DEPARTMENT OF ELECTRONICS &COMMUNICATION ENGINEERING
COURSE STRUCTURE & SYLLABUS
B.TECH. ELECTRONICS &COMMUNICATION ENGINEERING

SEMESTER I

S.No.	Subject Code	Subject	L-T-P	Credit
1	LNG-302	Professional Communication	2-1-0	3
2	CHEM-513	Engineering Chemistry	3-1-1	5
3	MAS-411	Engineering Mathematics-I	3-1-0	4
4	ECE-301	Basic Electronics	2-1-1	4
5	PHY-311	Engineering Physics-	3-0-1	4
6	ME-301	Engineering Graphics-I	0-0-2	2
7	GPT-301	Moral And Value Education	2-0-0	2
8	ME-302	Introduction to Manufacturing Process	2-0-0	2
			Total Credits	**26**

SEMESTER II

S.No.	Subject Code	Subject	L-T-P	Credit
1	LNG-303	Professional Communication -II	3-0-0	3
2	PHY-312	Engineering Physics-II	3-0-1	4
3	MAS-490	Engineering Mathematics-II	3-1-0	4
4	CSIT-401	Computer And Languages	2-1-1	4
5	ME-304	Workshop Practice & Technology	2-0-2	4
6	ME-401	Engineering Graphics-II	0-0-2	2
7	EE-302	Electrical Engineering	3-0-1	4
8	CE-401	Engineering Mechanics	2-1-0	3
Total Credits				**28**

SEMESTER III

S.No.	Subject Code	Subject	L-T-P	Credit
1	MAS-590	Engineering Mathematics-III	3-1-0	4
2	EE-401	Network & System	3-1-1	5
3	ECE-401	Solid State Devices & Circuits	3-1-1	5
4	ECE-402	Switching Theory & Logic Design	2-1-0	3
5	ECE-403	Electronics Workshop And P.C.B Lab	0-0-2	2
6	ECE-404	Electronic Measurement & Measuring instruments	3-1-1	5
7	ENV-415	Environmental Studies-I	2-0-0	2
Total Credits				**26**

SEMESTER IV

S.No.	Subject Code	Subject	L-T-P	Credit
1	ECE-405	Microprocessor & Application	3-1-1	5
2	EE-404	Electrical Engineering Material	2-1-0	3
3	EE-406	Electromagnetic Field Theory	3-1-0	4
4	EE-402	Principles of Electrical Machines	3-0-1	4
5	MAS-491	Computer Based Numerical & Statistical Techniques	3-1-0	4
6	ECE-406	Signals & Systems	3-1-0	4
7	CSIT-415	Object Oriented Programming	3-1-1	5
8	ENV-416	Environmental Studies-II	2-0-0	2
Total Credits				**31**

Note: - Four Weeks Practical summer training-I after IV semester (to be evaluated in V Semester)

SEMESTER V

S.No.	Subject Code	Subject	L-T-P	Credit
1	BAM-315	Elements Of Economics & Principles Of Management Science	3-1-0	4
2	EE-510	Automatic Control System	3-1-1	5
3	ECE-501	Analog Communication System	3-1-1	5
4	ECE-502	Antenna & Wave Propagation	3-1-0	4
5	ECE-503	Electronic Switching	3-1-0	4
6	ECE-504	Electronic Circuit Design	3-1-1	5
7	ECE-400	Training-I	0-0-1	1
Total Credits				**28**

SEMESTER VI

S.No.	Subject Code	Subject	L-T-P	Credit
1	EE-504	Power Electronics	3-1-1	5
2	ECE-505	Biomedical Instrumentation	2-1-1	4
3	ECE-506	Digital Communication System	3-1-1	5
4	ECE-507	Digital Signal Processing	3-1-1	5
5	ECE-508	Microwave & Radar Engineering	3-1-1	5
6	ECE-509	VLSI Design Technology	3-1-1	5
7	ECE-580	Seminar-I	0-0-1	1
Total Credits				**30**

Note: - Four Weeks Practical summer training-II after VI semester (to be evaluated in VII Semester)

SEMESTER VII

S.No.	Subject Code	Subject	L-T-P	Credit
1	ECE-601	Data Communication Networks	3-1-1	5
2	ECE-602	Optical Fibre Communication	3-1-1	5
3	ECE-603	Microprocessor Based Instrumentation System	3-1-0	4
4	ECE-604	Wireless Communication	3-1-0	4
5	ECE-605	Image Processing	3-1-0	4
6	ECE-500	Training-II	0-0-2	2
7	ECE-680	Seminar-II	0-0-1	1
8	ECE-699a	Project (Project Formulation)	0-0-2	2
			Total Credits	**27**

SEMESTER VIII

S.No.	Subject Code	Subject	L-T-P	Credit
1	ECE-606	TV & Satellite Communication	3-1-0	4
2	ECE-630-639	Elective-I	3-0-0	3
3	ECE-640-649	Elective-II	3-0-0	3
4	ECE-650-659	Elective-III	3-0-0	3
5	ECE-699b	Project (Execution and Report)	0-0-6	6
			Total Credits	**19**

Elective-I

S.No.	Subject Code	Subject	L-T-P	Credit
1	ECE-630	Wireless LAN Technologies	3-0-0	3
2	ECE-631	Antenna Analysis & Synthesis	3-0-0	3
3	ECE-632	Optical Network	3-0-0	3
4	ECE-633	Cellular Mobile Communication	3-0-0	3
5	ECE-634	Robotics	3-0-0	3
6	ECE-635	Virtual Instrumentation	3-0-0	3

Elective-II

S.No.	Subject Code	Subject	L-T-P	Credit
1	ECE-640	Smart Anntena	3-0-0	3
2	ECE-641	Embeded System	3-0-0	3
3	ECE-642	Photonics	3-0-0	3
4	ECE-643	GSM & TDMA	3-0-0	3
5	ECE-644	Spread Spectrum System	3-0-0	3

Elective-III

S.No.	Subject Code	Subject	L-T-P	Credit
1	ECE-650	Architecture & Application Of Digital Processors	3-0-0	3
2	ECE-651	Bio Medical Engineering	3-0-0	3
3	ECE-652	Bioinformatics Engineering	3-0-0	3
4	ECE-653	Applied Multimedia Communication	3-0-0	3
5	ECE-654	Artificial Neural Network and Fuzzy Logic	3-0-0	3
6	ECE-655	Micro Electronics	3-0-0	3
7	ECE-656	Artifical Intelligents And Expert System	3-0-0	3

PROFESSIONAL COMMUNICATION – I

Course Code (LNG-302) **Credits 3 (2-1-0)**

1. **Study of selected Literacy Texts.**
   i. Collection of short essays.
   ii. Collection of short stories.

2. **Testing Written Comprehension Ability:** Comprehension Passages of 500 words Multiple Choice Questions.
3. **Composition & Grammar.**
4. **Report Writing:** Characteristics of Business Reports. Structure of reports: Front Matter, Main Body, and Back MatterStyle of Reports: Definition, the Scientific Attitude, Readability of Reports, Choice of Words and Phrases, Construction and length of sentences, Construction and length of Paragraphs. The lineout or break up of a format report Blank Form Report, Frogen Report, Memoranda Form Report, Periodic Report, and Miscellaneous Report.
5. **Speech Drills:**
   Using the language laboratory to develop Speaking Communication Skills.
   (i) Word Accent: Production of correct accentual patterns involving two and three syllabi words.
   (j) Rhythm: Stress-tone rhythm in sentences.
   (k) Intonation: Rising Tone and Talking Tone Ear Training and Production Tests.

References:

1.Close R.A.: A University Grammar of English Workbook. Longman, London, 1998.
2.Jones, Daniel: English Pronouncing Dictionary, ELBS, and London, 1999.
3.Sharma S.D: A Textbook of Spoken and Written English, Vikas, 1994.
4.Alvarez, Joseph A.: The Elements of Technical Writing, New York: Harcourt, 1998.
5.5.Bansal, R.K.: Spoken English For India, Orient Longman, 1993.

ENGINEERING C H E M I S T R Y

Course Code (CHEM-513) **Credit 5 (3-1-1)**

1. **General Chemistry:** Advanced Theory of Chemical Bonding: Valence bond and molecular orbital theory. Structure of NH_3, H_2O, SO_3, PCl_5, XeO_2 molecules. Theories of bonding in metals and semiconductors, n-type and p-type semi-conductors, Imperfections in materials. Born-Haber cycle, Bragg's conditions.
2. **Physical Chemistry:** Equilibrium on Reactivity: Bronsted and Lewis Acids, pH, pka, pkb Scale, Buffer solution. Stereochemistry of organic compounds, Co-ordination chemistry, Nomenclature, Valence Bond and crystal field theory.

Chemical Kinetics & Catalysis: Rate law, Order of reactions, Parallel and reversible reactions, Catalysis, Homogeneous and heterogeneous catalysis, Characteristics of catalytic reaction, Catalytic promoters and poi-sons, Auto catalysis and negative catalysis, Intermediate compound formation theory and absorption theory.

3. **Environment Chemistry:**Atmospheric Chemistry & Air Pollution: Environment and Ecology, Environmental segments, Structure and composition of atmosphere, Radiation Balance of Earth and Green House Effect, Formation and depletion of Ozone layer, Chemical and photochemical reactions of various species in atmosphere, Air pollution – sources, reactions and sinks for pollutants, Acid rains and Smog formation. Pollution control methods.

   Corrosion and Lubrication: Introduction, causes of corrosion, Theories of corrosion, Factors influencing Corrosion, Corrosion inhibitors, passivity, Types of corrosion, Protection from corrosion and protective coatings. Theory, Classification and mechanism of Lubrication.

4. **Applied Chemistry:**Water and Waste Water Chemistry: Introduction, Hardness of water, characteristics imparted by impurities, Analysis of contaminants, Treatment of Water by Zeolite, L-S process, Boiler feed water, Waste water treatment.

5. **Chemistry of Engineering Materials:** Fuels & Combustion: Classification of fuels, Non conventional Energy, Biogas, Biomass and solar energy. Calorific value- gross and net, characteristics of good fuel, Determination of calorific value, Solid fuels, Analysis of coal, Liquid fuels.

   Instrumentation: IR, UV, NMR, MASS AND ASS.

6. **Industrial Chemistry:** Polymer Chemistry: Classification of Polymers, Including Biopolymers condensation and addition polymers and their applications. Industrial

   Application and mechanism of chemical reaction, Beckman, Hoffman, Reimer Tiemann, Cunnizzaro, Diels Alder and Skraup synthesis.

References:

1.Puri and Sharma/Principles of Physical Chemistry.
2.Manas Chandra/Atomic Structure and Chemical Bond.
3.Bahl and Tuli /Engineering Chemistry.
4.Jain and Jain/A Text-Book of Engineering Chemistry
5.S.S Dara/Environmental Chemistry and Pollution Control.
6.S.S Dara /Environmental Chemistry.
7.A.K De/Environmental Chemistry.

LIST OF EXPERIMENTS (ANY TEN):

1. To determine the percentage of available chlorine in the supplied sample of Bleaching powder.
2. To determine the Ferrous content in the supplied sample of iron ore by titrimetric analysis against standard K_2Cr_2 solution using K, $Fe(CN)_g$ as external indicator.

3. To determine the chloride content in supplied water sample using Mohr's method.
4. To determine the constituents and amount of alkalinity of the supplied water sample.
5. To determine the Temporary and Permanent hardness of water sample by Coplexometry.
6. To find the Chemical Oxygen Demand of a waste water sample using Potassium dichromate.
7. To determine iron concentration in the sample of water by spectrophotometric method.
8. To find out the Velocity constant for the inversion of cane sugar in acidic medium and to show that inversion follows the first order kinetics.
9. To determine the Molecular weight of a polystyrene sample by using Viscometer method.
10. To determine pH of a solution using a pH-meter and titration of such a solution pH-metrically.
11. To determine the calorific value of a fuel sample by using a Bomb Calorimeter.
12. Analysis of a coal sample by proximate analysis method.

ENGINEERING PHYSICS

Course code: PHY-311 **Credits 4(3-0-1)**

1. Special Theory of Relativity:
Michelson Morley experiment, Inertial frames of reference, postulates of special theory of relativity, Lorentz transformation equation of space and time, length contraction, time dilation. Addition of velocities, variation of mass with velocity, mass energy equivalence.
2. Optics:
Interference : coherent sources , conditions of interference, Fresnel's biprism experiment, And Displacement of fringes, interference in thin films wedge- shaped – film, Newton's rings.
Diffraction: single slit and doubles sit diffraction, diffraction grating, and Raleigh's criterion of limit of Resolution, resolving power of telescope, microscope and grating
Polarization: polarization of, light , pictorial representation of polarized light , Brewster's law , Malus law, phenomenon of double refraction, Geometry of calcite crystal,Optic axis. Principal Section , Ordinary and extra- ordinary rays, construction And working of Nicole, circularly and elliptically polarized light, retardation Plates, Production and analysis of plane, optical activity, Specific orientation, Polarimeter.
3. Fields:
Scalar and vector fields gradient of scalar field, divergence & curl of a vector field, line Integral, conservative vector field , Gauss divergence theorem, stoke's theorem.

4. Electrostatics:
Gauss ' law and it's applications, Poisson and Laplace equations .Maxwell's Equations, basic Concept of electromagnetic Waves and its solution in Free space.
5 .Magnetic Properties of Materials:
Para, dia , Ferro, antihero and ferro – magnetie materials , hysteresis , Methods of plotting hysteresis curve of a ferromagnetic materials and their uses, magnetic circuits.

6. X-Ray's:
Origin of X-rays, continuous and characteristic X- ray spectra, Moseley's law, Absorption of xrays, diffraction of X-rays, Bragg's law, Bragg's spectrometer, practical applications of X-rays, Compton effects. (4)

7. Quantum Theory:
Wave particle duality, de Broglie concept of matter Waves, Davisson and Germer experiment, Heisenberg uncertainty principle, Schrodinger Wave equation and its solution.

8. Laser:
Spontaneous and stimulated emission of radiation, Einstein's coefficients, Main components of a laser, types of lasers and their applications.

Reference:

1. Arthur Beiser: ' Colilcept of modem physics, TMH.
2. Subrahmanyam & Brij Lal: A Text Book of Optics S. Chand & Co.
3. K.K. Tiwari: Electricity & Magnetism, S. Chand & Co.
4. Brij Lal & Subrahmanyam: Electricity & Magnetism.
5. Wehr, Richardo & Adair: physics of the Atom

ENGINEERING M A T H E M A T I C S – I

Course Code (MAS-411) **Credit 4(3-1-0)**

1. **Matrices :**Elementary row and column transformations, Linear dependence, Rank of matrix, Consistency of system of linear equations and solution of linear equations, Characteristic equation, and Caley-Hamilton theorem, Eigen values and eigen vectors, Diagonalisation, Complex and unitary matrices.
2. **Differential Calculus-I:** Leibnitz theorem, Partial differentiation, Euler's theorem, Asymptotes, Curve tracing, Change of Variables, expansion of functions of one and several variables. Cylindrical and spherical coordinate systems
3. **Differential Calculus-II:** Jacobian, Approximation of errors, Extrema of function of several variables, Lagrange's method of multipliers (simple applications).
4. **Multiple integrals:** Double and triple integrals, change of order, change of variables, Gamma & Beta functions,application to area, volume, Disrichlet's integral and its applications.
5. **Vector Calculus:** Point functions, Gradient, divergence and curl of a vector and their physical interpretations, line, surface & volume integrals, Gauss divergence theorem and Greens & Stokes theorem.

References:

1. Shanti Narayan: A Text Book of matrices, S.Chand & Co.
2. Thomas/Finney: Calculus and Analytic Geometry, Narosa Pub. House.
3. J. N. Kapur: Mathematical Statistis, S. Chand &Co.

4. C. Prasad: Mathematics for Engineers, Prasad Mudranalaya.
5. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers.
6. Jaggi & Mathur: Advanced Engineering Mathematics, Khanna Publishers.
7. Piskunov, N.: Differential & Integral Calculus, Moscow Peace Pub.
8. H.K. Das, Engineering Mathematics.
9. Vijai Shankar Verma & Sanjeev Kumar, Engineering Mathematics.
10. Rakesh Dubey, Engineering Mathematics

BASIC ELECTRONICS

Course Code: (ECE-301) **Credits 4 (2-1-2)**

1. **Energy Bands in Solids:** Energy band theory of solids, Concept of forbidden gap, Insulators, Metals and Semiconductors.
2. **Transport Phenomenon in Semiconductors:** Mobility and conductivity, electrons and holes in an intrinsic semiconductor, Donor and acceptor impurities, Fermi level, carrier densities in semiconductor, electrical properties of semiconductor, Hall Effect, Diffusion.
3. **Junction Diode:** P-N junction, depletion layer, V-I characteristics, diode resistance, capacitance, switching time, diode application as a rectifier (half wave and full wave), diode circuits (clipper, clamper, voltage multipliers) Breakdown mechanism, Zener & Avalanche, breakdown characteristics, Zener diode and its applications.
4. **Bi-junction Transistor:** Bipolar junction Transistor, CE, CB and CC configuration, characteristic curves (cut off, active and saturation region), Requirement of biasing, biasing types and biasing analysis, stability.
5. **Transistor as an Amplifier:** Graphical analysis of CE amplifier, concept of voltage gain, current gain and power gain, h-parameter (low frequency), computation of A_v, R_I, R_o and approximate formulae.
6. **FET & UJT:**
7. Construction & characteristics of JFET -parameters of JFET -MOSFET -depletion ,enhancement modes-FET in CS,CD,CG Configura tions-equivalent circuit of FET at low frequencies-FET model at high frequencies-FET Specifications.Construction, theory of operation & characteristics of UJT, PUT..
8. **Operational Amplifiers:** Concepts of ideal op-amp, inverting, non-inverting and unity gain amplifiers, adders, difference amplifiers. , Integrators.
9. **Switching Theory & Logic Gates:** Number systems, conversion of bases, Boolean algebra, Logic Gates, concept of universal gate, canonical forms, and minimization using K-map.
10. **Electronic Instruments:** Multimeter, CRO and its Applications.

References:

1. Boylestad & Nashelsky/Electronic Devices & Circuits/ PHI.
2. Morris Mano/Digital Computer Design/ PHI.
3. Milliman, J. Halkias/Integrated Electronics/TMH.
4. Malvino & Leach/Digital Principles & Application/
5. Sanjeev Gupta /Electronics devices & ckts./Dhanpat Rai sons

List of Experiments:

1-Study of lab equipments and components: CRO, Multimeter, Function Generator, Power supply- Active, Passive Components & Bread Board.

2. **P-N Junction Diode**: Characteristics of PN Junction diode-Static and dynamic resistance measurement from graph.
3. **Applications of PN junction diode**: Half & Full wave rectifier- Measurement of Vrms, Vdc, and ripple factor-use of filter- ripple reduction (RC Filter)-Clipper & Clamper
4. **Properties of junctions** Zener diode characteristics. Heavy doping alters the reverse characteristics. Graphical measurement of forward and reverse resistance.
5. **Application of Zener diode:** Zener diode as voltage regulator. Measurement of percentage regulation by varying load resistor.
6. **Characteristic of BJT**: BJT in CB and CE configuration- Graphical measurement of h parameters from input and output characteristics. Measurement of A_v, A_I, R_o and R_i of CE amplifier with potential divider biasing.
7. **Characteristic of FET**: FET in common source configuration. Graphical measurement of its parameters gm, rd & m from input and output characteristics.
8. **Characteristic** of silicon-controlled rectifier.
9. **To plot** V-I Characteristics of DIAC .
10. **To draw** V-I characteristics of TRIAC for different values of Gate Currents.

ENGINEERING MECHANICS

Course Code (CE-401) **Credit 3 (2-1-0)**

1. **Force and Equilibrium:**Basic concepts, Force, Moment and couple, Principle of Transmissibility, Verigonon's theorem, Resultant of Force Systems concurrent and Non- concurrent coplanar Forces, Funicular polygon. Free body diagram.
2. **Trusses:** Plane structures, various methods of analysis of Trusses, Method of joints, Method of sections and Graphical method.
3. **Moment of Inertia:**Center of gravity, centroids of Line, Area, volume and Composite Bodies, Area Moment of Inertia and Mass Moment Moment of Inertia for plane figures and bodies including composite bodies, Product Moment of inertia, Parallel axis theorem, Principal moment of inertia.
4. **Friction:** Introduction, Dry friction, Co-efficient of static friction. Friction cone, screw jack and Belt
5. **Beams:** Bending moment and shear force diagrams for statically determinate beams.
6. **Kinematics of Rigid Bodies:** Plane motion, Absolute motion, Relative motion, Translating axes and Rotating axes.
7. **Kinetics of Rigid Bodies:**Plane motion, Force Mass and Acceleration, Work and energy, Impulse and momentum, Principles of energy conservation, Principle of virtual work, D'Alembert's principle and Dynamic equilibrium.

References:

1. Beer F.P and Johnston F.R: Mechanics for Engineers, McGraw Hill.
2. Meriam, J.L: Statistics, John Wiley.
3. Meriam, J.L: Dynamics, John Wiley.
4. Shames I.H: Engineering Mechanics, Prentice Hall of India.
5. Dayaratnam, P.: Statistics, Tata Mc Graw Hill.
6. Timeshenko, S. and Ypung D.: Engineering Mechanics, Mc Graw Hill.

PROFESSIONAL COMMUNICATION – II

Course Code: LNG-303 **Credits 3(3-0-0)**

Technical Written Communication:
(a) Nature, origin and development of technical written communication.
(b) Salient features
(c) Difference between technical writing and general writing. Pre- requisites of Scientific and
Technical Communication:
(a) Fragmented sentences
(b) Parallel comparisons.
(c) Elements of a series
(d) Squinting construction and split infinitive.
(e) Modifiers, connectives, antecedents and clause subordination
(f) Dangling participles and gerunds
(g) Ellipsis
(h) Coherence, Unity, chronological method, spatial method, inductive method, Linear
(i) Method, deductive method, interrupted method.
Business Correspondent:
(a) General principles of business correspondence
(b)Ramifications, of business letters.
(c) Letters giving instructions, inquiries and answers to inquires, complaints and adjustments, letters urging action, employment letters,
Application and resumes.
Proposal Writing:
(a) Proposal : Definition and kinds.
(b) Division of format proposals (front matter, title page, summary abstract, Table of Contents etc.
(c) Statement of request, body- statement of problem, background, scope, methodology,
(d) Advantages and disadvantages.
Writing Scientific, and Semi –technical articles:
(a) Source material, topic sentence, literature review
(b) Tables, figures footnotes, bibliography.

References:

Arora, V.n. (etal), Improve your writing (Delhi: oxford University Press, 1981

ENGINEERING GRAPHICS-I

Course Code (ME-301) **Credit 2(0-0-2)**

1. **Introduction:** Graphics as a tool to communicate ideas, engineering drawing instruments and its uses. Lettering and dimensioning, scales, layouts of drawing sheets Construction of geometrical figures like pentagon and hexagon.
2. **Orthographic Projection:** Principles of orthographic projections, Principal and auxiliary planes, First and Third angle projections. Projection of points. Pictorial view.Projection of lines parallel to both the planes. Parallel to one and inclined to other, Inclined to both the planes. Application to practical Problems.Projection of solid in simple position, Axis or slant edge inclined to one and parallel to other Plane, Solids lying on a face or generator on a plane. Sectioning of solids lying in various positions, True shape of the section.Development of lateral surfaces, sheet metal drawing**.**
3. **Isometric Projection:** Principles of isometric projection, Isometric projection using box and offset methods.

References:

1. Bhatt N.D.: Elementary Engineering Drawing, Charothar Publishing.
2. Laxmi Narayan V & Vaish W.: A Text Book of Practical Geometry on Geometrical Drawing.

MORAL AND VALUE EDUCATION

Course Code (GPT-301) **Credits 2 (2-0-0)**

My country and my people, the many Indians, being and becoming an Indian, nationalism and internationalism.
Some life issues- love, sex and marriage, men and money-value of time, meaning of work, human communication, human suffering, addiction, ecology, women's issues.
Understanding one's neighbour, neibhourhood groups: their structure and functions,

Patterns of social interaction of group dynamics.
Preparation for a career, choice of vocation, motivation for study and research.
The present educational system: curriculum and syllabus, teaching methods, examination and work experience.
Definition of value education, moral and ethics, laws and morale based on Ten Commandments and two great commandments.
Discovery of self, self-awareness, growth of intellect- man's spiritual nature emotions, will, respect, the rights of life, liberty, property, truth and reputation.
Sin, orign of sin, manifestation of sin, the results of sin, the remedy of sin, sin as an act, Sin as a state, sin as a nature.

Conscience- as defined in oxford dictionary and Winston dictionary. Types of consciousness (such as Evil, convicted, purged, pure, weak, good, void of offence).

INTRODUCTION TO MANUFACTURING PROCESS

Course Code (ME-302) **Credit 2 (2-0-0)**

1. Intoduction to engineering materials – Metals & alloys – composition – properties and uses.
2. Manufacturing process – Classification , mechanization , Automation , Inter – changeability , computers in manufacturing , CAD , CAM , CIM , MRP , GT
3. Metal Forming – Brief introduction to press working , casting , plastic processing , smithy operations.
4. Machine tools – Introduction to lathe machines , Drilling , Shaper , Slotter , Planer , Boring machines
5. Machine Operation – Turning , Threading , Boring , Drilling.
6. Plastic Processing.

References

1. Sherman, Theodore A. (et al) Modern Technical Writing, New Jersey, Prentice Hall, 1991.

2. Legget, Glenn (et al) Essentials of grammar and composition, Macmillan, Delhi 1994.

3. Strunk, Jr. William (et al), The elements of style, Macmillan, 1987.

4. Sharma, S.D A Text Book of Scientific and Technical Writing, Vikas, Delhi, 1990.

ENGINEERING PHYSICS-II

Course code: PHY- 312 **Credit 4(3-0-1)**

Unit-1:

Wave Mechanics and X-ray Diffraction:

Wave- particle duality, de- Brogie matter waves, Phase and group velocities, Davisson-Germer experiment, Heisenberg uncertainty principle and its applications, Wave function and its significance, Schrodinger's wave equation- particle in one dimensional box. Diffraction of X-rays by crystal planes, Bragg's spectrometer, Compton's effect**.**

Unit-11:

Dielectric and magnetic properties of Materials:

Dielectric constant and polarization of dielectric materials, Types of polarization (Polarizability). Equation of internal fields in liquid and solid (one- Dimensional), Claussius mussoti- Equation, Ferro and Piezo electricity (Qualitative), Frequency dependence of dielectric constant, Dielectric losses, Important applicationsof dielectric material. Langevin's theory for dia and paramagnetic material, phenomenon of hysteresis and its applications. Ultrasonic: Generation, detection, and application of ultrasonics.

Unit-III :

Electromagnetics:

Displacement Current, Maxwell's Equations (Integral and Differential Forms). Equation of continuity, E-M wave equation and its propagation characteristics in free space and in conducting media, pointing theorem and pointing vectors.

Unit-IV:

Superconductivity and Science and technology of non materials:

Temperature dependence of resistivity in superconductivity material, Effects of magnetic field *(Meissner effect), Type-I and Type-II superconductors, Temperature dependence of critical filed, BCS theory (Qualitative) ,High temperature superconductors in superconducting state, Applications of Super-conductors.

Introduction to Nanomaterials- Basic principle of nanoscience and technology, creation and use of buck balls, structure, properties and use of carbon nanotubes, Application of nanotechnology.

Reference books:

1. Engineering Physics: Srivastava / Yadav
2. Physics for Engineers – II : Narinder Kumar
3. Introduction to Engineering Physics – II : A. S. Vasudeva
4. Engineering Physics: Satya Prakash
5. Text book of Engineering Physics – II: Gupta/Kumar
6. Engineering Physics: Uma Mukherji

List Of Experiments (Any Ten)

1. To determine the wavelength of monochromatic light by Newton's ring.
2. To determine the wavelength of monochromatic light with the help of Fresnel's biprism.
3. To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.
4. To determine the specific rotation of cane sugar solution using half shade polarimeter.
5. To determine the wavelength of spectral lines using plane transmission grating.
6. To determine the specific resistance of the material of given wire using Carey Foster'sbridge.
7. To determine the variation of magnetic field along the axis of a current carrying coil and then to estimate the radius of the coil.
8. To verify Stefan's Law by electrical method.
9. To calibrate the given ammeter and voltmeter.
10. To study the Hall Effect and determine Hall coefficient, carrier density and mobility of a given semiconductor material using Hall Effect set up.
11. To determine the energy band gap of a given semiconductor material.
12. To determine E.C.E of copper using Tangent or Helmholtz galvanometer.
13. To draw hysteresis curve of a given sample of ferromagnetic material and from this to determine magnetic susceptibility and permeability of the given specimen.
14. To determine the ballistic constant of a ballistic galvanometer.
15. To determine the viscosity of a liquid.
16. To determine refractive index of the material of prism using spectrometer.

ENGINEERING MATHEMATICS –II

Course Code (MAS-490) **Credit 4 (3-1-0)**

1. **Differential Equations:**Ordinary differential equations of first order, exact differential equations, Linear differential equations of 1st order with constant coefficients, Complementary functions and particular integrals, Simultaneous linear differential equations, Solution of second order differential equation by changing dependent and independent variables, Method of variation of parameters, Applications to engineering problems(without derivation).
2. **Series Solution & Special Functions:**Series solutions of ODE of 2nd order with variable coefficients with special emphasis to the differential of legendre and Bessel. Legendre's polynomials, bessel's functions and their properties.
3. **LaplaceTransform:**Laplace transform, Existence theorem, Laplace transform derivatives and integrals, Inverse Laplace transform, Unit-step function, Dirac Delta function, Laplace transform of periodic functions, convolution theorem Applications to solve simple linear and simultaneous differential equations.
4. **Fourier Series And Partial Differential Equations :**Periodic functions,Trignometric series, Fourier series of functions with period 2n, Eulers formulae, functions having arbitrary period, even and odd functions, change of interval, half range sine and cosine series.
   Introdution to partial differtial equations, linear partial differential equation with constant coefficients of 2nd order and their classifications, parabolic, elliptic & hyperbolic with illustrative examples.
5. **Application of Partial Differential Equations**
   Method of separation of variables for solving partial differential equation, Wave equation up to two dimension, Laplace equation in two dimension, Heat conduction equations up to two dimension, Equation of transmission Lines.

References:

1. E. Kreyszig: Advanced Engineering Mathematics, Wiley Eastern Ltd.
2. B.S Grewal: Higher Engineering Mathematics, Khanna Publishers.
3. Jaggi & Mathur: Advanced Engineering Mathematics, Khanna Publishers.
4. C. Prasad: Advanced Mathematics for Engineers, Prasad Mudranalaya.

COMPUTER AND LANGUAGES

Course Code (CSIT-401) **Credit 4 (2-0-2)**

- Computer hardware components and their functions
- Basic operating system concepts
- MS-DOS and getting to know DOS commands
- Familiarizing with WINDOWS environment
- Getting started with UNIX

6 Files and Directories and their use in different Operating System Environments
7 Getting to know different editors like edit & vi
8 Introduction to Internet
9 Getting familiar with Web Browsers like Netscape Navigator & Internet Explorer
10 Sending & receiving mail over Internet
11 Introduction to PINE and /or ELM
12 Need of programming languages.
13 Language translators.
14 Introduction to "C" language
15 Data types operators and expressions.
16 Conditional & looping statements.
17 Function & Arrays.
18 Introduction to Pointers & Structures.

References:

1. DOS the complete reference by Kris Jamsa, Tata- McGraw Hill Publication.
2. UNIX POWER TOOLS by J.Peek Tim O'reilly & M. Locekides, BPB Publication.
3. The 'C' Programming Language by B.W Kernighan & D.M Ritchie, Prentice Hall of India.
4. Using LINUX- Latest Edition by Jade Tackett & David Ganter, Prentice Hall of India.

LIST OF PRACTICALS

1. Basic Internal and External DOS Commands.
2. Write a simple batch program.
3. Giving exposure to Windows environment.
4. File and program management in windows.
5. Practice of basic UNIX commands.
6. Write simple shell script.
7. Introduction to word processing.
8. Exposure to advance feature supported by some editors.
9. Net Surfing.
10. Creation and checking of E-mail account.
11. Write C program to demonstrate each of the following:
    1 Conditional statements.
    2 Looping statements.
    3 User defined functions.
    4 Arrays.
    5 Pointers and structures.
12. Familiarizing mail account using PINE, deleting, creating folder/mail-messages, adding signature, creating director of addresses.

Note: List may be modified according to new software available.

WORKSHOP PRACTICE & TECHNOLOGY

Course Code (ME-304) **CREDIT 4 (2-0-2)**

I. Introduction to tools – application of tools used in different shops
   1. Carpentry – Classification of tools – marking and measuring – holding and supporting- planning – cutting – boring – striking – miscellaneous – etc.
   2. Fitting shop – Marking & measuring , holding , cutting tools etc.
   3. Smithy – holding and supporting tools, cutting tools , striking tools
   4. Sheet metal
   5. Welding

II. Properities of metals – strength , elasticity , plasticity, Malleability , hardness , brittleness etc.

III. Timber – Introduction – selection of timbers – seasoning of timbers – timber defects

IV. Brief introduction to joining process – Nuts & bolts – screw – Screws – rivets & riveting -welding – electric arc – gas welding – TIG – MIG welding – threads

V. Extruction – Classification – process geometry- Geometrical realitionship – analysis of extraction- stresses – load – power – maximum reduction possible – working and application of indirect extraction – hydrostatic extraction – defects in extruded parts.

VI. Forging – classification – strip sand disc forging – process geomectry – geometrical relationship – Analysis – defects in forged products.

VII. Rolling – classification – process geometry - geometrical relationship analysis – rolling pressure & rolling separating force.

References:

1. Van Wylen G.J & Sonnlog R.E: Fundamentals of classical thermodynamics, John Wiley & Sons, Inc. NY.
2. Wark Wenneth: Thermodynamics (2nd edition), McGraw Hill book Co. NY)
3. Yadav R.: Thermodynamics and Heat Engines, Vol. I & II (SI Edition) Central Publishing House, Allahabad.
4. Yadav R.: Steam and Gas Turbines.
5. Kshitish Chandra Pal: Heat Power, Orient Longman Limited, 17, Chittranjan Avenue, Calcutta.
6. S. Rao, B.B. Parulekar: 'Energy Technology', Khanna Pub, New Delhi.
7. G.H. Ryder:" Strength of Materials".

LIST OF PRACTICALS

1. Study of boiler models- Babcock Wilcox, Lancashire and Locomotive.
2. Study of Steam engine and steam turbine models.
3. Study of 2-stroke and 4-stroke I.C.E models.
4. Study of Fiat engine and/or Diesel engine prototype.
5. Study of vapour compression Refrigeration unit tutor/refrigerator.
6. Study of a window type air conditioner.

7. To conduct the tensile test on a UTM and determine ultimate Tensile strength, percentage elongation for a steel.

ENGINEERING GRAPHICS II

Course Code (ME-401) **Credit 2 (0-0-2)**

1. **Introduction:** Graphic language, Classification of drawings, Principles of drawing: IS codes for Machine drawing, Lines, Sections, Dimensioning, Standard abbreviation**.**
2. **Orthographic Projections:** Principles of first and third angle projections, drawing and sketching of machine elements in orthographic projections, spacing of views.
3. **Screwed (Threaded) Fasteners:** Introduction, Screw thread nomenclature, Forms of threads, Thread series, Thread designation. Representation of threads, Bolted joints, Locking arrangements for nuts, Foundation bolts.
4. **Keys and Cotters:** Keys, Cotter joints.
5. **Shaft Couplings:** Introduction, Rigid and flexible coupling.
6. **Riveted Joints:** Introduction, Rivets and riveting, Rivet heads, Classification of riveted joints.
7. **Assembly Drawing:** Introduction, Engine parts, Stuffing box etc.
8. **Free Hand Sketching:** Need for free hand sketching, Free hand sketching of some threaded fasteners and simple machine components.

References:

1. N. Siddeshwar, P. Kannaiah, V.V.S Shastri: Machine Drawing, TMH, New Delhi.
2. K.L Narayana, P. Kannaiah, K. VenkatReddy: Machine Drawing, New Age International Publications, 2nd edition.
3. Engineering drawing practice for schools and colleges, SP 46-1998(BIS).

ELECTRICAL ENGINEERING

Course Code (EE-302) **Credit 4 (3-0-1)**

1. **Sinusoidal Steady State Circuit Analysis:**Voltage, Current, Sinusoidal & Phasor representation.1-Phase A.C. Circuit-behavior of resistance, Inductance and Capacitance and their combinations, impedance, concept of power, power factor, series & parallel resonance-bandwidth and quality factor.
2. **Network Theory:**Introduction to basic physical laws, Network theory: Superposition, Thevenin, Norton, Maximum Power transfer theorems, Star-delta transformation, Circuit theory Concepts: Mesh and Nodal analysis.
3. **Three Phase Supply:**Star/delta connections, line and phase voltage/current relations, Three-phase power and its measurement.
4. **Basic Instruments:**Instruments for measurement of voltage, Current, power and energy: Construction, principle and application.

5. **Magnetic Circuit and Transformer:**Magnetic circuit concept, theory and working principle of single-phase transformer.
6. **Rotating Machines:**Principles of energy conversion, Basic concepts of rotating machines, DC machines, Different types and their characteristics & applications. Elementary idea of operation of synchronous and induction machines. Single-phase induction & stepper motors, Applications.
7. **Power Systems:**Introduction, Elements, Line diagram, Supply systems, Power factor improvement.

Reference:

1. V. Del Toro/ Principles of Electrical Engineering/ PHI.
2. W.H Hayt & J.E Kennedy/ Engineering Circuit Analysis/ McGraw Hill.
3. I.J Nagrath/ Basic Electrical Engineering/ Tata McGraw Hill.
4. A.E Fitzgerald/ Electronic Instruments & Measurement Techniques/ PHI.
5. Higginbotham L.Grabel/Basic Electrical Engineering/ McGraw Hill.

LIST OF PRACTICALS

A minimum of 10 experiments from the following**:**

1. Verification of Thevenin's Theorem.
2. Verification of Superposition Theorem.
3. Verification of Norton's Theorem
4. Verification of Kirchoff's Law.
5. To measure the value of impedance and power factor in RLC series A.C. circuit.
6. To measure the value of impedance and power factor in RLC parallel A.C. circuit.
7. To study resonance by frequency variation in series RLC circuit.
8. To calibrate the given energy meter with the help of a standard wattmeter.
9. To find the relation between line current and phase current and line voltage and phase voltage in Star – Delta connections.
10. To perform open circuit and short circuit test and draw the equivalent circuit of a single-phase transformer.
11. To measure three phase power by two-wattmeter method.
12. To draw the magnetizing characteristic of a single-phase transformer.

Additional experiments may be added based on contents of syllabi.

ENGINEERING MATHEMATICS III

Course Code (MAS-590) **Credit 4 (3-1-0)**

1. **Integral Transforms:**Fourier integral, Fourier complex transform, Fourier sine and cosine transforms and application to simple heat transfer equations. Z transform and its application to solve difference equations**.**

2. **Functions of a Complex Variable-I:**Analytic functions, Cauchy-Riemann quations and Harmonic functions, Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula derivatives of analytic functions, Liouvilles Theorem, Fundamental theorem of algebra**.**
3. **Functions of a Complex Variable-II:**Representation of a function by power series, Taylor's series and Laurent's Series, Poles, Singularities and zeroes. Residue theorem, evaluation of real integrals of type $\int f(\cos\theta,\sin\theta)d\theta$ AND $\int$,Conformal mapping and bilinear transformations.
4. **Probability and Statistics:**Moments, Moment generating functions, skewness, kurtosis, Binomial distribution, normal distribution and poission distribution, correlation and regression.
5. **Solution Of Equations And Curve Fitting:**Solution of cubic and bi-quadratic equations. Method of least squares and curve fitting.

References:

1. Kreyzig, E. (1993): Advanced Engg. Mathematics 7th Edition, John Willey & Sons inc.
2. Paopoulis: Signal Analysis 3rd Edition (1998) McGraw Hill
3. Engineering Mathematics Volume II
4. By H.K.Das.
5. Publication: S.CHAND
6. H.K. Das, Engineering Mathematics.
7. Vijai Shankar Verma & Sanjeev Kumar, Engineering Mathematics.
8. Rakesh Dubey, Engineering Mathematics

NETWORKS AND SYSTEMS

Course Code (EE-401) **Credit 5 (3-1-1)**

1. **Introduction to Graph theory:** Definitions, graph, tree, spanning tree, walk, Trail path, loop, co-tree, basic cut-set and Loop and cut set matrices for planar networks, loop and nodal method of analysis.
2. **Introduction to continuous time signals and systems:**Basic continuous time signals, unit step, ramp and impulse, differential equation Formulation for linear-time-invariant (LTI) continuous time systems.
3. Review of Laplace transform (LT), initial value and final value theorem, properties and solution of differential equations using LT, waveform synthesis and LT of complex waveforms, concept of transform impedance.
4. **Network theorems:** Principle of superposition, Tellegen's Theorem, Thevenin, Norton, Millman, Maximum power transfer, Block diagram representation of LTI continuous – time networks and systems, Time- domain analysis of LTI network using Laplace's transform (transient and steady state), Relation between impulse response and system function.
5. Concept of poles and zeros, relation between location of poles, Time-response and Stability, Frequency response and Bode plots, interrelation between frequency response and time response, Convolution integral.

6. Two port networks, two-port parameters, inter-conversion of 2-port parameters, network functions: driving point and transfer, interconnections of 2 port networks, reciprocity, ladder networks, image impedance, characteristic impedance, T-p transformation.
7. **Positive real function:** Definition and properties, Synthesis of LC, RL and RC using Cauer's and Foster's first and second form.

References:

1. M.E Van Valkenburg, 'Network Analysis', Prentice Hall.
2. M.E Van Valkenburg, 'Network Synthesis', Prentice Hall.
3. W.H Hayt & Jack E. Kemmerly, 'Engineering Circuit Analysis', TMH.
4. Sudhakar, Circuit and Networks, TMH.
5. D. Roychowdhary, Network and Systems, New Age International.

List of Experiments

Minimum eight experiments from the following:

1. Verification of principle of Superposition with dc & ac sources.
2. Cross verification of Thevenin, Norton, Maximum power transfer theorem in ac. Input power consumption must be measured.
3. Verification of Tellegen's Theorem for two networks of same topology.
4. Transient response of RC circuits.
5. Transient response of RLC circuits.
6. Frequency response of RLC circuits.
7. Determination of two port z- and h- parameters (dc only) and computation of other parameters.
8. Determination of z- parameters of a T-network and computation and realization of corresponding □-network.
9. Verification of parameter properties in inter-connected two port networks: series, parallel and cascade (loading effect in cascade).
10. Frequency response of Twin-T notch filter.

SOLID STATE DEVICES AND CIRCUITS

Course Code (ECE- 401) **Credits 5 (3-1-1)**

1. Study of unregulated power supplies: Review of Half and Full Wave bridge Rectifiers With capacitor & L-C filters, Bleeder resistance, Ripple factor, Diode rating.
2. Ebers-moll model, Cut off, Active and Saturation region of transistor. Review of transistor biasing: Stability analysis of biasing, Thermal runaway.
3. Field effect transistor: Construction of JFET and MOSFET (Enhancement and depletion), characteristics, circuit symbols, biasing, FET as a Resistance, Small signal model, and FET amplifiers

4. Multistage amplifier, Effect of coupling and Bypass capacitors, Emitter follower at Low Frequency, Darlington connection, Source follower, Cascade amplifier, Bootstrapping. Power Amplifier: Single ended and Push-Pull amplifiers, Class B, Class AB and Class C Power amplifiers, Transformer coupling and Capacitor coupling, Conversion efficiency, Power considerations and heat sinks.

5. Small signal model: hybrid-p model, Frequency response of a transistor amplifier, Gain bandwidth product, Concept of f_a, f_T and f_b. Wideband amplifier: Compensation techniques, Cascode amplifiers, Introduction to tuned amplifiers.

6. Feed Back Amplifiers and Oscillators: Principles of feedback in amplifiers, Advantage of Negative feed back. Classification of feedback: Voltage-series, Voltage-shunt, Current- Series, Current-Shunt, Effect of feedback on input and output Impedance, Gain, Stability, Noise, Distortion and Bandwidth. Barkhausen criterion for sinusoidal Oscillators, Phase shift oscillators, Wein bridge oscillators, Hartley and Colpitts oscillators, Crystal oscillators, Frequency stability.

References:

1. J. Millman and A. Grabel / Microelectronics / TMH.
2. R.L. Boylestad & L. Nashelsky / Electronics Devices & Circuit Theory / Prentice Hall.
3. J. Millman & Halkias / Integrated Electronics / TMH.

List of experiments:

Any eight experiments from the following list:

1. Study of CRO and multimeter applications.
2. Diode clipping circuits, clamping circuits, Zener Shunt regulator.
3. Study of a single stage RC-coupled BJT amplifier (frequency response, max. signal handling capacity, input impedance).
4. Study of a single stage RC-coupled FET amplifier (frequency response, max. signal handling capacity, input impedance).
5. Study of A/AB/B push-pull amplifier.
6. Study of tuned amplifier and construction of oscillators.
7. Realization of fixed frequency Wein-bridge oscillator.
8. To realize emitter follower amplifier using Darlington pairs transistor and find the input impedance.
9. Application of Operational Amplifiers as summer, difference amplifiers and integrators.
10. Op-Amp used as instrumentation amplifier.
11. Realization of various combinational digital circuits.
12. Realization of flip-flops and counters.

SWITCHING THEORY AND LOGIC DESIGN

Course Code (ECE-402) **Credit 3 (2-1-0)**

1. Number system: Representation of negative number, 9's and 1's complement, 10's and 2's complement, arithmetic using 2's complement, floating point representation: range, resolutions, normalization, representation of zero, unused codes, parity bit & error-detection and correction code, character codes (ASCII, EBCDIC).

2. **Minimization Techniques:**Minimizations of Boolean functions having don't care entries, minimization using tabular method.
3. **Combination Circuits Design:**Adders: serial and parallel, magnitude comparator, decoder, multiplexers and applications, hazards and its avoidance.
4. **Introduction to sequential logic:** Concept of history sensitive circuits and feedback, flip flops: RS, D, T, JK race around condition, master slave flip flops. Analysis of clocked sequential circuits, distinction between asynchronous and synchronous circuits. Design of Synchronous circuits: state transition diagram, forming of universal map, excitation tables for flip flops, design using minimization techniques, handling entry into undesired states, power on reset.
5. **Design of asynchronous sequential circuits:** Fundamental mode circuits synthesis using flow tables, excitation tables and output tables, races (critical and non-critical) and cycles and its avoidance.

References:

1.M. Morris Mano, 'Digital Design', Prentice Hall.
2.Zvi Kohavi, 'Switching & Finite Automata Theory', Prentice Hall.
3.A.S Tannenbaun, 'Structured computer organization', Prentice Hall (For negative number representation of Sl. No. 1).
4.R.P Jain, 'Modern Digital Electronics, TMH.

ELECTRONIC MEASUREMENT & INSTRUMENTATION

Course Code (ECE-404) **Credit 5 (3-1-1)**

1. **Precision & Accuracy:** Errors in measurement application, AC&DC Bridges & Q –meter.
2. **Measurement Of Frequency, Phase, Time Interval:** Cathode Ray Oscilloscopes-The block diagram, compensated attenuators, Horizontal and vertical amplifiers, Synchronization, Storage oscilloscope, Measurements using CROs – Voltage, Frequency, Period, Phase etc, Oscilloscope probes, Specifications of typical CRO.
3. Measurement of distortion, Measurement of Amplifier and Receiver characteristics.
4. **Measurement & Instrumentation of Non–electrical quantities:** Active and Passive Transducers, Measurement of temperature, pressure, liquid level, humidity, flow, and IC sensors
5. **Instrumentation interface bus:** IEEE-483.
6. Telemetry and Data Acquisition System
7. **Advanced measuring instruments:** IP Display devices (CRT, LED, LCD), Block diagram & Application of Recorders. Spectrum analyzer, Network analyzer, Storage Oscilloscope. Measurement of frequency and Time, Universal frequency counter and modes of measurement, Automatic time and Frequency Scaling, Digital Clock, Digital RF Frequency measurement, Phase meter, Energy meter.

References:

1. Cooper / Modern Electronic Instrumentation & Measurement Technique./PHI
2. E.O. Doeblin /Measurement Systems/McGraw Hill
3. C.S. Rangan, G.R. Sharma, V.S.V. Mani/ Instrumentation Devices and Systems/ TMH
4. Oliver and J.M. Cage/ Electronic Measurement and Instrumentation/ McGraw Hill.

List of Experiments:

1. Study of Spectrum Analyser.
2. Study of CRO.
3. Study of Q-meter.
4. Measurement of temperature using RTD.
5. Measurement of temperature using Thermocouple.
6. Measurement of Water Level.
7. Measurement of Pressure.
8. Instrumentation Amplifier; Design for gain for verification of CMRR.
9. Study of Network Analyzer.
10. Study of LVDT.
11. Study of Strain Gauge.
12. Study of Digital Storage Oscilloscope.
13. Study of Frequency Counters.

ENVIRONMENTAL STUDIES-1

Course Code: ENV-415 **Credit 2(1 – 1- 0)**

1: The Multidisciplinary Nature of Environmental Studies.
Definition,Scope and Importance.

(i) Ecosystems.
Concept of an Ecosystem.
Structure and function of an Ecosystem.

Producers,consumers and decomposers.
Energy flow in he ecosystem.
Ecological successsion.
Food chains,food webs and ecological pyramids.
Introduction,types,Characteristics features,structures and function of the following ecosystem:
(a) Forest Ecosystem.
(b) Grassland Ecosystem.
(c) Desert Ecosystem.
(d) Aquatic Ecosystem (Ponds,streams,lakes,rivers,oceans,estuaries).

(ii) Social Issues and the Environment

From unsustainable to sustainable development.
Urban problems related to energy.
Water conservation, rain water harvesting, water shed management.
Resettlement and rehabilitation of people; its problems and concerns case studies.
Environmental ethics: Issues and possible solutions.
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies
Wasteland reclamation.
Consumerism and waste products.
Environment Protection act.
Air (Prevention and Control of Pollution) Act
Visit to local polluted site-Urban/Rural/industrial/Agricultural.
Study of Common plants, insects, birds.
Study of simple ecosystems-ponds, river. Hillslopes etc(Field work equal to 5 lecture hours).
Issues involved in enforcement of environmental legislation; public awareness.

List Of Experiments:

(1)Visit to different polluted sites to assess their effect on pollution, monitoring of pollutant in ecosystem.
(2)Study of simple ecosystem-ponds, rivers, Hill slopes.
(3)Study of common plant, insects,(Herbarium file/insect box)
(4)Visit of local polluted site-Urban/Rural/Agricultural/Industrial
(5)To study the different purification of industrial effluents and wastes.

MICROPROCESSORS & APPLICATIONS

Course Code (ECE-405) **Credit 5 (3-1-1)**

1. **Introduction to Microprocessors:** Evolution of microprocessors, Register structure, ALU, BUS, organization, Time and control.
2. **Architectures of 16- bit Microprocessors:** Introduction of Internal organization of 8086. Bus, Interface unit, execution unit, register organization, Sequential memory organization, Bus cycle.
3. **Assembly Language Programming:** Addressing modes, data transfer instructions, Arithmetic and logic instructions, Program controlled instruction (jump and conditional jump, subroutine call) loop and string instructions, Assembler, Directives, parameter Passing and recursive procedure.
4. **CPU Module Design:** Signal description of pins of 8086 and 8088, Clock generation, Address and data bus,Demultiplexing, Buffering, Memory organization, Read and write cycle timing, Interrupt structure, Minimum mode CPU module, Maximum mode operation (coprocessors configuration) features of numeric processors (8087).
5. **Memory Interfacing:**Types of memory RAM, ROM, interfacing with timing considerations, DRAM interfacing, Trouble shooting of memory module.
6. **Basic I/O Interfacing:**Programmed I/O interrupt, driven I/O, DMA, Parallel I/O (8255- PPI Centronics Parallel port and serial I/O (8251 /8250, RS –232

standard), 8289, Programmable interrupt controller, 8237 DMA controller, 8253/8254 – programmable timer counter, A/D & D/A conversion.

7. **Advanced Microprocessors and Micro controller:** Multi-user, multitasking, OS concept, Intel 86, Pentium I, II, III, IV, processors, Motorola 68xxx processors, Micro controllers (8051/8751 based design, 80186, direction).

References:

1. Plicationanyala/ Micro controller.
2. Hall D.V / Microprocessors And Interfacing /TMH.
3. Brey Barry/ Intel Microprocessors /PHI /Rafique Uzzman And AP.
4. B.P.Singh/ Microprocessor Interfacing & Application/ New Age International.
5. B.P.Singh /Advance Microprocessor & Micro controllers/ New Age International.
6. R.S. Gaonkar/ Microprocessr Architecture, Programming & Interfacing With 8085/Wiley Eastern Ltd

List of Experiments:

8086 Based Experiments:

1. Familiarization with the kit.
2. Recursive routine for finding factorial N.
3. Signed multiplication.
4. Arrangement of a string of numbers in ascending /descending order.
5. Addition of two numbers using 8086.
6. Subtraction of two numbers using 8086.
7. Interfacing with 8255 in I/O mode/BJR mode.
8. Interfacing with 8253.
9. Interfacing with ADC/DAC.
10. Interfacing with stepper motor.
11. Interfacing with traffic light controller.

ELECTRICAL ENGINEERING MATERIALS

Course Code (EE-404) **Credit 3 (2-1-0)**

1. **Crystal Structure of Materials**
   Atomic bonding, crystallinity, Miller Indices, X- ray crystallography, structural imperfections, crystal growth.
2. **Conductivity of Metals**
   Free electron theory of metals, factors affecting electric conductivity of metals, thermal conductivity of metals, heat developed in current carrying conductors, thermoelectric effect, super conductivity.
3. **Dielectric Properties of Materials**
   Polarization mechanism and dielectric constant, Behavior of polarization under impulse and frequency switching, Dielectric loss, Spontaneous Polarization, Piezoelectric effect.
4. **Magnetic Properties of Materials**

Origin of permanent magnetic dipoles in materials, classification, diamagnetism, paramagnetism, ferromagnetism, anti-ferromagnetism and ferrimagnetism, magnetostriction.

5. Mechanism Of Conduction In Semiconductor

Energy band theory, Classification of materials using energy band theory, Hall effect, Drift and Diffusion currents, continuity equation, P-N diode, volt-amp equation and its temperature dependence.

6. Electrical Engineering Materials

Properties and applications of electrical conducting, semiconducting, insulating and magnetic materials.

References:

1. A.J Dekker, "Electrical Engineering Materials", Prentice Hall of India, India.
2. C.S Indulkar & S. Thiruvengadam, "An Introduction to Electrical Engineering Materials", S. Chand & Co. India.
3. R.K Rajput, "Electrical Engineering Materials", Laxmi Publications, India.
4. Ian P. Hones, "Material Science for Electrical & Electronics Engineers", Oxford University Press.

ELECTROMAGNETIC THEORY

Course Code (EE-406) **Credit 4 (3-1-0)**

1.ElectromagneticTheory: Review of scalar and vector field, Dot and Cross products, Other coordinates- cylindrical, spherical etc., Vector representation of surfaces, physical interpretation of gradient divergence and curl, Gauss' law, Stoke's Theorem, different coordinate systems.

2. Electrostatic Fields: Electric field due to point-charges, Electrostatic potential, Solution of Laplace and Poisson's equation in one dimension, M method of images applied to plain boundaries, Electric flux density, Boundary conditions, Capacitance, Electrostatic energy.

3. Magneto-static Fields: Ampere's law of force, Magnetic flux density, Ampere's circuital law, Boundary conditions, Faraday's law, Energy stored in magnetic fields.

4. Time Varying Fields: Continuity equation, Displacement current, Maxwell's equation, Boundary conditions, Plane wave equation and its solution in conducting and non-conducting media, Phasor notation, Phase velocity, Group velocity, Depth of penetration, Conductors and dielectrics, Impedance of conducting medium. Polarization, Reflection and refraction of plane waves at plane boundaries, Poynting vectors and Poynting theorem.

5. Transmission Lines: Transmission line equations, Characteristic impedance, Distortion-less lines. Input impedance of a loss less line, Open and Short circuited lines, Standing wave and reflection losses, Impedance matching, Application of smith chart.

References:

1. Electromagnetics- J.F.D Kraus.

2. Electromagnetic Waves and Radiating System- E.C Jordan, D.G Balmein.
3. Electromagnetics- Hayt.
4. Electromagnetics- J.D Kraus, R.C Keith.

ELECTRICAL MACHINES

Course Code (EE-402) **Credit 4(3-0-1)**

1. **D.C Machines:**Constructional features and principles of operation of shunt, series and compound generators and motors including EMF equation and armature reaction, Performance characteristics of generators and motors, starting, Speed control and breaking of motors. Two Quadrant and Four Quadrant operation of motors, choice of dc motors for different applications, Losses and efficiency.

2. **Transformers:**Construction, EMF equation, Principle of operation, Phasor diagram on no-load, effect of load, equivalent circuit, Voltage regulation, Losses and efficiency, Tests on transformers, Prediction of efficiency and regulation, Autotransformers, Instrument transformers, Three phase transformers.

3. **Induction Motors;**Rotating magnetic fields, Principle of operation, Equivalent circuit, Torque-slip characteristics, Starters for cage and wound rotor type induction motors, Speed control and breaking, Single phase induction motors and methods of starting.

4. **Synchronous Machines:**Construction, EMF equation, Effect of pitch and distribution, Armature reaction and determination of regulation of synchronous generators, Principle of motor operation, effect of excitation on line currents (V-curves), methods of synchronization, typical applications of AC motors in industries.

References:

1. Hughes Edward, Electrical Technology, Addision Wesley Longman Ltd.
2. Nagrath I.J & Kothari D.P, Electrical Machines, TMH.
3. Cotton H., Advanced Electrical Technology, Wheeler & Co.
4. Fitzgerald, Kingsley, Kusko, Dumas-Electrical Machines, TMH.
5. Kosow L.L, Electrical Machinery and Transformers, PHI.
6. Parker Smith, Electrical Engineering Problems, CBS.
7. B.R. Gupta , Electrical Machines.
8. J.B. Gupta, Electrical Machines.

List of Experiments:

Minimum Eight Experiments are to be performed from the following:

1. To obtain Magnetization characteristics of a D.C shunt generator.
2. To obtain Load Characteristics of a D.C component generator.

3. To obtain Load Characteristics of a D.C series generator.
4. To obtain Load Characteristics of a D.C shunt generator.
5. To obtain speed torque characteristics of a D.C shunt motor.
6. To obtain efficiency & regulation of a 1-phase transformer by Sympner's (Back to Back) test.
7. To perform No load test & blocked rotor test on a 3-phase induction motor & determine its efficiency.
8. To perform No load test & blocked rotor test on a 1-phase induction motor and determine its efficiency.
9. To perform No load test on a 3-phase induction motor and draw its performance curve.
10. To plot V curve of a synchronous motor at no load, ½ and full load.
11. To perform no load test & short circuit test on a 3-phase alternator & to find voltage regulation by synchronous impedance method at power factor of unity, 0.8 lagging & 0.8 leading.

COMPUTER BASED NUMERICAL & STATISTICAL TECHNIQUES

Course Code (MAS-491) **Credit 4 (3-1-0)**

1. **Introduction:**Errors in Numerical Computation, Mathematical Preliminaries, Errors and their Analysis, Machine Computations, Computer Software.
2. **Algebraic & Transcendental Equation:**Bisection Method, Iteration Method, Method of False Position, Rate of Convergence, Method for Complex Root, Muller's Method, Quotient Difference Method, Newton Raphson Method.
3. **Interpolation:**Introduction, Errors in Polynomial Interpolation, Finite Differences, Decision of Errors, Newton's Formulae for Interpolation, Gauss, Stirling, Bessel's, Everett's Formulae, Interpolation by Unevenly Spaced Points, Lagrange's Interpolation Formula, Divided Difference, Newton's General Interpolation Formula.
4. **Curve Fitting, Cubic Spline & Approximation:**Introduction, Method of Least Square Curve Fitting Procedures, Fitting a Straight Line, Curve Fitting by Sum of Exponentials, Data Fitting with Cubic Splines, Approximation of functions.
5. **Numerical Integration & Differentiation:**Introduction, Numerical differentiation, Numerical Integration, Trapezoidal Rule, Simpson 1/3 Rule, Simpson 3/8 Rule, Boole's and Weddle's Rule, Eular—Maclariaun Formula, Gaussian Formula, Numerical Evaluation of Singular Integrals.
6. **Statistical Computation:**Frequency Chart, Regression Analysis, Least Square Fit, Polynomial Fit, Linear & Non Linear Regression, Multiple Regressions, Statistical Quality Control Methods.

References:

1. Jain, Iyengar, Jain, "Numerical Methods for Scientific & Engineering Computation", New Age International.
2. Balaguruswamy, "Numerical Methods", TMH.
3. Sastry, "Introductory Method of Numerical Analysis", PHI.

4. Gerald & Wheatly, "Applied Numerical Analysis", Addision Wesley.
5. Probability & Statistic, Schaum Series.
6. Hulquit, "Numerical Method for Engineers & Computer Scientist", Addision Wesley.
7. Flowers, "Numerical Methods In C++", Oxford University Press.
8. Vedamurthy, "Numerical Methods", Vikas.

List of Experiments:

Write Programs in C

1. To deduce errors involved in polynomial Interpolation.
2. Algebraic and transcendental equations using Bisection, Iterative method of false position, also give rate of conversions of roots in tabular form for each of these methods.
3. To implement Bessel's functions, Newton's, Stirling, Languages.
4. To implement method of least square curve fitting.
5. Implement numerical differential using trapezoidal, Simpson 3/8 rules.

SIGNALS AND SYSTEMS

Course Code (ECE-406) **Credit 4 (3-1-0)**

1. Continuous and discrete time signals, transformation of the independent variable, continuous and discrete time systems, Basic system properties.
2. Fourier Transform, basic theorem, application to LTI networks frequency response, Fourier series representation of periodic non-sinusoidal-signals, application to analysis of LTI networks.
3. Discrete time Fourier transform: representation of aperiodic signals, Fourier transform of periodic signals, properties of discrete Fourier transform, convolution property, multiplication property, duality.
4. Time and frequency characterisation: magnitude-phase representation of Fourier transform, Frequency response of LTI systems, time domain properties of ideal frequency selective filters. Time domain & Frequency Domain Aspects of non-ideal filters, first order and second order continuous and discrete time systems.
5. Random variables & Process: Random variable, random process, correlation function (auto & cross), cumulative distribution function, probability density function, joint cumulative & distribution and probability density.
6. Sampling: Sampling theorem, reconstruction of signals from samples, effect of under sampling, discrete time processing of continuous time signals.
7. Introduction to Z-transforms: Convergence, inverse, properties of z-transform (linearity, time shifting, scaling, reversal, expansion, conjugation, convolution, differentiation in z-domain, initial value theorem), analysis and characterization of LTI systems.

References:

1. A.V Oppenheim, A.S Willsky and S.H Nawab, "Signals and Systems", Prentice Hall.

2. B.P Lathi, "Modern Analog and Digital Communication Systems", Oxford University Press, New Delhi.
3. S. Haykins, "Communication Systems", John Wiley.
4. Taub & Schilling, "Principles of Communication Systems", TMH.

OBJECT ORIENTED PROGRAMMING

Course Code (CSIT-415) **Credit 4(2-1-1)**

. Overview
- Introduction
-0 Basic Concept of Object - Oriented
-1 Object - Oriented Development
-2 Object Oriented Themes
-3 Usefulness of Object Oriented Development
- **Modelling Concept**
-4 Modelling As a Design Technique
-5 The Object Modelling Technique

- **Object Modelling**
-6 Object and Classes
-7 Link and Associations
-8 Advanced Link & Association Concepts
-9 Generalization & Inheritance
-10 Grouping Constructs
. **Design Methodology**
- **Object Design**
-11 Overview Of Object Design
-12 Combining The Three Models
-13 Designing Algorithms
-14 Design Optimization
-15 Implementation of Control
-16 Adjustment of Inheritance
-17 Design Associations
-18 Object Representation
-19 Physical Packaging
-20 Documenting Design Decision
. Implementation
- **Programming Style**
-21 Object Oriented Style
-22 Reusability
-23 Extensibility
-24 Robustness
-25 Programming in the Large
- **Object oriented Languages**
-26 Translating A Design into an Implementation.
-27 Class Definition.
-28 Calling Operations.
-29 Using Inheritance.

-30Object Oriented Language Features.
-31 Survey of Object Oriented Languages.

References:

1. Object Oriented Modelling And Desig **By Rumbaugh & Michel Bhaha,**Publication: Prentice Hall India
2. Object Oriented Modelling and Design, By Benjamin & Cummins, Publication: Redwood City C.A. U.S.A.
3. Designing Object Oriented Software, By Rebecca Wirfs – Brock Publication: Prentice Hall India

OBJECT ORIENTED PROGRAMMING LAB / C++

1. Generate a series of Fibonacci numbers using construct
2. What is bit field operator? Find the output of the following program

```
Main ()
{struct a
{
category : 5;
scheme: 4;
}
cout<< size of struct (a,
}
```

3. Write a program to generate two strings.

4. Over load * operator for scalar multiplication in vectors.
5. Swap the private data of two classes using friend function.
6. Add the private data of two classes using friend function
7. Write a program to demonstrate the concept of link and association between classes & objects

ENVIRONMENTAL STUDIES-II

Course Code: ENV-416 **Credits 2(1 – 1 - 0)**

1) Natural Resources.
(a)Forest resources.
(b)Water resoures.
(c)Mineral resoures.

(d)Food resoures.
(e)Energy resoures.
(f)Land resoures.

Role of an individual in conservation of natural resoures.
Eqitable use of resoures for sustainable life style.

2) Biodiversity and its conservation.

(a) Introduction -Definition: genetic, species and ecosystem diversity.

(b) Bio geographical classification of India.

(c) Value of diversity: consumptive use, productive use, social, ethical aesthetic and option values.

(d) Biodiversity at global, National and local levels.

(e) India as mega-diversity nation.

(f) Hot-Spots of biodiversity.

(g) Threats to biodiversity: habitat loss, poaching of wild life, man-wild life conflicts.

(h) Endangered and endemic species of India.

(i) Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

3) Environment Pollution.

Definition

Causes effect and control measures of

(a) Air Pollution.

(b) Water Pollution.

(c) Soil Pollution.

(d) Marine Pollution.

(e) Noise Pollution.

(f) Thermal Pollution.

(g) Nuclear Hazard.

Solid waste Management: Causes, effect and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution.

Pollution case studies.

Disaster Management: floods, earthquake, cyclone and landslides.

List of Experiments:

(1) Identification and study of different Natural Resources.
(2) Determination of Chloride of water sample.
(3) Determination of pH of water sample.
(4) Determination of Acidity of water sample.
(5) Determination of Hardness of water sample.
(6) Determination of Alkalinity of water sample.
(7) Determination of Turbidity of water sample.
(8) Identification of different tools for measurement of Environmental pollution.

1. To show frequency chart, regression analysis, Linear Square fit and polynomial fit.

ELEMENTS OF ECONOMICS AND PRINCIPLES OF MANAGEMENT SCIENCE

Course Code (BAM-315) **CREDIT 4(3-1-0)**

Industrial Economics;

1. **Introduction:** -Nature and significance of economics, meaning of science, Engineering and technology and their relationship with economic development.

2. **Basic concept: -** The concept of demand and supply, indifference curve analysis, price effect, income effect and substitution effect.
3. **Money and banking: -** Function of money, value of money, inflation and measure to control it. Brief idea function of banking system, viz; commercial and central banking, business fluctuation.

Management:

4. **Introduction:** Definition, nature and significance of management, evaluation of management thought, contribution of Max Weber, Taylor and Fayol.
5. **Human behaviour:** Factors of individuals' behaviour, perception. Learning and personality development, inter personal relationship and group behaviour.

References:

4. Dewett, K.K./Modern Economics Theory.
5. Luthers, Fred / Organizational Behaviours.
6. Prasad L.M/ Principles of Management
7. A.W. Stonier &D.C Hergne/ A Text Book of Economics Theory /Oxford Publishing House Pvt Ltd

AUTOMATIC CONTROL SYSTEMS

Course Code (EE-510) **Credit 5 (3-1-1)**

1. **Input /Output Relationship:** Introduction to open loop and closed loop control systems Mathematical representation of physical systems. Transfer function, Block diagram and signal flow graph. Reduction algebra, Mason gain formula.
2. **Time- Domain Analysis:**Test input signals for Transient analysis. Time domain performance criterion, Transient response of first order, Second order and higher order systems
3. **Error Analysis:** Static and dynamic error coefficients, Error criterion, Introduction to system optimization.
4. **Frequency –Domain Analysis:** Polar and inverse polar plots, bode plots, Frequency domain specification. Relative stability gain margin and phase margin correlation with time domain, M & N circles.
5. **Stability Theory:** Concept of stability theory asymptotic and conditional stability, Routh-Hurwitz criterion, Nyquist stability criterion, Liapunov's direct method, root locus plots.
6. **Compensation Techniques:** Concepts, Lag, Lead and lag lead network, Design of closed loop system using compensation techniques.
7. **stable variable analysis:** Introduction, State space representation , State modes of linear systems, State equations, transfer matrices, diagonalization solution of state equations, controllability, effect of pole zero cancellation in transfer function.
8. **Advances in Control Systems**: Basic Introduction to Neural Networks and Fuzzy logic control.

References:

1. KUO B.C/ Automatic Control System /PHI.

2. Ogata K. / Modern Control Engineering /PHI.
3. Nagrath I.J. & Gopal M./ Control System Engineering./NAI.
4. Siljack D.D/ nonlinear system.
5. S.N.Sivanandam/ Control System Engineering /Vikas Publishing House Pvt. Ltd
6. B.S. Manke / Linear Control System / Khanna Publishers.

List of Experiments:

Minimum 8 experiments are to be performed from the following.

1.To study and determine speed- torque characteristics of an A.C servomotor.
2.To study servo voltage stabilizer using load bank.
3.To study synchro-transmitter and receiver and obtain output V/S input characteristics.
4.Determine 1st order and 2nd order system response using linear simulator unit and compare the theoretical and practical and practical results (with variation of 'K').
5.To study P, PI and PID Temperature controller for an oven and compare their results.
6.To design the compensator (Lag, Lead and Lead- lag, network) using frequency response (Bode Plot).
7.To study D.C Position controller system.
8.To study and calibrate the temperature using resistance temperature detector (RTD).
9.To study of PID Controller for simulation process like transportation lag.
10. To study the behavior of D.C separated excited motor at open loop and closed loop conditions with variation of load.

ANALOG COMMUNICATION SYSTEM

Course Code (ECE-501) **Credits 5(3-1-1)**

1. Elements of communication system and its fundamentals, Limitations, Modulation, benefits and applications.
2. **Noise:**External and internal sources of Noise, Thermal noise, voltage and current model for noisy resistor, Calculation of thermal noise in R-C circuits. Shot noise, Noise temperature, Equivalent Noise Bandwidth, Calculation of Noise figure for cascaded networks, and Experimental determination of noise figure.
3. **Amplitude (Linear) Modulation:** Base band and carrier communication, Generation and detection of VSB, DSB and SSB. Carrier Acquisition AM Transmitter and Receiver, Receiver Characteristics,software defined radio.
4. **Angle (Exponential) Modulation:** Types of Angle Modulations, Concept of Instantaneous Frequency, Wideband and Narrowband FM; Generation And Detection of FM, Generation and Detection of PM.
5. **Noise performance of C.W. modulation system:** Noise in DSB-SC, SSB-SC & AM System, Noise in FM and PM, FM threshold and its extension, Pre-emphasis & De-emphasis in FM.

References:

1. Communication System (IV Edition): S.Haykin, John Wiley & Sons
2. Communication Systems: A.B. Carlson, McGraw-Hill.
3. Modern Analog And Digital Communication Systems: B.Lathi, Oxford Univ.Press.
4. Communication Systems: Taub & Schilling, TMH.

List of Experiments

1. To study amplitude modulation using a transistor & determine depth of modulation.
2. To study envelope detector for demodulation of AM signal and observe diagonal peak clipping effect.
3. Frequency modulation using voltage controlled oscillator.
4. Generation of DSB-SC signal using balanced modulator.
5. Generation of single side band signal.
6. Study of PLL and detection of FM signal using PLL.
7. Measurement of noise figure using noise generator.
8. Study of Superheterodyne AM receiver & measurement of sensitivity, selectivity and fidelity.
9. Characteristic Impedence and Propagation Constant of a coaxial transmission line.
10. Measurement of load impedence using transmission line.
11. Measurement of characteristics of at least two of the following antennas:
    1. Dipole 2. Yagi-Uda
    3. Parabolic Antenna 4. Broadside and End Fire Antenna.

ANTENNA AND WAVE PROPAGATION

Course Code (ECE-502) **Credits 4(3-1-0)**

1. **Electromagnetic Field Radiation:** Retarded potential, Radiation from an oscillating current element, Short monopole and Dipole, Half wave dipole, Radiation pattern, Power radiated, Radiation resistance.
2. **Antenna Technology:**Antenna theorems, Superposition, Reciprocity, Isotropic radiator, Directive gain, Power gain, Efficiency, Effective area, Effective length, Band Width, Beam Width & Polarization, Directional Patterns, Directivities, Effective Length, impedance of an antenna as a transmitting or a receiving antenna, Antenna impedance- lumped parameter representation, Average characteristic impedance, End effect.
3. **Antenna Arrays:**Uniform linear arrays- Broad side, End-fire, Collinear, Parasitic arrays, Binomial arrays, Pattern multiplication.
4. **Practical Antennas:** VLF, LF & MF transmitting antennas- Vertical radiator, effect of ground, Grounded Antennas, Grounding Systems, Effect of antenna height, Antenna top loading and tuning. Antenna arrays in MF band, Antenna coupling at medium frequency, Traveling wave antenna, Long wire harmonic antenna, Rhombic antenna, VHF & UHF antennas – folded dipoles, Yagi, corner reflector, Helical, Frequency independent, log–periodic antenna, Microwave antennas- parabolic reflector, Feed systems, Lens antennas.
5. **Antenna Measurements:** Impedance measurements- bridge and slotted line methods, radiation pattern measurement, gain measurement.

6. **Radio Wave Propagation:**Modes of radio wave propagation- ground wave, Sky wave & space wave, Ground wave and surface wave propagation, Propagation mechanism, Effect of earth and terrain, Sky wave or Ionospheric propagation – structure of ionosphere, Characteristic of different ionized regions, Sky wave propagation mechanism, Critical frequency, Effect of earth's magnetic field on ionospheric propagation, Virtual height, Maximum usable frequency, Skip distances, Optimum working frequency, Ionosphere abnormal noise precipitation, Static, Fading, multi-wave propagation. Space wave propagation – range, Effect of earth's curvature on tropospheric propagation, Duct propagation.

Reference:

1. Jordan Edwards and Balmain Keith / Electromagnetic Waves and Radiating Systems, PHI.
2. William H. Hayt Jr / Engineering Electromagnetic.
3. J.D. Krauss/ Antennas.
4. K.D. Prassad / Antennas and Wave Propagation.
5. Rajeswari Chatterjee / Antenna Theory & Practices.
6. R.Collin /Antennas & Radio Propogation.

ELECTRONIC SWITCHING

Course Code (ECE-503) **Credits 4 (3-1-0)**

1. **Introduction:**
   Message switching, circuits switching, functions of a switching system, register-translator-senders, distribution frames, crossbar switch, a general trunking, electronic switching, Reed electronic system, digital switching systems.
2. **Digital switching:**
   Switching functions, space division switching, multiple stage switching, nonblocking switches, blocking probabilities, Lee graphs and Jacobaeus, foulded four wire switches, path dinding, switch matrix control; Time division switching, analog and digital time division switching, a digital memory switch, time stage in general, two dimensional switching, implementation complexity of TD switches, multiple stage time and space switching, STS switching , TST switching, TSSST switches, No.4 ESS Toll switch, System 75 digital PBX, Digital cross connect systems, Consolidation and segregation, DCS hierarchy, integrated cross connect equipment, digital switching in analog environment, zero loss switching.
3. **Telecom Traffic Engineering:**
   Network traffic load and parameters, grade of service and blocking probability, modeling switching systems, Markov processes, birth-death processes, incoming traffic and service time characteristics, Poisson arrival process, holding time of calls, blocking models and loss estimates, lost calls cleared systems with infinite and finite subscribers, lost calls returned systems and lost calls held system, Delay systems and Erlang C formula
4. **Control of Switching Systems:**

Call processing functions, sequence of operations, signal exchanges, state transition diagrams; common control, Reliability availability and security; Stored program control, processor architecture, centralized

SPC, distributed SPC, Level3, Level2 and Level-1 processing, SPC software, system software and Language processor, SDL, application software.

5. **Signalling :**
   Customer line signalling, AF junctions and trunk circuits, outband and inband signalling, PCM and inter register signalling, Common channel signaling, general principles and network, CCITT signaling system No. 6 and 7, HDLC protocol, Signal units, the signaling information field
6. **Packet Switching:**
   Packets formats, statistical multiplexing, routing control, dynamic, virtual path circuit and fixed path routing, flow control, X.25 protocol, frame relay, TCP/IP, ATM cell, ATM service categories, ATM switching , ATM memory switch, space memory switch, memory-space, memory-space-memory switch, Banyan network switch.

Text / Reference Books:

1. Telecommunication switching System and networks, Thiagarajan Viswanathan, PHI.
2. Telecommunication switching, Traffic and Networks, J.E. Flood, Pearson education.
3. Digital Telephony, J.C. Bellamy, John Wiley, 3rd ed.
4. Principles of Communication Systems, Taub and Schilling, TMH

ELECTRONIC CIRCUIT DESIGN

Course Code (ECE-504) **Credits 5 (3-1-1)**

1. Eber's MoLL equation & its application

2. Two transistor amplifier stages (CC-CE, CC-CC and Darlington configurations. Cascode configuration). Large and small signal behavior of Emitter-coupled and source- coupled Paris (used in differential amplifier).

3. Transistor current sources (simple current source, Widlan & Wilson current source) current source & Active locals. Level shifting, bias considerations.

4. CE, CB & Emitter follower as output stages, Analysis of Monolithic OP AMPS. Design Considerations, Effect of bias current and input offset, band width and slewrate.

5. Differentiate amplifiers : CMRR, Operational amplifiers, Application of OP AMP circuits: Summer Integrator, current converter instrumentation amplifier, non linear OP-AMP circuits, precisom rectifier linear half wave and full wave rectifier, sample and hold circuits, OP-AMP as comparator, Schmitt trigger, square and triangular wave generator log and antilog amplifiers, analog multipliers, capacitance multiplier, simulation of inductance using OP-AMP, zero crossing detector, Active filters.

6. Oscillators : Phase shift, wein bridge and tuned oscillator.

7. A/D converters & D/A converters.

8. IC 555 application monostabe and astable operation.

9. PLL: Principle, Definitors and applications.

Reference Books

1. Analysis & Design of Analog Ics.- P.R. Gray & R.G. Meyer
2. Op-amp and liner ICs - R.A. Gayakwad
3. Op-amp and liner ICs - B.R. Coughlin & F.F. Driscoll
4. Applications of Analog ICs - S. Soclof

POWER ELECTRONICS

Course Code (EE-504) **Credit 5 (3-1-1)**

1. **Power Converter Components:**Power transistor and Triac, Commutation, Thyristor, Power MOSFET, IGBT, Thyristor characteristics, rating, Protection and cooling of Thyristors, Gate circuit requirements, Single pulse and carrier frequency gating, Firing circuits based on RC, UJT, 555 and comparator circuits. Darlington and series parallel combination of Thyristors, GTO & MOSFET Basics.
2. **Controlled Rectifiers:**Cycloconverters and ac controllers, Half wave rectifier, Analysis of single phase controlled rectifiers with different types of loads, effect of transformer leakage inductance. Three phase converters and line commutated inverters. Single and three phase converters with inter phase reactors. Dual converters. Regulated D.C. power supplies using Thyristors and Triacs.
3. **Inverters:**Principle of inverters, half and full bridge single phase inverters, analysis with resistive and inductive loads, feedback diodes, Three phase inverters, McMurray – Bedford half bridge inverters, PWM inverters.
4. **Choppers:**Principle of choppers, analysis of chopper circuits, Multiquadrant choppers, parallel voltage and current commutated choppers.
5. **Solid State Speed Control of Motors:**Converter and chopper control of dc motors, control of universal motor with half wave converter and ac controller, AC motor speed control.

References:

1. M.H. Rashid / Power Electronics Circuits Devices and Applications / PHI.

2. J. Michael Jakob / Power Electronics: Principle and Applications / Vikas Publishing House.

3. Cyril W. Lauder / Power Electronics / TMH.

4. J. Vithyathil / Power Electronics: Principle and Applications / TMH.

5. P.S. Bhimbra / Power Electronics / TMH.

List of Experiments:

1. Characteristics of SCR.
2. RC trigger circuit.
3. UJT trigger circuit.
4. Series capacitor commutation.
5. Auxiliary commutation.
6. Complementary commutation.
7. Modified series inverter.
8. Parallel inverter.
9. DC chopper.
10. Phase control Circuit of DC motor.
11. Speed control of AC motor using TRIAC.
12. Speed control of DC motor.

BIOMEDICAL INSTRUMENTATION

Sub Code (ECE - 505) **Credit 4(2-1-2)**

1. INTRODUCTION TO HUMAN PHYSIOLOGICAL SYSTEMS

Cell and its structure - Electrical and mechanical activity of heart - cardiovascular system- central nervous system - respiratory system - musculo-sketetal system - digestive system - kidney.

2. ELECTRODES

Origin of resting and action potential - propagation of action potential- electrode potential - electrode impedance- equivalent circuit for extra cellular electrodes - micro electrodes- micropipette and their equivalent circuits - PH, PO2 and PCO2 electrodes.

3. MEASUREMENT OF NON-ELECTRICAL PARAMETERS

Blood flow, blood pressure, respiration rate, temperature, mean and instantaneous heart rate measurements.

4. BIOSIGNAL ACQUISITION

Special requirements of physiological signal amplifiers - various types of pre amplifiers - Isolation amplifier - Differential amplifier - Instrumentation amplifier - bridge amplifier - chopper amplifier - Biosignal analysis - signal recovery and Data acquisition.

5. BIOPOTENTIAL RECORDERS

Electro cardiography - echocardiography - vector cardiography - electro encephalography - echo encephalography - applications of ECG and EEG in various investigations - Arrythonia monitor.

6. OPERATION THEATER EQUIPMENT

Short wave Diathermy - Microwave Diathermy - ultrasonic diathermy - surgical diathermy - anaesthetic monitor - Gas analyses - PH meters, Oxymeters.

7. PHYSIOLOGICAL STIMULATORS

Cardiac pacemakers - Defibrillators - nerve and muscle stimulators - Heart valves - heart-lung machines -artificial kidney - bio telemetry.

8. RADIOTHERAPEUTIC EQUIPMENTS

Applications of X-rays in various investigations - Generation of X- rays - properties of X-rays - Diagnositic X-rays - Super voltage therapy - radiation detectors - properties of isotopes - usage of isotopes in various investigation.

9. RECENT TRENDS IN BIOMEDICAL INSTRUMENTATION

Computer analysis of ECG and EEG - computers in patient monitoring system - computers in clinical laboratories - application of lasers in various investigations - endoscopes - computer tomography - thermography - Ultrasonic imaging systems - NMR imaging - application of microprocessors in medical instrumentation, electron microscopy.

10. PATIENT-SAFETY

Micro and macro shocks - possible causes of electric shock - GFL and other measures against shock - recent trends in patient isolation.

References:

1. Khandpur R.S./Biomedical Instrumentation/TMH.
2. Tompkins/Biomedical DSP: C Language Examples and Laboratory Experiments For The IBM PC/PHI.
3. Cromwell/Biomedical Instrumentation and Measurement/PHI.

List of Experiments

1. To observe the ECG wave- forms Subject (human bodies) using different leads of standard Bipolar Configuration.
2. To study the measurement of heart rate.
3. To measure the respiration rate of human body also observe the respiratory signal wave form of various blocks of Respiratory Rate monitor.
4. To study and observe the electric potential generated by muscles an nerves using electromyography.
5. To study and observe the electric potential generated by brain using Electro-encephalograph.
6. To observe, record and study the sound generated by heart using Pho- cardiograph.
7. To observe, record and study the sound generated by lungs using Pho-cardiograph.
8. To study the abnormalities present in human Cardiovascular System is ECG Simulator.
9. To study the abnormalities present in human Respiratory System.

DIGITAL COMMUNICATION SYSTEM

Course Code (ECE-506) **Credit 5 (3-1-1)**

1. **Element of Digital Communication And Information Theory:** Model of digital communication system, logarithmic measure of information, entropy and information rate, conditional entropy and redundancy source coding, fixed and variable length code words, source-coding theorem, prefixes doing and Kraft Inequality. Shannon-Fano and Hoffman coding for 1st, 2nd, 3rd order extension, maximum entropy of continuous source (with Gaussian distribution) entropy of band limited white Gaussian noise, mutual information & channel capacity of the discrete memory less channel, calculation of channel capacity of a discrete memory less channel of BSC, of a continuous AWGN channel, Hartley Shannon law, maximum limit of channel capacity exchange of band and SNR.
2. **Sampling Theory And Pulse Modulation:** Sampling Theorem, Signal reconstruction in time domain, Practical and flat top sampling, Sampling of bandpass signal; Types of analog pulse modulation, Method of generation and Detection of PWM, PNM & PPM, Spectra of pulse modulated systems.
3. **Waveform Coding Techniques:** Discretization in time and amplitude. Linear Quantizer, Quantization noise power calculation, signal to Quantisation noise ratio, non-uniform Quantizer A law & μ law companding; encoding and pulse code modulation bandwidth of PCM, Differential Pulse Code Modulation using predictor, Delta modulation, Idling noise and slope overload, Quantization noise in DM for sinusoidal modulation, Adaptive Delta Modulation, Demodulation, Comparison of PCM and DM, MPEG audio digital signal standard
4. **Digital Multiplexing:** Fundamental of Time division multiplexing, Electronic commutator, Bit, Byte inter leaving, T1 carrier, synchronization and signalling of T1, TDM, PCM hierarchy, North -America * CCITT standards, T1 to T4 PCM TDM system (DS_1 to DS_4 signals), Signal formats of M12 Mux for AT & T (Bell) system, Bit rate calculation DS_1 to DS_4 signals.
5. **Digital Base Band Transmission:** Line coding and its properties. NRZ & RZ types, signalling format for unipolar, polar, bipolar (AMI) & Manchester coding and their power spectra (no derivation), HDB and B8ZS signalling, ISI, Nyquist criterion for zero ISI and raised cosine spectrum. Matched filter receiver, derivation of its impulse response and peak pulse signal to noise ratio, correlation detector decision threshold and error probability for binary unipolar (on – off) signalling.
6. **Digital Modulation Techniques:**Types of digital modulation, Wave forms for amplitude, Frequency and Phase shift keying. Method of generation and detection of coherent and non-coherent binary ASK, FSK & PSK, differential phase shift keying, quadrature modulation techniques, (QPSK & MSK) probability of error and comparison of various digital modulation techniques.
7. **Error Control Coding:**Error free communication over a noisy channel, hamming sphere, hamming distance and hamming bound, relation between minimum distance and error detection and correction capability, linear block codes, encoding and syndrome decoding, cyclic codes, encoder and decoders for systematic cycle codes, convolution codes, code tree and Trellis diagram, Viterbi and sequential decoding, Burst error correction, comparison of performance.

References:

1. B.P. Lathi / Modern Analog and Digital Communication / Oxford University Press.
2. Simon Haykin / Digital Communication / John Wiley & Sons.
3. Simon Haykin / Communication Systems (IV Ed) /
4. A.B. Carlson / Communication Systems / TMH.
5. Proakis, J.J. / Digital communication / McGraw Hill.

List of Experiments

1. Study of Sample and hold circuit-using Op-amp.
2. To study PAM generator and observe characteristics of both single and dual polarity pulse amplitude modulation.
3. Study of Pulse Width Modulation and demodulation.
4. Study of Pulse Position Modulation and demodulation.
5. Study of Time Division Multiplexer.
6. Study of Pulse Code Modulation and demodulation.
7. Study of Delta Modulation and demodulation and observe effect of slope overload.
8. Study pulse data coding technique for NRZ formats.
9. Data decoding technique for NRZ formats.
10. Study of amplitude shift keying modulator and demodulator.
11. Study of frequency shift keying modulator and demodulator.
12. Study of phase shift keying modulator and demodulator.
13. Single bit error detection and correction using Hamming code.
14. Simple fiber optic link fabrication using discrete components with available digital data input.

DIGITAL SIGNAL PROCESSING

Course Code (ECE-507) **Credit 5 (3-1-1)**

1. **Discrete Time Signals**: Sequences; representation of signals on orthogonal basis; Sampling and reconstruction of Signals.
2. **Discrete System**: Attributes, Z- Transform, Analysis of LSI system, Frequency analysis, Inverse systems, Discrete Fourier Transform (DFT), Fast Fourier Transform algorithm, Implementation of Discrete Time Systems.
3. **Design of FIR Digital Filters**: Window method, Park McClellan's method, and effect of finite register length in FIR filter design.
4. **Design of IIR Digital Filters**: Butterworth, Chebyshev and Elliptic Approximation; lowpass, Band pass, Band stop and High pass filters.
5. Parametric and non- parametric spectral estimation. Introduction to multirate signal processing.
6. Application of DSP to Speech and Radar Signal processing.

References:

1. A.V. Oppenhiem and Schafer / Discrete Time Signal Processing / Prentice Hall, 1989.
2. John G. Prokis and D.G. Manolakis / Digital Signal Processing: Principles, Algorithms and Applications / Prentice Hall, 1997.
3. L.R. Rabiner and B. Gold / Theory and Applications of Digital Signal Processing / Prentice Hall, 1992.
4. J.R. Johnson / Introduction to Digital Signal Processing / Prentice Hall, 1992.
5. D.J. DeFatta, J.G. Lucas and W.S. Hodgkiss / Digital Signal Processing / J Willey and Sons, Singapore, 1988.

MICROWAVE & RADAR ENGINEERING

Course Code (ECE-508) **Credit 5 (3-1-1)**

1-Measurement:
Smith Chart, Impedance matching with reactive elements, Double stub matching network, Triple stub tuner, Impedance matching with Lumped elements, Frequency, power, attenuation, phase shift, VSWR, impedance, insertion loss, dielectric constant, noise factor, Q of a cavity resonator

2-Design of complex impedance mismatch factor, Wave guide reactive elements, Quarter wave transformer, Binomial transformer, Chebyshev Transformer, Tapered transmission lines;

3-Antennas:
Review of dipole, monopoles, arrays, parasitic antenna, antenna feeding, antenna parameters and antenna measurements, Linear wire antennas, linear elements near or on plane conductor, Ground effects, Loop antennas, Polygonal and ferrite loop linear, Planner and Circular Arrays, Broadband Dipoles and matching techniques, Traveling wave and broadband Antennas, Frequency Independent Antennas and Antenna miniaturization, Reflectors and antennas ,

4-Wide band antennas, microwave antenna like horns, parabolic reflectors, slot antenna, principle of operation, construction, feeding, parameters, measurements; Micro-strip antennas: Principle of operation, methods of analysis, polarization, dual frequency micro-strip antenna, feeding methods, application of micro-strip antennas

5-Radar System :
Principle block, diagram, classification, radar range, equation, Pulsed radar system, Radar receivers, Radar modulators, Radar display, Scanning and tracking, Doppler radar, MTI Radar, Radio navigational aids

6-Microwave frequencies and Microwave applications :-
Industry (Food, Rubber, Chemical, Heating and Drying); Scientific (Satellite, Radio, Navigation, Radio Astronomy, Remove, sensing, particle Accelerators Fusion, Spectroscopy, Space Craft and Missile and echo friendly (Application); Medical (Diagnosis, Monitoring and Treatment).

Text Books :

- Pozar, Wiley Publication, "Microwave Engineering", 3rd Ed.
- McGRaw Hills, "Radar System Skolink" .
- Sisdodiya and Raghuwanshi, "Microwave Test Lab Measurment".

VLSI DESIGN & TECHNOLOGY

Course Code (ECE-509) **Credit 5 (3-1-1)**

1. Digital Design Fundamentals: Review of techniques of using a truth table, canonical forms to develop the AND/OR or OR/AND combinational circuit models, minimization techniques, Hazards and Hazard free circuits. Difference between combinational and sequential circuits. General model of sequential machine, timing and triggering considerations.
2. Basic HDL Constructs: VLSI Design flow, Overview of different modeling styles in VHDL, Data types and data objects in VHDL, Dataflow Modeling, Behavioral Modeling, using VHDL for combinational Circuits and sequential Circuits.
3. Hardware Description Language: Structural Modeling, Subprograms, Packages and Libraries, Generics, Configurations, attributes. Comparison of various Hardware Description Languages.
4. Programmable Logic Devices: Introduction to CPLDs: Function block architecture, input/output block, switch matrix, Study of architecture of CPLDs of Altera /Xilinx .
5. Introduction to FPGAs: Configurable logic block, input/output block and interconnect, Study of architecture of FPGAs of Xilinx /Actel /Altera.
6. CMOS Circuits: Different logic families, MOS Transistor, CMOS as an inverter, propagation delay, power consumption/dissipation issues, simple circuits using CMOS.
7. CMOS Processing & Digital Circuit Verification: CMOS Fabrication: Different steps of fabrication, CMOS p-well, n-Well and twin tub processes, CMOS Layout and Design rules. Simple Test Bench, Simulation and Synthesis issues, case study of ALU/ Sequence Detector.

List of Experiments:

1. Push-pull Amplifier.
2. Tuned Amplifier: Single tuned circuits using BJTs and FETs.
3. Sweep circuit Design.
4. Regulated Power Supply.
5. (i). Simulation and Layout design of NMOS & CMOS inverter.
   (ii). Simulation and Layout design of NAND gate.
   (iii). Simulation and Layout design of NOR gate.
6. Simulation and Layout design of full adder using PSPICE / LASI.
7. Develop a program for test pattern generation for full Adder using a high level language.
8. Chip design (mini project) using VHDL.

Text Books & Reference Books

- Neil H.Weste and Kamran Eshraghin, "Principles of CMOS VLSI design".
- J Bhasker,Addison Wesley," VHDL Primer" .
- Douglas Perry, TaTa McGRAW HILL," VHDL".
- William I. Fletcher "An Engineering approach to Digital Design",Prentice Hall India.
- Stephen Brown and Zvonko Vranesic,TaTa McGRAW HILL, " Fundamentals of Digital Logic with VHDL Design".
- John Yarbrough,BROOKS/COLE, "Digital Logic Applications and Design".
- Xilinx data Manual, " The Programmable Logic data Book".
- J bhasker, Addison Wesley, "A VHDL Synthesis Primer".
- Charles Roth, McGRAW HILL, "Digital System Design using VHDL".
- E.Sicard and Sonia Bendhia,TaTa McGRAW HILL," Basics of CMOS Cell Design ".
- Peter Ashenden, Harcourt Asia PTE LTD," The Designer's Guide to VHDL".
- www.actel.com
- www.altera.com
- www.xilinx.com

DATA COMMUNICATION NETWORKS

Sub Code (ECE - 601) **Credit 5(3-1-1)**

1. **Data Transmission Basics:**
   Review of digital data analog modulation and digital formats. Data rates, Baud Rates, Channel capacity, Mediums for communication. Synchronous and asynchronous data communication.
2. **ISO- OSI model and TCP/IP model of network.**
   Protocols and services. Connection oriented and connectionless services, their interpretation at different layers. Quality of services. Design issues for different layers.
3. **Data Link Layer Design Issues:**
   Services provided to network layer framing: necessity and techniques. Error control feature and review of techniques. Flow control: sliding window protocols: Go back n, Selective repeat. Example data link protocols: SLIP, PPP.
4. **Medium access sub layer in Broadcast channels**.
   ALOHAS: Analysis. CSMA protocols, collision detection. Collision free protocols: binary countdown, limited contention protocols: adaptive tree walk compromise between high load channel utilization and low load delay.
5. **LAN Standards:**
   Example of IEEE 802.3, 802.4, 802.5, 802.6 LAN/MAN Framing medium operation and MAC. 802.3 performances. Switches. Fast Ethernet, bridge. 802.2: LLC, FDDI. Wireless LAN: IEEE 802.11.
6. **Network layer:**
   Network layer services provided to transport layer. Routing algorithms: Dijskra's algorithm for shortest path, flooding flow based routing, distance vector routing, Link stat routing Hierarchical routing, Routing for mobile hosts. Congestion control: leaky bucket & token bucket algorithms,

congestion control in virtual circuit subnets: choke packets, Internetworking. Internet, IP address, IP protocol basics.

7. **Transport Layer:**
   Services provided to the upper layers Elements of transport protocols: Addressing, establishing and releasing connection, flow control & buffering, multiphasing crash recovery. TCP & UD
8. **Introduction to Network Security.**

List of Experiments:

1. Familiarization with LAN components and cabling.
2. Settings up a data communication link between two PCs using direct cable connection.
3. Using PING command, troubleshoot a TCP/IP network.
4. Design two subnets of specified sizes and form an internet work by joining them through a router or a multi-homed system acting as a router.
5. Practice various TCP/IP services (TELNET, SMTP, and FTP) on the Internet.
6. Study of synchronous Serial Communication.
7. Study of asynchronous Serial Communication.
8. Study of PC-PC Serial Communication using RS-232 cable.
9. Study of different modems in Serial Communication.
10. Study of flow controls in Serial Communication.
11. Study of protocols in Serial Communication.
12. Implementation of various network topologies (star, bus & ring).
13. Implementation of Peer to Peer network.

References:

1. Andrew Tanenbaum," Computer networks", Prentice Hall PTR.
2. D. Comer," Computer Networks and Internet/ TCP-IP"
3. Kurose/Ross, "Computer Networking: A Top-Down Approach Featuring the Internet", Addison-Wesley.
4. William Stallings," Data and computer communications", Prentice Hall.
5. William Stallings "Computer Networks", Prentice Hall.
6. Behrouz A. Forouzan "Data Communications and Networking," McGraw Hill.

OPTICAL FIBRE COMMUNICATION

SUB CODE (ECE – 602) **CREDIT 5(3-1-1)**

1. **INTRODUCTION** :Block diagram of optical fibre communication system, advantages of optical fibre communication system. **(1)**

2. OPTICAL FIBRE : Structure of optical wave guide, light propagation in optical fibre using ray theory, acceptance angle, numerical aperture, skew rays, wave theory for optical propagation, Modes in optical fibre, Step and Graded Index fibre, Single mode fibres cut-off wave length, mode field diameter, effective refractive index, group and mode delay factor. **(7)**

3. TRANSMISSION CHARACTERISTICS OF OPTICAL FIBRE : Signal degradation in optical fibre, attenuation in optical fibre, intrinsic and extrinsic absorption, linear and non-linear scattering losses, fibre bend losses, Dispersion and pulse broadening, intermodal and intramodal dispersion for step and graded index fibres, dispersion flattened and dispersion shifted fibres, modal birefringence and polarization maintaining fibres. **(5)**

4. OPTICAL SOURCES : Optical sources, LED, LASER diode, Power launching and coupling , Basic concepts of Einstein relation, population inversion, optical feedback and threshold condition, direct and indirect bandgap semiconductors, spontaneous and stimulated emission in p-n junctions, double hetero junction structure, fabrication and characteristics of LEDs and semiconductor laser diode . **(5)**

5. OPTICAL DETECTORS : Requirement for photo detectors , p-n photo diode , characteristics of photo diode , characteristics of photo detectors , p-i-n and Avlanche photo diodes , Response time and Avlanche multiplicationnoise, phototransistors & photodetectors . **(5)**

6. DIRECT DETECTION RECIEVER PERFORMANCE CONSIDERATION : Noise sourses in optical fibre communication , noise in p-n , p-i-n and APD Recievers , receiver structure . **(5)**

7. OPTICAL FIBRE COMMUNICATION SYSTEM : Pricipal components of optical fibre communication system , optical transmitter circuits LED and LASER drive circuits. Optical receiver block diagram , pre amplifier, optical fibre link design, power and rise time budgeting , Line coding block diagram and detection principal of coherent optical fibre system. **(6)**

Text / Reference Books :

Text Book

1) Optical fibre communication : John M.S Senior PHI ; 2nd ED
2) Optical fibre communication : G.E. Keiser MGH ; 3rd ED
3) Optical fibre communication : Wilson & Hawkes PHI ; 2nd ED

List of Experiments:

1. Study of the external beam parameters of a He-Ne / Semiconductor LASER.
2. Power distribution within the beam.
3. Spot size of the beam.
4. Divergence of the beam.
5. To verify Snell's law and determine the critical angle for high to low index incidence.
6. Fiber-end preparation and launching light into fibers.
7. Setting up a fiber optic analog link and to measure the bandwidth of optical link.
8. Study of attenuation and bending losses in optical fibers.
9. Measurement of numerical aperture of different optical fibers.
10. Setting up a fiber optic digital link and to determine the maximum bit rate transmitted through the link.

11. To study the characteristic of a fiber optic LED and photo detector.
12. Comparison of Led and LASER diode characteristics and hence to determine LASER diode.
13. To measure the optical loss at a bulkhead ST connector using both LED and LASER diode.
14. Determination of fiber link length and fiber attenuation coefficient.
15. Determination of bandwidth and fiber dispersions in a fiber optic communication system.
16. Manchester Coding & De-coding.
17. Design of pre-amplifier for optical signal.
18. System design- a mini theoretical project.

MICROPROCESSOR BASED INSTRUMENTATION

Course Code (ECE-603) **Credit 4(3-1-0)**

1. **Introduction:**Review of architecture & Assembly language programming of 8086, Memory Interfacing Data Transfer Techniques and their implementation.
2. **Common Peripherals And Their Interfacing:** Single chip Microcontrollers 8031 family & 8096 architecture, Instruction set and Programming.
3. **Buses:**Types of Buses IEEE 488, MULTI Bus, MIL-STD-1553 Bus centronix standard, Serial Bus Standards.
4. **Interfacing I/O Devices:**Interfacing of keyboards, Displays (Using 8279), Power devices, optical motor shaft encoders, ADCs & DACs to Microcontrollers, Microcontroller based scale.
5. **Process Control Application:** Data Acquisition, Temperature scanners, Temperature controller, flow control & level control, Signature analyzer, using a logic analyzer for troubleshooting.

References:

1. Intel Data Sheets.
2. DV hall / Microprocessor and interfacing/TMH.
3. Refiquzzaman / Microprocessor and Micro Computer based system design.
4. B.P. Singh / Advanced Microprocessor and Microcontrollers / New Age International.
5. B.P. Singh / Microprocessor Interfacing and Application/ New age International.
6. Richard A. Cox/Technician's Guide to Programmable Controller's 4th Ed. /Vikas Publishing House.

WIRELESS COMMUNICATIONS

Course Code (ECE-604) **Credit 4(3-1-0)**

1. Introduction to RF propagation, Multi - path fading mobile channel description & analysis, RF circuits & systems

2. Mobile communication concepts, Cellular engineering, Cellular concepts, Frequency allocations, Spectrum efficiency, Speech coding, Modulation/demodulation techniques, Multiple access techniques TDMA/CDMA

3. Error control coding for mobile channel, Communication applications, Capacity of cellular communication networks, Mobile communication standards.

4. Wireless data communication systems, Wireless multimedia, ATM & IP, Paging, wireless local loops.

5. Mobile satellite communication, Third generation cellular systems, GSM systems, Universal mobile telecommunication systems.

References:

1. William C.Y. Lee/Mobile Cellular Telecommunications Analog & Digital Systems/McGraw Hill.
2. Pandya/ Mobile And Personal Communication Services And System/PHI.
3. Feher/Wireless Digital Communications: Modulations & Spread Spectrum Applications/PHI.

IMAGE PROCESSING

Course Code (ECE-605) **Credit 4(3-1-0)**

1-Digital Image Processing

Elements of a Digital Image Processing system, Structure of the Human eye, Image formation and contrast sensitivity, Sampling and Quantization, Neighbours of a pixel, Distance measures, Photographic file structure and exposure, Filem characteristics, Linear scanner, Video camera, Image processing applications.

2-Image Transforms

Introduction to Fourier transform-DFT, Properties of two dimensional FT, Separability, Translation, Periodicity, Rotation, Average value, FFT algorithm, Walsh transform, Hadamard transform, Discrete Cosine transform.

3-Image Enhancement

Definition, Spatial domain methods, Frequency domain methods, Histogram modification technique, Neighborhood averaging, Media filtering, Lowpass filtering, Averaging of multiple images, Image sharpening by differentiation and high pass filtering.

4-Image Restoration

Definition, Degradation model, Discrete formulation, Circulant matrices, Block circulant matrices, Effect of diagnolization of circulant and block circulant matrices, Unconstrained and constrained restorations , Inverse filtering, Wiener filter, Restoration in spatial domain.

5-Image Encoding

Objective and subjective fidelity criteria, Basic encoding process, The mapping, The quantizer, The coder, Differential encoding, Contour encoding, Run length encoding, Image encoding relative to fidelity criterion, Differential pulse code modulation.

6-Image Analysis and Computer Vision

Typical computer vision system, Image analysis techniques, Spatial feature extraction, Amplitude and Histogram features, Transform features, Edge detection, Gradient operators, Boundary extraction, Edge linking, Boundary representation, Boundary matching, Shape representation.

References

- Rafael, C. Gonzlez., and Paul, Wintz, "Digital Image Processing", Addison-Wesley Publishing Company.
- Jain Anil K., "Fundamentals of Digital Image Processing", Prentice Hall.
- Sosenfeld, and Kak, A.C., "Digital Image Processing", Academic Press.
- William K. Pratt., "Digital Image Processing", John Wiley and Sons.

T.V & SATELLITE COMMUNICATION

Course Code (ECE-606) **Credit 4 (3-1-0)**

1. **Elements Of TV System:** Picture transmission and reception, sound, composite Video signal, Fundamental of Monochrome and Colour television system, Modulation Schemes, Bandwidth requirement, Frequency allocation, Standard of monochrome & Colour TV System.
2. **Picture tubes & Camera Tubes:** Monochrome & Colour Picture Tubes, Various Camera Tubes.
3. **Television Broadcasting and Receivers:** T.V. Transmitter monochrome and colour, T.V. Receiver block diagram
4. **Introduction to modern T.V. Systems:** Introduction to cable T.V. Systems, HDTV, satellite T.V.
5. **Introduction:**Origin and brief history of satellite communication, Elements of a satellite communication link, Current status of satellite communication
6. **Orbital Mechanism and Launching of Satellite:** Equation of orbit, describing the orbit, locating the satellite in the orbit, locating the satellite with respect to earth, orbital elements, look angle determination, Elevation and Azimuth calculation, Geostationary and other orbits, orbital perturbations, orbit determination, Mechanics of launching a synchronous satellite, selecting a launch vehicle.
7. **Space Craft:**Satellite subsystems, Altitude and orbit Control system (AOCS), Telemetry Tracking and Command (TT & C), Communication subsystem, Transponders, Spacecraft antennas, Frequency re-use antennas.
8. **Satellite Channel and link Design:**G/T ratio of earth stations, design of down links and uplinks using C/N ratio, FM improvement factor for multi-channel signals, Link Design for FDM/FM, TV signals and Digital Signals.
9. **Earth Station Technology:** Earth Station design, Earth Station Tracking, Design of small earth station antenna, low noise amplifiers.

10. Multiple Access Techniques: Frequency Division Multiple Access (FDMA), FDM/FM/FMFDMA, Time Division Multiple Access, Frame structure and synchronization, Code Division Multiple Access, Random Access.

References:

1. Pratt T & Bostian C.W: Satellite Telecommunication, John Wiley & Sons, 1986.
2. Roddy D: Satellite Communications, Prentice Hall. 1989.
3. Dhake/Modern Television & Video Engineering/TMH.
4. R.R.Gulati/ Colour Television: Principles & Practice/New Age.

Wireless LAN Technologies (Elective-I)

Course Code (ECE-630) **Credit 3 (3-0-0)**

1. **Radio Technologies:** Overview, Spread Spectrum, Channel Sets, 802.11 IEEE Standards, Association Process, Diversity Antennas .
2. **Wireless LAN Topologies :** WLAN, Single Cell of Coverage, Multiple Cells of Coverage , Wireless Repeater, System Redundancy (Hot Standby), Peer to Peer (Ad Hoc) , Multi-Rate and Gear Shifting, Overlapping Coverage , 340/350 Comparison, In Line Power , Home Base Station
3. **Wireless LAN Products:** Access Points, Client Devices, Accessories .
4. **Basic Antenna Theory:** Directionality, Gain, Cisco Antennas.
5. **Client Device Configuration:** Windows Drivers, AirNet Client Utility.
6. **Basic Access Point Configuration:** Access Point LEDs, Setup of Network Ports, Statistics, Setup of Association Parameters, Firmware Upgrade and Distribution, SNMP Setup, Set Up of Event Logs
7. **Home Base Station Configuration:** Base Station Client Utility, BSM Configuration, BSE Configuration, Client Configuration,
8. **Security:** 802.11 and WEP, WEP Configuration, 802.11 Security Issues, Next Generation Security, 802.1x, EAP/LEAP, Radius Server.

References:

1. Wireless Communication & Networks 2nd edition, William Stallings, Prentice Hall
2. Microwave Engineering, 2nd edition, David M. Pozar, John Wiley & Sons

ANTENNA ANALYSIS & SYNTHESIS (Elective I)

Course Code (ECE-631) **Credit 3(3-0-0)**

1. Review of Antenna parameters, Radiation pattern of dipoles, loops, helices, Horns and Slots.
Linear Arrays: Pattern formulas, Schelkunoff's unit circle representation, Linear arrays synthesis, Plane Arrays.

2. Impedances: Self impedance and mutual impedances of antenna elements, The current distribution on an antenna, general formulation, self impedance of dipole antenna, Self admittance of center fed slots in a large ground plane and their self and mutual admittance, addition of parasitic elements, design of feeding structures for antenna elements & arrays, wide band antennas.

3. **Continuous Aperture Antennas:** Travelling wave antennas, Long wire, Rhombic Vee; Fast wave, Travelling wave arrays, Frequency scanned arrays.

4. **Reflectors & Lenses:**Simple reflectors, Aperture blockages, design of a shaped cylindrical reflector, Radiation patterns of reflector antennas, Single surface dielectric lenses, Stopped lenses, Realization patterns, Surface mismatches, Frequency sensitivity and dielectric loss for lens, Antennas.

References:

1.Robert S. Eliott/Antenna Theory & Design /PHI.
2.J.D. Krauss/Antennas/TMH.
3.R.Collin/Antennas & Radiowave Prorogation/TMH.
4.Chatterjee R. / Antenna Theory & Practice / New Age.

OPTICAL NETWORK (Elective I)

Course code (ECE-632) **Credit 3 (3-0-0)**

1. **Introduction to Optical Networks**
Characteristics of Optical Fiber (Emphasis on Non Linear Characteristics), Timing & Synchronization

2. Components
Couplers, Isolators & Circulators, Multiplexers & Filters, Optical Amplifiers, Tunable Lasers, Switches, Wavelength Converters

3. Networks
SONET/SDH, Multiplexing, SONET/ SDH Layers, Frame Structure, Frame Structure, Physical Layer, Elements of a SONET/SDH Infrastructure

4-ATM
Functions of ATM, Adaptation Layers, Quality of Service, Flow Control, Signaling and RoutingWDM Network Elements Optical Line Terminals, Optical Line Amplifiers, Optical Add/ Drop Multiplexers, Optical Cross Connects

4. WDM Network Design
Cost Trade-offs, Light path Topology Design, and Routing and wavelength assignment problems, Dimensioning Wavelength Routing Networks, network Survivability ,Basic Concepts, Protection in SONET/SDH, Protection in IP networks, Optical Layer Protection, Different Schemes, Interworking between Layers Access NetworksNetwork Architecture Overview, Enhanced HFC, FTTC,

5. Optical Switching
OTDM, Synchronization, Header Processing, Buffering, Burst Switching.Deployment Considerations.

Text Books:

1. Ramaswami, Rajiv & Sivarajan, Kumar N. / "Optical Networks a Practical perspective"/ Morgan Kaufmann Publishers / 2nd Ed.
2. Black, Uyless / "Optical Networks Third Generation Transport Systems"/ Pearson Educations

Reference Books:

1. Tanenbaum. Andrew S./ "Computer Networks"/ Prentice Hall (India)
2. Murthy, C. Siva Ram & Gurusamy, Mohan / "WDM Optical Networks Concepts, Design & Algorithms" / Prentice Hall (India)

Cellular & Mobile Communication (Elective I)

Course Code (ECE-633) **Credit 3 (3-0-0)**

1-Introduction to cellular mobile system
A basic cellular system, Performance criteria, Uniqueness of Mobile Radio Environment, Operation of cellular systems, Planning and cellular system.
Elements of Cellular Radio System Design: General description of problem, Concept of frequency channels, Co channel interface reduction factor, Hand off, Cell splitting, Consideration of the components of cellular systems.

2-Interface:
Introduction to co-channel interface, Real time Co-channel interface Co-channel measurement, Design of antenna system, Atenna parameter and their effects, Diversity receiver non co-channel interface different types.

3-Cell coverage for signal and traffic :
General introduction, Obtaining the mobile point-to-point mode propagation over water or flat open area, foliage loss, propagation near in distance, long distance propagation, point-to-point prediction model-characteristics, cell site, Antenna heights and signal coverage cells, Mobile-to-mobile propagation.

4-Cell site antennas and mobile antennas:
Antennas at cell site, mobile antennas.Frequency management and Channel Assignment: Frequency management, Fixed channels assignment, Non-fixed channel assignment, Traffic and channel assignment.

5-Digital Cellular System:
GSM, Architecture, Layer Modeling, Transmission, GSM channels, Multiple process, CDMA, Terms, Power limits & Control Modulation characteristics, Call processing, Hand off.

References :

- Lee, Cellular and Mobile Communication, McGraw Hill.
- Faher Kamilo., Wireless Digital Communication, PHI.

Introduction to Robotics (Elective I)

Course Code (ECE-634) **Credit 3 (3-0-0)**

1-Introduction:
Automation and Robotics, Definition, Basic Structure of Robots, Classification of Robots based on co-ordinate system, Present trends and future trends in robotics, Overview of robot subsystems, Components of Robot system-Manipulator, Controller, Power conversion unit etc, Specifications of robot.

2-Dynamics & Kinematics:
Dynamic constraints, velocity & acceleration of moving frames, Robotic Mass Distribution & Inertia, Tension, Newton's equation, Euler equations, Dynamic Modeling of Robotic Manipulators. Homogeneous co-ordinate vector operations, matrix operations, co-ordinate reference frames, Homogeneous transformation and manipulator orientation relative points reference frames, forward solutions- Link co-ordinate frames, D-H matrix, Inverse or back solutions- problem of obtaining inverse solution, techniques of using direct & geometric approach.

3-End Effectors and Actuators:
Different types of grippers, vacuum & other methods of gripping, overview of actuators, Internal & External sensors, position, relocking and acceleration sensors, proximity sensors, force sensors, touch slip laser range tinder, camera.

4-Motion Planning and Controllers:
On-off trajectory, relocking and acceleration profile, Cartesian motion of manipulator, joint interpolated control, Jacobian in terms of D-H matrix, Obstacle avoidance, Basic control system, control loops of robotic system, Fuzzy controllers.

5-Robot Vision:
Machine Vision system, description, sensing, Digitizing, Image Processing and Analysis and Application of Machine Vision System, Robotic assembly sensors & Intelligent Sensors. Object recognition.

6-Robots for Industrial Automation:
Need for Automation, Robotics for automation. Robot Intelligence and Task Planning, MEMS (Micro Electro Mechanical Systems) – Introduction and working principle, Nano-robots

Text Books:

- Robert J Schilling, PHI, NewDelhi ,"Fundamentals of Robotics: Analysis and Control". Klafter, Thomas, Negin, PHI, New Delhi," Robotic Engineering".

Reference Books:

- Yoram Koren, McGraw Hill, New York, " Robotics for Engineers".
- T.C. Manjunath, "Fundamentals of Robotics", Nandu Publishers, Mumbai.
- R. K. Mittal, I. J. Nagrath, TMH, NewDelhi, "Robotics and Control".
- HSU, T, "MEMS and Microsystems Design and Manufacture",.

VIRTUAL INSTRUMENTATION (Elective I)

Course Code (ECE-635) **Credit 3 (3-0-0)**

1-Virtual Instrumentation:
Historical perspective, advantages, block diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with conventional programming. Development of Virtual Instrument using GUI, Real-time systems, Embedded Controller, OPC, HMI / SCADA software, Active X programming.

2-VI programming techniques:
VIS and sub-VIS, loops and charts, arrays, clusters and graphs, case and sequence structures, formula nodes, local and global variables, string and file I/O, Instrument Drivers, Publishing measurement data in the web.

3-Data acquisition basics:
Introduction to data acquisition on PC, Sampling fundamentals, Input/ Output techniques and buses. ADC, DAC, Digital I/O, counters and timers, DMA, Software and hardware installation, Calibration, Resolution, Data acquisition interface requirements.

4-VI Chassis requirements.
Common Instrument Interfaces: Current loop, RS 232C/ RS485, GPIB.

5-Bus Interfaces:
USB, PCMCIA, VXI, SCSI, PCI, PXI, Firewire. PXI system controllers, Ethernet control of PXI.

6-Networking basics for office & Industrial applications, VISA and IVI.

7-VI toolsets, Distributed I/O modules. Application of Virtual Instrumentation: Instrument Control, Development of process database management system .

8-Simulation of systems using VI, Development of Control system, Industrial Communication, Image acquisition and processing, Motion control.

TEXT BOOKS:

1. Gary Johnson, LabVIEW Graphical Programming, 2nd edition,McGraw Hill, Newyork, 1997.
2. Lisa K. wells & Jeffrey Travis, LabVIEW for everyone, Prentice Hall, New Jersey, 1997.

REFERENCES:

1. Kevin James, PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control, Newnes,2000.

SMART ANTENNAS (Elective II)

Course Code (ECE-640) **Credit 3 (3-0-0)**

Applications of Antenna Arrays to Mobile Communications, Part I: Performance Improvement, Feasibility, and System Considerations (Complete contents of reference 1)
Application of Antenna Arrays to Mobile Communications, Part II: Beam-Forming and Direction-of-Arrival Considerations (Complete contents of reference 2)
Introduction to Smart Antennas:
Spatial Processing for Wireless Systems, Key Benefits of Smart Antenna Technology
Introduction to Smart Antenna Technology, The Vector Channel Impulse Response and the Spatial Signature, Spatial Processing Receivers, Fixed Beamforming Networks, Switched Beam
Systems, Adaptive Antenna Systems, Wideband Smart Antennas, Spatial Diversity, Diversity Combining, and Sectoring, Digital Radio Receiver Techniques and Software Radios for Smart
Antennas, Transmission Beamforming
Smart Antennas Techniques for CDMA
Non-Coherent CDMA Spatial Processors, Coherent CDMA Spatial Processors and the Spatial Processing Rake Receiver, Multi-User Spatial Processing, Dynamic Re-sectoring Using Smart
Antennas, Downlink Beamforming for CDMA
CDMA System Range and Capacity Improvement Using Spatial Filtering
Range Extension in CDMA, Single Cell Systems with Spatial Filtering at the IS-95 Base Station,
Reverse Channel Performance of Multi-cell Systems with Spatial Filtering at the Base Station,
Reverse Channel Spatial Filtering at the WLL Subscriber Unit, Range and Capacity Analysis Using Smart Antennas – A Vector Based Approach

References
1. L.C. Godara, “Applications of antenna arrays to mobile communications, Part I: Performance improvement, feasibility, and system considerations,” Proc. IEEE, vol. 85,no.7, pp.1031-1060,1997
2. L.C. Godara, “Applications of antenna arrays to mobile communications, Part II:
ME (E & TC) Microwave 11
Beamforming and direction-of-arrival considerations,” Proc. IEEE, vol. 85, no.8, pp.1193-1245,1997.
3. T.S. Rappaport and J.C. Liberti, Smart Antennas for Wireless Communications, Prentice Hall, NJ: Prentice Hall,1999

Artificial Neural Networks and Fuzzy Logic (Elective III)

Course Code (ECE-654) **Credit 3 (3-0-0)**

1-Introduction

Structure and Function of a single neuron:

Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widro & Hebb's learning rule/Delta rule, ADALINE, MADALINE, AI v/s ANN.

2-Introduction of MLP problem with linear activation function, different activation functions, sigmoidal, linear thresholding, hyperbolic tangent function etc, Error back propagation algorithm, derivation of EBPA, momentum, limitation, characteristics and application of EBPA, case-study: NETTALK, two dimensional pattern recognition.

3-Counter propagation network, architecture, functioning in normal and training mode, characteristics of counter. Propagation network, Deterministic v/s statistical training, Boltzman training, Cauchy training, artificial specific heat method.

4-Hopfield / Recurrent network, configuration, stability constraints, associative memory, characteristics, limitations and applications Hopfield v/s Boltzman machine.

Adaptive Resonance Theory: Architecture, classification, Implementation and training.

5-Optical neural network, advantages and disadvantages, vector matrix multiplies, electro-optical matrix multiplier, introduction to cognitron and neocognitron.

References:

- Hagan, Dernuth & Beale, Neural network design, Thomson learning (VP).
- Mehrotra, Mohan & Ranka, Elements of Artificial Neural Network, Penram.
- Philip D. Wasserman, Neural Computing, Van Nostrand Reinhold Pub.
- Judith E. Dayhoff, Neural Network Architecture, Van Nostrand Reinhold Pub.

System (Elective II)

Course Code (ECE-644) **Credit 3(3-0-0)**

1-Introduction

Introduction To Spread Spectrum, Spread Spectrum Techniques, Direct Sequence System, Frequency Hopping Systems, Pulse Fm(Chirp) System, Hybrid Systems.

2- Coding For Communication And Ranging

Property Of Codes For Spread Spectrum, Autocorrelation And Cross Correlation Of Codes, Composite Codes, Code Selection And Signal Spectra, Error Detection And Correlation Codes.

3-Modulation And Demodulation –

Balance Modulator, Quadriphase Modulator, Frequency Synthesis For Spread Spectrum Modulation, In Line And Heterodyne Correlation, Base Band Recovery, Phase Lock Loop, Costas Loop, Fm Feedback, Pdm And Fh Demodulators

4.Need For Synchronization, Types Of Synchronizers, Rf Link- Noise Figure, Cochannel Users, Dynamic Range And Agc, Propagation Medium, Overall Transmitter And Receiver Design.

5.Test And Evaluation Of Spread Spectrum System- Selectivity, Sensitivity, Jamming Margin, Synch Acquisition, Processing Gain. Transmitter Measurements.

Text Book:

R. C. Dixen, "Spread Spectrum Systems With Commercial Application", Jhon Wiley, 3rd Ed.

Reference Book:

H. Taube And D. L. Schilling, "Priciples Of Communication Systems", Tata Mc Graw Hill, 2nd Ed. Reprint 2007.

Embedded System (Elective II)

Course Code (ECE-641) **Credit 3(3-0-0)**

1-Introduction:

Embedded systems and its applications, Embedded Operating system, Design parameters of an embedded system and its significance, design life cycle, tools introduction, hardware and software partitioning and co-design. 2. Hardware Fundamentals for the embedded developers Digital circuit parameters-Open collector outputs Tristate outputs I/O sinking and Sourcing, PLD's, Watchdog Timers, Hardware design and development. Custom Single Purpose Processors: Optimizing program, FSMD, Data path & FSM. General purpose processors and ASIP's (Application Specific Instruction set Programming): Software and operation of general purpose processors-Programmers View Development Environment-ASIPs Microcontrollers-DSP Chips.

2- Introduction to Microcontrollers and Micoprocessors, Embedded versus external memory devices, CISC and RISC processors, Harvard and Von Neumann Architectures. 8051 Microcontrollers-Assembly language, architecture, registers, Addressing modes, Instruction set, I/O ports and memory organization Interrupts Timer/counter and serial communication. RTOS-Tasks, states, Data, Semaphores and shared data, Operating system services, Message queues, Mailboxes.

3-Advanced Processor-(only architectures) 80386, 80486 and ARM (References).

4- Communication basics, Microprocessor Interfacing I/O Addressing, Direct memory access, Arbitration, multilevel bus architecture, Serial protocols, Parallel protocols and wireless protocols.

5- Real world Interfacing: LCD, Stepping Motor, ADC, DAC, LED, Push Buttons, Key board, Latch Interconnection, PPI.

Text Books:

1. Embedded System Design-Frank Vahid/Tony Givargis, John Willey@2005.
2. Microcontroller (Theory and Applications) Ajay V Deshmukh, Tata McGraw-Hill@2005.
3. An Embedded Software Primer-David E.Simon, Pearson Education @ 1999.

References:

1. The 8051 Microcontroller and embedded systems-Muhammad Ali Mazidi and Janice Gillispie.
2. Microcontrollers (Architecture, Implementation & Programming) Kenneth Hintz, Daniel Tabak, Tata McGraw-Hill@2005.
3. 8051 Microcontrollers & Embedded Systems 2nd Edition-Sampath Kr, Katson Books@2006.

ARCHITECTURE AND APPLICATIONS OF DIGITAL PROCESSORS (ELECTIVE-III)

Course Code (ECE-650) **Credit 3(3-0-0)**

1. Review of DSP fundamentals.
2. Issues involved in DSP processor design speed, cost, accuracy, pipelining, parallelism, quantization error.
3. Key DSP hardware elements, Multiplier, ALU shifter, Address generator.
4. ADSP 2100 and 21000 families. Architecture and instruction set.
5. Software development tools, Assembler, Linker and Simulator.
6. Application using DSP processor Spectral analysis, FIR/IIR filter, Linear predictive coding.

References:

1.Oppenheim A.V. and Schafer, R.W./Digital Signal Processing/Prentice Hall.
2.Kung, S.Y. 1988/VLSI Array Processors/Prentice Hall.
3.Lee, E.A. 1988/Programmable DSP Architecture: Part 1/IEEE ASSP Magazine 4-19.
4. Yuen, C.K., Beauchamp, K.G. and Fraser, D. 1989/Microprocessor System In Signal Processing/San Diego: Academic Press

INTRODUCTION TO BIOMEDICAL ENGINEERING (ELECTIVE-III)

Course Code (ECE-651) **Credit 3(3-0-0)**

2. **Introduction**
   Bioengineering as an emerging technology at the intersection of biology , engineering , physics , and chemistry
3. **Design concept**
   Concept of different design approach neede in biomedical engineering than that required for industry. Design philosophy and design approach , dedicated to rehabilitation technology. Importance of this field due to human – machine interaction . Design process illustraction like system analysis design approach ,

topology synthesis , system atternative and improvement , dimensional optimization , choice of components.

Arm and hand prosthetics , arm orthotics and exoskeleton , controlof prosthetics and orthotics , transmission of forces , influence of visco – elastic materials on the behavior of mechanical system , static balancing , low friction mechanism , medical terminology.

Text and References

- Upper Extremitics Prosthetics , current status & Evalution :Dick H . Plettenburg.

INTRODUCTION TO BIOINFORMATICS

Course Code (ECE-652) **Credit 3(3-0-0)**

1-Introduction

Bioinformatics objectives and overviews, Interdisciplinary nature of Bioinformatics, Data integration, Data analysis, Major Bioinformatics databases and tools. Metadata: Summary & reference systems, finding new type of data online. Molecular Biology and Bioinformatics: Systems approach in biology,Central dogma of molecular biology, problems in molecular approach and the bioinformatics approach, Overview of the bioinformatics applications.

2- The Information Molecules and Information Flow

Basic chemistry of nucleic acids, Structure of DNA, Structure of RNA, DNA Replication, -Transcription, -Translation, Genes- the functional elements in DNA, Analyzing DNA,DNA sequencing. Proteins: Amino acids, Protein structure, Secondary, Tertiary and Quaternary structure, Protein folding and function, Nucleic acid-Proteininteraction.

3- Perl

Perl Basics, Perl applications for bioinformatics- Bioperl, Linux Operating System,Understanding and Using Biological Databases, Java clients, CORBA, Introduction to biostatics.

4- Nucleotide sequence data

Genome, Genomic sequencing, expressed sequence tags, gene expression, transcription factor binding sites and single nucleotide polymorphism. Computational representations of molecular biological data storage techniques: databases (flat, relational and object oriented), and controlled vocabularies, general data retrieval techniques: indices, Boolean search, fuzzy search and neighboring, application to biological data warehouses.

5- Biological data types and their special requirements: sequences,macromolecular structures, chemical compounds, generic variability and its connection to clinical data. Representation of patterns and relationships: alignments, regular expressions, hierarchies and graphical models.

Books:

1. O'Reilly, " Developing Bio informatics computer skills", Indian Edition's publication
2. Rastogi, Mendiratta, Rastogi, "Bioinformatics concepts, skills & Applications", CBS Publishers

3. Rashidi, Hooman and Lukas K. Buehler, “Bioinformatics Basic Applications” CRC Press.
4. “Bioinformatics” , Addison Wesley
5. Stephen Misner & Stephen Krawetz, “ Bioinformatics- Methods & Protocols”

AUTOMATIC FUZZY LOGIC AND NEURAL NETWORKS (ELECTIVE-III)

Course Code (ECE-654) **Credit 3 (3-0-0)**

1. **Neural Networks characteristics:** History of development in neural Networks Principles,
   Artificial Neural Net terminology, Model of a neuron, topology, learning types of learning
   supervised unsupervised, re-inforcement learning.
2. **Basic Hopfield Model:** the perceptron, linear separability, Basic learning laws : Hebb's rule,
   Delta rule, Widrow & Hoff LMS learning rule, correlation learning rule, instar and outstar
   learning rules.
3. **Unsupervised learning**: competitive learning, K-means clustering algorethm, Kohonen's
   feature maps.
4. **Radial Basis**: Function neural networks, basic learning Laws in RBF nets, Recurrent networks, recurrent back propagation, Real Time Recurrent learning algorithm. Introduction
   to counter Propagation networks, CMAC networks, ART networks.
5. **Applications of neural nets such as pattern recoginition:** optimization, associative
   memories, vector quantization, control,Applications in speech and decision making.
6. **Fuzzy Logic :** Basic concepts of Fuzzy Logic, Fuzzy vs Crisp set, Linguistic variables, membership functions, operations of fuzzy sets, fuzzy IF-THEN rules, variable inference,
   techniques, defuzzication techniques, basic fuzzy inference algorithm, Applications of fuzzy
   logic, Fuzzy system design, Implementation of fuzzy system, Useful tools supporting design.

Text Books:

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1. Fuzzy Systems Design Principles, Building Fuzzy IF-THEN Rule Bases By Riza C. Berkin & Trubatch, JeeeBcss
2. Vegna Narayanan - Artificial Neural Networks
3. Bart Kosko - Neural Networks & Fuzzy Logic
4.SimonHaykin-NeuralNetworks

Artificial Intelligence and Expert Systems

Course Code (ECE-656) **Credit 3(3-0-0)**

1-Artificial Intelligence:

History and Applications, Production Systems, Structures and Strategies for state space search- Data driven and goal driven search, Depth First and Breadth First Search, DFS with Iterative Deepening,
Heuristic Search- Best First Search, A* Algorithm, AO* Algorithm, Constraint Satisfaction, Using heuristics in
games- Minimax Search, Alpha Beta Procedure.

2-Knowledge representation –

Propositional calculus, Predicate Calculus, Theorem proving by Resolution, Answer Extraction, AI Representational Schemes- Semantic Nets, Conceptual Dependency, Scripts, Frames, Introduction
to agent based problem solving.

3-Machine Learning-

Symbol based and Connectionist, Social and Emergent models of learning, The Genetic Algorithm- Genetic Programming, Languages and Programming Techniques for AI- Introduction to PROLOG
and LISP-features. Basics of search strategies and Logic Programming in LISP.

4-Overview of Expert System Technology –

Rule based Expert Systems, Expert systems Inference: Forward
chaining and backward chaining. Deduction process. Languages and tools. Knowledge acquisition and
uncertainty: Explanation facilities, knowledge acquisition, dealing with uncertainty, fuzzy reasoning. Introduction
to natural language processing. Understanding, perception, learning; explanation facilities and knowledge
acquisition.

Text Books

1. G. F. Luger, *Artificial Intelligence- Structures and Strategies for Complex Problem Solving,* 4th ed.,
Pearson Education, Delhi, 2002
2. E. Rich and K. Knight, *Artificial Intelligence*, 2nd ed., Tata McGraw-Hill, New Delhi, 1991

Reference Books

1. D. W. Rolston, *Principles of Artificial Intelligence & Expert Systems Development*, McGraw Hill, Ney
York, 1988
2. D. W. Patterson, *Introduction to Artificial Intelligence and Expert Systems*, Prentice Hall of India, New
Delhi, 1990
3. N. J. Nilsson, *Principles of Artificial Intelligence*, Narosa Publishing House, New Delhi, 1990

APPLIED MULTIMEDIA COMMUNICATION

Course Code (ECE-653) **Credit 3(3-0-0)**

1. The communication requirements associated with the different types of multimedia applications such as video telephony / teleconferencing, electronic mail, interactive TV, electronic commerce, web TV.
2. Multimedia information representation, Text and image compression standards for multimedia communications.
3. Digital communications basics, operation of different kinds of networks, the internet, board band ATM networks, entertainment networks, high speed modems.
4. New communication protocols for use with these networks to meet the requirements of multimedia application, transport protocols, application support functions, internet applications, the world wide web.

References:

1. Fred Halsall/Multimedia Communications: Applications, Networks, Protocols And Standards/ Pearson Education's, Asia.
2. Jean Walrand & Pravin Varaiya/High performance communication networks/Harcourt Asia PTE Ltd.
3. James E. Shuman/Multimedia in Action/Vikas Publishing House Pvt. Ltd.

MICRO ELECTRONICS (ELECTIVE-III)

Course Code (ECE-655) **Credit 3(3-0-0)**

1. **Epitaxy**: Vapour phase and liquid phase epitaxy. Evaluation of epitaxial layers.
2. **Oxidation**: Thermal and anodic oxidation of silicon and GaAs. Evaluation of oxide layers.
3. **Diffusion:** Diffusion process and diffusion equation. Diffusion systems and techniques impurity
   diffusion in silicon and GaAs. Evaluation techniques for diffused layers.
4. **Ion implantation:** Implantation process and system.
5. **Deposited films:** Deposition techniques and characteristics of various films used for monolithic
   ICs.
6. **Photolithography and etching**: Optical, e-beam, ion-beam and x-ray lithography and etching
   techniques.
7. **Monolithic Integrated Circuits**: Isolation techniques. Bipolar, PMOS, NMOS, CMOS, BICMOS,
   VMOS, HMOS and SOI devices. Realization of passive components in monolithic ICs.
   Thin-film and thick-film devices, their design and fabrication techniques.