilinear coordinates : Cylindrical, Spherical and polar coordinates.

2. Introduction of Partial Differential Equations

Formation of partial differential equations, Solutions of PDEs, Equations solvable by direct integration, Linear equations of first order, Homogeneous linear equations with constant coefficients, Rules for finding the complimentary function, Rules of finding the particular integral, Working procedure top solve homogeneous linear equations of any order, Non-homogeneous linear equations.

3. Applications of Partial Differential Equations

Method of separation of variables, Vibrations of a stretched string-wave equations, One-dimensional and two-dimensional heat flow equations, Solution of Laplace's equation, Laplace's equation in polar coordinates.

4. Integral Transforms

Introduction, Definition, Fourier Integral, Sine and Cosine Integrals, Complex Forms of Fourier Integral, Fourier Transform, Fourier and Cosine Transforms, Finite Fourier Sine and Cosine Transforms. Properties of F - Transforms, Convolution Theorem for F - Transforms, Parseval's Identity for Fourier Transforms, Fourier Transforms of the Derivatives of a Function, Applications to Boundary Value Problems, Using Inverse Fourier Transforms only.

Text Book :

Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Pub. New Delhi, 34th Edition, 1998.

Reference Books :

1. A Text Book on Engineering Mathematics, N. P. Bali Etal, Laxmi Pub. Pvt. Ltd. – New Delhi.

2. Higher Engineering Mathematics, Dr. M. K. Venkataraman, National Pub. and Co. – Madras.
3. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley Eastern Pvt. – N. Delhi.

EME 212 ENGINEERING MECHANICS AND STRENGTH OF MATERIALS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

Engineering Mechanics

Concurrent Forces in a Plane and its Equilibrium, Centroids of Composite Plane Figures, General Case of Forces in a Plane.

Moment of Inertia of Plane Figures, Parallel Axis Theorem, Polar M.I., Concept of Mass M.I., Rectilinear Translation, Kinematics, Principle of Dynamics, Motion of a Particle Under Constant Force, Force Proportional to Displacement and Free Vibrations (SHM), D' Alembert's Principle, Momentum, Impulse – Work and Energy.

Rotation of a Rigid Body about a Fixed Axis Kinematics, Equation of Motion of a Rigid Body about a Fixed axis, Rotation and Constant Moment, Torsional Vibration.

Strength of Materials:

Simple Stress and Strain, Stresses on Inclined Plane, Two-dimensional Stress Systems, Principal Stress and Principal Planes, Mhor's Circle.

Shearing Force and Bending Moment, Types of Loads, Types of Supports, S.F. and D.M. Diagrams for Cantilever and Simply Supported Beams under Concentrated Loads and under U.D.L.

Flexure formula, Bending Stresses on the above types of Beams with Rectangular and Circular Sections.

Torsion of Circular Shafts, Determination of Shear Stress.

Text Books

1. Engineering Mechanics, S. Timoshenko (Relevant sections only).
2. Elements of Strength of Materials, S. Timoshenko (Relevant sections only).

EEE 213 NETWORK THEORY

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Analysis of DC Circuits:

Active Elements, passive Element, Reference Directions for current and voltage, Kirchoffs Laws, Voltage and Current Division Nodal Analysis, MESH Analysis, Linearity and superposition, Thevinin's and Norton's Theorem, Source Transformation.

2. DC Transients:

Inductor, Capacitor, Source free RL, RC and RLC Response, Evaluation of Initial conditions, application of Unit-step Function to RL, RC and RLC Circuits, Concepts of Natural, Forced and Complete Response.

3. Sinusoidal Steady State Analysis:

The Sinusoidal Forcing Function, Phasor Concept, Average and Effective values of Voltage and Current, Instantaneous and Average Power, Complex Power, Steady State Analysis Using Mesh and Nodal Analysis, Application of Network Theorems to AC Circuits, Balanced 3-phase circuits, Resonance, Concept of Duality.

4. Coupled Circuits:

Magnetically Coupled Circuits, Dot Convention, Y, Z, H, T – Parameters of Two – Port Networks, Reprocity Theorem.

5. Laplace Transform Techniques:

Transforms of Typical Signals, Response of Simple Circuits to Unit – Step, Ramp and Impulse Functions, Initial and Final Value Theorem, Convolution Integral, Time Shift and Periodic Functions, Transfer Function.

Text Books

1. Engineering Circuit Analysis, Willam H. Hayt Jr., and Jack E. Kemmerly, 5th Edition, McGraw Hill.
2. Network Analysis, M. E. Vanvalkenburg, 3rd Edition, PHI.

ECE 214 ELECTRICAL MACHINES

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Electric Energy System

Basic Structure, Generation, Transmission, Distribution and Utilization of Electric Power, Non – Conventional Energy Sources (Elementary treatment only).

2. DC Machines

Constructional Features, Function of Commutator, Induced EMF and Torque Expressions, Relationship Between Terminal Voltage and Induced EMF for Generator and Motoring Action, Different Types of Excitation and Performance Characteristics of Different Types of DC Machines, Starting and Speed Control of DC Motors, Losses and Efficiency, Efficiency by Direct Loading, Swinburne's Test and Hopkin's Test, Applications of DC Machines.

3. Transformers

Constructional Details, EMF Equation, Equivalent Circuit, Voltage Regulation, Losses and Efficiency, Auto – Transformers, Instrument Transformers, Open/Short – Circuit Tests and Determination of Efficiency and Regulation.

4. Three – Phase Induction Machines

Construction, Rotating Magnetic Field and 3ph Induction Motor, Power Flow Diagram, Torque and Torque-slip Characteristics, Condition for Max. Torque and its Value, Starting and Speed Control, Losses and Efficiency, Equivalent Circuit and Circle Diagram of Induction Motor, No – Load and Rotor – Blocked Tests and Efficiency and Torque - Speed Characteristics.

5. Three – Phase Synchronous Machines

Generation of EMF, Constructional Details, Induced EMF, Synchronous Generator on No – Load and Load, Synchronous Impedance and Voltage Regulation.

6. V – Curves and Inverted V – Curves, Synchronous Condenser, Starting of Synchronous Motors, Applications of Synchronous Machines.

7. Single – Phase Motors

Double Revolving Field Theory, Methods of Starting Single Phase Induction Motors, Universal Motor, Stepper Motor.

Text Books :

1. Electrical Machines, S. K. Bhattacharya, TMH Publications N. Delhi.
2. A First Course In Electrical Engineering, S. M. Tiwari, A. S. Binsaroor, Wheeler Publications.

ECE 215 ELECTRONIC DEVICES AND CIRCUITS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Energy Band Theory of Solids

Intrinsic and Extrinsic Semiconductors Doping, Doping Materials, Carrier Mobility, Conductivity, Diffusion and continuity equation, Hall – Effect and its Application.

2. Semiconductor Diodes

Band structure of PN Junction, Quantitative Theory of PN Diode, Volt – Amp. Characteristics, Temperature Dependence, Transition and Diffusion Capacitance of PN Junction, Zener and Avalanche Breakdowns, Tunnel Diode, LED, Schottky Barrier Diode, Varactor Diode, Photo Diode, PIN Diode, Point Contact Diode.

3. Diode Rectifiers

Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Ripple Factor and Regulation Characteristics.

4. Bipolar Junction Transister

NPN and PNP junction Transistor, Characteristics of Current Flow across the Base Regions, Minority and Majority Carrier Profiles, CB, CE and CC Configurations and their Input and Output Characteristics. Comparison of CE, CB and CC Configurations. Junction Biasing for Saturation, Cutoff and Active Region, α and β Parameters and the relation between them.

5. JFET

JFET and its characteristics, Pinch off Voltage, Drain Saturation Current, MOSFET – Enhancement and Depletion Modes, Small signal models of FET.

6. Transistor Biasing Circuits

Various Biasing Circuits and Stabilization, Thermal Runaway, Thermal Stability, Biasing of FETs.

7. Small Signal – Low Frequency Transistor Biasing Circuits

Transistor as an Amplifier, h – parameter model, Analysis of Transistor Amplifier Circuits using h – parameters. CB, CE and CC Amplifier configurations and performance factors. Analysis of Single Stage Amplifier, RC Coupled Amplifiers. Effects of Bypass and Coupling Capacitors. Frequency Response of CE Amplifier, Emitter – Follower, Cascaded Amplifier, High Frequency model of Transistor.

Text Books :

1. Electronic Devices and Circuits, G.S.N. Raju, I.K. International Publications, New Delhi, 2006.
2. Integrated Electronics Analog Digital Circuits, Jacob Millman and D. Halkias, McGraw Hill.
3. Electronic Devices and Circuits Theory, Boylsted, Prentice Hall Publications.

EEP 216 MATERIAL SCIENCE

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Conducting Materials

Relaxation Time and Electrical Conductivity. Sources of Resistivity of Metals and Alloys, Electrical Conductivity at High Frequencies. Geometrical and Magnetic Field Effects on Electrical Conductivity. Types of Conducting Materials.

2. Dielectric Materials

Types of Electric Polarization, Frequency and Temperature Effects on Polarization, Dielectric Loss, Dielectric Breakdown, Insulating Materials, Ferro-electric Materials, Electrets.

3. Magnetic Materials

Types of Magnetic materials, Ferro and Ferri magnetism, Hard and Soft Magnetic materials, Ferrites – Microwave applications, Magnetic bubbles.

4. Super Conducting Materials

Types of Super Conductors, High Tc Super Conductors and High Frequency Applications.

5. Integrated Circuits – Fabrication

Crystal Growth, Epitaxial Process, Masked Diffusion, Fabrication of Thin Films, Principles of IC Packaging.

Text Books :

1. Material Science, M. Arumugam, Anuradha Agencies Publishers.
2. Science of Engineering Materials, C. M. Srivastava and C. Srinivasan, Wiley Eastern Ltd.
3. Integrated Circuits, R. M. Warner Jr., McGraw Hill.

ECE 217 NETWORK LABORATORY

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
2	-	-	3	3	50	50	100

Ten Experiments based on Networks Theory.

ECE 218 ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
2	-	-	3	3	50	50	100

1. Study of CRO and Applications
2. V-I Characteristics of PN Junction Diode
3. V-I Characteristics of Zener Diode and Zener regulator characteristics.
4. V-I Characteristics of LED
5. V-I characteristics of Photo diode
6. Half-wave and full-wave rectifiers
7. Half-wave and full-wave rectifiers with capacitor filter
8. CE characteristics of BJT, h-parameters
9. CB characteristics of BJT, h-parameters
10. Voltage gain, input impedance and output impedance of emitter follower
11. Drain and transfer characteristics of JFET
12. Frequency response of CE amplifier

Textbook

Electronic devices and circuits (Chapter 14), G.S.N. Raju, IK International Publishers, New Delhi, 2006.

B.E. 2nd Year 2nd Semester

EEM 221 MATHEMATICS – IV

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Functions of a Complex Variables

Continuity concept of f(z), Derivative of f(z), Cauchy - Riemann Equations, Analytic Functions, Harmonic Functions, Orthogonal Systems, Applications to Flow Problems, Integration of Complex Functions, Cauchy's Theorem, Cauchy's Integral Formula, Statements of Taylor's and Laurent's Series without Proofs, Singular Points, Residues and Residue Theorem, Calculations of Residues, Evaluation of Real Definite Integrals, Geometric Representation of f(z), Conformal Transformation, Some Standard Transformations:- (1) $w = z+c$, (2) $w = 1/z$, (3) $w = (az+b)$ (4) $w = z^2$, (6) $w = e^2$.

2. Statistical Methods

Review of Probability theory (not be examined), Addition law of probability, Independent events, Multiplication law of probability, Bay's theorem, Random variable, Discrete probability distribution, Expectation, Moment generation function, repeated trails, Binomial distribution, Poission distribution, Normal distribution, Prabable error, Normal approximation to binomial distribution.

Sampling Theory: Sampling Distribution, Standard Error, Testing of Hypothesis, Level of Significance, Confidence Limits, Simple Sampling of Attributes, Sampling of Variables - Large Samples and Small Samples, Student's T-distribution, x^2 - Distribution, F - Distribution, Fisher's Z - Distribution.

3. Difference Equations and Z-Transforms

Z-transforms - Definition, Some Standard Z-transforms, Linear Property, Sampling Rule, Some Standard Results, Shifting Rules, Initial and Final Value Theorems, Convolution theorem, Evaluation of inverse transforms, definition, Order and Solution of Difference Equations, Formation of Difference Equations, Linear Difference Equations, Rules for finding C.F., Rule for finding P.L., Difference Equation Reducible to Linear Form, Simultaneous Difference Equations with Constant Coefficients, Application to Deflection of a Loaded String, Applications of Z-transform to Difference Equations.

Text Books :

1. Higher Engineering Mathematics, Dr. B. S. Grewal, Khanna Publisher - N. Delhi, 34th Edition, 1998.

Reference Books :

1. Higher Engineering Mathematics, Dr. M. K. Venkataraman, National Pub. and Co. - Madras.

ECE 222 ELECTROMAGNETIC FIELD THEORY & TRANSMISSION LINES

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

Electrostatics

Introduction, Applications of electrostatic fields, Different types of charge distributions, Coulomb's law, Applications of coulomb's law, Limitation of coulomb's law, Electric field strength due to point charge, Salient features of electric intensity, Electric field due to line charge density, Electric field strength due to an infinite line charge, Field due to surface charge density, Field due to volume charge density, Potential, Potential at a point, Potential difference, Salient features of potential difference, Potential gradient, Salient features of potential gradient, Equipotential surface, Potential due to electric dipole, Electric field due to dipole, Electric flux, Salient features of electric flux, Faradays experiment to define flux, Electric flux density, Salient features of electric flux density, Gauss's law and applications, Proof of Gauss's law, Gauss's law in point form, Divergence of a vector, Applications of Gauss's law, Limitations of Gauss's law, Salient features of Gauss's law, Poisson's and Laplace's equations, Applications of Poisson's and Laplace's equations, Uniqueness theorem, Boundary conditions on E and D, Proof of boundary conditions, Conductors in electric field, Properties of conductors, Electric current, Current densities, Equation of continuity, Relaxation time, Relation between current density and volume charge density, Dielectric materials in electric field, Properties of dielectric materials, Dipole movement, Polarization, Capacitance of different configurations, Energy stored in an electric field, Energy in a capacitor.

Steady Magnetic Fields

Introduction, Applications of magnetic fields, Fundamentals of steady magnetic fields, Faradays law of induction, Magnetic flux density, Ampere's law of current, Element or Biot-Savart law, Field due to infinitely long current element, Field due to a finite current element, Ampere's work law or Ampere's circuit law, Differential form of Ampere's circuit law, Stock's theorem, Force on a moving charge due to electric and magnetic charge, Applications of Lorentz force equation, Force on a current element in a magnetic field, Ampere's force law, Boundary conditions on H and B, Scalar magnetic potentials, Vector magnetic potentials, Force and torque on a loop or coil, Materials in magnetic fields, Magnetization in materials, Inductance, Standard inductance configurations, Energy density in a magnetic field, Energy stored in inductor, Expression for inductance, L in terms of fundamental parameters, Mutual inductance, Comparison between electric and magnetic fields / circuits / parameters.

Maxwell's Equations

Introduction, Equation of continuity for the varying fields, Maxwell's equations for time varying fields, Meaning of Maxwell's equations, Conversion of differential form of Maxwell's equations to integral form, Maxwell's equations for static fields, Characteristics of free space, Maxwell's equations for free space, The Maxwell's equations for static fields in free space, Proof of Maxwell's equations, Sinusoidal time varying fields, Maxwell's equations in phasor form, Influence of medium on the fields, Types of media, Summary of Maxwell's equations for different cases, Boundary conditions, Proof of boundary conditions on E, D, H and B, Complete boundary conditions in scalar form, Boundary conditions in vector form, Time varying potentials, Retarded potentials, Maxwell's equations approach to relate potentials, Fields and their sources, Helmoltz theorem, Lorentz gauge condition.

Electromagnetic Waves

Introduction, Applications of EM waves, Wave equations in free space, Wave equations for a conducting medium, Uniform plane equation, General solutions of uniform plane wave equations, Relation between E and H in a uniform plane wave, Proof of E and H wave are perpendicular to each other, Wave equations in phasor form, Wave propagation in a lossless medium, Propagation characteristics of EM waves in free space, Propagation characteristics of EM waves in a conducting medium, Summary of propagation, Characteristics of EM waves in conducting medium, Conductors and dielectrics, Wave propagation characteristics in good dielectrics, Summary of the propagation characteristics in good dielectrics, Wave propagation characteristics in good conductors, Summary of characteristics of wave propagation in good conductors, Depth of penetration, Polarization of a wave, Sources of different polarized EM waves, Direct cosines of vector field, Waves on a perfect conductor – Normal incidence, Waves on dielectric –Normal incidence, Oblique incidence of a plane wave on a boundary plane, Oblique incidence of a wave on perfect conductor, Oblique incidence of a plane wave on dielectric, Brewster angle, Total internal reflection, Surface impedance, Poynting vector and flow of power, Complex poynting vector.

Guided Waves

Induction, Waves between parallel plates, Derivation of field equations between parallel plates and propagation parameters, Field components for TE waves ($E_Z = 0$), Field components of TM waves ($H_z = 0$), Propagation parameters of TE and TM waves, Guide wavelength, Transverse electromagnetic waves (TEM wave), Velocities of propagation, Attenuation in parallel plane guides, Wave impedances, Waves in rectangular waveguides, Derivation of field equations in rectangular hallow waveguides, Propagation parameters of TE and TM waves in rectangular waveguides, TEM does not exist in waveguides, Excitation methods for different TM and TM modes, Evanescent wave or mode, Wave impedance in waveguide, Power transmitted in a lossless waveguide, Waveguide resonators, Salient features of cavity resonators, Circular waveguides, Salient features of circular waveguides.

Transmission Lines

Types of transmission lines, Applications of transmission lines, Equivalent circuit of pair of transmission lines, Primary constants, Transmission line equations, Secondary constants, lossless transmission lines, Distortionless line, Phase and group velocities, Loading of lines, Input impedance of transmission lines, RF lines, Relation between reflection coefficient, Load and characteristic impedance, Relation between reflection coefficient and voltage standing wave ratio (VSWR), Lines of different lengths - $\lambda/8, \lambda/4, \lambda/2$ lines, Losses in transmission lines, Smith chart and applications, Stubs, Double stubs.

Textbook

1. Electromagnetic Field Theory and Transmission Lines, G.S.N. Raju, Pearson Education (Singapore) Pvt., Ltd., New Delhi, 2005.

References:

1. Engineering Electromagnetics, W. H. Hayt Jr., McGraw Hill – New York.
2. EM Waves and Radiating Systems, E. C. Jordan, PHI, 1997.
3. Electromagnetics with Applications, Kraus and Fleisch, McGraw Hill, 1999.
4. Time Harmonic EM Fields, R. F. Harington, McGraw Hill.

ECE 223 ANALOG ELECTRONIC CIRCUITS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

Multistage Amplifiers

BJT and FET RC Coupled Amplifiers – Frequency Response. Cascaded Amplifiers. Calculation of Band Width of Single and Multistage Amplifiers. Concept of Gain Bandwidth Product.

Feed back Amplifiers

Concept of Feedback Amplifiers – Effect of Negative feed back on the amplifier Characteristics. Four Feedback Amplifier Topologies. Method of Analysis of Voltage Series, Current Series, Voltage Shunt and Current Shunt feedback Amplifiers.

Sinusoidal Oscillators

Condition for oscillations –LC Oscillators – Hartley, Colpitts, Clapp and Tuned Collector Oscillators – Frequency and amplitude Stability of Oscillators – Crystal Oscillators – RC Oscillators -- RC Phase Shift and Weinbridge Oscillators.

Power Amplifiers

Classification of Power Amplifiers – Class A, Class B and Class AB power Amplifiers. Series Fed, Single Ended Transformer Coupled and Push Pull Class A and Class B Power Amplifiers. Cross-over Distortion in Pure Class B Power Amplifier, Class AB Power Amplifier – Complementary Push Pull Amplifier with trickle Bias, Derating Factor – Heat Sinks.

Tuned Voltage Amplifiers

Single Tuned and Stagger Tuned Amplifiers – Analysis – Double Tuned Amplifier – Bandwidth Calculation.

Operational Amplifiers

Concept of Direct Coupled Amplifiers. Ideal Characteristics of an operational Amplifier – Differential Amplifier - Calculation of common mode Rejection ratio – Differential Amplifier supplied with a constant current – Normalized Transfer Characteristics of a differential Amplifier – Applications of OP-Amp as an Inverting and Non-Inverting Amplifier, Integrator, Differentiator Summing and Subtracting Amplifier and Logarithmic Amplifier. Parameters of an Op-Amp, Measurement of OP-Amp Parameters.

Books :

1. Integrated Electronics – Millman and Halkias
2. Electronic Devices and Circuits, G.S.N. Raju, IK International Publications, New Delhi, 2006.
3. Electronic Devices and Circuits – Mottershead
4. Op-Amps and Linear Integrated Circuits – Gayakwad.

ECE 224 PROBABILITY THEORY & RANDOM PROCESS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

Probability Theory

Definitions of Probability, Axioms of Probability, Probability Spaces, Properties of Probabilities, Joint and Conditional Probabilities, Independent Events.

Random Variables

Probability Distribution Functions, Probability Density Functions, Joint Distribution of Two Variables, Conditional Probability Distribution and Density, Independent Random Variables.

Statistical Averages

Functions of Random Variables and Random Vectors, Statistical Averages, Characteristic Function of Random Variables, Inequalities of Chebyshev and Schwartz, Convergence Concepts, Central Limit Theorem.

Random Processes

Stationarity, Ergoridicity, Covariance Function and their Properties, Spectral Representation, Weiner-Kinchine Theorem, Linear operations, Gaussian Function, Poisson Processes, Low-pass and Band-pass Noise Representation.

Textbook :

1. Probability Theory and Random Processes, S. P. Eugene Xavier, S. Chand and Co. New Delhi, 1998 (2nd Edition).
2. Probability Theory and Random Signal Principles, Peebles, Tata McGrew Hill Publishers.

References :

1. Signal Analysis, Papoulis, McGraw Hill N. Y., 1977.
2. Introduction to Random Signals and Noise, Davenport W. B. Jrs. and W. I. Root, McGraw Hill N.Y., 1954.

ECE 225 SIGNALS AND SYSTEMS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

Signals, Transformations of Independent Variables, Basic Continuous Time Signals, Basic Discrete Time Signals, Systems, Properties of Systems, Linear Time – invariant Systems.

Linear Time – Invariant (LTI) Systems

Representation of Signals in terms of Impulses, Discrete Time LTI Systems, the Convolution Sum, Continuous Time LTI Systems, the Convolution Integral. Properties of LTI Systems, Systems Described by Differential and Difference Equations. Block Diagram Representation of LTI Systems Described by Differential Equations and, Singularity Functions.

Analogy between Vectors and Signals, Orthogonal Vector and Signal Spaces. Approximation of a Function by a Set of Mutually Orthogonal Functions, Fourier Analysis of Continuous Time Signals and Systems. The Response of Continuous Time LTI Systems to Complex Exponentials, the Continuous Time Fourier series. Convergence of Fourier series, A-periodic Signals and Continuous Fourier Transform. Periodic Signals and Continuous Fourier Transform. Convolution and Modulation Property. Polar Representation of Continuous Fourier Transform. Frequency Response Characterized by Linear Constant Coefficient Differential Equations. First-order and Second-order Systems.

Fourier Analysis of Discrete Time Signals and Systems Response of Discrete Time LTI Systems to Complex Exponential. Fourier Series, DTFT, Periodic Signals and DTFT, Properties of DTFT, Convolution, Modulation and Duality Property. Polar Representation of DTFT, First-order and Second-order Systems.

Concept of Z

Sampling Theorem, Reconstruction of a Signal from Samples, the Effect of Under-sampling, Discrete Time Processing of Continuous Time Signals. Sampling in Frequency Domain, Sampling of Discrete Time Signals. Z-transform of a Discrete Sequence, Region of Convergence for the Z-transform. Inverse Z-transform, Properties of Z-transform, Relation Between Z and Fourier Transform.

Textbook : Signals and Systems, Alan V. Oppenheim, Alan S. Willsky and Ian T. Young, PHI.

References :

1. Communication Systems, B. P. Lathi.
2. Signals and Systems, B. P. Lathi.

ECE 226 ADVANCED NETWORK THEORY

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

Fourier Transforms

Definitions and Properties, Transforms for Simple Time Domain Functions, Transforms of General Periodic Time Functions, Convolution and Response in Time Domain, Response in Frequency Domain, Relationship between Fourier and Laplace Transforms.

Network Functions

Network Functions for Single Port and Two Port, Calculation of Network Functions for Ladder and General Networks, Poles and Zeroes, Restriction of Poles and Zeroes for Driving point and Transfer Functions, Time Domain Behavior from Pole Zero Plot, Transfer Functions in terms of Y and Z functions, Scaling Network Functions.

Positive Real Function and Other Properties, Herwitz Polynomials, Computation of Residues, Even and Odd Functions, Test for Positive Real Functions.

Network Synthesis

Elementary Synthesis Operation, LC Network Synthesis, Properties of RC Network Functions, Foster and Cauer Forms of RC and RL Networks.

RLC Networks

Minimum Positive Real Functions, Brune's Method of RLC Synthesis, Realization Difficulties.

Textbooks :

1. Network Analysis, M. E. Van Valkenburg, 3rd Edition, PHI.
2. Modern Network Synthesis, M. E. Van Valkenburg, Wiley Eastern.

Reference :

Engineering Circuit Analysis, William H. Hayt Jr. and Jack E. Kemmerley, 5th Edition, McGraw Hill International Edition.

ECE 227 ENVIRONMENTAL STUDIES

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
3	3	-	-	3	30	70	100

Module 1 : Introduction

Definition, Score and importance, Measuring and defining environmental development : Indicators

Module 2 : Ecosystems

Introduction, Types, Characteristic features, Structure and functions of ecosystems, Forest, Grassland, Desert, Aquatic (lakes, rivers and estuaries).

Module 3 : Environment and Natural Resources Management

Land Resources : Land as a resource, Common property resources, land degradation, Solerosion and desertification, Effects of modern agriculture, fertilizer-pesticide problems, Forest Resources : Use and over-exploitation, Mining and dams – their effects on forest and tribal people, Water resources : Use and over-utilization of surface and ground water, Floods, Droughts, Water logging and salinity, Dams – benefits and costs, Conflicts over water, Energy Resources : Energy needs, Renewable and non-renewable energy sources, Use of alternate energy resources, Impact of energy use on environment.

Module 4 : Bio-Diversity and its Conservation

Value of bio-diversity – Consumptive and productive use, Social, Ethical, Aesthetic and option values, Bio-geographical classification of India – India as a mega diversity habitat, Threats to biodiversity – Hot-sports, habitat loss, poaching of wildlife, loss of species, seeds etc., Conservation of biodiversity – in – situ and ex-situ conservation.

Module 5 : Environmental Pollution – Local and Global Issues

Causes, Effects and control measures of : Air pollution, Indoor air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Solid waste management, Compositing, Vermiculture, Urban and industrial wastes, Recycling and re-use, Nature of thermal pollution and nuclear hazards, Global warming, Acid rain, Ozone depletion.

Module 6 : Environmental Problems in India

Drinking water, Sanitation and public health, Effect of activities of the quality of environment : Urbanization, Transportation, Industrialization, Green revolution, Water scarcity and ground water depletion, Controversies on major dams –

Resettlement and rehabilitation of people problems and concerns, Rain water harvesting, Cloud seeding and watershed management.

Module 7 : Economy and Environment

The economy and environment interaction, Economics of development, Preservation and conservation, Sustainability : Theory and practice, Limits to growth, Equitable use of resources for sustainable lifestyles, Environmental impact assessment.

Module 8 : Social Issues and the Environment

Population growth and environment, Environmental education, Environmental movements, Environment Vs development.

Module 9 : Institutions and Governance

Regulation by Government, Monitoring and enforcement of environmental regulation, Environmental acts : Water (Prevention and control of pollution) act, air (Prevention and control of pollution) act, Environmental Protection Act, Wild life protection act, Forest conservation act, Costal zone regulations, Institutions and policies relating to India, Environmental Governance.

Module 10 : International Conventions

Stockholm Conference 1972, Earth Summit 1992, World Commission for Environmental Development (WCED).

Module 11 : Case Studies

Chipko movement, Narmada bachao andolan, Silent valley project, Madhura refinery and Taj Majal, Industrialization of pattancheru, Nuclear reactor at Nagarjuna Sager, Tehri Dam, Ralegaon Siddhi (Anna Hazare), Kolleru lake – Acquaculture, Florosis in Andhra Pradesh.

Module 12 : Field Work

Visit to a local area to document and mapping environmental assets – River / forest / grassland / hill / mountain, Study of local environment – Common plants, Insects, Birds, Study of simple ecosystems – Pond, river, hill, slopes etc. Visits to industries, Water treatment plants, Affluent treatment plants.

Textbooks : Kaushik – Kaushik, Anubha

Reference : Deswal & Deswal, Raja Gopal, Dharmaraj Publishers.

ECE 228 ELECTRICAL MACHINES LABORATORY

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
2	-	-	3	3	50	50	100

Ten Experiments based on Electrical Machines Theory.

ECE 229 ANALOG ELECTRONIC CIRCUITS LABORATORY

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
2	-	-	3	3	50	50	100

1. Feedback Amplifier - Calculation of Gain without Input Resistance, Output Resistance and Frequency Response Characteristic.
2. Current series feedback amplifier
3. Voltage series feedback amplifier
4. Colpitt's Oscillator
5. RC Phase - Shift Oscillator
6. Wein - Bridge Oscillator
7. Class B Push - Pull Power Amplifier
8. Operational Amplifier - as an Inverting and Non-inverting Amplifier and Frequency Response Characteristics
9. Measurement of Op-Amp Parameters
10. Multistage Amplifier
11. Tuned Voltage Amplifier
12. Class A Transformer - Coupled Amplifier

Textbooks

1. Electronic Devices and Circuits (Chapter 14), G.S.N. Raju, IK International Publications, New Delhi, 2006.
2. Bernard Grob, "Basic Electronics", McGraw Hill Book Company

B.E. 3rd Year 1st Semester (Credit Based Grading System)
With effect from the admitted batch of 2006 - 2007

ECE 311 PULSE AND DIGITAL CIRCUITS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Linear Wave Shaping:

High Pass and Low Pass RC Circuits and their Response for Sinusoidal, Step Voltage, Pulse, Square Wave and Ramp Inputs. High Pass RC Circuit as a Differentiator. Low Pass RC Circuit as an Integrator. Attenuators and their Application as CRO Probe. RL and RLC Circuits and their response for step input. Ringing circuit.

2. Non-Linear Wave Shaping:

Diode clippers. Transistor Clippers. Clipping at two independent levels. Comparator – Applications of voltage Comparators – Diode Comparator. Clamping Operation. Clamping Circuits using Diode with Different Inputs. Clamping Circuit Theorem. Practical Clamping circuits. Effect of diode Characteristics on Clamping Voltage.

3. Multivibrators:

Transistor as a Switch - Switching times of a transistor. Astable, Monostable and bistable Multivibrators using Transistors. Resolution time of a Binary. Methods of improving Resolution time – Methods of Triggering a binary. Schmitt Trigger.

4. Sweep Circuits:

Voltage sweep -- Simple Exponential sweep Generator. Errors that define Deviation from linearity, UJT Relaxation Oscillator – Methods of linearising a Voltage Sweep – Bootstrap and Miller Circuits – Current Sweep – Linearising a current Sweep by Adjusting the driving Waveform.

5. Synchronization and Frequency Division:

Principles of Synchronization – Synchronization of Astable Multivibrators. Synchronization of Sweep Circuits with Symmetrical Signals.

6. Logic Gates:

IC Families, TTL, CMOS, ECL, FFs and Circuits.

7. Blocking Oscillator:

Base Timing. Emitter Timing, and Astable Blocking Oscillator.

Books:

1. Pulse, Digital and Switching Waveforms – Millman and Taub.
2. Wave Generation and Shaping – L. Strauss.

ECE 312 LINEAR ICS AND APPLICATIONS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Operational Amplifiers:

   Design Aspects of Monolithic Op-Amps, Ideal Characteristics, Specifications, Offset Voltages and Currents, Frequency Compensation Techniques, Measurement of Op-Amp Parameters,

2. Applications of Op-Amps, Inverting and Non-inverting Amplifiers, Integrators, Function Generators, Logarithmic Amplifiers, Instrumentation Amplifiers,

3. Signal Conditioning Circuits, Multivibrators, Square Wave Generators, Rectifiers, Peak Detection and Voltage Regulation.

4. 555 Timers, 556 Function Generator ICs and their Applications. Three Terminal IC Regulators,

5. IC 1496 (Balanced Modulator), IC 565 PLL and its Applications.

6. Active Filters – LPF, HPF, BPF, BEF, All-pass Filters, Higher Order Filters and their Comparison.

7. Op-Amp Phase Shift, Wein-bridge and Qudrature Oscillator, Voltage Controlled Oscillators, Voltage to Frequency and Frequency to Voltage Converters, Voltage to Current and Current to Voltage Converters. Switched Capacitance Filters, Analog Multiplexers, Sample and Hold Circuits.

Books:

1. Microelectronics, Jacob Millman
2. Op-Amps and Linear ICs, Ramakanth Gayakwad.
3. Integrated Circuits, Botkar, Khanna Publications.
4. Applications of Linear ICs, Clayton.

ECE 313 ANALOG COMMUNICATION

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Linear Modulation Systems:

Need for Modulation, Frequency Translation, Method of Frequency Translation, Amplitude Modulation, Modulation Index, Spectrum of AM Signal, Modulators and Demodulators (Diode detector), DSB-SC Signal and its Spectrum, Balanced Modulator, Synchronous Detectors, SSB Signal, SSB Generation Methods, Power Calculations in AM Systems, Application of AM Systems.

2. Angle Modulation Systems:

Angle Modulation, Phase and Frequency Modulation and their Relationship, Phase and Frequency Deviation, Spectrum of an FM Signal, Bandwidth of Sinusoidally Modulated FM Signal, Effect of the Modulation Index on Bandwidth, Spectrum of Constant Bandwidth FM, Phasor Diagram for FM Signals,

3. FM Generation:

Parameter variation method, Indirect method of Frequency Modulation (Armstrong Method), Frequency Multiplication, PLL FM Demodulator, Pre – emphasis and De – emphasis, Comparison of FM and AM.

4. Noise In AM and FM Systems:

Sources of Noise, Resistor Noise, Shot Noise, Calculation of Noise in a Linear System, Noise in AM Systems, Noise in Angle Modulation Systems, Comparison between AM and FM with respect to Noise, Threshold Improvement in Discriminators, Comparisons between AM and FM.

5. Radio Transmitters:

Classification of Radio Transmitters, AM and FM Transmitters, Radio Telegraph and Telephone Transmitters, SSB Transmitters.

6. Radio Receivers:

Radio receiver Types, AM Receivers – RF Section, Frequency Changing and Tracking, Intermediate Frequency and IF Amplifiers, Automatic Gain Control (AGC); FM Receivers – Amplitude Limiting, FM Demodulators, Ratio Detectors, ISB Receiver, Comparison with AM Receivers.

7. Communication Receivers:

Extensions of the Super-heterodyne Principles, Additional Circuits.

Text Books:

1. Principles of Communication Systems, H. Taub and D. L. Schilling, McGraw Hill, 1971.
2. Communication Systems, Simon Haykins (2nd Edition).
3. Electronic Communication Systems, G. Kennedy, McGraw Hill, 1977 (2nd Edition).

References:

1. Modern Digital and Analog Communication Systems, B. P. Lathi (2nd Edition).
2. Electronic Communications Modulation and Transmission, Robert J. Schoenbeck, PHI N. Delhi, 1999.

ECE 314 COMPUTER ARCHITECTURE AND ORGANIZATION

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Register Transfer and Micro operations:

Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit.

2. Basic Computer Organization:

Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input - Output and Interrupt, Complete Computer Description.

3. CPU Organization:

Introduction, General Register Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC), Stack Organization.

4. Micro programmed Control:

Control Memory, Address Sequencing, Microinstruction Formats, Micro program Example, Design of Control Unit.

5. Memory Organization:

Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

6. Input - Output Organization:

Peripheral Devices, Input - Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA),

7. Introduction to Multiprocessor System.

Text Book:

Computer System Architecture, M. Morris Mano, PHI Publications, (3rd Edition May 1996).

References:

1. Computer Organization, V. Carl Hamacher, Zvonko G. Vranesic and Safwat G. Zaky, McGraw Hill International, (4th Edition).
2. Digital Computer Fundamentals, Thomas C. Bartee.

ECE 315 SWITCHING THEORY AND LOGIC CIRCUITS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. **Introductory Concepts:**
   Number Systems, Base Conversion Methods, Complements of Numbers, Codes, Error detecting and Error Correcting Codes.

2. **Minimization of Boolean Functions:**
   Standard forms of Boolean Functions, Simplification of Functions – Karnaugh map and Quine McClusky methods, multiple output functions.

3. **Logic Gates:**
   Symbols and Truth Tables of Gates – AND, OR, NOT, NAND, NOR, XOR, Multiplexers, Demutiplexers, Encoders, Decoders, Flip-flops, Counters and Registers.

4. **Combinational Logic:**
   Logic Design of Combinational circuits – Binary addition, Subtraction, Code Conversion, Priority Encoders, Decoders, Seven – segment Displays, Comparators, PLAs.

5. **Sequential Machine Fundamentals:**
   The Flip-flop – RS, JK and D Flip-flops, the Design of Clocked Flip-flop, Flip-flop conversion from one type to another.

6. **Traditional Approaches to Sequential Analysis and Design:**
   Analysis and Design of Finite State Machines, State Reduction, Design of Flip-flops, Counters and Shift Registers.

7. **Asynchronous Finite State Machines:**
   Analysis and Design of Asynchronous Machines, Cycles, Races and Hazards.

Books:

1. Switching and Finite Automata Theory, 2nd Edition, Zvi Kohavi, Tata McGraw-Hill, 1978.
   (For syllabus items 1, 3, and 4)
2. Introduction to Switching Theory and Logical Design, 3rd Edition, Frederick J. Hill and Gerald R. Peterson, John Wiley and Sons, 1981.
   (For syllabus item 2)
3. An Engineering Approach to Digital Design, William I. Fletcher, PHI, 1980.
   (For syllabus items 5, 6, and 7)

ECE 316 ANTENNAS AND WAVE PROPAGATION

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Radiation and Antennas

Antenna definition, Functions of antennas , Network theorems, Properties of antennas, Antenna parameters , Polarization, Basic antenna elements , Radiation mechanism, Radiation fields of alternating current element, Radiated power and radiation resistance of current element, Radiation, induction and electrostatic fields, Hertzian dipole, Different current distributions in linear antennas, Radiation from half-wave dipole, Radiation from quarter wave monopole , Radiation characteristics of dipoles.

2. Analysis of Linear Arrays

Directional characteristics of dipole antennas, Radiation pattern of alternating current element, Radiation pattern expressions of centre-fed vertical dipoles of finite length, Radiation patterns of centre-fed vertical dipoles, Radiation patterns of centre-fed horizontal dipoles, Radiation patterns of vertical dipoles, Two-element uniform array, Uniform linear arrays, Field strength of a uniform linear array, First sidelobe ratio (SLR), Broadside and End-fire arrays, Patterns of array of non-isotropic radiators, Multiplication of patterns, Generalized expression for principle of pattern multiplication, Radiation pattern characteristics, Binomial arrays, Effect of earth on vertical patterns, Effect of earth on radiation resistance, Methods of excitation, Impedance matching techniques, Transmission loss between transmitting and receiving antennas - FRIIS formula, Antenna temperature and signal-to-noise ratio.

3. Array Synthesis

Introduction, Synthesis methods, Fourier transform method, Linear array design by Woodward-lawson method, Dolph-chebychev method (Tschebyscheff distribution), Taylor method, Laplace transform method, Standard amplitude distributions.

4. HF, VHF and UHF Antennas

Introduction, Isotropic radiators, Directional antennas, Omni-directional antennas, Resonant antennas, Non-resonant antennas, LF antennas, Antennas for HF, VHF and UHF, Dipole arrays, Folded dipole, V-Antennas, Inverted V-antennas, Rhombic antenna, Yagi-Uda antenna, Log-periodic antennas, Loop antenna, Helical antenna, Whip antenna, Ferrite rod antenna, Turnstile antennas, Discone antennas, Notch antenna.

5. Microwave Antennas

Introduction, Rod reflector, Plane reflector, Corner reflector, Parabolic reflector, Types of parabolic reflectors, Feed systems for parabolic reflectors, Shaped beam antennas, Horn antennas, Corrugated horns, Slot antennas, Impedance of a few typical dipoles, Slots in the walls of rectangular waveguides, Babinet's principle, Lens antennas, Microstrip antennas.

6. Antenna Measurements

Introduction, Drawbacks of measurements of antenna parameters, Methods to overcome drawbacks in measurements, Methods for accurate measurements, Measurement ranges, Indoor and outdoor ranges, Antenna impedance measurements, Measurement of radiation resistance, Gain measurements, Measurement of antenna bandwidth, Directivity measurement, Measurement of sidelobe ratio, Measurement of radiation efficiency, Measurement of antenna aperture efficiency, Measurement of polarization of antenna, Phase measurement.

7. Wave Propagation

Propagation characteristics of EM Waves, Factors involved in the propagation of radio waves, Ground wave propagation, Ground wave field strength by Maxwell's equations, Reflection of radio waves by the surface of the earth, Roughness of earth, Reflection factors of earth, Wave tilt of the ground wave, Tropospheric wave propagation, Atmospheric effects in space wave propagation, Duct propagation, Radio horizon, Troposcatter, Fading of EM waves in Troposphere, Line of sight (LOS), Ionospheric propagation, Characteristics of ionosphere, Refractive index of ionosphere, Phase and group velocities, Mechanism of Ionospheric propagation, reflection and refraction, Characteristic parameters of Ionospheric propagation, Sky wave field strength, Fading and diversity techniques, Faraday's rotation, Effect of earth's magnetic field.

Text Book :

1. Antennas and Wave Propagation, G.S.N. Raju, Pearson Education (Singapore) Pvt., Ltd., New Delhi, 2007.

References :

1. EM Waves and Radiation Systems, E. C. Jordan and K. G. Balmain, PHI – N. Delhi, 1997.
2. Antennas, J.D. Kraus, McGraw Hill, NY.
3. Antenna theory, C.A. Balanis, John Wiley & Sons, NY, 1982.

ECE 317 LINEAR ICS AND PULSE CIRCUIT LABORATORY

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
2	-	-	3	3	50	50	100

1. Applications of Op-Amps.
2. 555 Timer as Monostable and Astable Multivibrator.
3. Three terminal IC Voltage Regulator.
4. Linear Wave Shaping – RC Circuits.
5. Non-linear wave Shaping – Clipping and Clamping Circuits.
6. Fixed – Bias Binary.
7. Self – Bias Binary.
8. Schmitt Trigger.
9. UJT Sweep Generator.
10. Miller and Bootstrap Sweep Circuits.

ECE 318 DIGITAL ICS LABORATORY

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
2	-	-	3	3	50	50	100

1. Minimization and Realization of a given Function using Basic Gates (AND, OR, NOR, NAND, EXOR).
2. Function Generation using Decoders and Multiplexers.
3. Experiments on Priority Encoder using 74LS148.
4. Application of Multiplexers.
5. Seven – segment Display experiments.
6. Four bit and eight bit adders and subtractors.
7. Experiments using 74LS181 and 74LS182 ICs (ALU and Carry Look Ahead Adders).
8. Experiments on SR Latch and Master – slave JK Flip-flops using SSI gates.
9. Design and testing of Ripple Counters using ICs.
10. Design and testing of Mod-K Synchronous Counters.
11. Design and testing of Shift Registers.
12. Experiments using ROMs.
13. A PCM Companded encoder using 27512.
14. PLAs to realize SOP function using IC828100.
15. To realize Binary – Select Multiplexer using PAL 16L8.

ECE319 SOFT SKILLS

COMMON WITH OTHER BRANCHES
SYLLABUS IN SOFT SKILLS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
1	-	-	3		100		100

Communication:
Importance of communication
Non verbal communication
Personal appearance
Posture
Gestures
Facial expressions
Eye contact
Space distancing
Goal setting:
Immediate, short term, long term,
Smart goals, strategies to achieve goals
Time management:
Types of time
Identifying time wasters
Time management skills
Leadership and team management:
Qualities of a good leader
Leadership styles
Decision making
Problem solving
Negotiation skills
Group discussions:
Purpose (Intellectual ability, creativity, approach to a problem, solving, tolerance, qualities of a leader)
Group behavior, Analyzing performance
Job interviews:
Identifying job openings
Preparing resumes & CV
Covering letter
Interview (Opening, body-answer Q, close-ask Q),
Types of questions

Reference books:

1. 'Effective Technical Communications' by Rizvi M. Ashraf, McGraw–Hill Publication
2. 'Developing Communication Skills' by Mohan Krishna & Meera Banerji, Macmillan
3. 'Creative English for Communication' by N.Krishnaswami & T.Sriraman, Macmillan
4. 'Professional Communication Skills' by Jain Alok, Pravin S.R. Bhatia & A.M. Sheikh, S.Chand & Co.

B.E. 3rd Year 2nd Semester (Credit Based Grading System) with effect from the admitted batch of 2006 - 2007

EEE 321 CONTROL SYSTEMS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Transfer Functions of Linear Systems – Impulse Response of Linear Systems – Block Diagrams of Control Systems – Signal Flow Graphs (Simple Problems) – Reduction Techniques for Complex Block Diagrams and Signal Flow Graphs (Simple Examples).

   Pages (65 – 100)

2. Introduction to Mathematical Modeling of Physical Systems – Equations of Electrical Networks – Modeling of Mechanical Systems – Equations of Mechanical Systems.

   Pages (127 – 150)

3. Time Domain Analysis of Control Systems – Time Response of First and Second Order Systems with Standard Input Signals – Steady State Error Constants – Effect of Derivative and Integral Control on Transient and Steady State Performance of Feedback Control Systems.

   Pages (296 – 350)

4. Concept of Stability and Necessary Conditions for Stability – Routh-Hurwitz Criterion, Relative Stability Analysis, the Concept and Construction of Root Loci, Analysis of Control Systems with Root Locus (Simple Problems to understand theory).

   Pages (355 – 428)

5. Correlation between Time and Frequency Responses – Polar Plots – Bode Plots – Log Magnitude versus Phase Plots – All Pass and Minimum Phase Systems – Nyquist Stability Criterion – Assessment of Relative Stability – Constant M and N Circles.

   Pages (552 – 624)

Text Book:

Automatic Control Systems, Benjamin C. Kuo, PHI Publication (5th Edition).

Reference Books:

1. Modern Control Engineering, Ogata, PHI.
2. Control Systems Engineering, I. J. Nagrath and M. Gopal, Wiley Eastern Ltd.

ECE 322 MICROPROCESSORS AND APPLICATIONS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Internal Architecture and Functional Description of INTEL 8085, Microprocessor Interrupt Structure of 8085, Instruction Set and Timing Diagrams.
2. Programming The 8085:

   Introduction to 8085 Assembly Language Programming, Sample Programs - Stack and Subroutines.
3. Interfacing Semiconductor Memory Devices To 8085:

   Classification and Internal Organization of Semiconductor Memory Devices, Interfacing of SRAMs, DRAMs and EPROMs.
4. Interfacing I/O Devices to 8085:

   Parallel I/O (8255A), Timer/Counter (8253), Serial I/O (8251A), Keyboard/Display Interface.
5. Data Converters:

   ADC, DAC, and their Interfacing to 8085.
6. Elementary Concepts of 16Bit and 32Bit Microprocessors, like INTEL 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro.

Text Book:

Architecture Programming and Applications, Ramesh S. Gaonkar, New Age International Pvt. Ltd., (3rd Edition).

References:

1. Microcomputer and Microprocessors – The 8080, 8085 and Z-80 Programming, Interfacing and Troubleshooting, John Uffenbeck, PHI (2nd Edition).
2. Introduction to Microprocessors, A. K. Mathur, TMH (3rd Edition).
3. The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro Processor, Architecture, Programming and Interfacing, Barry B. Brey, 4th Edition, PHI.

ECE 323 DATA STRUCTURES (Common with Metallurgy)

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Revision of C Language Overview only (no questions to be set on this).
2. Arrays and Functions:

   Organization and use of One Dimensional, Two Dimensional and Multi Dimensional Arrays, Handling of Character Strings, String Operation, Concept of Function, Parameter Passing, Recursion.
3. Structures, Pointers and Files:

   Definition of Structure and Union, Programming examples; Pointers, Pointer Expressions, Programming examples; File Operations, Preprocessor.
4. Linear Data Structures:

   Stack Representation, Operation, Queue Representation, Operations, Circular Queue, List, Representation, Operations, Double Linked and Circular Lists.
5. Non-Linear Data Structures:

   Trees, Binary Tree Representation, Tree Transversals, Conversion of a General Tree to Binary Tree, Representation of Graphs.
6. Searching Techniques:

   Basic Search Techniques, Tree Searching Graphics, Linked Representation of Graphics, Graph Transversal and Spanning Trees.

Text Books:

1. Programming In ANSI C, by E. Balaguruswamy.
2. Data Structures Using C, by A. M. Tanenbaum and others.

Reference Books:

1. An Introduction To Data Structures With Applications, Trembly and Sorenson.
2. The C – Programming Language, Kerningham and others.

ECE 324 COMPUTER NETWORKS ENGINEERING

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Introduction:

   Uses of Computer Networks, Network Structure, Architectures, Services, Standardization, Functions of Various Network Layers, Network examples.

2. Physical layer:

   Theoretical Basis for Data Communication, Transmission Media, Analog and Digital Transmission, Transmission and Switching ISDN.

3. Medium Access Sub-layer:

   LAN, MAN, Protocol, ALOHA, IEEE Standard for 802 for LANs, Fiber Optic Networks, Satellite Networks.

4. Data Link layer:

   Design Issues, Error Detection and Correction, Protocols and their Performance, Specifications and Examples.

5. Network layers:

   Design Considerations, Difference between Gateway, Ethernet Switch, Router, Hub, Repeater, Functions of Router, Congestion Control Internetworking and Examples, Details of IP addressing schemes, TCP/IP Protocol details.

Books:

1. Data Communications and Networking by Behrouz A. Forouzan, 2nd Edition, Tata McGraw Hill.

References :

1. Computer Networks, A. S. Tannenbaum, PHI – New Delhi.
2. Computer Networking Terminology Products and Standards, R. P. Suri and J. K. Jain, Tata McGraw Hill.

ECE 325 DIGITAL COMMUNICATION

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Analog-to-Digital Conversion: Pulse modulation techniques, Sampling, Time Division Multiplexing, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, Digital Modulation Techniques: Pulse Code Modulation, Differential Pulse Code Modulation, Delta Modulation, Adaptive Delta Modulation, Continuously Variable Slope Delta Modulation, Companding, Noise in Pulse-Code and Delta-Modulation Systems.
2. Binary Phase-Shift Keying, Differential Phase-Shift Keying, Differentially-Encoded PSK (DEPSK), Quadrature Phase-Shift Keying (QPSK), M-ary PSK, Quadrature Amplitude Shift Keying (QASK), Binary Frequency Shift-Keying, Similarity of BFSK and BPSK, M-ary FSK, Minimum Shift Keying (MSK), Duo-binary Encoding.
3. Mathematical Representation of Noise:Some Sources of Noise, Frequency-Domain Representation of Noise, The Effect of Filtering on the Probability Density of Gaussian Noise, Spectral Components of Noise Response of a Narrowband Filter to Noise, Effect of a Filter on the Power Spectral Density of Noise, Superposition of Noises, Mixing Involving Noise, Linear Filtering, Noise Bandwidth, Quadrature Components of Noise, Power Spectral Density of n(t) and n(t), Probability Density of n(t), n(t), and their Time Derivatives, Representation of Noise Using Orthonormal Coordinates, Irrelevant Noise Components
4. Data Transmission: A Base-band Signal Receiver, Probability of Error, The Optimum Filter, White Noise: The Matched Filter, Probability of Error of the Matched Filter, Coherent Reception: Correlation, Phase-Shift Keying, Frequency-Shift Keying, Non-coherent Detection of FSK, Differential PSK, Four Phase PSK (QPSK), Error Probability for QPSK, Probability of Error of Minimum Shift Keying (MSK), Comparison of Modulation Systems.
5. Spread Spectrum Modulation: Direct Sequence (DS) Spread Spectrum, Use of Spread Spectrum with Code Division, Multiple Access (CDMA), Ranging using DS Spread Spectrum, Frequency Hopping (FH) Spread Spectrum, Generation and Characteristics of PN Sequences, Acquisition (Coarse Synchronization) of a FH Signal, Tracking (Fine Synchronization) of a FH Signal, Acquisition (Coarse Synchronization) of a DS Signal, Tracking of a DS Signal.

Text Books:

1. Analog and Digital Communication Systems by Martin S. Roden, 3rd edition, Prentice Hall, 1994;
2. Principles of Communications By Taub and Schilling

ECE 326 Elective – I(1) : CELLULAR AND MOBILE COMMUNICATIONS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

Introduction to Cellular Mobile Systems:

A basic Cellular System, Performance Criteria, Uniqueness of Mobile Radio Environment, Operation of Cellular Systems, Planning and Cellular Systems, Analog & Digital Cellular Systems.

Elements of Cellular Radio System Design:

General description of the problem, Concept of Frequency Channels, Co-channel interference Reduction factor, Desired C/I from a normal case in an Omni-directional Antenna system, Cell splitting, consideration of the components of Cellular Systems.

Interference:

Introduction to Co-channel interference, Real time Co-channel interference, Co-channel measurement, Design of Antenna system, Antenna parameters and their effects, Diversity Receiver, Non Co-channel interference - different types.

Cell Coverage for Signal and Traffic:

General introduction, Obtaining the Mobile Point - to - Point model, Propagation over water or flat open area, Foliage loss, Propagation in near in distance, Long distance Propagation, Point - to - Point predication model - characteristics, Cell site, Antenna heights and signal coverage cells, Mobile - to - Mobile Propagation.

Cell Size Antennas and Mobile Antennas:

Characteristics, Antennas at Cell site, Mobile Antennas.

Frequency Management and Channel Assignment:

Frequency management, Fixed Channels assignment, Non Fixed Channel assignment, Traffic and Channel Assignment.

Hand Off, Dropped Calls:

Why Hand-Off, Types of Hand-Off and their characteristics, Dropped call rates and their evaluation.

Operational Techniques:

Parameters, Coverage hole filter, Leaky feeders, Cell Splitting and small cells, Narrow Beam concept.

Reference Books:

Cellular and Mobile Communications by Lee, McGraw Hill.

Wireless Digital Communication by Dr. Kamilo Feher, PHI.

ECE 326 Elective – I(2) : EMI / EMC

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Introduction to EMI/EMC:

   EMI Sources, EMI Coupling, Noise Path, Models of Noise Coupling, EMC Regulations, Designing for EMC, Compliance Tests, Elimination of EMI, EMI Testing, Compliance Test and Engineering Tests.

2. Grounding Techniques, Shielding Techniques, Cabling Techniques.

3. Conducted EMI/EMC:

   Origin of Conducted EMI, Common and Normal mode Noise, Noise from Power Electronic Systems, Spectra of Pulse Noise Sources, Modeling of EMI Noise Sources, Transient Disturbance Simulation Signals, EMI Filters for Mains Noise.

4. Choice of Passive Components:

   EMC Design Components

5. EMI Measurement Technology:

   EMI Measuring Instruments, Pitfalls of EMI Measurements, Test Instrumentation Accessories and their Characteristics, Measurement of Pulsed EMF, EMI Patterns from Different List Objects, EMI Immunity Test System, Software in EMI/EMC Measurements, Recent Trends in Susceptibility Measurement, Cost Effective EMI/EMC Measurements, Setup and its Maintenance.

Books:

1. IMPACT Learning Material Series Modules 1 – 9, IIT New Delhi, Published by RSTE.
2. Electromagnetic Compatibility, R. C. Paul.

ECE 326 Elective – I(3) : MICROELECTRONICS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Integrated- Circuit Fabrication:

   Monolithic Integrated - Circuit (microelectronics) technology- The planar processes - Bipolar Trasister Fabrication - Fabrication of FETs - CMOS Technology - Monolithic Diods - The Metal - Semiconductor Contact - IC Resistor - IC Capacitors - IC Packaging - Characteristics of IC Components - Microelectronic circuit layout.

2. Basic Digital circuits:

   MOS Technology - NMOS, CMOS, Iverters, Logic gates - ECL circuits.

3. Combinational Circuits:

   Arithmetic functions - Comparators - Multiplexers - Demultiplexers - Memory - Memory applications - PAL - PLAs.

4. Sequential Circuits:

   A1 - Bit memory - The circuits properties of biastable latch - The clocked SR Flip-Flop - J-K, T, and D-type Flip-flops. Shift-registers - Ripple Counters - synchronous counters - Applications of counters.

Text Books:

Microelectronic by JocobMilliman, Arbin Grabel second edition, TMH.

Refereces:

1. Part 2 of Integrated Circuits, Design Principles and Fabrications by editors, Warner and Fordemwalt, 1965, Motorola Series, McGraw Hill.
2. MOS LSI Design and Applications by Dr. William N. Carr and Dr. Jack P. Mize, McGraw Hill, 1972.
3. Micro electronic circuits and devices second edition Horenstien, PHI.

ECE 326 Elective – I(4) : INSTRUMENTATION

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Measurement of Physical Systems:

   Objectives of Engineering Measurement - Types of Data, Analog vs. Digital Measurement – measurement of Accuracy, Precision and Uncertainty.

2. Transducers:

   Electrical Transducers – Selecting a Transducer – Strain Gauges, Linear Variable Differential Transducer (LVDT), Piezo Electric Transducers, Photo Electric Transducer, Frequency Generating Transducers, Digital Transducers.

3. Data Indication and Recording:

   Analog Display and Recorders, Digital Input – Output Devices – Displays – Display Multiplexing and Zero Suppression.

4. Signal Transmission and Processing:

   Data Transmission Systems, Modulation Techniques for Digital and Data Transmission, Serial Data Communication – Telemetry Systems, Digital Signal Processing.

References:

1. Instrumentation For Engineering Measurement, R. H. Cerni and L. E. Foster.
2. Electronic Instrumentation, H. S. Kalsi, TMH.
3. Instrumentation Devices and Systems, 2nd Edition, C. S. Rangan, G. R. Sarma and V. S. V. Mani, TMH.
4. Intelligent Instrumentation, Microprocessor Application in Measurement and Control, 2nd Edition, George C. Barney, PHI.
5. Transducers and Instrumentation, D.V.S. Murthy, PHI.

ECE 326 Elective – I(5) : ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

ECE 327 ANALOG COMMUNICATION LABORATORY

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
2	-	-	3	3	50	50	100

Generation of AM Signal and measurement of Modulation Index.

Diode Detector for AM Signals.

Generation of FM Signal.

FM Detector.

Receiver Measurements.

Balanced Modulator.

Passive Filters (LPF, HPF, BPF).

Active Filters.

Attenuator.

Equalizer and Twin-T-Network.

Frequency Multiplier/Limiter.

SSB Generation and Detection.

Pre-emphasis and De-emphasis.

PLL.

IF Amplifier.

ECE 328 MICROPROCESSORS & APPLICATIONS LABORATORY

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
2	-	-	3	3	50	50	100

1) Write a program, which loads Registers, A, B, C, and D with the same constant. Try to optimize the program in such a way that the smallest numbers of program bytes are used. Test the program in single step mode. After each step, test the register of interest.

   Assume that 4 bytes of data are stored at consecutive locations of the data-memory starting at (x). Write a program, which loads Registers E with (x), D with (x+l), C with (1+2) and A with (x+3).

   a. Assume that l byte of data is stored at data memory location (x). Write a program which tests bit 5 of (X). Write 'FF' in (x+1), if bit 5=0 and write '00' at the same location if bit 5=1.
   b. Write a program which tests the zero-condition of a data byte specified at data memory location (x). If it is zero '00' should be stored at (x+1) location, if non-zero 'FF' should be stored at the same location.
   c. A binary number is stored at data-memory location (x) Compute the number of its logical 1's and store the result at y.
   d. Comment on the instructions used in the above three programs and write about the effect of flags with the instructions used.

2) Two unsigned binary numbers are stored at data-memory locations (x) and (x+1).
   a) Compute the sum of the two numbers and store the result at y, ignoring the possible overflow.
   b) Write a program to compute (x+1) - (x). The magnitude of the result should be stored at (y) and the sign (00 if positive, 01 if negative) at (y+1). Understand the 2's compliment Arithmetic.

3) a) A double precision number is stored at (x) and (x+1) (lower order byte at (x). Add another double precision number stored at (y) and (y+1) (lower order byte at (y)]. Store the result at (w) and (w+1).
   b) Same as above: subtract the number (y+1) (y) from (x+1) (x) and store the result at (w) and (w+1).

4) a) Two 2-digit BCD numbers are stored at consecutive memory locations (x) and (x+1). Write a program for computing the sum and store the result at loc. (y)
   b) Write a program to compute the difference and store the result at (y).

5) Implement a time-delay loop for the generation of milli seconds. Determine the exact time-delay by adding the states of the instructions executed in the program.

6) a) Write a program for a decimal counter (00-99) with programmable clock frequency [Eg. Frequency specified at data memory locations (x)] and display the count in the data field using the corresponding monitor subroutine.
   b) Reset the decimal counter at a predefined number and start the count again.

7) N binary numbers stored at consecutive data memory locations starting at (x) where N is defined at data memory location 'NUMBER'.
   a) Find the largest number and display it in the data field and arrange them in ascending order.

b) Find the smallest number and display it in the data field and arrange them in descending order.

8) Two 8-bit binary numbers are stored at data memory locations (x) and (x+1) compute the product of the two numbers using, a). Successive addition method. b). Shifting and adding method store the result in (y) and (y+1).

9) Divide the l6-bit unsigned number in memory location (x) and (x+1) [Most significant byte in (x+1)] by the 8-bit unsigned number in memory location (x+2). Store the quotient in memory location (x+3) and reminder in memory location (x+4). [Choose the data such that the quotient must be contained in 8 bits].

10) a) A 2-digit BCD number is stored at data-memory location (x). Convert the number into binary and display the result in data field.

b) Convert a binary number in memory location (x) to two BCD digits in memory locations (x+1) and (x+2) [most significant digit in (x+1)]. The number in memory location (x) is unsigned and less than $(64)_H$+1.

11) Write a program to do the operation specified at a data memory location (x). The operations are specified as follows:

00-Test the parity of the data at (x+1) and store DD for odd parity, EE for even parity at (y).

01-To operate a staircase lamp, 02-Test the zero condition of the data and store 00 if zero and FF if not, 03-Test if the data is positive or negative.

12) Hardware experiments:

a) A/D and D/A Converters.
b) DPSK Modulator and Demodulator.
c) Seven Segment Display interface.
d) Keyboard interface.

B.E. 4th Year 1st Semester (Credit Based Grading System) with effect from the admitted batch of 2006 - 2007

ECE 411 DIGITAL SIGNAL PROCESSING

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Discrete - Time Signals and Systems:

   Discrete - Time Signals – Sequences, Linear Shift – Invariant Systems, Stability and Casuality, Linear Constants – Coefficient Difference Equations, Frequency Domain Representation of Discrete – Time Signals and Systems.

2. Applications of Z – Transforms:

   System Functions H(z) of Digital Systems, Stability Analysis, Structure and Realization of Digital Filters, Finite Word Length Effects.

3. Discrete Fourier Transform (DFT):

   Properties of the DFS, DFS Representation of Periodic Sequences, Properties of DFT, Convolution of Sequences.

4. Fast – Fourier Transforms (FFT):

   Radix – 2 Decimation – In – Time (DIT) and Decimation – In – Frequency (DIF), FFT Algorithms, Inverse FFT.

5. IIR Digital Filter Design Techniques:

   Design of IIR Filters from Analog Filters, Analog Filters Approximations (Butterworth and Chebyshev Approximations), Frequency Transformations, General Considerations in Digital Filter Design, Bilinear Transformation Method, Step and Impulse Invariance Technique.

6. Design of FIR Filters:

   Fourier Series Method, Window Function Techniques, Comparison of IIR and FIR Filters.

7. Applications:

   Applications of FFT in Spectrum Analysis and Filtering, Application of DSP in Speech Processing.

Text Book:

Alan V. Oppenheim and Ronald W. Schafer: Digital Signal Processing, PHI.

References:

1. Sanjit K. Mitra, Digital Signal Processing "A – Computer Based Approach", Tata Mc Graw Hill.
2. Raddar and Rabiner, Application of Digital Signal Processing.
3. S. P. Eugene Xavier, Signals, Systems and Signal Processing, S. Chand and Co. Ltd.
4. Antonio, Analysis and Design of Digital Filters, Tata Mc Graw Hill.

ECE 412 INFORMATION THEORY AND CODING

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Information measure and source coding, Information measure, Entropy and Information rate, Coding for a discrete memory less source, Predictive coding for sources with memory, Information transmission on discrete channels, Mutual information.

   Discrete channel capacity, coding for the binary symmetric channel, Continuous channels and system comparisons , continuous information, continuous channel capacity, Ideal communication system , system comparisons.

2. Rationale for coding , and types of codes, Discrete memory less channels, linear block codes , cyclic codes, convolution codes, Maximum likely hood Decoding of Convolution codes, Distance properties of convolution codes.

   Sequential Decoding of Convolution codes, Trellis codes, Applications , Algebraic codes, Burst error correcting, Parity check bit coding for error detection, comparison of error rates in coded and un coded transmission, Automatic repeat request.

Text Books:

1) Communication Systems,3/e, by A.B. Carlson, Mc. Graw Hill Publishers(for topic1)
2) Digital Communications by Simon Haykin , John Wiley & Sons(for topic 2)

References:

1) Principles of Digital Communications, Signal representation, Detection , Estimation &Information
2) Coding by J Das, S.K. Mullick, P.K.Chatterjee, New Age Int. Ltd.
3) Principles of Communication Systems, Taub &Schilling, 2/e, TMH Publishers

ECE 413 TV AND SATELLITE COMMUNICATION

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

Television

Basic Television System:

Sound and Picture Transmission, the Scanning Process, Interlaced Scanning, Number of Scanning Lines, Vertical and Horizontal Resolution, Bandwidth of the Baseband Picture Signal.

Television Cameras:

Principle of working and constructional details of Image Orthicon, Vidicon, Plumbicon and Silicon diode array Vidicon and Solidstate Image Scanners.

Composite - Video Signal:

Video signal levels, Need for Synchronization, Details of Horizontal and Vertical Sync Pulses, Equalizing Pulses.

Signal Transmission and Channel Bandwidth:

AM and FM Channel Bandwidth, VSB Transmission, Complete Channel Bandwidth, Reception of Vestigial Sideband Transmission, Television Standards, Block Schematic study of a typical TV Transmitter.

The TV Picture Tube:

Monochrome Picture Tube, Picture Tube Characteristics and Picture Tube Control Circuits, Gamma Correction.

Television Receiver:

Block Schematic and Functional Requirements, VSB Correction, Vertical and Horizontal Deflection Circuits, E.H.T. Generation, Study of Video IF Amplifier Video Detector, Sound Channel Separation, Sync Separation Circuits.

Colour Television:

Principles of Additive and Subtractive Colour Mixing, Chromaticity Diagram, Compatibility and Reverse Compatibility of Colour and Monochrome TV Requirements, Colour Signal Transmission, Bandwidth for Colour Signal Transmission, Sub-carrier Modulation of Chroma Signals, NTSC Encoding (Y, I, Q signals), PAL Encoding (Y, U, V signals), NTSC and PAL Decoders, Types of Colour TV Picture Tubes (Delta-gun, PIL and Trinitron Picture Tubes), Convergence Techniques.

Satellite Communication

Orbital Aspects, Tracking and Control of Communication Satellites, Launch Vehicles, Propagation Characteristics: Attenuation and Noise, Frequency Bands, Satellite Transponders, Earth Station: Configuration, High Power Amplifiers, Antennas, LNA, Link Design, Multiple Access: FDMA, TDMA, CDMA, SPADE, INTELSATs, INSAT.

Text Books:

Monochrome and Colour Television, R. R. Gulati, Wiley Eastern.

Satellite Communication, D. C. Agarwal, Khanna Publishers.

Reference Books:

1. Television Engineering, A. M. Dhake, Tata - McGraw Hill.
2. Satellite Communication, T. Pratt and S. W. Bostian, John Wiley and Sons.

ECE 414 MICROWAVE ENGINEERING

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Microwave Components:

   Introduction to Microwaves and their applications, Coaxial Line Components, Wave-guide Components, Directional Couplers, Hybrid Tee Junction, Magic Tee, Attenuators, Ferrite Devices, Isolators, Circulators, Cavity Resonators, Re-entrant Cavities, Wave-meters, Microwave Filters, Detectors, Mixers.

2. Microwave Signal Generators and Amplifiers:

   Vacuum Tube Triodes, Resonant Cavity Devices, Reflex Klystron, Two – Cavity Klystron, Multi – Cavity Klystron, Slow – Wave Devices, TWT, Crossed Field Devices, Magnetrons, Semiconductor Devices, Microwave BJTs, FETs, Tunnel Diodes, Gunn Diode, IMPATT, TRAPATT Diodes.

3. Microwave Circuits:

   Scattering Matrix and its Properties, Scattering Matrix of directional coupler, circulator, E Plane Tee, H plane Tee and Magic Tee.

4. Microwave Integrated Circuits:

   Materials, Substrate, Conductor, Dielectric and Resistive Materials, MMIC Growth, Fabrication Techniques, MOSFET Fabrication, NMOS Growth and CMOS Development, Thin Film Formation.

5. Microwave Measurements:

   VSWR, Frequency, Guide Wavelength, Coupling and Directivity measurements.

Text Books:

1. Microwave Engineering, G.S.N. Raju, IK International Publishers,
2. Microwave Communications – Components and Circuits, E. Hund, McGraw Hill.
3. Microwave Devices and Circuits, S. Y. Liao, PHI.
4. Microwave Engineering, R. Chatarjee, East – West Press Pvt. Ltd.

Reference :

1. Foundations For Microwave Engineering, R. R. Collin, McGraw Hill.

ECE 415 Elective – II(1) : VLSI DESIGN AND EMBEDDED SYSTEMS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Review of microelectronics and an introduction to MOS technology:
   Introduction to IC technology, MOS and related VLSI technology, NMOS, CMOS, BiCMOS Technologies, Thermal aspects of processing, Production of E beam marks.

2. MOS and BiCMOS circuit design processes:
   MOS layers, ,Stick diagrams, Design rules, and layout, 2 & 1.2 micro meter CMOS rules, Layout diagrams, Symbolic diagram.

3. Basic Circuit concepts:
   Sheet resistance, Area capacitances of layers, Delay unit, Wiring Capacitances, Choice of layers.

4. Scaling of MOS Circuits:
   Scaling models, Scaling function for device parameters, Limitations of scaling.

5. Sub system design and Layout:
   Architectural issues, Switch logic, Examples of Structural design(Combinational logic).

6. Sub system design process:
   Design of ALU subsystem, Some commonly used storage elements, Aspects of design tools, Design for testability, Practical design for test guidelines, Built in self test, CMOS project-an incrementer / decrementer,a comparator for two n-bit numbers.

   Ultra fast systems, Technology development, MOSFET based design.

Text books:

1. Basic VLSI Design by Douglas A, Pucknell, Kamran Eshraghian, Prentice-Hall, l996, 3rd Edition.

References:

1. Mead, C.A and Conway, LA, "Introduction to VLSI Systems", Addison-Wesley, Reading, Massachusetts, l980.

ECE 415 Elective – II(2) : INFORMATION NETWORKS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Information and Communication:

   Measure for Information, sources, source models and source encoding, coding for memory

   less sources, coding for analog sources, channel model and channel capacity.

2. Communication Networks:

   Existing Communications Networks, outlines of the associated hardware facilities,

   Modules of the interfacing facilities, brief outlines of the characteristics of the networks.

3. Communication Methodologies.
4. Information based services:

   Communication services, data analysis services, systems oriented services.

5. Information based forecasting MIS Establishing the Frame work, Information Research management, Data Base

Books:

1. Jevome Kanter: "Management Information Systems" Prentice-Hall, 1992
2. Andrew S. Tanenbaum: "Computer Networks" Prentice Hall, 1989
3. Taub and Schilling: Principles of Communication systems, McGraw Hill, 1971.

ECE 415 Elective – II(3) : IMAGE PROCESSING AND PATTERN RECOGNITION

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

Introduction:

Digital Image Processing and Applications – Image Representation and Modeling – Image Enhancement – Image Restoration – Image Analysis – Image Data Compression.

Digital Image Fundamentals:

Elements of Visual perception – A simple Image Model – Sampling and Quantization – Some Basic Relationship between Pixels.

Image Transforms:

Two Dimensional Orthogonal and Unitary Transforms – Properties of Unitary Transforms – One Dimensional DFT - Two Dimensional DFT – Cosine Transforms – Sine transforms – Hadamard Transforms – Haar Transforms – Slant transforms.

Image Enhancement:

Point Operations – Histogram Modeling – Spatial Operations – Transform Operations.

Image Restoration and Compression:

Image observation models – Inverse and Wiener Filtering – Pixel Coding – Predictive techniques – Transform Coding of Images.

Statistical and Non – Parametric Decision Making:

Applications of Pattern Recognition – Baye's Theorem – Multiple Features – Conditionality Independent Features – Decision Boundaries – Unequal Costs of Error – Estimation of Error Rates – Kernel and Window Estimator – Nearest Neighborhood Classification Techniques – Adaptive Decision Boundaries – Adaptive Discriminant Functions.

Clustering:

Introduction – Hierarchical Clustering – Partitional Clustering.

Artificial Neural Networks:

Introduction – Nets without Hidden Layers – Nets With Hidden Layers – The Back Propagation Algorithms – Hopfield Nets – Classifying Sex From Facial Images.

Text Books:

Fundamentals of Digital Image Processing, Anil K. Jain, PHI.

Pattern Recognition and Image Analysis, Earl Gose and Richard Johnsonbaugh Steve Jost, PHI.

Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, Addinson – Wesley.

Image Processing Theory Algorithms and Architecture, M. A. SID – AHMED, McGraw Hill Inc.

ECE 415 Elective – II(4) : SOFTWARE ENGINEERING

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

ECE 415 Elective – II(5) : ADVANCED MICROPROCESSORS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

8086 / 8088 microprocessor, architecture and addressing modes.

Instructions and assembly language programming.

Macroassembler MASM and advanced programming.

Interrupts of 8086 / 8088 and DOS Interrupt 21h functions.

Interfacing A/D converters to the PC and data acquisition. Interfacing D/A converters and waveform generation.

80286, 80386, 80486 and Pentium microprocessors.

Motorola 68000, 68020 and 68030 microprocessors.

Text Books:

1. Microprocessor and Interfacing by Douglas V. Hall, McGraw Hill International Edition, 1992.
2. The Intel Microprocessor 8086 / 8088, 80186, 80286, 80386 and 80486 by Barry B. Brey, PHI, 1998.
3. 68000 Microprocessors by Walter A. Tribel and Avtar Singh, PHI, 1991.

Reference Books:

Assembly Language Programming the IBM PC by Alan R. Miller, Sybex INC, 1987.

ECE 416 DIGITAL COMMUNICATION LABORATORY

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
2	-	-	3	3	50	50	100

1. Sample the given input signal for different sampling rates and recover the signal by means of appropriate low – pass filter.
2. Study the Pulse – Width Modulation for both AC and DC Modulating Signals and obtain the corresponding waveforms.
3. Study the Pulse – Position Modulation for both AC and DC Modulating Signals and obtain the corresponding waveforms.
4. Study the functioning of a given Analog to Digital Converter.
5. Study the functioning of a given Digital to Analog Converter.
6. Encode the given 4-Bit Data Word into 16-Bit Orthogonal Encoded Word using Hadamard Code.
7. Decode the 16-Bit Orthogonal Encoded Word to 4-Bit Data Word.
8. Study the performance of the given Continuously Variable Slope Delta Modulation (CVSD).
9. Obtain the characteristics of the Phase Shift Keying (PSK) Modulator.
10. Obtain the characteristics of the Frequency Shift Keying (FSK) Modulator.

ECE 417 DIGITAL SIGNAL PROCESSING LABORATORY

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
2	-	-	3	3	50	50	100

ECE 418 INDUSTRIAL TRAINING AND SEMINAR

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
2				-	100		100

The students are supposed to submit a detailed report covering the following aspects related to Electronics and Communication engineering projects that are relevant to the industry in which they received training:

B.E. 4th Year 2nd Semester (Credit Based Grading System) with effect from the admitted batch of 2006 - 2007

ECE 421 ENGINEERING ECONOMICS AND MANAGEMENT

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Fundamentals of Economics – Scarcity and Efficiency Market, Command and Mixed Economics.
   Basic Elements of Supply and Demand – Law of Demand – Elasticity of Demand.
2. Business Organizations – Individual Proprietorship – Partnership – The Corporation.
   Statement of Profit and Loss – The Balance Sheet – Break-Even Analysis – Cost Concepts – Elements of Costs.
3. Principles and Functions of Management – Evolution of Management Thought – Decision Making Process.
   Organization Theory and Process – Leadership – Motivation – Communication – Conflict Management in Organization.
4. Plant Location – Plant Layout – Production Planning and Control – Product Design and Development – Channels of Distribution. Materials Management – Inventory Control.
5. Industrial Disputes and their Settlement – Provision of Factories Act and Industrial Disputes Act.
   Recent Trends in Contemporary Business Environment.

References:

1. Economics – Paul A. Samuelson and William D. Nordhaus.
2. Engineering Economics – Vol. 1 – Tara Chand.
3. Financial Management – S. N. Maheswari.
4. Essentials of Management – Koontz and O' Donnel.
5. Production and Operation Management – B. S. Goel.
6. Modern Production / Operation Management – Elwood S. Buffa, Rakesh K. Sarin.
7. Industrial Law - S. P. Jain.
8. Industrial Law - R. P. Maheswari and S. N. Maheswari.
9. Labour and Industrial Laws – Singh, Agarwal and Goel.

ECE 422 RADAR ENGINEERING AND NAVIGATIONAL AIDS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Radar Equation, Radar Block Diagram and Operation, Prediction of Range, Minimum Detectable Signal, Receiver Noise, Probability Density Functions, S/N, Integration of Radar Pulses, Radar Cross-section, Transmitter Power, PRF and Range Ambiguities, Radar Antenna Parameters, System Losses and Propagation Effects.
2. MTI and Pulse Doppler Radar: Introduction, Delay line Cancellers, Moving target Detector, Limitation to MTI performance, MTI from moving platform, Pulse Doppler Radar
3. Tracking Radar, Sequential Lobing, Conical Scan, Monopulse tracking Radar, Low angle tracking, Pulse compression,

   Block Diagrams of Synthetic Aperture Radar (SAR), Phased array Radars,. MST Radar, ECM, ECCM
4. Radar Receiver, Mixers, Radar Displays, Receiver Protectors.
5. Principles of Direction Finders, Aircraft Homing and ILS, Radio Altimeter, LORAN, DECCA, OMEGA, Inland Shipping Aids.

Text Book:

Radar Engineering and Fundamentals of Navigational Aids, G S N Raju, IK International Publishers, 2008

References

Introduction to Radar Systems, Skolnik, McGraw Hill, 2007.

ECE 423 DATA COMMUNICATIONS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

Data Communication Concepts and Terminology:

Data Representation, Data Transmission, Modes of Data Transmission, Signal Encoding, Frequency Spectrum, Transmission Channel, Data Communication

Transmission Media:

Transmission Line Characteristics, Transmission Line Characteristics in Time Domain, Cross talk, Metallic Transmission Media, Optical Fiber Base-band Transmission of Data Signals, Telephone Network, Long Distance Network

Modems and Data Multiplexers:

Digital Modulation Methods, Multilevel Modulation, Differential PSK, Standard Modems, Limited Distance Modems and Line Drivers, Group Band Modems, Data Multiplexers, Statistical Time Division Multiplexers

Error Control:

Transmission Errors, Coding for Error Detection and Correction, Error Detection Methods, Forward Error Correction Methods, Reverse Error Correction

The Physical Layer, The Data Link Layer:

Need for Data Link Control, The Data Link Layer 196, Frame Design Considerations, Flow Control, Data Link Error Control, Data Link Management, HDLC-HIGH-LEVEL DATA LINK CONTROL

The Network Layer:

The Sub network Connections, Circuit Switched Sub networks, Store and Forward Data Sub networks, Routing of Data Packets, Internetworking, Purpose of the Network Layer, Title of X.25 Interface, Location of X.25 Interface, Addressing in X.25, Packet Assembler and Disassembler (PAD), Asynchronous Character Mode Terminal PAD

Local Area Networks:

LAN Topologies, Media Access Control and Routing, MIEDIA ACCESS CONTROL IN LOCAL AREA NETWORKS, INTERNETWORKING, THE TRANSPORT AND UPPER OSI Layer, The Session Layer, The Presentation Layer, The Application Layer.

Text Book:

Praksh C. Gupta 'DATA COMMUNICATIONS' Prentice Hall of India 1996.

ECE 424 FIBER-OPTIC COMMUNICATIONS

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
4	3	1	-	3	30	70	100

1. Propagation: in Fibers:

   Elementary discussion of propagation in fibers

   Attenuation in Optical Fibers

   E M wave propagation in step-Index Fibers

   E M wave propagation in graded-Index Fibers.

2. Optical Fibers and Associated Components:

   Fiber Properties

   Splices, connectors, Couplers, and Gratings.

3. Transmitting and Receiving Devices:

   Injection laser Characteristics

   LED structures, Characteristics and modulation

4. Optical Transmitters, Receivers and Fiber-optic Link Design:

5. Concepts of Fiber-Optic Networks and wavelength – Division Multiplexing:

Books:

For syllabus items 2,4 and 5

An Introduction to Fiber Optic Systems by John Powers, 2nd Edition, Irwin, l997.

For syllabus item 1

Optical Communication Systems by John Gowar, PHI l994

For syllabus item 3

Optical Fiber Communications, Principles and Practice by John M. Senior, Second Edition, PHI l996.

ECE 425 PROJECT

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
8	3	1	12	-	50	50	100

ECE 426 MICROWAVE ENGINEERING AND ANTENNAS LABORATORY

Credits	*Periods*			*Exam Hrs.*	*Sessional Marks*	*Exam Marks*	*Total Marks*
	Theory	*Tutorial*	*Lab*				
2	-	-	4	-	50	50	100