

**DEPARTMENT OF ELECTRONICS AND  
COMMUNICATION ENGINEERING**

## **10EN201 PROFESSIONAL ENGLISH I**

**Credits: 2:0:0**

### **Course Objectives**

To impart basic grammar skills with special thrust on framing sentences for day to day conversation.

To train the students in language use and help improve their vocabulary.

To train the students in reading and writing skills

### **Unit I**

Developing basic skills in Grammar- Parts of Speech- Tense forms- Concord- Articles-Voice- Infinitives- Gerunds—Modal auxiliaries- Understanding vocabulary- Word power.

### **Unit II**

Developing skills in basic sentence patterns- Direct and indirect speech - Homophones- Note-Making- Paragraph writing- Personal letter writing- Summarizing- Punctuations- Discourse markers.

### **Unit III**

Error Analysis- Descriptive writing- Abbreviations- Word formations- Cohesive devices- One-word substitution- Subordinating conjunction- Co-relative conjunction- Relative pronouns- Writing short speeches.

### **Unit IV**

Instructions- Warning- Group discussions- - Writing minutes- writing recommendations- Memo writing- Understanding biography

### **Unit V**

Essay writing- Writing official letters- If- clauses- Technical and non- technical meaning of words- Presentational skills- Body language- Role-play

### **Text Book**

1. Dhanavel, S.P, 2009. English and Communication Skills for Students of Science and Engineering. Orient Black Swan.

### **Reference Books**

1. Radhakrishnan, Pillai G.et.al. Spoken English for You-Level I. Chennai: Emerald Publishers, 2000.
2. Rizvi, Ashraf M. Effective Technical Communication. New Delhi: Tata McGraw-Hill. 2005.
3. Joseph, Maya and Sundarsingh, J. ed. Communication Skills I & II. Coimbatore, Gems Publishers, 2005.

## **EN 214 BASIC FRENCH LANGUAGE**

**Credits: 2:0:0**

### **Unit I**

Nouns and Pronouns- Personal pronouns –Verbs- Concord – Present of regular verbs – present of frequently used verbs – direct infinitive to show preferences

### **Unit II**

Adjectives– Types of adjectives and usage - Adverbs – use and position of frequently used adverbs - Prepositions and Conjunctions– use of prepositions of place

### **Unit III**

Interrogative Constructions – questions indicated by rising intonation – questions starting with question words - Sentence Structure

### **Unit IV**

Listening Skill – Pronunciation – Contextual meaning – Listening to comprehend ideas

### **Unit V**

Reading a variety of short, simple materials – Demonstrate understanding through oral and brief written responses – Writing short expressions

### **Reference:**

1. The Ontario Curriculum: FSL — Extended French, Grades 1–8; French Immersion, Grades 1–8, 2001

## **EN 216 BASIC GERMAN LANGUAGE**

**Credits: 2:0:0**

### **Unit I**

Introduction – Alphabets – Greetings – Countries and Languages – Pronouns – Possessive Pronouns - Verbs and their conjugations – Articles

### **Unit- II**

Question Words – Statements and questions – Negation – Exercises –Nouns – Singular and Plural, Imperative statements

### **Unit – III**

Number system – Family – Daily routines related verbs and question verbs.

### **Unit – IV**

Accusative and dative declensions of pronouns and articles – Modal verbs and their related grammatical structure.

### **Unit – V**

Time and time related particles – Related vocabulary and grammar – Exercises.

## Reference Books

1. Tangram Aktuell ! (Max Hueber Verlag).
2. Pingpong (Maz hueber Verlag)

## 10EN202 PROFESSIONAL ENGLISH II

**Credits: 2:0:0**

### Course Objectives

- To impart skills in language use.
- To enrich the vocabulary of students.
- To enable students identify errors and frame error-free sentences
- To impart reading and writing skills

### Unit I

Language use-Word formation-Synonyms-Antonyms- Vocabulary building- Word Power-Abbreviations-Acronyms-homophones.

### Unit II

Language use-Error Analysis-Impersonal passive voice-Punctuations-Verb forms-Modal Auxiliaries- Reading Skills-Extensive Reading-Intensive Reading.

### Unit III

Communicative Skills-Prepositional Phrases-Gerunds-Infinitives-Imperatives-Situational speech-practice to speak fluently-Contextual use of words-Language for various communicative functions

### Unit IV

Speaking Skills- Phonetics-Vowels - Consonants-Stress-Intonation- Phonetic Transcription-Correct pronunciation Identification-Speeches-Group Discussion.

### Unit V

Writing Skills-Creative writing - Continuous writing-Description- Parts of business letters-Types of Business letters-Formatting of Business Letters - Editing

### Text Book:

1. Viswamohan, Aysha, 2008. English for Technical Communication. Tata Mc Graw-Hill.

## Reference Books

- 1 Joseph, Maya and Sundarsingh, J. ed. Communication Skills I & II. Coimbatore, Gems Publishers, 2005.
- 2 Radhakrishnan, Pillai G.et.al. (2000). Spoken English for You-Level I. Chennai: Emerald Publishers.

- 3 Dhanavel, S.P, 2009. English and Communication Skills for Students of Science and Engineering. Orient Black Swan.

## **MA244 ALGEBRA, DIFFERENTIAL CALCULUS AND ANALYTICAL GEOMETRY**

**Credits: 3:1:0**

### **Unit I: Theory of Equations**

Relations between coefficients and roots. Irrational and imaginary roots – symmetric functions of the roots – transformation of equations – Reciprocal equations and formation of equation whose roots are given.

### **Unit II: Matrices**

Characteristic equation – Eigen values and eigenvectors of a real matrix – Properties of Eigen values – Cayley Hamilton theorem – Orthogonal reduction of a symmetric matrix to diagonal form – Orthogonal matrices – Reduction of quadratic form to canonical form by orthogonal transformation

### **Unit III: Three Dimensional Analytical Geometry**

Direction cosines and ratios – Angle between two lines – Equation of a plane – Equation of a straight line – Co-planar lines – Shortest distance between skew lines

### **Unit IV: Geometrical Applications of Differential Calculus**

Curvature – Cartesian and polar co-ordinates – Circle of curvature – involutes and Evolutes – Properties of envelopes – Evolutes as envelope of normals.

### **Unit V: Functions of Several Variables**

Functions of two variables – Partial derivatives – Total differential – Differentiation of implicit functions – Taylor's expansion – Maxima and Minima – Constrained Maxima and Minima by Lagrange's – Multiplier method – Jacobians

### **Text Book:**

Kandasamy.P, Thilagavathi .K and Gunavathi K., Engineering Mathematics, Volume I (6<sup>th</sup> revised Edition), S Chand. & Co., New Delhi, 2003

### **Reference Books:**

- 1 Kreyszig, E., "Advanced Engineering Mathematics" (8<sup>th</sup> Edition), John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2000
- 2 Grewal, B.S., "Higher Engineering Mathematics" (6<sup>th</sup> Edition) Khanna Publisher, New Delhi, 2001

## **MA245 MULTIPLE INTEGRALS, DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS**

**Credits: 3:1:0**

### **Unit I: Multiple Integrals**

Evaluation of Multiple Integrals, Change of order of Integration, Application of Multiple Integrals to find area enclosed by plane curves and volume of solids.

### **Unit II: Beta and Gamma Integrals**

Definition, relation connecting Beta and Gamma integrals, properties, evaluation of definite integrals in terms of Beta and Gamma functions.

### **Unit III: Ordinary differential Equation**

Simultaneous linear equations with constant coefficients – Linear equations of higher order with constant coefficients – Homogeneous equation of Euler type – Method of variation of parameters.

### **Unit IV: Vector Calculus**

Gradient, Divergence, Curl – Line, surface & volume integrals – Statements of Green's, Gauss divergence and Stokes' theorems (without proof) – verification and applications.

### **Unit V: Laplace Transforms**

Transforms of simple functions – Basic operational properties – Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – Periodic function – Applications of Laplace transforms of solving linear ordinary differential equations upto second order with constant coefficients and simultaneous equations of first order with constant coefficients.

### **Text Book:**

1. Kandasamy.P, Thilagavathi .K and Gunavathi K., Engineering Mathematics volume II (6<sup>th</sup> revised Edition), S. Chand & Co., New Delhi, 2003

### **Reference Books:**

1. Kreyszig, E., "Advanced Engineering Mathematics" (8<sup>th</sup> Edition), John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2000
2. Grewal, B.S., "Higher Engineering Mathematics" (6<sup>th</sup> Edition) Khanna Publisher, New Delhi, 2001

## **PH105 APPLIED PHYSICS**

**Credits: 3:0:0**

### **Unit I:**

#### **Particles and waves**

Planck's hypothesis- Wave nature of matter- De Broglie wave –De Broglie wavelength of electrons-properties of matter waves, Experimental verification of matter waves- Davisson and Germer experiment, G.P. Thomson's experiment, Heisenberg's uncertainty principle.

Schrodinger's wave equation (Time dependent and time independent equations)- Applications: particle in a box,

## **Unit II:**

### **Structure of solids**

Classification of solids-Fundamental terms of crystallography-Lattice, basis, Unit cell, Crystallographic axis, primitives-Types of crystals-Bravais Lattices, miller indices-Unit cell characteristics of Simple cubic, BCC, FCC and HCP systems.

### **Nano Materials**

Preparation of Nano Materials-Bottom up, top down approaches-Properties and applications of Carbon nano tubes

## **Unit III:**

### **Dielectrics**

Basic Definitions-Electric field intensity, Electric flux density, Dielectric parameters- dielectric constant- Experimental determination of dielectric constant- Dipoles – Dipole moment- polar and non polar dielectrics, polarization- Types of polarization- Internal field-Clausius-Mosotti equation-Dielectric loss- dielectric breakdown- dielectric properties.

**Semiconductors:** Classification of solids on the basis of band theory- Conductors, Insulators and semiconductors. Classification of semiconductors-Intrinsic and Extrinsic semiconductors - Solar cells-Light emitting diodes-Liquid crystal display

## **Unit IV**

### **Lasers**

Properties of laser beam-Principle of laser-Einstein's theory of stimulated emission-Population inversion-Types of lasers-Nd :YAG, He:Ne, CO<sub>2</sub> and Semiconductor lasers-Application of lasers-Computer peripherals(CD-ROM)-Industrial applications –drilling and welding.

**Fibre optics:** Principle of optical fibre-Propagation in optical fibres-Acceptance angle-Numerical aperture-Structure of optical fibres-Fibre optic materials-Classification of optical fibres-Applications-Optical fibres for communication-Fibre optic sensors-Temperature sensor

## **Unit V**

### **Acoustics**

Classification of sound, Characteristic of musical sound-Loudness- Weber and Fechner's law-Decibel- Absorption coefficient- Reverberation time- Sabine's formula (growth and decay), Factors affecting acoustics of buildings and their remedies

**Ultrasonics-classification:** of ultrasonic waves-properties of ultrasonic waves- ultrasonic production- Magnetostriction and piezoelectric methods, Acoustic grating, SONAR, NDT, applications in medicine and industry

### **Recommended Text Book**

V. Rajendran, A Marikani – Applied physics for Engineers Tata McGraw –Hill Publishing company Ltd Third Edition

### **Reference Books:**

1. M.N. Avadhanulu, P.G. Kshirshagar – A Text Book of Engineering Physics- S.Chand

2. R.K. Gaur, S.L. Gupta – Engineering Physics – Dhanpat Rai Publications
3. P.K. Mittal – Applied Physics – I.K. International
4. M. Arumugam- Materials Science – Anuradha Publications
5. M.R. Srinivasan- Physics for Engineers – New Age international (P) Limited Publishers.

### **09PH101 APPLIED PHYSICS LAB**

**Credits: 0:0:2**

#### **Course Objective:**

- To train engineering students on basis of measurements and the instruments
- To give practical training on basic Physics experiments which are useful to engineers
- To equip the students with practical knowledge in electronic, optics, and heat experiments

#### **Course outcome:**

Demonstrate the practical skill on measurements and instrumentation techniques of some Physics experiments.

#### **List of experiments:**

1. Rigidity Modulus of the wire - Torsional Pendulum
2. Young's Modulus of a beam- Non-uniform bending
3. Thermal Conductivity of a bad conductor-Lee's Disc
4. Radius of curvature of a lens – Newton's Rings
5. Refractive Index of Prism-Spectrometer
6. Wavelength of mercury source- Spectrometer Grating method
7. Coefficient of Viscosity of a liquid by Poiseuille's method
8. Frequency determination of a tuning fork- Melde's string
9. Particle size measurement-Laser diffraction method
10. Discharge of a capacitor
11. Thickness of a glass plate- Single optic lever
12. Characteristics of Zener diode
13. Efficiency of Solar cell
14. Ultrasonic interferometer

HoD can choose any 10 experiments from the above list at the beginning of the course in each Semester.

### **10PH201 - ENGINEERING PHYSICS**

**Credits: 2:0:0**

#### **Course Objectives:**

- To help to prepare the Engineering students, a stronger foundation in the classical physics and Dynamics of particles



- Greater emphasis through on the role of reference frames in Newton's laws, force laws
- A clear analysis of the concepts of Heat, Energy and laws of Thermodynamics (quantitatively).
- To provide the understanding of concepts of electricity and magnetism.

**Course Outcome:**

Student understands the classical portions of the Electricity and Magnetism and special momentum to Electromagnetic introduction

**Unit I :Particle Dynamics**

Classical Mechanics, Newton's First Law, Force, Mass, Newton's Second Law, Newton's Third Law Of Motion, System Of Mechanical Units, The Force laws, Weight And Mass, Static Procedure For Measuring Forces, Applications Of Newton's' Laws Of Motion

**Unit II Heat And Thermodynamics**

Heat- A Form Of Energy, Quantity Of Heat And Specific Heat, Molar Heat Capacity Of Solids, - Heat Conduction, The Mechanical Equivalent Of Heat  
Heat And Work, The First, Second and Third laws Of Thermodynamics, Some Applications

**Unit III : Magnetism**

Coulomb's Law, Magnetic Potential, Tangent Law, Magnetic Induction, Permeability And Susceptibility, Magnetic Properties Of Materials I-H & B-H Curves, Properties Of Para, Dia and Ferro Magnetic Materials, Measurement Of Magnetic Moment—Stern & Gerlach Experiment

**Unit IV: Electrostatics**

Electric Field And Electric Intensity, Electrostatic Potential, Gauss's Theorem, Applications Of Gauss's Theorem, Mechanical Force Experienced By Unit Area Of A Charged Field, Electrostatic Potential At A Point Due To A Dipole

**Unit V : Electromagnetic Induction**

Faraday's Laws Of Electro-Magnetic Induction, Lenz's Law, Fleming's Right Hand Rule, Self Induction, Mutual Induction, Transformer, Practical Applications Of Electromagnetic Induction- Earth Inductor, Dynamo.

**Text Books:**

1. Fundamentals of Physics, Robert Resnick & David Halliday, Wiley Eastern Publishing Limited 2007
2. Electricity & Magnetism, Brijlal & Subramaniam S. Chand and Co 2004

**Reference Books:**

1. University Physics, Sears and Zemansky –Pearson Addison Wesley,2007
2. Fundamentals of Physics, an introductory course, David G. Martindale, Robert W. Heath, D.C. Heath, Canada, 1987
3. Fundamentals of Electrostatics, Joseph M. Crowley, 1986
4. Electricity and Magnetism, William C. Robertson, NSTA press, 2005

5. Heat and thermodynamics by M.S.Yadav, Anmol Publications Pvt. Ltd, 2002

## **CH106 APPLIED CHEMISTRY**

**Credits: 3:0:0**

### **Unit I: High Polymers**

Classification – Functionality of polymer – Mechanism (Free radical, ionic and zeigler – Nutta) – polymerization – Plastics – Thermoplastics and Thermosetting plastics – Compounding and fabrication of plastics – Important thermoplastic resins – Polythene (P.E.) – Polyvinyl Chloride (P.V.C.) – Important thermosetting plastic resins – Phenolic resin and Silicone resin – Industrial polymers – Nylons – Epoxy resin – Polyester resin – Applications of polymers – Conducting polymers – Semi conducting Polymers

### **Unit II: Water Technology**

Sources of water – Hardness of water – Units of hardness – Estimation of hardness – EDTA method and alkalinity method – Softening of hard water – Lime soda process – Zeolite process – Demineralisation or Ion exchange process – Scale and sludge formation in boilers – Internal conditioning – Boiler corrosion – Caustic embrittlement – Desalination – Water for drinking purpose

### **Unit III: Fuels and Combustion**

Fuels and Classifications - gross and net calorific values - Proximate and ultimate analyses of coal – Significances – Characteristics of metallurgical coke – manufacture by Otto – Hoffman method – Synthetic petrol – Bergius process – Fischer – Tropsch's process – Knocking – Octane number – Improvement of anti knocking characteristics – Cetane number, gaseous fuels – an elementary treatment of Water gas, producer gas and CNG (definition only) – An introduction to Non-conventional Sources of Energy – Biomass – Biogas – Bio fuels (Bio-diesel and Bio-ethanol) - Theoretical calculation of calorific values (Dulong's formula) – Simple problems – Calculation of minimum air requirements – Simple problems – Flue gas analysis – Orsat's apparatus

### **Unit IV: Electrochemistry**

Electrode potential – Measurement of electrode potential – Nernst equation for electrode potential – Electrochemical Series – Electrochemical cell or Voltaic cell – Concentration cell – Primary Cell– Leclanche cell - Secondary batteries – alkaline batteries – Lead acid, and Li batteries – An introduction to Fuel Cell, H<sub>2</sub> – O<sub>2</sub> Fuel Cell – Applications  
Types of corrosion – Wet or electrochemical corrosion – Types – factors influencing corrosion – Corrosion control methods

### **Unit V: Emerging Trends in Chemistry**

Basics of Nanotechnology - Nanomaterials – Types: Nanowires, Nanotubes – Applications  
Chemical aspects of Biotechnology – Fermentation – Manufacture of ethyl alcohol and acetic acid by fermentation – Deamination  
Fundamentals of Semiconductor Technology – Semiconductor materials – Basic fabrication steps – oxidation – photolithography and etching – diffusion and ion implantation - metallization

**Text Book:**

1. P.C. Jain and Monika Jain, "Engineering Chemistry", Dhanpat Rai Publishing Co. (P) Ltd., 15<sup>th</sup> Edition, 2006

**Reference Books:**

1. S. Glasstone and D. Lewis – "Elements of Physical Chemistry", McMillan Co. of India Ltd., 2002
2. P.L.Soni, O.P. Dharmarsha and U.N. Dash – "Text Book of Physical Chemistry" Sulthan Chand & Sons, New Delhi, 2001
3. J C Kuriakose, and J Rajaram, "Chemistry in Engineering and Technology", Tata Mcraw-Hill Publications Co. Ltd., New Delhi, 1996
4. V.R. Gowrikar, N.V.Viswanathan and Jaydev Sreedhar, "Polymer Science", New Age International Pvt. Ltd., New Delhi, 2000.
5. Garry S. May and Simon M. Sze, "Fundamentals of Semiconductor Fabrication", John Wiley & Sons, Inc., 2004, Chapter – I
6. C. Daniel Yesudian and D.G. Harris Samuel, "Materials Science & Metallurgy", Scitech Publishers, 2004
7. Charles P. Poole Jr. and Frank J. Ownes, "Introduction to Nanotechnology", Wiley Publishers, 2003

**09CH104 – APPLIED CHEMISTRY LAB****Credits: 0:0:2****Objectives:**

1. To understand the principles of estimation in acidimetry, alkalimetry and permanagnometry titrations
2. To understand gravimetric principles involved in complexometric titration
3. To understand the principles of potentiometry, conductometry and pH measurements
4. To understand the principles of spectrophotometry and flame photometry

**List of Experiments:**

1. Estimation of Hydrochloric acid
2. Estimation of Sodium Hydroxide
3. Estimation Fe<sup>2+</sup> ions
4. Estimation of total, permanent and temporary hardness of Water Sample
5. Estimation of alkalinity in water sample
6. Estimation of dissolved oxygen
7. Estimation of Iron in water sample by spectrophotometry
8. pH measurements for acid – alkali titration
9. Conductometric estimation of an acid
10. Potentiometric estimation of Fe<sup>2+</sup> Ions
11. Determination of single electrode potential by potentiometry
12. Determination of rate of corrosion of mild steel by weight loss method
13. Estimation of sodium present in water by flame photometry

## Reference Books

1. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, "Vogel's text book of quantitative chemical analysis", ELBS, 6<sup>th</sup> Edition, Longman, Singapore publishers, Singapore, 2004
2. I.M. Kolthoff and E.B. Sandell, "Quantitative Chemical Analysis" MacMillan, Chennai, 1980
3. S.K. Bhasin and S.K. Sudha Rani, "Laboratory Manual on Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd., 2003

## 09CH201 – ENVIRONMENTAL STUDIES

**Credits: 3:0:0**

### Objectives:

1. To acquire the knowledge of environmental studies, its need & importance
2. To understand the concept, structure and function of different ecosystems
3. To know about pollution problems and green technology
4. To develop a sense of responsibility about the role of students in fostering the idea of learning to live in harmony with nature

### Unit I - Natural resources, ecosystems and biodiversity

Environment - Definition, scope and importance – Forest resources: Use and overexploitation, Water resources: Use and over-utilization, dams-benefits and problems – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources – Land resources: land degradation – Role of an individual in conservation of natural resources Ecosystem – Structure and function – Ecological succession – Introduction to various ecosystems. Biodiversity – Definition and types – Threats to Biodiversity in India and its impacts – Conservation of Biodiversity: In-situ and Ex-situ conservation of biodiversity

### Unit II – Air pollution and global issues

Air pollution - Introduction – atmospheric constituents – Chemical reaction in the atmosphere – air pollutants – classification – effects on human, animal, plant, property and environment – control methods for particulates and gaseous pollutants – control of pollutants from automobiles – Burning of plastics – PCBs and their impact - Green house gases – Photochemical reaction – green house effects - climate change - global warming and its effects – international climate conventions, protocols and perspectives – technology and policy options for GHG emission mitigation - acid rain, ozone layer depletion and solutions

### Unit III – Issues related to other environmental pollution aspects and green technology

Water pollution - sources – characteristics – BOD, COD - pollutants and their effects – heavy metal pollution – inorganic and organic pollutants control methods - Advanced waste water treatment techniques - Basic aspects of soil pollution - marine pollution - noise pollution - thermal pollution - nuclear hazards - Causes, effects and control measures - solid waste management: causes, effects and control measures of urban and industrial solid wastes  
Green chemistry and green technology – principles of sustainable and green chemistry - miscelle templated silica as catalyst in green chemistry – biocatalysis – bioproduction of

catalysts in industries – basics of clean energy technology for the future – fuel cells, wind power, solar power

#### **Unit IV – Environmental Legislation**

Pollution controls acts – environment protection act – water pollution act – air pollution act – wildlife (protection) act, 1972 – forest (conservation) act, 1980 – polluter pays principle – precautionary principle – Issues in pollution control enforcement and public awareness – issues of environment – public awareness

#### **Unit V - social issues and the environment**

From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management - Population growth, variation among nations – Population explosion – Environment and human health – Role of Information Technology in Environment and human health – Family welfare programme – HIV / AIDS – women and child welfare – Disaster management: floods, earthquake, cyclone and landslides

#### **Text books:**

1. Deeksha Dave and S.S. Katewa, “Textbook of Environmental studies”, Cengage Learning, 2008
2. Deswal S and Deswal A, 'A basic course in Environmental studies', Dhanpat Rai & Co, First edition, Delhi, 2004
3. Kurian Joseph and Nagendran R, 'Essentials of Environmental studies', Pearson Education Pvt Ltd., First edition, Delhi, 2004
4. Santhosh Kumar Garg, Rajeswari Garg and Ranjani Garg, 'Environmental Science and Ecological Studies', Khanna Publishers, Second Edition, New Delhi, 2007.

#### **Reference Books:**

1. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', Pearson Education Pvt. Ltd., Second Edition, 2004.
2. Tivedi R.K., 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media., 1998
3. Cunningham, W.P.Cooper, T.H.Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
4. Wager K.D., 'Environmental Management,' W.B. Saunders Co., Philadelphia, USA, 1998.
5. James Clark & Duncan Macquarie, “Green Chemistry & Technology”, Blackwell publishing, 2002

### **09ME101 BASIC MECHANICAL ENGINEERING**

**Credits: 2:0:0**

#### **Objective:**

To provide knowledge about IC Engines, External combustion Engines, boilers, power plants, metal forming, metal joining, machining process and materials. To understand about CAD and modern design softwares in the mechanical engineering.

### **UNIT - I**

Engine-External combustion engine – Working of Steam Engine – Steam Turbine – Impulse turbine & reaction turbine – Boilers fire tube and water tube boiler – Cochran boiler – Babcock & Wilcox boiler – Internal Combustion Engine – Working of petrol and Diesel Engine – Difference between two stroke and four stroke engines.

### **UNIT - II**

Conventional power plants – Hydro, Thermal, Nuclear power plants – Diesel and Gas Turbine power plants; Non-conventional power plants – Solar, wind and tidal power plants – Geothermal power plant – Ocean Thermal Energy conversion power plant.

### **UNIT - III**

Load – Types of load –stress and strain – Types of stresses and strains –Stress strain curve of ductile materials- Introduction of Mechanical Engineering Software Packages.

### **UNIT – IV**

Metal casting and forming process – Introduction – advantages of casting – patterns – molding – melting of cast iron – forging. Metal joining Process: Introduction - welding – arc welding, gas welding

### **UNIT –V**

Metal machining: Lathe – Drilling machine – Milling machine – Shaping machine. Basic Engineering Materials: Properties of materials – ferrous metals and alloys – Nonferrous metals and alloys.

### **Text Books:**

1. S.R.J.Shantha Kumar, “Basic Mechanical Engineering”, HiTech Publications,2001.
2. G. Shunmagam, “Basic Mechanical Engineering”, Tata McGraw Hill, 2001.

### **Reference Books:**

1. I.E. Paul Degarmo, J.T. Black, Ronald A. Kosher, “Material and Processes in Manufacturing”, 8th Edition, John Wiley and sons, inc., 1999.
2. Dr. O.P. Khanna, “A Text Book of Materials Sciences and Metallurgy”, Dhanpat Rai & Sons, Delhi, 2001.
3. V.Remesh Babu, “A Text Book on Basic Civil Engineering”, Anuradha Agencies,2000
- 4.K.Venugopal,V.Prabhuraja,” Basic Mechanical Engineering”, Anuradha Agencies,2000

## **09EC218 BASIC ELECTRONICS**

**Credits: 3:0:0**

**Objective:** To know the basics about semiconductor, integrated circuits and communication system.

**Outcome:** Students will get overview about the basics of electronics.

## **UNIT I**

### **Introduction to Semiconductor**

Covalent bond – N type & P type semiconductor – conduction in semiconductor – semiconductor devices : diode, transistor, FET, MOSFET, UJT.

## **UNIT II**

### **Integrated Circuits**

IC: OP-amp – introduction-Ideal characteristics-inverting and non-inverting amplifier –adder subtractor-differentiator-integrator- Monolithic IC fabrication techniques.

## **UNIT III**

### **Digital Systems**

Number system – Boolean algebra – logic gates –truth table - combinational circuit -4 x 1 multiplexer – 1 x 4 demultiplexer - digital computer principles.

## **UNIT IV**

### **Communication**

Basic block of communication system – need for modulation – Derivation of AM and FM signal - Amplitude and Frequency Modulation (Balanced modulator and varactor diode modulator)- Demodulation(AM diode detector and balanced slope detector).

## **UNIT V**

### **Communication systems**

Block diagram of AM and FM transmitter - Superheterodyne receiver – satellite communication – Fibre optic communication

### **Text Book**

Muthusubramanian ,R, Salivahanan S, Muraleedharan Ka , “Basic Electrical Electronics & Computer Engineering “Tata Mc.Graw Hill, 2005

### **Reference Books**

1. Robert Boylestad, “Electronic Devices & Circuit Theory”, Eighth Edition, PHI,2002.
2. Anokh Singh, “Principles of Communication Engineering” S.Chand Co., 2001
3. V.K.Metha.”Principles of Electronics”,Chand Publications,2008.

## **09EE101 BASIC ELECTRICAL ENGINEERING**

**Credits: 3:0:0**

### **Course Objectives**

- To impart the basic knowledge about the Electric and Magnetic circuits.
- To inculcate the understanding about the AC fundamentals.
- To understand the working of various Electrical Machines.
- To know about various measuring instruments and house wiring.

### **Unit I: DC CIRCUITS**

Standard symbols – Units & Abbreviations – Circuit Elements – Current and Voltage Sources – Ohm's and Kirchhoff's law – Resistive circuits – Series and Parallel reduction – Voltage and Current Division – Source transformation – Star Delta Transformation

### **Unit II: MAGNETIC CIRCUITS**

Magnetic flux- flux density – reluctance – permeance-magnetic effect of electric circuit-Law of Electromagnetic induction – induced emf – self and mutual inductance – coupling co-efficient – inductance in series and parallel, Magnetic Materials.

### **Unit III: AC FUNDAMENTALS**

Sources of Electrical Energy – Thermal, Hydro and Nuclear power generating station – Transmission of Electric Power – Introduction to Alternating Quantities – Average and RMS 6.7 values – Circuit Elements – Series and Parallel Combinations – Phasor representation – Introduction to three phase system.

### **Unit IV: ELECTRICAL MACHINES**

Working principle, operation and application of DC Generator, DC Motor, Transformer, Three Phase Induction motor, Single phase Induction motor, Alternator. (Quantitative approach)

### **Unit V: MEASURING INSTRUMENTS AND HOUSE WIRING**

Classification of Instruments – Essential features of Indicating Instrument – Deflecting, Controlling and Damping Mechanism - Moving Coil instrument – Moving Iron Instrument – Induction type Instruments – examples.

Wiring materials and accessories – Types of wiring – Fluorescent lamp wiring – stair case wiring – basic principles of earthing – layout for a residential building.

### **Course Outcome**

After the completion of the course, the student should be able

- To predict the behavior of any electrical and magnetic circuits.
- To identify the type of electrical machine used for that particular application.
- To wire any circuit depending upon the requirement.

### **Text Book**

Muraleedharan K. A, Muthusubramanian R & Salivahanan S, "Basic Electrical, Electronics & Computer Engineering", Tata McGraw Hill Limited, New Delhi, 2006.

### **Reference Books**

1. Chakrabarti .A, Sudipta nath and Chandan Kumar, "Basic Electrical Engineering", Tata Mc Graw Hill Limited, New Delhi, 1<sup>st</sup> edition, 2009.
2. Edward Hughes, "Electrical Technology", ELBS, 6<sup>th</sup> edition, 2002.
3. Mittle. V.N., "Basic Electrical and Electronics Engineering", Tata McGraw Hill Edition, New Delhi, 1<sup>st</sup> edition, 2007.
4. Openshaw Taylor .E, "Utilization of Electrical Energy in SI Units", Orient Longman limited, New Delhi, 2007.



5. Delton T. Horn, Abraham Pallas, "Basic Electricity and Electronics", McGraw-Hill Limited, Europe, 1993

## **CS101 PROGRAMMING IN C**

**Credits: 4:0:0**

### **Unit I**

Introductory Concepts - Introduction to Computers– What is a Computer – Block Diagram of Computer – Computer Characteristics – Hardware vs Software – How to Develop a Program – Modes of Operation – Types of Programming Languages – Introduction to C – Desirable Program Characteristics -

Introduction to C Programming - The C Character Set – Writing First Program in C - Identifiers and Keywords – A More Useful C Program – Entering the Program into the Computer – Compiling and Executing the Program - Data Types – Constants – Variables and Arrays – Declarations – Expressions – Statements – Symbolic Constants (Chapters 1,2)

### **Unit II**

Operators and Expressions - Arithmetic Operators – Unary Operators – Relational and Logical Operators – Assignment Operators – The Conditional Operator – Library Functions – Data Input and Output – Preliminaries - Single Character Input & Output – Entering Input Data – More About scanf Function - Writing Output Data – More About printf Function – The Gets and Puts Functions – Interactive Programming – Preparing and Running a Complete C Program – Planning a C Program- Writing a C Program – Error Diagnostics – Debugging Techniques (Chapters 3-5)

### **Unit III**

Control Statements – Preliminaries - Branching – Looping – More Looping – Still More Looping - Nested Control Structures – The switch, break, continue, comma statements – The Goto Statement – Functions Defining a Function – Accessing a Function – Function Prototypes – Passing Arguments to a Function – Recursion (Chapters 6,7)

### **Unit IV**

Program Structure - Storage Classes – Automatic Variables – External Variables – Static Variables – Multifile Programs – More About Library Functions Arrays: Defining an Array – Processing an Array – Passing Arrays to Functions – Multidimensional Arrays – Arrays and Strings- Pointers - Fundamentals – Pointer Declarations – Passing Pointers to Functions – Pointers and One-Dimensional Arrays – Dynamic Memory Allocation - Operations on Pointers – Pointers and Multidimensional Arrays – Arrays of Pointers – Passing Functions to other Functions (Chapters 8-10)

### **Unit V**

Structures & Unions - Defining a Structure – Processing a Structure – User-Defined Data Types – Structures and Pointers – Passing Structures to Functions – Self Referential Structures – Unions. Data Files – Why Files - Opening and Closing a Data File – Reading and Writing a Data File – Processing a Data File – Unformatted Data Files – Concept of Binary Files -

Additional Features of C – Enumerations – Command Line Parameters (Chapters 11, 12, 14.1,14.2)

**Text Book:**

Byron S. Gottfried, Programming with C, Second Edition, 1996 (Indian Adapted Edition 2006), Tata McGraw Hill, ISBN 0-07-059369-8.

**09CS217 PROGRAMMING IN C LAB**

**Credits: 0:0:2**

1. Write a Program to find the Palindrome.
2. Write a Program using switch statement with the multiple cases (Fibonacci Series, Factorial for the Given Number, Armstrong Number or Not, Prime or Not)
3. Sorting of Numbers Using Arrays
4. Printing 10 Numbers both in Ascending and Descending.
5. Pyramid
6. Customer Account Locator.
7. Counting Number of Characters, Number and Special Characters In Given String.
8. Student Record Using Structure.
9. Print Multiplication Table In Reverse Order Using For, While Do While.
10. Matrix Addition, Multiplication Using Functions.
11. Data Files
12. Data Files.

12 Experiments will be notified by the HOD from time to time. A tentative list is mentioned above.

**MA 246 COMPLEX ANALYSIS, STATISTICS AND Z-TRANSFORMS**

**Credit: 3:1:0**

**Unit I: Analytic Functions**

Cauchy Riemann equations – Properties of analytic functions – Determination of harmonic conjugate – Milne – Thomson’s method – Conformal mappings  $w = z + a$ ,  $az$ ,  $1/z$ ,  $z^2$ , and bilinear transformation.

**Unit II: Complex Integration**

Cauchy’s theorem – Statement and application of Cauchy’s integral formulae – Taylor’s and Laurent’s expansions – Singularities – Classification – Residues – Cauchy’s residue theorem – Contour integration – Circular and semi Circular contours (excluding poles on real axis)

**Unit III: Statistics**

Moments, skewness and kurtosis (based on moments only) – Linear correlation-coefficient of correlation – rank correlation and regression lines – Theoretical Distributions – Binomial – Poisson – Normal.

#### **Unit IV: Testing of hypothesis**

Tests based on large samples - Small samples: t mean and difference of means –  $\chi^2$  test for goodness of fit and attributes and F - distribution.

#### **Unit V: Z – Transforms**

Z-transforms of standard functions, inverse Z-transform (Partial fraction expansions and residues), properties of Z-transform, Solution of difference equations.

#### **Text Book:**

1. Kandasamy.P, Thilagavathi .K and Gunavathi K., Engineering Mathematics volume II and III (6<sup>th</sup> revised Edition), S. Chand & Co., New Delhi, 2003

#### **Reference books:**

1. Kreyszig, E., “Advanced Engineering Mathematics” (8<sup>th</sup> Edition), John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2000
2. Grewal, B.S., “Higher Engineering Mathematics” (6<sup>th</sup> Edition) Khanna Publisher, New Delhi, 2001

### **10EC202 ELECTRIC CIRCUIT ANALYSIS**

**Credits: 3:1:0**

#### **OBJECTIVES:**

- To understand the basic concepts of electric circuits
- To study the various techniques which can be used to analyse electric circuits
- To understand the nature of the responses of electric circuits

#### **OUTCOME:**

- Make the students capable of applying the knowledge of circuit theory in other engineering subjects

#### **UNIT I**

##### **Basic Circuit Concepts**

Kirchoffs Laws -VI relationships of R, L and C -independent sources - dependent sources – simple resistive circuits -network reduction, Series and parallel circuits reduction, Star delta transformation voltage division rule -current division rule -source transformation.

#### **UNIT II**

##### **Sinusoidal Steady State Analysis**

Phasor- sinusoidal steady state response -concepts of impedance and admittance -analysis of simple circuits- power and power factor -series resonance and parallel resonance – bandwidth and Q factor. Solution of three-phase balanced circuits , Star connected load and delta connected load-power measurements by two wattmeter- solution of three phase unbalanced circuits, Star connected and delta connected load.

### **UNIT III**

#### **Mesh-Current And Node-Voltage Methods**

Formation of matrix equations and analysis of complex circuits using mesh-Super mesh analysis-nodevoltage analysis-Super node analysis- mutual inductance- coefficient of coupling -ideal transformer.

### **UNIT IV**

#### **Network Theorems And Applications**

Superposition theorem -reciprocity theorem –compensation theorem -substitution theorem - maximum power transfer theorem -Thevenin's theorem. -Norton's theorem and Millman's theorem with applications.

### **UNIT V**

#### **Transient Analysis**

Forced and free response of RL, RC and RLC circuits with D.C. and sinusoidal excitations- Forced and free response of RL, RC and RLC circuits with D.C. and sinusoidal excitations using Laplace transform technique.

### **TEXT BOOKS**

1. Paranjothi S.R., 'Electric Circuit Analysis', New Age International Ltd. , Delhi, 2<sup>nd</sup> Edition, 2000.
2. Sudhakar, A. and Shyam Mohan S.P., 'Circuits and Network Analysis and Synthesis' Tata McGraw Hill Publishing Company Limited, Third edition, 2007

### **REFERENCE BOOK**

1. Hyatt, W.H. Jr. and Kemmerly, J.E., 'Engineering Circuit Analysis', McGraw Hill International Editions, 1993.

## **10EC201 ELECTRON DEVICES**

**Credits: 3:0:0**

#### **Objectives:**

- To know about the internal function of Electron devices
- To know about the advanced semiconductor devices
- To know about the practical applications of devices.

#### **Outcome:**

- Able to design practical circuits and to analyse various components

### **UNIT I**

#### **Electron Ballistics**

Charged Particles – Constant electric Field – Two dimensional motions – Electrostatic Deflection in CRT – CRO – Force in magnetic Field – Motion in a magnetic field – Magnetic deflection in CRT – Combined electric and Magnetic Field.

## **UNIT II**

### **Theory of PN Junction**

Mobility and conductivity – Drift and diffusion currents - Hall effect - Continuity equation – PN junction – Open circuit junction – Depletion Region – Barrier Potential. Transition and diffusion capacitance.

## **UNIT III**

### **Theory of semiconductor devices**

Forward and Reverse characteristics of pn diode– Diode Equation– EberMoll equation – Transistor hybrid model, determination of hybrid parameters, measurement of hybrid parameters, Miller's theorem.

## **UNIT IV**

### **Special semiconductor diodes**

SCR: Construction- Static- Characteristics, Zener diodes – Schotky Barrier diode – Tunnel diodes – DIAC – TRIAC – Gunn diodes - Varactor diode.

## **UNIT V**

### **Special Semiconductor Devices**

Photo diodes –Photo transistors – LED – LCD – optocouplers –Digital electronic display-plasma display, nano crystal display.

## **TEXT BOOKS**

1. Jacob Millman, Christos C Halkias, Satyabrata Jit, "Electronic Devices & Circuits", Tata McGraw Hill, 2008.
2. Albert Malvino, David A Bates, "Electronic Principles", Tata McGraw Hill, Seventh Edition, 2008.

## **REFERENCE BOOKS**

1. David.A.Bell, "Electronic Devices & Circuits ", PHI, 1998.
2. Robert Boylestad, "Electronic Devices & Circuit Theory", Sixth Edition, PHI, 2002.
3. Charles A Schuler, Roger L Tokheim, "Electronics Principles and Applications", Tata McGraw Hill, Sixth edition, 2003.

## **EC284 DIGITAL ELECTRONICS**

**Credits: 3:1:0**

### **Unit I : Number Systems & Boolean Algebra**

Review of binary, octal, & hexadecimal number systems-representation of signed numbers-floating point number representation-BCD-ASCII-EBCDIC-Excess 3 codes-gray code-error detecting & correcting codes. Boolean Algebra:Postulates & theorems of Boolean Algebra – canonical forms –simplification of logic functions using karnaugh map Quine Mcclausky method.

## **Unit II : Combinational Logic Design**

Logic gates –implementation of combinational logic functions – encoders & decoders – multiplexers & demultiplexers –code converters – comparator - half adder, full adder – parallel adder – binary adder – parity generator/checker – implementation of logical functions using multiplexers.

## **Unit III :Counters &Registers**

RS, JK, JK Master–slave, D&T flip flops – level triggering and edge triggering – excitation tables –asynchronous & synchronous counters – modulus counters–shift register –Johnson counter- ring counter – timing waveforms-counter applications.

## **Unit IV: Synchronous Sequential Logic Design**

Basic models of sequential machines – concept of state table – state diagram – state reduction through partitioning & implementation of synchronous sequential circuits

## **Unit V: Digital Logic Families**

LOGIC FAMILIES: RTL, DTL, TTL families, schottky – clamped TTL, Emitter Coupled (ECL), Integrated Injection Logic (IIL), MOS inverters, CMOS inverters, comparison of performance of various logic families.

### **Text Book**

1. Morris Mano, "Digital logic and computer Design", 3<sup>rd</sup> edition Prentice Hall Of India, 2002.

### **Reference Books**

1. Tokheim R.L, "Digital Electronics-Principles and Applications", Tata McGraw Hill, 1999.
2. JAIN R.P, "Modern Digital Electronics", third edition, Tata Mcgraw Hill, 2003
3. Floyd T.L., "Digital Fundamentals ", Prentice Hall, 9<sup>th</sup> edition, 2006
4. Alan B Marcovitz, "Introduction to Logic and Computer Design", Tata McGraw Hill, 2003.

## **09EC221 ELECTROMAGNETIC FIELDS**

**Credits: 3:1:0**

### **Objective**

To get knowledge about electric and magnetic fields

### **Outcome**

Students can make use of electromagnetic field concepts in wave guide applications.

## **UNIT I**

### **Static Electromagnetic Fields**

Introduction to co-ordinate system - Gradient, Divergence - Curl, Divergence Theorem - Stoke's Theorem - Coulomb's Law - Electric field Intensity - Principle of superposition - Electric Scalar potential - Line charge distribution by Moment method - Electric flux Density - Gauss Law and its applications - Field Computations and Problems.

## **UNIT II**

### **Static Magnetic Field**

Magnetic field of a current carrying element - Ampere's Force law - The Biot-Savart Law - Magnetic Flux density - Gauss law for magnetic fields - Torque on a loop - Magnetic moment, Ampere's Law and Magnetic field intensity - Magnetomotive force - Field cells and permeability - Vector potential - Field computation and problems.

## **UNIT III**

### **Electric Field In Dielectrics**

Permittivity – Polarization - Boundary relation – Capacitance - Dielectric strength - Energy and energy density - Poisson's and Laplace equations and applications - Electric Current - Current Density - Ohms law at a point - Resistance and Conductance - Continuity relations for current problems.

## **UNIT IV**

### **Magnetic Field In Ferromagnetic Materials**

Magnetic materials - Magnetic dipoles - Loops and Solenoids – Magnetization – Inductance - Energy in an Inductor and Energy Density - Boundary relations - Ferro magnetism – Hysteresis - Reluctance and Permeance - Problems.

## **UNIT V**

### **Time Varying Electric And Magnetic Fields**

Faraday's Law - Transformer and Motional Induction - Maxwell's equation from Faraday's Law - Self and Mutual Inductance - Displacement current - Maxwell's equation from Ampere's Law and its inconsistency - Boundary relation - Poynting Vector - Comparison of field and circuit theory - Circuit Application of Poynting Vector.

### **Text Books**

1. John D. Kraus, "Electromagnetics", McGraw Hill, 2003.
2. David K. Chang, " Field and Wave Electromagnetics ", Second edition, Addison Wesley, New Delhi,2001.

### **Reference Book**

Hayt W.H., "Engineering Electromagnetics", McGraw Hill, 2003.

## **10EN203 ADVANCED ENGLISH**

### **Credits: 2:0:0**

### **Course Objectives**

- To make the learners aware of the importance of correct English both in writing and speaking contexts
- To enable the learners to acquire the additional skills required to perfect their language competency

## **UNIT I**

Role of language in communication- basics of communication – types and barriers — comparison of oral and written communication – error analysis in English grammar

## **UNIT II**

Body language and communication in English – types of non-verbal communication – oral presentation exercises – telephone conversation – communication errors in English

## **UNIT III**

Role of English in interviews - interview techniques – question types – interpersonal communication – vocabulary for specific interview situations

## **UNIT IV**

Business letters: Enquiry letter, Quotation letter, Purchase letter & Sales letter – Sales advertisement – headline writing - overcoming errors in sentence construction

## **UNIT V**

Email messages - Circular - Memo – Minutes – Report writing: types and features – proposal writing – resume: planning and writing

### **Text book:**

1. Soundararaj, Francis. Speaking and writing for effective business communication. Macmillan: new Delhi, 2007.

### **Reference Books:**

1. Mohan, Krishna & Banerji, Meera. Developing Communication Skills. Macmillan: New Delhi, 2009
2. Raman, Meenakshi and Sharma, Sangeeta. Technical Communication: Principles and Practice. OUP: New Delhi, 2004
3. Pal, Rajendra & Korlahalli, J.S. Essentials of Business Communication. New Delhi: Sultan Chand & Sons: New Delhi, 2005

## **09EC230 DIGITAL ELECTRONICS LAB**

### **Credits: 0:0:2**

1. Realization of logic gates
2. Half adder & full adder
3. Half subtractor & full subtractor
4. Multiplexer & demultiplexer
5. Encoder & decoder
6. Odd and even parity generator and checker
7. Bcd to excess three converter
8. Code conversion
9. Flip flops
10. Shift register



11. Counters
12. Comparator

### **10EC206 ELECTRON DEVICES LAB**

**Credits: 0:0:2**

1. Study of CRO
2. Characteristics of PN Junction diode, Zener diode
3. Characteristics of Photo diode
4. Characteristics of BJT
5. Characteristics of Triac, SCR
6. DC Analysis of Electric Circuits
7. AC Analysis of Electric Circuits
8. Rectifiers
9. Characteristics of UJT, FET

Implementation of the above using PSPICE & Hardware

### **MA247 FOURIER SERIES , TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS**

**Credits: 3:1:0**

#### **Unit I: Fourier series**

Euler's formula – Dirichlet's conditions convergence statement only – change of interval odd and even functions. Half range series – RMS value, Parseval's formula – complex form of Fourier series – harmonic analysis.

#### **Unit II: Partial Differential Equations**

Formation of equations by elimination of arbitrary constants and arbitrary functions – solution of equations – general, particular and complete integrals – Lagrange's linear equation – standard type of first order equations – second order and higher order equations with constant coefficients, homogeneous and nonhomogeneous equations.

#### **Unit III: One-Dimensional Wave Equations and Heat Equation**

One dimensional wave equation – transverse vibration of finite elastic string with fixed ends – boundary and initial value problems – Fourier series solution. One dimensional heat equation – steady and unsteady states, boundary and initial value problems – Fourier series solution. (Proofs and derivations not needed)

#### **Unit IV: Two Dimensional Heat Equation**

Two dimensional heat equations – steady state heat flow in two dimensions – Laplace Equations in Cartesian and polar co ordinates Fourier series solution. (Proofs and derivations not needed)

### **Unit V: Fourier transforms**

The infinite Fourier transform – sine and cosine transforms – properties (Proof not needed) – inversion theorem – Finite Fourier Transform – sine and cosine transforms – convolution theorem – Parseval's identity – transform of derivatives. (Proofs and derivations not needed)

#### **Text Books:**

1. Kandasamy, P., "Engineering Mathematics", S. Chand & Co., New Delhi, Volume – III, 1996.
2. Venkataraman, M.K., "Higher Engineering Mathematics", National Publishing Co., 1992.

#### **Reference Books:**

1. Erwin Kreyzig, "Advanced Engineering Mathematics", Wiley & Co, 1994.
2. Speigal, "Advanced Engineering Mathematics", Schaum's Series, 1995.

## **EC288 SOLID STATE CIRCUITS**

**Credits: 4:0:0**

### **UNIT I: Rectifiers and Filters**

Diode as Rectifiers – Half wave rectifier – Full wave rectifier – ripple factors – DC and AC components in rectifiers – Capacitor and inductor filters – Analysis and design of L section and Pi section filters – Regulators: Voltage and current regulators – Short circuit and over load protection.

### **UNIT II: Transistor And FET Biasing**

Transistor Biasing: Location of the Q point – Fixed bias circuit – Collector to base circuit – Self bias circuit – Graphical DC bias analysis – Design of DC bias circuit.  
FET biasing - Self biasing – Voltage feedback biasing.

### **UNIT III: Amplifiers**

Frequency response – RC coupled and Transformer coupled amplifiers – Single stage – Multistage amplifiers – Wideband amplifiers – Cascode – Video amplifiers – Peaking circuits – Power amplifiers : Class A, AB, B and class D amplifiers – Distortion – Push pull amplifiers – Complementary symmetry.

### **UNIT IV: Feedback Amplifiers & DC Amplifiers**

Positive and Negative feedback – Current and Voltage feedback – Effect of feedback on gain – Input and Output impedance – Noise and Distortion. DC amplifiers : Drift in amplifiers – Differential amplifiers – Chopper Stabilization.

### **UNIT V: Oscillators And Tuned Amplifiers**

Barkhausen criterion – RC and LC Oscillators – Crystal oscillators – Tuned amplifiers – Single tuned – Double tuned – Stagger tuned.

### **Text Books**

1. Millman .J. & Halkias.C , "Electronic Devices And Circuits", Tata McGraw Hill, 2007.
2. Mathur S.P,m Kulshrestha D.C., Chanda P.R., “Electronic Devices Applications and Integrated Circuits, Umesh Publications, 2004.

### **Reference Books**

1. Malvino A.P., “Electronic Principles”, McGraw Hill International, 2005.
2. Boylestred R and Nashelsky, “Electronic Devices and Circuits Theory”, PHI, 2005.
3. Allen Moltershed, “Electronic Devices and Circuits”, PHI, 1998.

## **09EC220 LINEAR INTEGRATED CIRCUITS AND APPLICATIONS**

**Credits: 3: 1: 0**

### **Objective**

To get knowledge about IC fabrication and applications

### **INFERENCE**

Students will be able to design circuits using ICs

### **UNIT I**

#### **Integrated Circuit Technology**

Monolithic Integrated Circuit Technology – Planar process – Bipolar Junction Transistor fabrication – Fabrication of FET’s – CMOS Technology – Monolithic diodes – Metal – Semiconductor contact – Integrated Circuit Resistors – Integrated Circuit Capacitors – Integrated Circuit Packaging – Characteristics of Integrated Circuit Components –Microelectronic Circuit Layout.

### **UNIT II**

#### **OP-AMP Characteristics And Applications**

Characteristics of ideal op-amp. Pin configuration of 741 op-amp. Bias, offsets and drift, bandwidth and slew rate. Frequency compensation. Applications: inverting and non-inverting amplifiers, inverting and non-inverting summers, difference amplifier, differentiator and integrator, Log and antilog amplifiers. Multiplier and divider, analog computers.

### **UNIT III**

#### **Comparators And Signal Generators**

Comparators, regenerative comparators, input output characteristics, astable multivibrator, Monostable multivibrator, Triangular wave- generators, RC-phaseshiftoscillator,Wein’s bridge oscillator.

#### **Voltage Regulator**

Series op amp regulator, IC voltage regulator,723 general purpose regulator, Switching Regulator.

## **UNIT IV**

### **Active Filters, Timers And Multipliers**

Low pass, High pass, Band pass and Band Reject filters, Butterworth, Chebychev filters, first and second order filters-switched capacitor filters.555 Timer functional diagram, monostable and astable operation, multiplier -application.

## **UNIT V**

### **PLL, ADC And DAC**

PLL- basic block diagram and operation, capture range and lock range simple applications of PLL, AM detection, FM detection and FSK demodulation. Weighted resistor DAC, R-2R and inverted R-2R DAC, monolithic DAC. Flash ADC, counter type ADC, successive approximation ADC, dual slope ADC, conversion times of typical ADC.

### **Text Book**

1. Roy Choudhury.D., Shail Jain, "Linear Integrated Circuits", New age international publications,Third Edition,2007.

### **Reference Books**

1. Gayawad.A.R., "Op-Amps & Linear IC's", PHI, fourth edition,2004
2. Coughlin.Frand.Driscoll.F.F., "Operational Amplifiers & Linear IC's", PHI, 1997.
3. Franco, "Design With Operational Amplifier And Analog Integrated Circuits", TMH, 1998.

## **EE261 C++ AND DATA STRUCTURES**

**Credits: 3:0:0**

### **Unit I: Introduction to Data Structures**

Linked list, Single linked list, Doubly linked list, Circular Linked list, Stack, Queue, Trees

### **Unit II: Sorting and Searching Techniques**

Sorting, Bubble sort, Insertion Sort, Selection Sort, Quick Sort, Heap Sort, Merge Sort. Searching, Binary Tree Search, Linear Search, Binary Search.

### **Unit III: Objects and Classes**

A Simple class, C++ objects as physical objects, C++ Objects and Data types, Object as function argument, constructors, as function argument, Overloaded Constructors, Copy Constructors, Returning objects from functions, structures and classes, Static class data, const and classes, Arrays and Strings.

### **Unit IV: Operator Overloading**

Overloading Unary and Binary Operator, data conversion, and Pitfalls, Inheritance: derived class and base class, derived class constructors, Overloading member functions, class hierarchies, public and private inheritance, level of inheritance, multiple inheritance. Pointers: address and pointers, pointers and arrays, pointer and c-type strings, new and delete operator, pointers to pointer.

### **Unit V: Virtual Functions**

Virtual functions, Friend functions, Static functions, this pointer. Streams and files: stream classes, stream errors, disk file I/O with streams, file pointers, error handling in file I/O. Templates and exception: function templates, class templates, exceptions.

### **Text Books**

1. Robert Lafore, “Object Oriented Programming in C++”, Third Edition, Galgotia Publishers, Pune 1999.
2. Jean-Paul Tremblay and Paul G Sorenson, “An Introduction to Data Structures with Applications”, Mc Graw- Hill Publishing Company Limited, New Delhi, 2<sup>nd</sup> Edition, 1994

### **Reference Books**

1. Herbert Schmidt, “ C++, The Complete Reference” , Mc Graw-Hill Publishing Company Limited, New Delhi, 3<sup>rd</sup> Edition, 1999
2. Sartaj Sahni, “Data Structures, Algorithms and Applications in C++”, Mc Graw-Hill Publishing Company Limited, New York, 3<sup>rd</sup> Edition, 1998.

## **10VE201 VALUE EDUCATION**

**Credits: 2:0:0**

### **Course Objectives:**

1. To give an understanding of life in all its complexities and to provide practical opportunities and mold students to meet the needs of the people.
2. To sharpen the capacity of the student in enabling them to make right moral and ethical choices,
3. To develop professionals with social concern reaching out to the nation as leaders and serving the needy with divine grace and power.

### **UNIT-I**

Introduction: Vision and Mission of Karunya. Value Education, Purpose and priority areas of Value Education. Importance of Values in Life – what is a Value system? Types of values, Value inculcation process, Clarifying values - Importance of Values in Life – what is a Value system? What kinds of values need to be inculcated eg. Ethical, moral and spiritual instead of materialistic values, value inculcation, trend of values such as a permissive culture. Character Building – advantages of good character, importance of trust, honesty, integrity, morality, and reliability as qualities of a good character. Building Relationship – Objectives, Ways to improve relationship, Issues that hinder relationship, Tools for effective relationship

### **UNIT- II**

Personality Development- definition, types and ways to improve Personal effectiveness. Purpose and philosophy of Life – Learning the purpose driven life, Decision making skills, Introspection, Moralization of Desires. Leadership – Qualities of a good leader, Types and

Principles. Communication – Principles and Types, advantages and disadvantages to communication. Communication skills

### **UNIT-III**

Foundation for success – Definition, Approaches for successful living, overcoming obstacles for success, and winning strategies – Desire, commitment, responsibility hard work and discipline. Emotions detrimental to personal growth - Hurt feelings – Dealing with anger, guilt, depression and stress.

Attitude – Definition, types, factors and steps to build positive attitude, benefits of positive attitude and consequences of negative attitude. Self-Esteem – Definition, Types, Characteristics of high and low self-esteem, Causes of low self-esteem and steps to build high self-esteem.

### **UNIT – IV**

Biographical Studies –Founder Dr. D. G. S. Dhinakaran, Mother Teresa, Ida Scudder, William Carey, Amy Carmichael, George Muller – Their life and secret to success, values inculcated by such personalities. Social Issues – Corruption, Cyber Crime, AIDS Awareness, and Substance abuse-concept, source, consequences and remedy - Jesus Calls Ministry – History and Developments – 21 facets of Jesus Calls ministry.

### **UNIT – V**

Sin and Temptation – Nature and Sources of sin, Ways to overcome temptation. Inner Life Integrity – Understanding Personality, Self-centered and God-centered Personality, Integrity in Time, Talent and Treasures. Human Resource Development – Eradication of worries, Benefits of Blessings, Greatness of Friendship, Purity in thought, Love and Compassion. Peace and Harmony – Individual Peace, Seven Steps to individual peace, Promoting World peace, Unity in diversity.

### **Reference Books:**

1. C. Maxwell John. (2001). Power of Leadership, USA: River Oak Publishing.
2. Geoffrey Hanks. (1992). 70 Great Christians, Secunderabad: OM Books.
3. Khera Shiv. (1988). You Can Win, New Delhi: Mac Millan India Limited.
4. Khera Shiv. (2003). Living With Honour, New Delhi: Mac Millan India Limited.
5. Mani Jacob, ed., (2002). Resource for Value Education, New Delhi: Institute of Value Education.

## **10VE202 VALUE EDUCATION**

**Credits: 2:0:0**

### **Course Objectives:**

1. To give an understanding of life in all its complexities and to provide practical opportunities and mold students to meet the needs of the people.

2. To sharpen the capacity of the student in enabling them to make right moral and ethical choices,
3. To develop professionals with social concern reaching out to the nation as leaders and serving the needy with divine grace and power.

## **UNIT-I**

Introduction: Vision and Mission of Karunya. Value Education, Purpose and priority areas of Value Education. Importance of Values in Life – what is a Value system? Types of values, Value inculcation process, Clarifying values Importance of Values in Life – what is a Value system? What kinds of values need to be inculcated eg. Ethical, moral and spiritual instead of materialistic values, value inculcation, trend of values such as a permissive culture. Character Building – Advantages of good character, Importance of trust, honesty, integrity, morality, and reliability as qualities of a good character. Building Relationship – Objectives, Ways to improve relationship, Issues that hinder relationship, Tools for effective relationship

## **UNIT- II**

Personality Development- Definition, Types and ways to improve Personal effectiveness. Purpose and philosophy of Life – Learning the purpose driven life, Decision making skills, Introspection, Moralization of Desires. Leadership – Qualities of a good leader, Types and Principles. Communication – Principles and Types, advantages and disadvantages to communication. Communication skills

## **UNIT-III**

Foundation for success – Definition, Approaches for successful living, overcoming obstacles for success, and winning strategies – Desire, commitment, responsibility hard work and discipline. Emotions detrimental to personal growth - Hurt feelings – dealing with anger, guilt, depression and stress. - Attitude – Definition, types, factors and steps to build positive attitude, benefits of positive attitude and consequences of negative attitude. Self-Esteem – Definition, Types, Characteristics of high and low self-esteem, causes of low self-esteem and steps to build high self-esteem.

## **UNIT – IV**

Biographical Studies –Founder Dr. D. G. S. Dhinakaran, Mother Teresa, Ida Scudder, William Carey, Amy Carmichael, George Muller – Their life and secret to success, values inculcated by such personalities. Social Issues – Corruption, Cyber Crime, AIDS Awareness, and Substance abuse-concept, source, consequences and remedy - Jesus Calls Ministry – History and Developments – 21 facets of Jesus Calls ministry.

## **UNIT – V**

Concept of God –Understanding and knowing God, Nature of God , Concept of Holy Spirit – The Gifts and the Fruit of the Holy Spirit, Concept of Man – His personality and accountability. Communication with God and Personal Devotion – Prayer, Quiet time and Practical Christian Living.- Sin and Temptation – nature and sources of sin, Ways to overcome temptation. - Inner

Life Integrity – Understanding Personality, Self-centered and Christ-centered Personality, Integrity in Time, Talent and Treasures.

**Reference Books:**

1. C. Maxwell John. (2001). Power of Leadership, USA: River Oak Publishing.
2. Dr. D. G. S. Dhinakaran. Gifts of the Holy Spirit, Chennai: Jesus Calls.
3. E. M. Bounds. (2006). How to Pray Effectively, USA: Whitaker House.
4. Geoffrey Hanks. (1992). 70 Great Christians, Secunderabad: OM Books.
5. Khera Shiv. (1988). You Can Win, New Delhi: Mac Millan India Limited.
6. Mani Jacob, ed., (2002). Resource for Value Education, New Delhi: Institute of Value Education.
7. Valentine Davidar. (2000), Being Made whole, Hyderabad: Haggai Institute.

**EE 295 NETWORK ANALYSIS AND SYNTHESIS**

**Credits: 3:1:0**

**Unit I: S-Domain Analysis**

S-domain network -driving point and transfer impedances and their properties -transform network analysis -poles and zeros of network functions -time response from pole-zero plots.

**Unit II: Frequency Domain Analysis**

Amplitude and Phase Characteristics from pole zero plot- Responses due to exponential and sinusoidal sources- Magnitude and phase plots for RL & RC networks- Complex Loci for RL & RC and RLC networks- Plots based on s-plane phasors.

**Unit III: Network Topology**

Network graph, Tree, incidence matrix – fundamental cut-sets and fundamental loops -tie set and cut-set schedules -v-shift and I-shift - Formulation of equilibrium equation on loop basis and node basis, Formulation of equilibrium equation in matrix form- Duality, Construction of a dual of a network.

**Unit IV: Two-Port Networks & Filters**

Characterization of two-port networks in terms of  $z$ ,  $y$ ,  $h$ -and  $T$ ,  $g$  and inverse  $T$  -parameters - Relations between network parameters- Network Equivalents -Analysis of  $T$ ,  $\pi$ , ladder, bridged-T and lattice networks -Transfer function of terminated two-port networks.

Filters and attenuators -Design of constant  $k$ ,  $m$ -derived and composite filters  
Design of symmetrical and asymmetrical attenuators ( $T$  and  $\pi$ )

**Unit V: Elements of Network Synthesis**

Realisability of one-port network -Hurwitz polynomials and properties -p. r. functions and properties -synthesis of RL, RC and LC one-port networks.



**Text Book**

1. Kuo. F.F., “Network Analysis and Synthesis”, Wiley International Edition, New Delhi, 2<sup>nd</sup> Edition, 1966.

**Reference Books**

1. Paranjothi,S.R., “Electric Circuit Analysis”, New age International Publishers Limited, New Delhi
2. 2<sup>nd</sup> Edition, 2000.
3. Sudhakar, A., and Shyammohan, “Circuits and Networks Analysis and Synthesis”, Tata Mc Graw- Hill Publishing Company Limited, New Delhi, 1994.
4. M.L.Soni and J.C.Gupta, “A Course in Electrical Circuit Analysis”, Dhanapat Rai & Sons Limited, New Delhi, 3<sup>rd</sup> Edition 1981.
5. Umesh Sinha, “Network Analysis and Synthesis”, Sataya Prakasan Publishers Limited, New Delhi, Fifth edition , 1992.
6. Sivanandam.S.N., “Electric Circuit Analysis”, Vikas Publishing House Private Limited, New Delhi, 2001

**10EC207 ELECTRONICS AND INTEGRATED CIRCUITS LAB****Credits: 0:0:2****LIC Experiments**

1. Design of Basic Operator circuits using op-amp
  - a. Adder
  - b. Subtractor
  - c. Differentiator
  - d. Integrator
2. Design of astable multivibrator and Schmitt trigger using 555 Timer
3. Design of active filters using op-amp
4. Design of Weinbridge Oscillator
5. Design of Digital Analog Converter
6. Precision rectifiers using op-amp

**Electronics Experiments**

7. Half wave & Full wave Rectifiers
8. Voltage Regulator
9. Single stage amplifier
10. Single tuned Amplifier
11. RC Phase shift Oscillator
12. Differential Amplifier

## **EE278 C++ AND DATA STRUCTURES LABORATORY**

**Credits 0:0:2**

12 Experiments will be notified by the HOD from time to time

## **09EC222 COMMUNICATION THEORY AND SYSTEMS**

**Credits: 4:0:0**

### **Objective**

To get knowledge about various modulation techniques, transmitters, receivers  
Inference

### **Outcome**

Students can design communication circuits

### **UNIT I**

#### **Base Band Signals and Systems**

Introduction, Definition of communication, Communication system block diagram – Need for wireless communication – Need for modulation – General definition of modulation – Types of modulation. General concepts about base band signal and bandwidth of signals.

### **UNIT II**

#### **Analog Modulation Techniques**

Amplitude Modulation: Introduction – Theory of Amplitude Modulation – AM power calculations – AM with a complex wave – Need for suppression of carriers – Suppressed carrier systems (DSB SC, SSB & VSB systems). Angle Modulation: Theory of Frequency modulation, Mathematical analysis of FM and representation of FM – Spectra of FM signals – Narrow band FM and wide band FM. Theory of PM, PM obtained from FM – Comparison of AM & FM, Comparison of PM & FM.

### **UNIT III**

#### **Modulation and Demodulation Techniques**

Amplitude Modulation: Introduction – generation of AM signal – low level and high level modulation – square law diode modulation – AM in amplifier circuits – suppressed carrier AM generation (Balanced Modulator, Ring Modulator, Product Modulator)

AM Demodulation: Square law detector, envelope (or) diode detector – distortion in diode detectors – synchronous demodulation. Frequency Modulation: Generation FM signal by Direct method (Varactor diode modulator) – Indirect generation of FM (Armstrong method, RC phase shift method). FM Demodulation: Direct methods frequency demodulation (Travis detector, Balanced slope detector, Foster seeley discriminator, ratio detector, limiters), Indirect methods (Detection using PLL, zero crossing detector)

## **UNIT IV**

### **AM & FM Transmitters and Receivers**

AM Transmitter and Receiver: Allocation of frequency for various services- AM transmitters- block schematic- high level and low level transmitters- class C- R.F tuned amplifiers- frequency multiplier- SSB transmitters- ISB transmitters. Tuned radio frequency receivers – Super heterodyne receiver- Basic elements of AM super heterodyne receiver: - RF amplifier, Classes of operation of RF amplifier, Image frequency rejection – frequency conversion – IF amplifier – tracking and alignment – merits and demerits of different receivers. Characteristics of Receivers. FM Transmitter and Receivers: Block diagram of FM transmitter and methods of frequency stabilization – Armstrong FM transmitter system – Pre-emphasis. Block diagram of FM receiver – De-emphasis – RF amplifier – AFC – Diversity reception techniques – Spurious response in receivers.

## **UNIT V**

### **Noise**

Noise and Interference- Thermal and Shot noise- Signal to Noise ratio - Noise figure – Noise temperature. Noise in AM and FM: SSB-SC - calculation of output signal to noise ratio. DSBS C calculation of output signal to noise ratio-figure of merit-frequency modulation-calculation of output signal to noise ratio-comparison of SNR with respect to AM and FM.

### **Text Books**

1. Anokh Singh, “Principles of Communication Engineering” S.Chand Co., 2001
2. Roody & Coolen, “Electronic Communication”, PHI, 4th Edition, 2003

### **Reference Books**

1. Taub and Schilling – “Principles of Communication Systems”, Mc Graw Hill, 2nd Edition, 25<sup>th</sup> Reprint, 2003
2. G.Kennedy, “Electronic Communication Systems”, Mc Graw Hill, 4th Edition, 8th Reprint, 2003

## **EC280 TRANSMISSION LINES AND WAVE GUIDES**

**Credits: 4:0:0**

### **Article I. Unit I: Transmission Line Theory**

Different types of transmission lines – Characteristic impedance – The transmission line as a cascade of T-Sections - Propagation Constant.

General Solution of the transmission line – The two standard forms for voltage and current of a line terminated by an impedance – physical significance of the equation and the infinite line – The two standard forms for the input impedance of a transmission line terminated by an impedance – reflection coefficient – wavelength and velocity of propagation.

Waveform distortion – distortion less transmission line – The telephone cable – Inductance loading of telephone cables.

Input impedance of lossless lines – reflection on a line not terminated by characteristic impedance - Transfer impedance – reflection factor and reflection loss – T and  $\Pi$  Section equivalent to lines.

## **Article II. Unit II: The Line at Radio Frequencies**

Standing waves and standing wave ratio on a line – One eighth wave line – The quarter wave line and impedance matching – the half wave line.

The circle diagram for the dissipationless line – The Smith Chart – Application of the Smith Chart – Conversion from impedance to reflection coefficient and vice-versa. Impedance to Admittance conversion and vice-versa – Input impedance of a lossless line terminated by an impedance – single stub matching and double stub matching.

## **Article III. Unit III: Guided Waves**

Waves between parallel planes of perfect conductors – Transverse electric and transverse magnetic waves – characteristics of TE and TM Waves – Transverse Electromagnetic waves – Velocities of propagation – component uniform plane waves between parallel planes – Attenuation of TE and TM waves in parallel plane guides – Wave impedances.

## **Article IV. Unit IV: Rectangular Waveguides**

Transverse Magnetic Waves in Rectangular Wave guides – Transverse Electric Waves in Rectangular Waveguides – characteristic of TE and TM Waves – Cutoff wavelength and phase velocity – Impossibility of TEM waves in waveguides – Dominant mode in rectangular waveguide – Attenuation of TE and TM modes in rectangular waveguides – Wave impedances – characteristic impedance – Excitation of modes.

## **Article V. Unit V :Circular Wave Guides and Resonators**

Bessel functions – Solution of field equations in cylindrical co-ordinates – TM and TE waves in circular guides – wave impedances and characteristic impedance – Dominant mode in circular waveguide – excitation of modes – Microwave cavities, Rectangular cavity resonators, circular cavity resonator, semicircular cavity resonator, Q factor of a cavity resonator for TE<sub>101</sub> mode.

### **Text Books**

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

### **Reference Books**

1. Ramo, Whineery and Van Duzer: “Fields and Waves in Communication Electronics” John Wiley, 2003.
2. David M.Pozar: Microwave Engineering – 2<sup>nd</sup> Edition – John Wiley.
3. David K.Cheng,Field and Waves in Electromagnetism, Pearson Education, 1989.

## **EC289 PULSE AND WAVE SHAPING CIRCUITS**

**Credits: 4:0:0**

### **Unit I : Linear Wave Shaping Circuits**

High pass and low pass RC circuits – response for step, pulse, square wave, ramp and exponential signals as input – High pass circuit as a differentiator – low pass circuit as an integrator – attenuators – Non Linear Wave Shaping Circuits: Diode and transistor - clippers – Clamping Circuits – clamping theorem – practical clamping circuits.

## **UNIT II : Bistable And Schmitt Trigger Circuits**

Fixed and self bias bistable circuits – Loading – Commutating capacitors – Triggering methods – Design of bistable circuits – Schmitt trigger circuit, critical voltages, Design example – Applications: Comparator, Sine wave to square wave converter.

## **UNIT III : Monostable And Astable Circuits**

Collector and emitter coupled monostable circuits – Waveforms – equation for delay – collector coupled, emitter coupled astable circuits – VCO – Design examples for monostable and astable circuits.

## **UNIT IV : Voltage And Current Time Base Generators**

General feature of a time base signal – exponential sweep circuit – A transistor constant current sweep – Miller and Bootstrap time base generators – General considerations – Current time base generator: A simple current sweep – A transistor current time base generator – Transistor Television sweep circuit.

## **UNIT V : Blocking Oscillator Circuits And Sampling Gates**

Blocking oscillators – Triggering Transistor blocking oscillators – Base and emitter timings – Triggering circuits – Astable blocking oscillators – Sampling gates: Unidirectional and bi-directional sampling gates using diodes and transistors.

### **Text Book**

1. Millman & Taub “Pulse Digital and Switching Waveforms”, McGraw Hill, Second Edition 2007.

### **Reference Books**

1. Ronald Tocci, “Fundamentals of Pulse and Digital Circuits”, Merrill Publishing Company, Third Edition, 1997.
2. David A Bell, “Solid State Pulse Circuits”, Prentice Hall Inc, Fourth Edition, 2005.

## **EC285 SIGNALS AND SYSTEMS**

**Credits: 3:1:0**

### **Unit I: Introduction**

Continuous Time (CT) signals – CT signal operations – Discrete Time(DT) signals – Representation of DT signals by impulses – DT signal operations – CT and DT systems – Properties of the systems – Linear Time Invariant(LTI) and Linear Shift Invariant(LSI) systems – Continuous and Discrete Convolutions – CT system representations by differential equations – DT System representations by difference equations.

## **Unit II: Fourier Analysis of Ct Signals and Systems**

Fourier series representation of periodic signals – Properties – Harmonic analysis of LTI systems – Convergence of Fourier series – Representation of a periodic signals by Continuous Time Fourier Transform (CTFT) – Properties – Frequency response of systems characterized by Differential Equations – Power and Energy Spectral Density–Parseval’s Relation.

## **Unit III: Sampling and Laplace Transform**

Representation of CT signals by samples – Sampling Theorem – Sampling Methods – Impulse, Zero – order hold method – Reconstruction of CT signal from its samples – Effect of under sampling – Aliasing Error – Discrete Time processing of CT signals. Analysis and Characterization of LTI system using the Laplace Transform, System function algebra and block diagram representation – Unilateral Laplace transform

## **Unit IV: Fourier Analysis of DT Signals and Systems**

Discrete Time Fourier series representation of DT periodic signals – Properties – Representation of DT aperiodic signals by Discrete Time Fourier Transform(DTFT) – Properties – Frequency response of systems characterized by Difference Equations – Power and Energy Spectral Density concepts related to DT signals–Parseval’s Relation.

## **Unit V: Transform Operations of DT Signals and Systems**

Z transforms and its properties – Inverse Z transform – Solution of Difference equations – Analysis of LSI systems using Z transform.

### **Text Books**

1. Alan V Oppenheim, Alan S Wilsky and Hamid Nawab S, “Signals & Systems”, II Edition, PHI, New Delhi, 1997.
2. Simon Haykin and Barry Van Veen, “Signals & Systems”, Second Edition, John Wiley and Sons Inc., 2005

### **Reference Books**

1. Ashok Ambardar, “Introduction to Analog and Digital Signal Processing”, PWS Publishing Company, Newyork, 1999.
2. Samir S Solimon and Srinath M.D., “Continuous and Discrete Signals and Systems”, II Edition, PHI, 1998.
3. Rodger E Zaimer and William H Tranter, “Signals & Systems – Continuous and Discrete”, McMillan Publishing Company, Fourth edition, 1998.

## **09EC233 MICROPROCESSORS AND MICRO CONTROLLERS**

**Credits: 4:0:0**

### **Objective**

To learn about the basics of microprocessors and microcontroller with applications.

### **Outcome**

On successful completion of the subject, students can able to write the assembly language coding for various applications

### **UNIT I: 8085 Microprocessor**

Organization of 8085 microprocessor –Instruction set-Addressing modes- Assembly Language programming-machine cycles-Read, Write – Interrupt acknowledge – Bus Cycles.

### **UNIT II: 8086 Microprocessor**

Organization of 8086 microprocessor – memory segmentation – Addressing bytes and Words – Address formation –Address modes in 8086 – Assembly language programming – Minimum mode and maximum mode

### **UNIT III : Microprocessor Interfacing techniques:**

Programmable parallel ports-8255 PPI -8253 programmable interval timer.  
8251A Programmable communication interface -8279 Programmable Keyboard/display interface- - 8259A Programmable interrupt controller-

### **UNIT IV: Microcontroller 8051**

Organization of 8031 and 8051 microcontrollers – I/O ports-External memory –  
– Interrupts – Instruction set – Addressing Modes – Assembly language programming,

### **UNIT V: Applications**

Counter and Timers – Serial data input and output – Interrupts – simple applications - LCD, Keyboard interfacing, ADC, Sensor interfacing and Signal conditioning,

### **Text Books**

1. Ramesh.S.Gaonkar “Microprocessor Architecture, Programming & Applications With 8085/8080a” – Penram International – 2006.
2. D.V.Hall “Microprocessor and Digital System”, McGraw Hill Publishing Company, 2008.
3. Kenneth J.Ayala “The 8051 Microcontroller Architecture, Programming & Applications” Penram International Publishing –2008.
4. Muhammad Ali Mazidi,J.G.Mazidi,R.D.Mckinlay, “The 8051 Microcontroller and Embedded  
Systems” Second Edition Prentice Hall-2007.

### **Reference Books**

1. Yu.Cheng Liu & Glenn A Gibson,” Microcomputer System, 8086/8088 Family”, 2nd Edition, PHI, 2000.
2. Rafiquzzaman.M. "Microprocessor Theory and Applications-Intel and Motorola", PHI, 2007.

## **10MS202 BUSINESS ENVIRONMENT**

**Credits: 2:0:0**

### **Objectives**

To understand the overall business environment and evaluate its various components in business decision making.

### **Learning Outcome:**

The course helps the students to familiarise with the nature of business environment and its components. The course contents facilitate the students to develop conceptual framework of business environment and generate interest in international business.

**Unit I - Business Environment** – Types– micro environment –macro environment - global environment –competitor analysis –environment analysis – forecasting techniques.

**Unit II - Nature of International Business** – International business and domestic business –FDI – factors – International operations managements –strategic issues.

**Unit III - Technological Environment** – source of technological dynamics – appropriate technology – technology adaption –globalization – transfer of technology.

**Unit IV - Financial system** – monetary and fiscal policies – credit market – money market and capital market- nature and constituents –industrial financing institutions (an overview).

Unit V - Global environment – WTO – multinational corporations – export and import policy – foreign exchange FERA and FEMA -corporate governance –social responsibility and business.

### **Text Books**

1. Francis Cherunilam, Business Environment- Text and Cases, Himalaya Publishing House, New Delhi (latest Edition)
2. Aswathappa, International Business, The McGraw Hill Companies, New Delhi (latest edition)
3. Shaikh Saleem, Business Environment, New Delhi, Pearson, 2006.

## **09MS209 MANAGERIAL SKILL**

**Credits: 2:0:0**

### **Unit: I – (5 hrs)**

**Creativity** - Basic concepts – Mental Abilities - Barriers to creativity – Convergent and Divergent thinking - Improving creativity – Creative Problem Solving methods – Steps to creative problem solving- Games on Creativity



## **Unit: II – (6 hrs)**

**Governance** types of Governance: Global governance – Democratic Governance – Participatory governance - Corporate governance - Project governance – E-governance – elements of effective governance- case study of effective governance models.

## **Unit III – (7 hrs)**

**Team Building & Conflict Management** - Groups and Teams – Teams basics – Stages of Team building – Forming, Storming, Norming, Performing, Adjourning – Characteristics of effective teams – **Conflicts** - Positive and Negative effects of conflict – Types and stages of conflict – Conflict Management styles - Role plays

## **Unit: IV – (7 hrs)**

### **Group Discussion & Personal Interview**

Preparation for Group Discussions - Techniques – Do's & Don'ts of a GD – **Personal Interview**: Types of Interviews - Preparation for interview – Criteria for successful interview – Mock Sessions.

## **Unit IV – (5hrs)**

**Adapting to Corporate life** – Corporate Dressing – Dress codes – Grooming for men and women – Business Etiquettes – Table manners – Dealing with people – Peers, Subordinates & Bosses – Communication media etiquettes.

### **Practical Sessions:**

Resume writing, Group Discussion, & Interview.

### **Recommended Text Book**

*Stephen P. Robbins, Essentials of Organizational Behavior, (2002) John Wiley & Sons, , New York,*

### **Reference Books:**

1. *Timpe, Dale A. (2005), "Creativity" M/s. Jaico Publishing House, New Delhi*
2. *Rao. V.M. E-Governance (2006) ABD Publishers. Jaipur*
3. *Jerald Greenberg, Robert A. Baron / Carol A. Sales / Frances A. Owen / Verlag (1999) Behaviour in Organizations: Pearson Education*
4. *Pradip. N. Khandwalla (2006) the Winning Edge, Corporate Creativity. published by Tata Mcgraw Hill*
5. *John I. Colley, corporate governance Jacqueline I. Doyle, published 2003 Mcgraw-hill professional*

## **09EC226 ELECTRONICS AND COMMUNICATION LAB**

### **Credits: 0:0:2**

1. Amplitude modulation
2. Diode detection
3. Frequency modulation

4. Pre-emphasis and de-emphasis
5. Pulse amplitude modulation
6. IF amplifier
7. Attenuators
8. Equalizer
9. Pulse duration modulation
10. Study of sampling theorem monostable multivibrator
11. Astable multivibrator
12. Clippers and clampers

### **09EC232 MICROPROCESSOR AND MICROCONTROLLER LAB**

**Credits: 0:0:2**

**Any 10 experiments.**

- 1) Programs involving Data Transfer instructions
- 2) Programs involving Arithmetic and Logical operations
- 3) Programs on Code conversions
- 4) Programs on finding largest/smallest number,
- 5) Programs on ascending/descending order.
- 6) Stepper motor Interfacing
- 7) DC Motor Interfacing
- 8) ADC Interfacing
- 9) Traffic Light Controller
- 10) DAC Interfacing
  
- 11) Serial Communication
- 12) Square wave generation.
- 13) Keyboard Display Interfacing

### **MA239 PROBABILITY AND RANDOM PROCESS**

**Credits: 3:1:0**

**Unit I:**

Axioms of probability – Probability spaces – Joint and conditional probabilities – Independent events.

**Unit II:**

Densities and distributions – Example, Properties of distribution and density functions – Joint distributions and densities – Conditional probability distribution and density functions – Independent random variables.

**Unit III:**

Function of random variables and random vectors – Statistical averages – Characteristic functions – Inequalities of Tchebyshev and Cauchy Schwartz – Convergence concepts and the central limit theorem (Proof not expected).

**Unit IV:**

Random process definitions – Basic concepts and examples – Stationarity and ergodicity – Second order processes – Weekly stationary process – Covariance functions and their properties – Wiener Khinchine theorem.

**Unit V:**

Linear operations – Gaussian process – Poisson process – Low-pass and Band-pass process noise representations.

**Text Books:**

1. Papoulis: “Probability, Random Variables and Stochastic Processes (2/e), Mc GrawHill, 1991.
2. Veerarajan, “Probability statistics and Random Process” Tata Mc Graw Hill, 2002.

**Reference Books:**

1. Davenport: “Probability and Random process for Scientists and Engineers”, Mc GrawHill.
2. E.Wong, “Introduction to Random Process”, Spiringerverlag.
3. H. Stark and J.W. Woods: “Probability, Random process and estimation theory for Engineers”, Prentice Hall

**10MS201 ENGINEERING PROJECT COSTING**

**Credits: 2:1:0**

**Objectives:**

The basic objective of the course is to give an insight about the importance of costing and to create necessary cost awareness to the students which adds to their knowledge a focused approach /path in the present highly competitive globalised arena. This paper provides the necessary inputs particularly for students pursuing Engineering courses and imbibe knowledge on project cost analysis etc

**Learning Outcome:**

At the end of the course the students will able to know and apply the cost concepts in real life projects. Project costing knowledge gives the students a practical and foreseeing insight in his area of employment. It enables them to have an awareness on cost consciousness and helps them to take cost effective decisions.

**UNIT-1 : INTRODUCTION:** Costing –Scope, Objectives ,Advantages ,Limitations, Role of Costing in WTO Objections against costing, steps in installation of cost accounting system in business, Characteristics of an ideal costing system

**UNIT-2: CONCEPTS:** Cost concepts- cost classification-Elements of cost –simple Cost sheet - Unit costing, Service costing - Project Cost Estimate - Application –Tender-Calculation of Machine hour rate

**UNIT-3: APPLICATIONS:** Job costing-Objectives, merits, limitations, Application –Process costing- application, abnormal loss, abnormal gain- - Simple break even analysis- Inventory control in projects-

**UNIT-4: PROJECT COST MANAGEMENT:** Key project parties-Managing risk in private infrastructure project-Project related activities-PPP (Public private partnership in infrastructure projects-outline Facet of project analysis –Key issues in major investment decisions –statement of analysis of cost variation

**UNIT-5: PROJECT INVESTMENT BUDGETING:-** Objectives, common weakness-techniques(NPV, Payback, ARR, Profitability index)-Project disparities and conflict in ranking-Project control and Performance Analysis - Decision making.

**Text Books:**

1. Jain .S.P,Narang.K.L(2007) Kalyani publishers ,New Delhi
2. Prasanna Chandra 2009 7<sup>th</sup> edition, McGraw Hill, New Delhi

**Reference Book:**

1. Bhavesh M Patel, Project Management, (2009) Recent Reprint, Vikas Publishing House, Noida (UP)

**10EI218 MODERN CONTROL SYSTEMS**

**Credits: 3: 1:0**

**Course Objectives**

- To teach the fundamental concepts of Control systems and mathematical modelling of the system
- To study the concept of time response and frequency response of the system
- To teach the basics of stability analysis of the system

**Course Outcome**

- Students will have the knowledge of mathematical modelling of the system
- Students will be able to find the response of different order systems for a step input
- Students will be able to identify the stability of the system

**Unit I: Introduction**

Open loop and closed loop systems - translational and rotational mechanical systems and analogous electrical systems - Basic components of control systems - potentiometer - synchros - tachogenerator - a.c and d.c servo motor – Mathematical representation – block diagram – signal flow graph and transfer function of electrical systems

## **Unit II :Time Response**

Time response - step response of first order and second order systems - time domain specifications - type and order of a system - steady state error - static error and generalized error coefficients

## **Unit III :Frequency Response**

Frequency domain specifications - estimation of the specifications for a second order system. Bode plot - Nichol's chart - Nyquist stability criterion - applications of Bode plots and Nyquist stability criterion – polar plot

## **Unit IV: Stability Analysis**

Stability - characteristic equation - location of roots in s plane for stability - Routh Hurwitz criterion -Root Locus Techniques

## **Unit V:State Space Analysis of Control Systems**

State space representation – The concept of state – State space representation of systems – Solution of state equations – Eigen values and Eigen vectors of  $n \times n$  nonsingular matrix – Diagonalization of  $n \times n$  matrix – Transfer matrix – Controllability – Observability

### **Text Books:**

1. Ogata, K., "Modern Control Systems Engineering", Prentice Hall, Eaglewood, New Jersey, 2002.
2. Nagrath and Gopal.,:"Control System Engineering", Wiley & Sons, New Delhi, 2007.

### **Reference Book:**

Benjamin C. Kuo., "Automatic Control Systems", John Wiley & Sons, New York,2002.

## **09EC224 DIGITAL SIGNAL PROCESSING**

**Credits: 3:1:0**

### **Objective**

To know more about digital signal processing concepts

### **INFERENCE**

Students can make use of signal processing concepts in TMS processors

## **UNIT I**

### **Introduction to DSP and Fourier Transform**

Review of Discrete Time LTI Systems – Linear, circular and sectioned convolutions - DFS, DTFT, DFT – FFT computations using DIT and DIF algorithms - Time response and frequency response analysis of discrete time systems to standard input signals.

## **UNIT II**

### **Finite Impulse Response Digital Filters**

Symmetric and Antisymmetric FIR filters – Linear phase response and its implication – FIR filter design using window method – frequency sampling method – design of optimal linear phase FIR filters – realization structures of FIR filters – transversal and linear phase structures.

## **UNIT III**

### **Infinite Impulse Response Digital Filters**

Calculation of IIR coefficients using pole –zero placement method-Review of classical analog filters-Butterworth,Chebyshev and Elliptic filters–Transformation of analog filters into equivalent digital filters using impulse invariant method and Bilinear Z transform method  
Realization structures of IIR filters-Direct,cascade,parallel forms

## **UNIT IV**

### **Finite Word Length Effects**

Representation of numbers in registers-ADC quantization noise-coefficient quantization error-Product quantization error –Limit cycles due to product round-off error, Round –off Noise reduction scheme-Addition over flow errors-Principle of scaling.

## **UNIT V**

### **Special Topics in DSP And DSP Processors**

Adaptive filtering – basic wiener filter theory – LMS adaptive algorithm – recursive least square algorithm. Introduction to general and special purpose hard ware for DSP – Harvard architecture –pipelining-Special instruction-Replication-Hardware digital filter – Texas Instruments TMS320C5416 – Instruction set of TMS320C5416 – Simple programs.

### **Text Book**

1. John G. Proakis and Dimitris G.Manolakis, ‘Digital Signal Processing, Algorithms and Applications’, PHI of India Ltd., New Delhi, 3rd Edition, 2000.

### **Reference Books**

1. Openheim and Schafer, ‘Digital Time Signal Processing’, Prentice Hall of India, Reprint, 2002
2. Emmanuel C. Ifeacher and Barrie W. Jervis, ‘Digital Signal Processing – A Practical Approach’, Addison – Wesley Longman Ltd., UK, 2nd 2004 Low Price Edition
3. Sanjit K.Mitra, ‘Digital Signal Processing - A Computer Based Approach’, Tata McGraw-Hill, New Delhi, 2nd Edition, 2001
4. Texas Instruments Manuel for TMS320C5416 Processor.

## **10EC205 VLSI DESIGN**

**Credits: 3:0:0**

### **Objective**

The purpose of this course is to give an exposure to VLSI Design Process , Layout Design , CMOS logic Design styles and VHDL

## **Outcome**

- Knowledge in VHDL Programming
- To Design various CMOS Design Styles

## **UNIT I**

### **Overview of VLSI Design Methodology**

VLSI Design Process – Architectural Design – Logical Design – Physical Design – Layout Styles – Full Custom Semi Custom Approaches – Overview of wafer fabrication – Wafer Processing – Silicon Gate NMOS process – CMOS Process – N well – P well – Twin Tub – Silicon On Insulator

## **UNIT II Layout Design**

MOS Transistor Structure – Depletion Mode Transistor-Enhancement Mode Transistor-Drain-to-source current versus Voltage Relationships - Stick Diagrams – NMOS/CMOS Design Style-Design Rules & layout - Mead Conway design rules for the Silicon gate NMOS process- CMOS N well / P well design rules-CMOS Inverter Characteristics.

## **UNIT III CMOS Design Styles**

Sheet Resistance-Area Capacitances of layers-Standard Unit of Capacitance-Area Capacitance Calculations-CMOS Logic Design styles

## **UNIT IV Introduction to VHDL**

Design Flow Process — Tutorial of VHDL – Basic Language Elements: Data Objects – Data Types – Data Operators – Entities and Architectures – Component Declaration and Instantiation

## **UNIT V Data Flow, Behavioral and Structural Modeling**

Concurrent Signal Assignment – Conditional Signal Assignment – Selected Signal Assignment – Concurrent and Sequential Statements – Data Flow, Behavioral and Structural Modeling – Test Bench .

## **Text Books**

1. Essentials of VLSI Circuits and Systems, K. Eshraghian Kamran PHI of India Ltd.,2008
2. CMOS VLSI Design : A Circuits and Systems Perspective, Neil H. E. Weste,David Harrisayan Banerjee ,Pearson Education India,3rd Edition ,2009.
3. Kevin Skahill ”VHDL for PROGRAMMABLE LOGIC” Pearson Publications,2004.

## **Reference Books**

1. A VHDL Primer, J. Bhasker, Third Edition, Prentice Hall Publication, 2009
2. Douglas Perry, “VHDL”, 3<sup>rd</sup> Edition, McGraw Hill 2001.

## **10EC208 VLSI DESIGN LAB**

**Credits: 0:0:2**

## **VHDL PROGRAMS**

1. Design and Simulation Half adder and Full adder
2. Design & Simulation simple ALU

3. Design & Simulation of  
4x1 Multiplexer & Demultiplexer
4. Design & Simulation of Combinational Circuits
  - Magnitude Comparator
  - 3x8 Encoder
5. Design and Simulation of up-down counter
6. Design & Simulation of flip-flops.
  - JK Flip-flop
  - RS Flip-flop
  - T Flip-flop
  - D Flip-flop
7. Design and Simulation of Memory Module

### **SIMULATION PROGRAMS**

8. Design & Simulation of CMOS Inverter/NAND & NOR.
9. Design & Simulation Half adder & Full adder
10. Design & Simulation of Transmission Gate and Multiplexer using TG
11. Design & Simulation of Boolean Expression & Bi CMOS Logic
12. Design & Simulation of different CMOS Design styles.

#### **Required Software Tools:**

**Xilinx 9.1, Model Sim, Tanner EDA**

### **09EC227 DIGITAL SIGNAL PROCESSING LAB**

#### **Credits: 0:0:2**

1. Waveform generation
2. Basic operations on dt-signals
3. Properties of discrete time system
4. Sampling rate conversion
5. Discrete convolution
6. Discrete fourier transform
7. Fast fourier transform
8. Analog butterworth filters
9. Analog chebyshev filters
10. Design of IIR filter
11. Design of FIR filter
  - a. Time domain response of IIR & FIR system
  - Frequency response of dt- systems

### **EC282 ANTENNAS AND WAVE PROPAGATION**

#### **Credits 3:1:0**

#### **UNIT I : Radiation Fields of Wire Antennas**



Concept of vector potential-modification of time varying retarded case. Fields associated with Hertzian dipole-Radiation power, resistance and gain of current element- Radiation resistance of elementary dipole with linear current distribution- Radiation from half-wave dipole and quarter wave monopole-Assumed current distribution for wire antennas-Use of capacity hat and loading coil for short antennas

## **UNIT II : Antenna Fundamentals and Antenna Arrays**

**Definitions:** Radiation intensity-Directive gain-Directivity-Power gain-Beam width-Band width. Radiation resistance and gain of half wave dipole and folded dipole-Reciprocity principle-Effective length and effective area. Relation between gain effective length and radiation resistance

**Loop Antennas:** Radiation from small loop and its radiation resistance- Radiation from loop with circumference equal to wavelength and resultant circular polarization on axis

**Helical Antennas:** Normal and axial mode of operation

**Antenna Arrays:** Expression for electric field from two or three element arrays-uniform linear array-method of pattern multiplication-binomial array-image method

## **UNIT III : Travelling Wave Antennas**

Radiation from a traveling wave on a wire

**Rhombic Antenna:** Analysis and design

**Coupled Antennas:** Self and mutual impedance-2 and 3 element yagi antennas-Log periodic antennas-feeding and transposing of lines- effects of decreasing  $\alpha$ .

## **UNIT IV : Aperture and Lens Antennas**

Radiation from Huygen's source- Radiation from the open end of a coaxial line- Radiation from a rectangular aperture treated as an array of Huygen's source-Equivalence of fields of slot and complementary dipole- Relation between dipole and slot impedances.

Feeding of slot antennas-Thin slot in an infinite cylinder-Field on E plane horn-Radiation from circular aperture-Beam width and effective area

Reflector antennas-Lens antennas-Spherical waves and biconical antennas

## **UNIT V: Propagation**

**Sky wave propagation:** Structure of ionosphere-Effective dielectric constant of ionized region-Refraction-Refractive index-critical frequency-Skip distance-Effect of earth's magnetic field-collisions-Max usable frequency-fading-diversity reception

**Space wave propagation:** Reflection of polarized waves-Reflection characteristics of earth-Resultant of direct and reflected wave at the receiver-Duct propagation

**Ground wave propagation:** Attenuation characteristics-calculation of field strength

**Text Book:**

1. John D Kraus and Ronald Marhefka “Antennas” Tata Mc Graw Hill 2002
2. Jordan and Balmain, “Electromagnetic waves and radiating systems”, PHI, 1968, Reprint 2003

**Reference:**

1. R.E. Collins “Antennas and Radio wave propagation” Mc Graw Hill 1987
2. Balanis, C.S “Antenna Theory Analysis and Design” John Wiley & Sons, II Edition 2003.

**10EC204 DIGITAL COMMUNICATION****Credits: 4:0:0****Objectives**

- To equip the students with the basic concepts of digital modulation techniques.
- To understand the need and basics of error control coding.
- To understand the effect of noise in data reception..

**OUTCOME:**

- To make the students understand the recent technologies with the basics of digital communication and design receivers.

**UNIT I****Sampling And Bandlimited Signalling**

Review of Sampling Theorem, PAM and TDMA Principles, Quantization, PCM, DPCM and Delta Modulation – International standard (CCCIT, CEPT) Power Spectra of PAM signals - Inter symbol Interference - Ideal Nyquist channel - Raised cosine channels – Correlative coding and precoding.

**UNIT II****Digital Modulation**

Introduction - Binary phase shift keying - differential phase shift keying – differentially encoded PSK - Quadrature phase shift keying – M-ary PSK – quadrature amplitude shift keying - Binary frequency shift keying – similarity of BFSK and BPSK – M-ary FSK – Minimum shift keying – Duo binary encoding

**UNIT III****Data Transmission – Detection and Estimation**

Base band signal receiver – Probability of error – Optimum filter – White noise: Matched filter – Probability of error of the matched filter – Coherent reception: Correlation – Phase- shift Keying – Non-coherent detection of FSK – Differential PSK – Four phase PSK (QPSK)

**UNIT IV****Information Theory and Coding**

Discrete messages-amount of information-average information-entropy information rate-Shannon’s theorem-capacity of gaussian channel-bandwidth-S/N trade off-coding-parity check

bit coding-block codes coding and decoding probability of error with coding- - Convolution codes – Cyclic codes.

## **UNIT V**

### **Spread Spectrum Systems**

Pseudo Noise sequences, generation and correlation properties - direct sequence spread spectrum systems - Frequency Hop systems - processing gain - antijam and multipath performance.

### **Text Books**

1. Taub and Schilling – “Principles of Communication Systems”, Mc Graw Hill, 2<sup>nd</sup> Edition, 25th Reprint, 2003
2. Simon Haykins, “Digital Communications”, John Wiley, 1st edition, Reprinted, 2004.

### **Reference Books**

1. Harold kolimbini “Digital Communication Systems” Prentice Hall India, Indian print, 2001
2. John.G.Proakis, ‘Digital Communication’, McGraw-Hill Inc., 4th edition, Malaysia, 2000
3. M.K.Simen, ‘Digital Communication Techniques, Signal Design & Detection’, Prentice Hall of India, Reprint, 2003
4. Leon.W.Couch II “Digital and Analog Communication”, Pearson Education Asia, Indian print 2001.

## **09EC223 MICROWAVE AND OPTICAL COMMUNICATION ENGINEERING**

**Credits 4: 0: 0**

### **Objective**

To get knowledge about Microwave Devices

### **Outcome**

Student knows more about Microwave and its propagation

## **UNIT I**

### **Microwave Passive Devices**

Review of electromagnetic theory on Transverse magnetic and electric waves in rectangular and circular wave-guides - Passive microwave devices: Coaxial Connectors and Adapters - Wave guide Choke Flanges - Matched Terminations - Short Circuit Plunger - Rectangular to circular wave guide transition - Tuning screws - Wave guide Corners - Bends and Twists – Windows - Coaxial line to Wave guide Adapters - Coupling Loops and Coupling Aperture – Attenuators - Phase shifters - Wave guide Tees - E plane Tee - H plane Tee - Magic Tee and their applications – Isolators - Circulators - Directional couplers - Scattering matrix derivation for all components.

## **UNIT II**

### **Microwave Vacuum Tube Devices**

Introduction - Two cavity Klystron Amplifier – Mechanism and mode of Operation - Power output and Efficiency - Reflex Klystron Oscillator – Mechanism and mode of Operation - Modulation of Reflex Klystron; Applications - TWT amplifier - Principle of Operation gain and applications; Magnetron Oscillator – Hull cut-off voltage, Mechanism of Operation - Mode separation.

## **UNIT III**

### **Microwave Solid State Devices and Measurement**

Microwave diodes – Crystal diode, Schottky diode, Harmonic Mixer; PIN diode – Gunn diode – Mode of operation - Oscillator Circuit – TRAPAT - IMPATT and BARITT diodes - Mechanism of Operation - Application as Oscillator and Amplifiers - Microwave transistors – Unipolar and Bipolar - Applications. Power measurements – Low and High power measurement, Insertion loss and Attenuation measurement, VSWR - measurement – Low and High VSWR, Impedance measurement -Frequency measurement.

## **UNIT IV**

### **Optical Communication**

Overview of optical communication - Need for optical communication – Comparison with the electrical communication - Optical Fiber light guides theory: Ray theory – Mode theory. Snell's law – Critical angle – Acceptance angle – Numerical Aperture. Types of fibers: Step and Graded index fibers. Wave propagation in multi mode and single mode optical fibers Attenuation – dispersion – Polarization.

## **UNIT V**

### **Optical Transmitters and Receivers**

Optical sources and Transmitters: Review of Physical Electronics - Physics of light emission and amplification in semiconductors - LEDs - types of LEDs – principle of operation - Laser Diodes – working principle -Power launching and coupling – Numerical Aperture. Optical Detectors and Receivers: Photo detectors - photodiodes - pin and Avalanche photo detectors - Photo detector requirements for optical communications - Mechanisms of photon detection – Quantum Efficiency - Detector responsivity –Phototransistors.

### **Text Books**

1. Samuel.Y.Liao, “Microwave Devices and Circuits”, Prentice Hall of India Pvt Ltd., 3rd Edition, 5th Reprinting, 2000
2. Keiser.G. "Optical Fiber Communications", McGraw Hill, 3rd edition, 2000

### **Reference Books**

1. Collin. R.E, “Foundation of Microwave Engineering”, McGraw-Hill, II Edition,1992.
2. Annapurna Das, Sisir K. Das, “Microwave Engineering”, Tata McGraw-Hill Co., Ltd., 1st Edition, 1999. Reprint 2001.
3. John Senior “optical communications” Prentice Hall India , Second Edition, 2004.

## **EE269 COMPUTER COMMUNICATION**

**Credits: 3:0:0**

### **Unit I: Introduction**

Computer Networks – A perspective – Goals – Applications – Switching techniques – Circuit switching – Message switching – Packet switching – Network components existing network – ARPANET – Concepts of network protocol – OSI reference model – Basics of Queuing theory – Queuing models – Poisson Statistics – M/M/1 queue.

### **Unit II: Local Area Networks**

Topologies – Star – Ring, Bus – Ethernet – Transmission media – LAN Access Techniques – Polling Contention – ALOHA – CSMA – CSMA/CD - Token Bus and Token Ring protocols – Delay throughput Characteristics – Token Ring and CSMA/CD Bus – performance.

### **Unit III: Data Communication Techniques**

Asynchronous and synchronous communication – BISYNC , SDLC , HDLC – X.2.5 protocols – Error control coding.

### **Unit IV : Inter – Networking**

Routing Algorithms – Congestion Control Algorithms – Internetworking – TCP/IP - IP Protocol – IP Address.

### **Unit V: Broadband Networks**

ISDN – User Access – Transmission structure - ISDN Protocol – Limitations – B – ISDN – ATM concepts and principles – Introduction to VSAT networks.

### **Text Books**

1. Andrew Tannenbaum., “Computer Networks”, Prentice Hall of India, New Delhi, 4<sup>th</sup> Edition, 2003
2. Forouzan, “Introduction to Data Communication and Networking”, Tata McGraw -Hill Publishing Company Limited, New Delhi, 4<sup>th</sup> Edition, 2004.

### **Reference Books**

1. William, Stallings, “Data and Computer Communication”, Prentice Hall of India, New Delhi, 7<sup>th</sup> Edition, 2003.
2. Keiser, G.E., “Local Area Networks”, Galgotia Publications, Pune, 2<sup>nd</sup> Edition, 2002.
3. Uyless, Black., “Computer Networks, Protocols, Standards and Interfaces”, Prentice Hall International Edition, 2<sup>nd</sup> Edition, 2002

## **09EC237 MICROWAVE AND OPTICAL COMMUNICATION LAB**

**Credits: 0:0:2**

### **Any 10 experiments**

1. Frequency And Wavelength Measurement

2. Impedance measurement
3. Mode characteristic of reflex klystron
4. Magic tee
5. Directional coupler
6. Characteristics of Gunn diode
7. Setting up of analog link
8. Setting up of digital link
9. Measurement of Numerical aperture of optical fiber
10. Study of losses in optical fiber
11. Characteristics of LED and PD
12. Time division multiplexing using optical link.

### **09EC228 ADVANCED COMMUNICATION LAB**

#### **Credits: 0:0:2**

1. Modulation and Demodulation of PAM, PWM, PPM
2. Digital Modulation techniques
3. Pulse code modulation and demodulation
4. Delta modulation and demodulation
5. RF filters
6. RF tuned amplifier
7. Measurement of antenna resonance and VSWR
8. Inverse square law of propagation and verification of reciprocity theorem
9. Determination of characteristics impedance & dielectric constant of transmission line
10. Measurement of VSWR, Reflection coefficient & return loss of transmission line
11. Study of serial communication
12. Modulation using MATLAB
13. Study of GPS

