Curriculum and Scheme for combined First and Second Semesters B. TECH
(Effective from 2006 admissions)

Code	Subject	Hrs / week			Sessional Marks	University Exam	
		L	T	P		Hrs	Marks
2K6 EN101	Engineering Mathematics I	2	1		50	3	100
2K6 EN102	Engineering Physics	2			50	3	100
2K6 EN103	Engineering Chemistry	2			50	3	100
2K6 EN104	Engineering Mechanics	2	1		50	3	100
2K6 EN105	Engineering Graphics	1		3	50	3	100
2K6 EN106	Basic Civil Engineering	2	1		50	3	100
2K6 EN107	Basic Mechanical Engineering	2	1		50	3	100
2K6 EN108	Basic Electrical Engineering	2	1		50	3	100
2K6 EN109	Basic Electronics and Computer Engineering	2	1		50	3	100
2K6 EN110 P	Basic Engineering Laboratory (Surveying, Fitting, Carpentry, Foundry, Smithy, Welding & Sheet metal)			2	50		
2K6 EN111 P	Basic Electrical & Electronics Work shop (Wiring, Soldering & Study of Basic Computer Hardware)			2	50		
		17	6	7	550		900

2K6 EN101: ENGINEERING MATHEMATICS I
(3 hrs/week)

Module I: Ordinary differential equations (16 hours)
A brief review of the method of solutions first order equations - Separable, homogeneous and linear types – Exact equations - Orthogonal trajectories – General linear second order equations - homogeneous linear equation of the second order with constant coefficients – Fundamental system of solutions – Method of variation of parameters – Cauchy's equation.
Module II: Laplace transforms (17 hours)
Gamma and Beta functions – Definition and simple properties – Laplace transform - Inverse transform – Laplace transform of derivatives and integrals – Shifting theorems – Differentiation and integration of transforms - Transforms of unit step function and impulse function – Transforms of periodic functions – Solutions of ordinary differential equations using Laplace transforms.
Module III: Vector differential calculus (18 hours)
Functions of more than one variable – Idea of partial differentiation – Euler's theorem for homogeneous functions – Chain rule of partial differentiation – Application in errors and approximations. Vector function of single variable – Differentiation of vector functions – Scalar and vector fields – Gradient of a scalar field – Divergence and curl of vector fields – Their physical meanings – Relation between the vector differential operators.
Module IV: Fourier series and harmonic analysis (15 hours)
Periodic functions – Trigonometric series – Euler formulae – Even and odd functions - Functions having arbitrary period – Half range expansions – Numerical method for determining Fourier coefficients - Harmonic analysis

Reference Books:

1. Piskunov N. , *Differential and Integral calculus*, MIR Publishers
2. Wylie C. R. , *Advanced Engineering Mathematics*, McGraw - Hill
3. B. S Grewal. , *Higher Engineering Mathematics*, Khanna publishers
4. Kreyszig E. , *Advanced Engineering Mathematics*, Wiley Eastern
5. Thomas G,B. , *Calculus and Analytic Geometry*, Addison Wesley
6. Spigel. , *Vector analysis*, Schume series, Mc Grawhill
7. Sastry S. S. Engineering Mathematics, Prentice Hall of India

University Examination Pattern
Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II - 2 questions (covering entire module) of 15 marks each from module I with choice to answer any one.
Q III - 2 questions (covering entire module) of 15 marks each from module II with choice to answer any one.
Q IV - 2 questions (covering entire module) of 15 marks each from module III with choice to answer any one.
Q V - 2 questions (covering entire module) of 15 marks each from module IV with choice to answer any one.

Marks Distribution

Tests (min: 2)	– 30 marks
Assignment (min: 2)	– 15 marks
Attendance	– 5 marks
Total	– 50 marks

2K6 EN102: ENGINEERING PHYSICS

(2 hrs/week)

Module I (11 hours)

Interference of light: Interference from plane parallel thin films - Colours of thin films by reflected light - Newton's rings Measurement of wave length – Thin wedge shaped air film - Air wedge – Testing of optical planes of surfaces. **Diffraction of light** – Introduction to Fresnel and Fraunhofer diffraction – Distinction between the two diffractions – Simple theory of plane transmission grating. **Polarization of light** – Double refraction – Nicol prism – Quarter and half wave plates – Production and detection of elliptically and circularly polarized light – Rotatory polarization – Laurent's half shade polarimeter – Applications of polarized light.

Module II (11 hours)

Quantum Mechanics - Newtonian Mechanics and quantum mechanics – Uncertainty principle - The wave functions – Shrodinger wave equation for free particle – Potentials in Shrodinger equation – Time independent Shrodinger equation - Time dependent Shrodinger equation - Expectation values – Derivation of Shrodinger equation - Application – Particle in a box (motion in one dimension)**NMR and ESR** – Basic principles of Nuclear Magnetic Resonance (NMR) and Electron Spin Resonance (ESR) – Experimental Method for detection of NMR and ESR – Applications

Module III (11 hours)

Laser Physics – Basic concepts of Laser – Spontaneous and stimulated emission – Absorption – Population inversion – Optical Pumping – Construction and components of Laser – Ruby Laser, Helium - Neon Laser and semiconductor laser – Applications – Basic principle of Holography and its application **Fibre Optics** – Basic Principles – Fiber Construction – Fiber Dimensions – Light propagation in fiber – Signal Distortion in optical fibers and transmission losses (Brief ideas only) – Light Wave communication using optical fibers and its advantages – Fiber Amplifiers and EDFAs –Applications of optical fibers. **Non Destructive Testing** –X - rays –Properties and production - X - ray radiography - Stereo radiography - CT scan - Ultrasonics - properties - NDT using ultrasonics - Electrical method - Magnetic method - ultrasound scanning - MRI scan

Module IV (13 hours)

Electron theory of solids. Classical free electron theory - drift velocity - conductivity – relaxation time – mean free path – temperature dependence of resistivity – relation between thermal and electrical conductivities (Weidman – Frenz law) – Quantum free electron theory - density of states - Fermi distribution function - Fermi energy Band theory of solids **(**Qualitative only) - Band structure of metals, semiconductors and insulators – Classifications of semiconductors on the basis of Fermi level and Fermi energy – Impurity levels in N - type and P - type semi conductors. **Hall Effect -** introduction – Measurement of Hall voltage and Hall coefficient – Importance of Hall effect. **Super conductivity** – Properties of superconductors – Josephson Effect and tunneling (qualitative) – B. C. S Theory of superconductivity (qualitative) – Applications of super - conductivity.

Reference Books:

1. Brijlal & Subrahmanyam. N. "Text Book of Optics", S. Chand
2. Rajendran and Marikani: Applied Physics for Engineers 3rd edition - TMH
3. A. S. Vasudeva S " Modern Engineering Physics", S. Chand
4. Jenkins F. A & White H. E. "Fundamentals of Optics", Mc Graw Hill.
5. M. Arumugam: Material science: Anuradha Publications
6. S. O. Pillai "Solid State Physics" New Age International.
7. Srivastva. C. M & Sreenivasan . C. "Science of Engineering Materials", New Age International

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II - 2 questions (covering entire module) of 15 marks each from module I with choice to answer any one.
Q III - 2 questions (covering entire module) of 15 marks each from module II with choice to answer any one.
Q IV - 2 questions (covering entire module) of 15 marks each from module III with choice to answer any one.
Q V - 2 questions (covering entire module) of 15 marks each from module IV with choice to answer any one.

Marks Distribution

Tests (min: 2)	– 30 marks
Assignment (min: 2)	– 15 marks
Attendance	– 5 marks
Total	– 50 marks

2K6 EN 103: ENGINEERING CHEMISTRY

(2 hrs/week)

Module I High Polymers & Lubricants (13 hours)

Classification of polymers. Polymerization - chain polymerization, condensation polymerization, copolymerization, coordination polymerization, electrochemical polymerization, metathetical polymerization, group transfer polymerization. Mechanism of polymerization. Polymerization technique - bulk polymerization, solution polymerization, suspension polymerization, emulsion polymerization, melt polymerization, solution polycondensation, interfacial condensation, solid and gas phase condensation. Structure – property relationship of polymers. Compounding and moulding of polymers. Important plastics – their production, properties and uses. Thermoplastic resins (PE, PP, PVC, PVA, PMMA, PS), thermosetting resins (Bakelite, Urea formaldehyde, Silicones), fibers (nylon 6, nylon 66, cellulose fibers, Dacron, Kevlar) Elastomers - Natural rubber - production, structure, properties, compounding & vulcanization. Synthetic rubbers - (buna, neoprene, thiokols, polyurethane, silicon rubber) Lubricants: Theory of friction, mechanism of lubrication, classification of lubricants - liquid, semisolid, solid and synthetic lubricants. Properties of lubricants(viscosity index, cloud point, pour point, flash point, fire point, corrosion stability, emulsification, aniline point). Additives and their functions.

Module II Electrochemistry (11 hours)

Electrode potential and electromotive force. Nernst equation for electrode potential. Measurement of EMF and electrode potential. Types of electrodes. Primary and secondary reference electrodes. Electrochemical series. Galvanic cells and concentration cells. Determination of pH using glass electrode. Secondary cells - lead acid cells, Ni – Cd cell, Edisson cell. Fuel cell - hydrogen – oxygen fuel cell. Acid and bases. Lowry - Bronsted and Lewis concepts. Concept of pH – pH measurements. (Instrumental details required) Dissociation constants - potentiometric titrations. Buffer solutions. Henderson equation for calculation of pH.

Module III Corrosion (11 hours)

Corrosion and its control – Theories of corrosion. Different types of corrosion. Factors affecting corrosion. Protective coatings. Self protecting corrosion products. Pretreatment of surfaces. Coating - organic, inorganic coatings - galvanizing, tinning, electroplating, electroless plating, anodisation, passivation by chemical treatment, cathodic protection. Properties and functions of ingredients in paints, varnishes and enamels.

Module IV Fuels & Environmental Pollution: (11 hours)

Classification of fuels - solids, liquid & gaseous fuels, Determination of calorific value. Solid fuels - wood, peat, lignite, coal, Proximate analysis, Petroleum and its refining, fractions and their uses. Cracking and reforming. Petrol knock and octane number. Gaseous fuels - Natural gas, coal gas, acetylene. Combustion calculation. Air - fuel ratio. Pollution - Classification (global, regional and local with examples). Air pollution - Primary and Secondary pollutants. Source, effects and control of air pollution. Water pollution - Pollutant classification - organic, inorganic, suspended, metals and their monitoring. Domestic sewage and industrial wastes. Control of water pollution. Hazardous wastes. Hard and soft water. Analysis of hardness. Quality of water for domestic use and boiler feed. Problem with hard water in boilers. Softening of water - internal and external conditioning of water.

Reference Books

1. V. Raghavan (2000) Material Science and Engineering - A first course, Prentice Hall of India Pvt. Ltd. New Delhi.
2. J. C. Kuriakose & J. Rajaram. Chemistry of Engineering & Technology. Vol. I & II Tata McGraw Hill, New Delhi.
3. A K De (1996) Environmental Chemistry. NewAge International Pvt. Ltd. New Delhi.
4. B R Gowariker etal (2000) Polymer science. New Age international Pvt. Ltd. New Delhi

5. S. Glasstone (1997) Text book of Physical Chemistry. MacMillian, New Delhi.
6. Shashi chawla A text book of Engineering Chemistry. Dhanpath Rai & Co. Pvt. Ltd. New Delhi

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II - 2 questions (covering entire module) of 15 marks each from module I with choice to answer any one.
Q III - 2 questions (covering entire module) of 15 marks each from module II with choice to answer any one.
Q IV - 2 questions (covering entire module) of 15 marks each from module III with choice to answer any one.
Q V - 2 questions (covering entire module) of 15 marks each from module IV with choice to answer any one.

Marks Distribution

Tests (min: 2)	– 30 marks
Assignment (min: 2)	– 15 marks
Attendance	– 5 marks
Total	– 50 marks

2K6EN104: ENGINEERING MECHANICS

(3 hrs/week)

Module I (15 hours)

Principles of statics – Free body diagrams – Coplanar forces and Force systems – Resultant and equilibrium conditions for concurrent, parallel and general system of forces – Solution of problems by scalar approach. Introduction to vector approach (Application to simple problems only) – Concurrent forces in space – Resultant – Equilibrium of a particle in space – Non - concurrent forces in space - Resultant of force systems.

Module II (17 hours)

Friction – Laws of friction – Simple contact friction problems – Wedge. Properties of surfaces – First moment and centroid of curve and area – Centroid of composite plane figures – Theorems of Pappus - guldinus - Second moments of plane figures and composite sections – Transfer theorems – Polar moment of area – Product of inertia and Principal axes. Moment of inertia of a rigid body – M. I of a lamina – M. I of 3 dimensional bodies (cylinder, circular rod, sphere).

Module III (17 hours)

Introduction to structural mechanics – Different types of supports, loads and beams – Reactions at supports. Shear force and Bending moment in beams – Shear force and bending moment diagrams for cantilever and simply supported beams (only for concentrated and uniformly distributed load cases). Plane trusses – Types of trusses (Perfect, Deficient and Redundant trusses) – Analysis of trusses - Method of joints - Method of sections.

Module IV (17 hours)

Kinetics of rectilinear motion – Newton's second law– D'Alembert's principle – Motion on horizontal and inclined surfaces – Analysis of lift motion - Motion of connected bodies. Curvilinear motion – Equation of motion – Tangential and normal acceleration - Centripetal and centrifugal forces – Motion of vehicles on circular path. Work, Power and Energy – Work done by a force – Work of the force of gravity and force of spring - Work - energy equation – Transformation and conservation of energy – Applications to problems. Kinematics of rotation – Rigid body rotation about a fixed axis – Rotation under the action of constant moment. Introduction to mechanical vibrations - Simple harmonic motion – free vibration – Oscillation of spring - Torsional vibration

Text Books

1. Timoshenko and Young, "Engineering Mechanics", McGraw Hill Publishers
2. Hibbeler, Engineering Mechanics, Vol. I statics, Vol II Dynamics, Pearson

Reference Books

1. Beer, F. P. and Johnson, E. R. , "Mechanics for Engineers - Statics and Dynamics", McGraw Hill Publishers.
2. Shames, I. H. , "Engineering Mechanics - Statics and Dynamics", Prentice Hall of India.
3. Merriam J. L and Kraige L. G. , *Engineering Mechanics - Vols. 1 and 2*, John Wiley.

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.

Q II - 2 questions (covering entire module) of 15 marks each from module I with choice to answer any one.

Q III - 2 questions (covering entire module) of 15 marks each from module II with choice to answer any one.

Q IV - 2 questions (covering entire module) of 15 marks each from module III with choice to answer any one.

Q V - 2 questions (covering entire module) of 15 marks each from module IV with choice to answer any one.

Marks Distribution

Tests (min: 2)	– 30 marks
Assignment (min: 2)	– 15 marks
Attendance	– 5 marks
Total	– 50 marks

2K6 EN105 ENGINEERING GRAPHICS

(1 hour lecture & 3 hours drawing practice)

Module 0 (12 hours - 2 drawing exercise) (No questions in the university exam; questions should be included in the class test)

Introduction to engineering graphics - drawing instruments and their uses - types of lines - lettering - dimensioning - BIS code of practice for engineering drawing - construction of conics, spirals, cycloids, involutes and helix.

Module I (14 hours - 2 drawing exercises)

Introduction to orthographic projection. Projection of points - projection of lines - parallel to one plane and inclined to the other - lines inclined to both the planes - true length and inclination with reference planes - traces. Trapezoidal and rotating line method. Projections of planes.

Module II (14 hours - 2 drawing exercises)

Orthographic projection of solids in simple position - projections of frustum and truncated solids - projection of solids with axis inclined to one or both the planes - projections on auxiliary planes - primary and secondary auxiliary projections - projections of solids in combination.

Module III (18 hours - 3 drawing exercises)

Sections of solids by horizontal, vertical or inclined planes - true shape of section. Development of surface of solids, sectional solids, solids having hole. Intersection of surfaces - intersection of prism in prism, cylinder in cylinder and cylinder in cone.

Module IV (14 hours - 2 drawing exercises)

Introduction to isometric projection - isometric scale - isometric view - isometric projections of solids, frustums & truncated solids and their combinations. Conversion of pictorial projection to orthographic projection.

Module V (16 hours - 3 drawing exercises)

Introduction to machine drawing - screwed fastening - bolts and nuts - cap screw - machine screw - set screw - locking arrangements - foundation bolts. Graphic symbols used in engineering. Simple and Sectional views of Knuckle joint - protected type flanged coupling, bushed bearing - socket & spigot pipe joint.

Note: All drawing exercises mentioned above are for class work. Additional exercises wherever necessary may be given as home assignments.

Reference Books:

1. John K C, *Engineering Graphics,* JET Publishers.
2. Varghese P I, *Engineering Graphics*, VIP Publishers.
3. Bhatt N D, *Elementary Engineering Drawing*, Charotar Publishing house.
4. Narayana K L & Kannaiah P *Engineering Graphics*, Tata McGraw Hill
5. Luzadder W J, *Fundamentals of Engineering Drawing*, Prentice Hall of India
6. K Venugopal, *Engineering Graphics*, New Age International (P) Ltd
7. K N Anilkumar, *Engineering Graphics*, Adhyuth Publishers Kottayam
8. Varghese P I, *Machine Drawing,* VIP Publishers
9. Bhatt N D ,*Machine Drawing,* Charotar Publishing house
10. S. B Mathur, *A Text Book of Engineering Graphics*, Vikas Publishing house.

Sessional Marks:

Drawing exercises - 20 marks
Class tests (min: 2) - 25 marks
Attendance - 5 marks
Total marks - 50 marks

University examination pattern

Q1 - Two questions from Module I with choice to answer any one.
Q2 - Two questions from Module II with choice to answer any one
Q3 - Two questions from Module III with choice to answer any one
Q4 - Two questions from Module IV with choice to answer any one
Q5 - Two questions from Module V with choice to answer any one

Each question carries 20 marks.

2K6 EN106: BASIC CIVIL ENGINEERING

(3hrs/week)

MODULE I (16 hours)

Measurement of distance - Direct measurement – tape & chain only - Ranging out survey lines - Taking measurement of a sloping ground - Errors - Tape correction problems. Leveling instruments (Dumpy level, Tilting level and Auto levels). Leveling staff(folding type only) - How to make measurements - temporary adjustment, holding the staff, reading the staff, principles of levelling - recording measurements in the field book - deduction of level - height of collimation method only, examples. Introduction to Total station. (Description only) - Linear and angular measurements using total station, Brief description of contour maps.

MODULE II (14 hours)

Selection of site for buildings - types of buildings - Components of buildings. Exposure to various building byelaws. Fire resistance characteristics of buildings - General classification as per National Building Code - Earth quake Zoning - Disaster mitigation methods

MODULE III (18 hours)

FOUNDATION: different types (description only). Spread footing, Isolated - Footing, Combined footing - Mat foundation - Pile foundation. Safe bearing capacity of soil, Importance of the safe bearing capacity of soil. SUPER STRUCTURE: Masonry - stone masonry, brick masonry. Partition - Materials used for making partition - plywood, particle boards and glass. Doors, windows - materials used for the construction of doors and windows - wood, Steel, Aluminium. Flooring - using mosaic, ceramic tiles, marble, granite and synthetic materials. Roofing - Selection of type of roof, sloping roof - Concrete roof, tiled roof, timber roof ,GI sheet, AC sheet, PVC sheet. Selection of roof covering materials.

MODULE IV (18 hours)

CONCRETE: Ingredients - cement, aggregates and water. Qualities of ingredients. Test for determining the qualities of fine aggregate - fineness modulus and grading curves. IS specifications. Cement - mortar - IS Specification for preparation and determination of mortar strength. Plain Cement Concrete(PCC) preparation - Test on fresh concrete - Test on Hardened Concrete. IS specification for the compressive strength of concrete. Steel - common types used in construction - Mild steel, HYSD steel and their properties. Reinforced Cement Concrete (RCC) –advantages of RCC over PCC. Elementary ideas on pre - cast and pre - stressed concrete constructions.

Reference Books:

1. T. P. Kenetker& S. V Kulkarny, “Surveying & levelling Vol. - 1”, Vidyarthi Griha rakashen
2. Rangwala, “Building Materials”, Charotar Publishing House
3. Rangwala, “Building Construction”, Charoter Publishing House
4. B. C Punmia, “Building Consrtuction” , Lakshmi Publication (p) Ltd.
5. S. K. Roy, “Fundamentals of Surveying” Prentice - Hall of India, New Delhi.
6. National Building Code
7. A M Chandra , “Higher Surveying”, New age International (p)Ltd. Publishers

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.

Q II - 2 questions (covering entire module) of 15 marks each from module I with choice to answer any one.

Q III - 2 questions (covering entire module) of 15 marks each from module II with choice to answer any one.

Q IV - 2 questions (covering entire module) of 15 marks each from module III with choice to answer any one.

Q V - 2 questions (covering entire module) of 15 marks each from module IV with choice to answer any one.

Marks Distribution

Tests (min: 2)	– 30 marks
Assignment (min: 2)	– 15 marks
Attendance	– 5 marks
Total	– 50 marks

2K6 EN107: BASIC MECHANICAL ENGINEERING

(3 hrs/week)

Module I (18 hours)

Thermodynamics: Definitions and basic concepts - systems, properties, state, process and cycle - work and heat - thermodynamic equilibrium, Zeroth law of thermodynamics, concepts of temperature and temperature scales, first law of thermodynamics, concepts of internal energy and enthalpy, second law of thermodynamics - Clausius and Kelvin - Planck statements, concept of entropy, thermodynamic processes - constant volume, constant pressure, adiabatic, isentropic, polytropic processes - P - V and T - S diagrams. (Simple problems only)

Module II (18 hours)

Air cycles: Carnot, Otto and Diesel cycles - air standard efficiency. (Simple problems only). I C Engines: Working and comparison of two stroke and four stroke petrol and diesel engines. Pumps and Turbines: Working principles of reciprocating , centrifugal and rotary pumps. Principles of operation of Pelton, Francis and Kaplan turbines. (Elementary ideas with simple sketches only.)

Module III (16 hours)

Properties of steam - saturation temperature, dryness fraction, degree of superheat, specific volume, enthalpy and entropy - T - S diagram. Steam Boilers: Classification - Cochran boiler, Babcock and Wilcox boiler, list of boiler mountings and accessories - applications. Refrigeration and Air conditioning: Refrigerants, properties of refrigerants, working principles of vapour compression refrigeration & vapour absorption refrigeration systems. Psychrometry - definition of terms - Principles of air conditioning - comfort and industrial air conditioning.

Module IV (14 hours)

Classification of manufacturing processes –elementary ideas with simple sketches of moulding, sand casting, die casting, forging, rolling, extrusion, wire drawing, punching and blanking, stamping, coining, surfacing, welding, soldering and brazing. Production machines - elementary ideas with simple sketches of centre lathe, milling machine, drilling machine, grinding machine and shaper - basic machining operations - Concepts of CNC machining systems.

Reference Books:

1. S. K. Hajra Choudhury, Elements *of Mechanical Engineering*, Media Promoters and Publishers Pvt. Ltd. Mumbai.
2. P. K. Nag , *Engineering Thermodynamics*,Tata McGraw - Hill Publishing Company.
3. Dr. R. K. Bansal,*Fluid mechanics and Hydraulic machines*, Lakxmi Publications (P) Ltd. New Delhi.
4. M. L. Mathur and F. S. Mehta ,*Thermal Engineering* , Jain Brothers, New Delhi.
5. K. Venugopal, Basic Mechanical Engineering, New Age International (P) Ltd.

Text Books:

1. S. Tryambaka Murthy, *Elements of Mechanical Engineering*, Vikas Publishing House Private Ltd. New Delhi.
2. S. Benjamin ,*A Text Book of Basic Mechanical Engineering* , Pentex Publishers and Distributers, Kollam - 5.

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.

Q II - 2 questions (covering entire module) of 15 marks each from module I with choice to answer any one.

Q III - 2 questions (covering entire module) of 15 marks each from module II with choice to answer any one.

Q IV - 2 questions (covering entire module) of 15 marks each from module III with choice to answer any one.
Q V - 2 questions (covering entire module) of 15 marks each from module IV with choice to answer any one.

Marks Distribution

Tests (min: 2)	– 30 marks
Assignment (min: 2)	– 15 marks
Attendance	– 5 marks
Total	– 50 marks

2K6 EN108: BASIC ELECTRICAL ENGINEERING

(3 hrs/week)

Module I(16 hours)

Generation ,Transmission and Distribution of electric power

Conventional methods of generation of electric power –thermal – hydro – nuclear. Non - conventional energy sources - solar - wind - tidal - geothermal –photovoltaic - fuel cells. General outline of power transmission & distribution system - substation equipment - circuit breakers - isolators, lightning arrestors - wave traps. (Functions only). Electrical wiring - different types - switchboards - earthing - protective devices - relays - MCB's , ELCB's.

Module II(17 hours)

Transformers and Electrical machines

AC fundamentals - 1 - Φ and 3 - Φ - Power factor – economics of power factor improvement. (Derivation not required). Tariff - Types of tariff. Transformer - Construction - different types - 1 - Φ and 3 - Φ - theory –emf equation - methods of cooling. DC machines – Construction - generators and motors - types - characteristics & applications. AC machines - Alternators - Construction - voltage regulation (definition only). Synchronous motors - Applications - Induction motors - 1 - Φ and 3 - Φ - Construction - characteristics & applications. Special machines – stepper motor - universal motor.

Module III (17hours)

Utilization of Electric power

Electric heating - resistance heating - Induction heating - dielectric heating - arc furnaces - principle & applications. Electric welding - resistance welding - arc welding – ultrasonic welding - electron beam welding - laser beam welding. Illumination - different types of lamps - fluorescent, incandescent, sodium vapour, mercury vapour, halogen - energy efficient lamps Traction - traction equipment and functions. Batteries - Different types - Charging methods - Applications. Electrolysis - Basic principles - Extraction of metals - Electro deposition - Electroplating.

Module IV(16 hours)

Instrumentation

Measuring instruments – Ammeter, Voltmeter, Wattmeter, Energy meter, Meggar - basic principle of operation, measurement of power by 2 - wattmeter method. Transducers – measurement of strain, acceleration, altitude, flow, force, torque, humidity and moisture.

Text Books

1. Jain & Jain, " ABC of Electrical Engineering(Electrical Science)", Dhanapat Rai & Son's publishing Company, New Delhi

Reference Books

1. M. L. Soni, PV Gupta, U. S. Bhatnagar and A. Chakrabarthy - A textbook of Power System Engineering - Dhanpath Rai & Sons, New Delhi.
2. Nagrath I. J. & Kothari D. P. – Electric Machines – Tata Mc. graw hill.
3. J. B. Gupta - Utilization of electric power & Electric traction –S. K. Kataria & sons , New Delhi.
4. Sawhney A. K. A Course in Electrical & Electronic Measurement and Instrumentation, Dhanpath Rai & Sons, New Delhi

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.

Q II - 2 questions (covering entire module) of 15 marks each from module I with choice to answer any one.

Q III - 2 questions (covering entire module) of 15 marks each from module II with choice to answer any one.

Q IV - 2 questions (covering entire module) of 15 marks each from module III with choice to answer any one.
Q V - 2 questions (covering entire module) of 15 marks each from module IV with choice to answer any one.

Marks Distribution

Tests (min: 2)	– 30 marks
Assignment (min: 2)	– 15 marks
Attendance	– 5 marks
Total	– 50 marks

2K6 EN109: BASIC ELECTRONICS AND COMPUTER ENGINEERING

(3 hrs/week)

PART A - ELECTRONICS & COMMUNICATION ENGINEERING

Module I: INTRODUCTION TO ELECTRONIC COMPONENTS AND DEVICES (16 hours)

Electronic Devices: Passive components, Active components. PN Junction Diodes: Characteristics and applications. Types of Diodes: Zener Diode, LED, LCD, Photodiode, varactor diode – principles of operation and applications. Bipolar Junction Transistors – construction – npn, pnp – working – configuration – characteristics – properties – applications. Amplifiers : RC Coupled amplifier – working. JFET : Construction – characteristics, parameters – applications. Oscillators: principle, RC Phase shift oscillator, crystal oscillator. Integrated circuits : classification – advantages – analog and digital I C's. Microprocessors - 8085: Internal architecture (block diagram only) – applications. Electronic Instruments: Strain gauge, Thermistor, Condensor microphone, Moving coil Loud - speaker, principles of CRT, CRO block diagram and working. Signal generators, regulated power supplies.

Module II: PRICIPLES OF ELECTRONIC COMMUNICATION ENGINEERING (17 hours)

Analog modulation - Different types - AM,FM,PM – principles and comparison. Block diagram of AM and FM Transmitters and superhetrodyne receiver (brief explanation only). Principle of TV systems: interlaced scanning, general simplified block diagram of TV Transmitter and receiver, Yagi antenna, Basic principles of cable TV.

Principles of pulsed RADAR: Block diagram, application. Satellite communication - Concept of Geostationary satellites - simplified block diagram of earth station, Transmitter, Receiver. Block diagram of optical communication systems, Concept of optical fibre, source (LED), detector (phototransistor), advantage of optical communication.

Frequency bands in microwave communication and their uses, simplified block diagram of microwave link.

Basic principles of cellular communication, concepts of cells - Frequency reusage, advantage of cellular communication.

PART B – COMPUTER ENGINEERING

Module III: INTRODUCTION TO COMPUTERS, TROUBLESHOOTING AND MAINTANANCE (16 hours)

Introduction – Characteristics of Computers –Classifications of Computers – Basic computer organizations - Computer software – Types of software. *Components of Standard PC*: Familiarization of motherboard, Processor & Memory, Graphics adapters & Monitors, Drive controllers & Drives, Buses, Network Adapters, Power supply - *Boot Process* : BIOS , POST – Installation of operating systems - *Troubleshooting and Maintenance*: Common problems in Motherboard, Memory, Monitor, Plug & Play Devices and their Troubleshooting.

Module IV: COMPUTER PROGRAMMING & NETWORK FUNDAMENTALS (17 hours)

Computer Programming - - High level and low level languages - steps involved in computer programming - Developing algorithms and flow charts - Efficiency of algorithms - Running, debugging and testing of programs - . *Computer Network*: Topologies – Types, Basic Components, Media: Wireless & Wired, - *Internet Basics*: Applications & Impact on Society, WWW, Email, Search Engine, Web server, Web browser - Future Internet Applications. *Application software packages* – Word Processing – Spread Sheet – Graphics – Personal Assistance.

Reference Books:

1. N. N. Bhargava, "Basic Electronic and Linear Circuits ", TMH Publications.
2. Kumar, "Communication Engineering" mesh Publication New Delhi
3. Peter Norton, "Introduction to Computer", 6th Ed. , Tata McGraw Hill, 2006
4. Pradeep K Sinha and Priti Sinha, "Computer Fundamentals: Concepts, Systems and Application", BPB Publicatios , 2003
5. T F . Bogart, " Electronic Devices and Circuits" Universal Bookstall New Delhi .

6. Santi ram Kal, " Basic Electronics " PHI Publications.
7. George Kennedy, "Electronic Communication Systems", Mc Graw Hill
8. V. Rajaraman, "Fundamentals of Computers" Prentice Hall of India, 2002.
9. Hans - Peter Messmer, "The Indispensable PC hardware book" 3rd Ed., Addison Wesley.
10. Allen B. Tucker, " Fundamentals of Computing ",Tata Mc Graw Hill New Delhi, 1998
11. Stephen J Bigelow " Troubleshooting Maintaining & Repairing PCs", 5th Ed. Tata McGraw Hill
12. Andrew S Tanenbaum, "Computer Network", 3rd Ed. , Pearson Education, 2003

University Examination Pattern

(PART A and PART B to be answered in separate answer books)

PART A

Q I – 4 short answer type questions of 5 marks, 2 from each module.

Q II - 2 questions (covering entire module) of 15 marks each from module I with choice to answer any one.

Q III - 2 questions (covering entire module) of 15 marks each from module II with choice to answer any one.

PART B

Q IV– 4 short answer type questions of 5 marks, 2 from each module.

Q V - 2 questions (covering entire module) of 15 marks each from module III with choice to answer any one.

Q VI - 2 questions (covering entire module) of 15 marks each from module IV with choice to answer any one.

Marks Distribution

Tests (min: 2)	– 30 marks
Assignment (min: 2)	– 15 marks
Attendance	– 5 marks
Total	– 50 marks

2K6 EN110 P: BASIC ENGINEERING LABORATORY

(2 hrs/week)

Part – A. Mechanical Engineering Workshops

Fitting Practice (10 Hours)

Study of metal cutting and measuring tools. Fabrication Exercises involving cutting and chiseling.

Welding (5 Hours)

Study of arc and gas welding equipments. Exercises involving preparation of lap and butt joints.

Carpentry (10 Hours)

Wood and its processing - measuring and marking tools. Wood working hand tools - Wood working machinery. Preparation of joints like dove tail, mortise & tenon.

Sheet metal practice (5 Hours)

Study of machines and tools used in sheet metal work.

Development and fabrication of simple sheet metal components like cylindrical dish, rectangular duct.

Foundry (5 Hours)

Study of foundry tool appliances. Preparation of sand for sand molding, making green sand molds for simple objects. Demonstration of melting, pouring and production of casting.

Smithy (5 Hours)

Study of hand forging tools. Hand forging exercises to make components of simple Geometry.

Part – B Civil Engineering Workshop

Surveying (10 Hours)

Chain survey - Traversing and plotting of details. Plane Table Surveying - method of radiation, intersection and traversing. Leveling – Fly leveling.

Sessional Requirements

Total Attendance	:5 marks
Part - A Mechanical Engineering Workshops	
Workshop Practical and Record	:25 marks
Test	:10 marks
Part – B Civil Engineering Workshop	
Workshop Practical and Record	: 5 marks
Test	: 5 marks
Total	: 50 marks

2K6 EN111P BASIC ELECTRICAL AND ELECTRONICS WORKSHOP

(2 Hrs / week)

A. Electrical Wiring (total 15 hours)

a) Familiarization of various types of service mains - wiring and installations – accessories and household electrical appliances.
b) Earthing – measurements of earth resistances – testing of Electrical installations – precautions and care from Electrical shocks.
c) Wiring practices of a circuit to control :
    i. one lamp by SPST switch
    ii. two lamps by SPST switch.
    iii. two lamps in series and parallel
    iv. stair case wiring
d) Familiarization of various parts and assembling of Electrical Motors and wiring practices of connecting a 3 phase – 1 phase motor with starter.

B. Electronics Workshop (total 15 hours)

1. Familiarization of various Electronic components such as resistors, capacitors, transformers, inductors, diodes, transistors and IC's
2. Assembling and soldering practice of a single phase full wave rectifier circuit with capacitor filter.
3. Assembling and soldering practice of common emitter amplifier circuits.
4. Assembling a timer circuit using IC555, phase shift oscillator using transistor and op - amp and JK flip - flop using NAND gates on the bread board.

C. Computer hardware Lab (total 20 hours)

1. Identification of components / cards – PC assembling from components.
2. Installation of motherboard, processor, memory and child hard disk.
3. Installation of peripherals such as FDD and a CD drive.
4. BIOS setup.
5. Preparation of HDD for installation – formatting partitioning and basics of file system.
6. Installation of different operating systems and managing application software.
7. Troubleshooting of standard PC.

Sessional Requirements

Total Attendance	: 5 marks
Workshop Practical and Record	: 10 marks each for A, B and C
Test	: 5 marks each for A, B and C
Total	: 50 marks

SCHEME AND SYLLABUS OF PHYSICAL EDUCATION, HEALTH AND FITNESS

Introductory Lectures

Unit 1. Health and Fitness: Modern concept of health and fitness, meaning, scope, need and importance of health, fitness and wellness
Unit II. Exercise and Fitness: Means and methods of developing fitness. Importance of physical activities and exercises in developing and maintaining good health, Physical fitness and well being.
Unit III. Sports and Physical education: Meaning and scope, role and importance of sports and games in the development of physical fitness and personality. Social values of sports. Rules of major games.

Practical Sessions

(All classes will be conducted after the normal working hours of the college)

50 sessions of minimum 1hour duration each are envisaged (including Theory and Practical). The student can opt for one of the following activities in line with the specific programme/ schedule announced by the faculty.
Athletics, Badminton, Basketball, Cricket, Football, General Fitness, Hockey, Kabaddi,
Table Tennis, Ball Badminton, Archery, Volley ball, Yoga (not all activities may be offered in a particular semester. More disciplines will be offered based on the availability of infrastructure and expertise.)
In addition, health and fitness assessment such as Height, Weight, Resting Pulse Rate and Blood Pressure will be carried out.

Objective

a) Basically to inculcate awareness of health, general fitness and attitude to voluntary physical involvement.

b) To promote learning of basic skills in sports activities and secondarily to pave the way for mastering some of the skills through continued future involvement.

Scheme of assessment

The student will be continuously assessed on his performance on the field of play. There will not be minimum mark for pass or fail. Total 50 marks will be given assessing their attendance, regularity, punctuality and performance for 50 hours of activity from1st semester to 7^{th} semester.

KANNUR UNIVERSITY
FACULTY OF ENGINEERING

Curricula, Scheme of Examinations & Syllabi for B.Tech Degree Programme (III-IV Semesters) in ELECTRONICS AND COMMUNICATION ENGINEERING With effect from 2007 Admissions

THIRD SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination	
		L	T	P/D		Hrs	Marks
2K6EC 301	Engineering Mathematics II	3	1	-	50	3	100
2K6EC 302	Humanities	3	1	-	50	3	100
2K6EC 303	Electrical Engineering	3	1	-	50	3	100
2K6EC 304	Solid State Devices	3	1	-	50	3	100
2K6EC 305	Network Theory	3	1	-	50	3	100
2K6EC 306	Electronic Circuits I	3	1	-	50	3	100
2K6EC 307(P)	**Basic Electronics Lab**	-	-	3	50	3	100
2K6EC 308(P)	**Electrical Engineering Lab**	-	-	3	50	3	100
TOTAL		**18**	**6**	**6**	**400**	**-**	**800**

FOURTH SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination	
		L	T	P/D		Hrs	Marks
2K6EC 401	Engineering Mathematics III	3	1	-	50	3	100
2K6EC 402	Computer Programming	3	1	-	50	3	100
2K6EC 403	Communication Engineering I	3	1	-	50	3	100
2K6EC 404	Signals & Systems	3	1	-	50	3	100
2K6EC 405	Electronic Circuits II	3	1	-	50	3	100
2K6EC 406	Digital Electronics	3	1	-	50	3	100
2K6EC 407(P)	**Electronic Circuits Lab**	-	-	3	50	3	100
2K6EC 408(P)	**Digital Electronics Lab**	-	-	3	50	3	100
TOTAL		**18**	**6**	**6**	**400**	**-**	**800**

2K6 EC 301 : ENGINEERING MATHEMATICS II

3 hours lecture and 1 hour tutorial per week

Module I:

Infinite Series: Convergence and divergence of infinite series – Ratio test – Comparison test – Raabe's test – Root test – Series of positive and negative terms- absolute convergence – Test for alternating series. ***Power Series***: Interval of convergence – Taylors and Maclaurins series representation of functions – Leibnitz formula for the derivative of the product of two functions – use of Leibnitz formula in the Taylor and Maclaurin expansions

Module II:

Matrices: Concept of rank of a matrix –echelon and normal forms – System of linear equation - consistency – Gauss elimination– Homogeneous liner equations-Fundamental system of solutions- Inverse of a matrix – solution of a system of equations using matrix inversion – eigen values and eigen vectors - Cayley- Hamilton Theorem.

Module III:

Vector Integral Calculus: Evaluation of line integral, surface integral and volume integrals – Line integrals independent of the path, conservative force fields, scalar potential- Green's theorem- Gauss' divergence theorem- Stoke's theorem (proof of these not required).

Module IV:

Vector Spaces: subspaces–linear dependence and independence–bases and dimension-linear transformations -sums, products and inverse of linear transformations.

References:

1. Kreyszing E. Advanced Engineering Mathematics, Wiley Eastern
2. Sastri. S. S. Engineering Mathematics, Prentice Hall of India.
3. Wylie .C. R. Advanced Engineering Mathematics, Mc Grawhill.
4. B .S. Grewal. Higher Engineering Mathematics, Khanna Publishers.
5. Greenberg. M.D. Advanced Engineering Mathematics, Pearson Education Asia.
6. Narayanan .S. Manickavachagom Pella and Ramaiah. Advanced Mathematics for Engineering Students, S. Viswanathan Publishers

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6EC 302 : HUMANITIES

3 hours lecture and 1 hour tutorial per week

Module I (20 hours)

Functional English Grammar: Sentence Analysis -Basic Patterns -Noun Group, Verbal Group, and Adverbial Group- Tenses – Conditionals - Active and Passive Voice - Reported Speech

Module II (14 hours)

Technical Communication

1. Nature, Growing need, and importance of technical communication – technical communication skills – listening, speaking, reading, and writing.
2. Barriers to effective communication – improper encoding, bypassing inter- cultural differences etc.
3. Organization in technical communication – spatial, chronological etc.
4. Style in technical communication - objectivity, accuracy, brevity, clarity etc.
5. Technical reports – types and format

Professional Ethics: 1. Ethics in Engineering, copyright – IPR- patents

Module III (10 hours)

Humanities, Science and Technology

1. Importance of humanities to technology, Education and Society
2. Relevance of a scientific temper
3. Relation between science, society and culture – the views of modern thinkers
4. The development of science and technology in society – science and technology in ancient Greece and India – the contribution of the Arabs to science and technology – recent advances in Indian science.

Reference books

1. Huddleston R, English Grammar – An outline, Cambridge University Press
2. Pennyor, Grammar Practice Activities, Cambridge University Press
3. Murphy, Intermediate English Grammar, Cambridge University Press
4. Hashemi, Intermediate English Grammar, Supplementary Exercises with answers, Cambridge University Press
5. Vesilind; Engineering, Ethics and the Environment, Cambridge University Press
6. Larson E; History of Inventions, Thompson Press India Ltd.
7. Bernal J. D., Science in History, Penguin Books Ltd.
8. Dampier W. C., History of Science, Cambridge University Press
9. Encyclopedia Britannica, History of Science, History of Technology
10. Subrayappa; History of Science in India, National Academy of Science, India
11. Brownoski J, Science and Human Values, Harper and Row
12. Schrödinger, Nature and Greeks and Science and Humanism, Cambridge University Press
13. Bossel. H., Earth at a Crossroads – paths to a sustainable future, Cambridge University Press
14. McCarthy, English Vocabulary in Use, Cambridge University Press
15. M. Ashraf Rizvi, Effective Technical Communication, Tata McGraw Hill, New Delhi, 2005

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 10 short type questions of 2 marks, from Module 1

Q II - 10 questions of 5 marks, from module II and III for writing short notes with choice to answer any **seven**

Q III - 2 questions A and B of 15 marks from module I for writing essay with choice to answer any one

Q IV - 2 questions A and B of 15 marks from module II for writing essay with choice to answer any one

Q V - 2 questions A and B of 15 marks from module III for writing essay with choice to answer any one

2K6 EC 303 : ELECTRICAL ENGINEERING

3 hours lecture and 1 hour tutorial per week

MODULE - I

DC Generator – E.M.F equation- Armature reaction – Commutation - interlopes – power flow diagram – losses and efficiency – voltage regulation – parallel operation – load sharing

DC Motor- back E.M.F. – speed equation – torques – performance characteristics – power flow diagram- losses and efficiency – starter- two point and three point – swinburns test – thyristor control of series and shunt motor.

MODULE –II

Transformers- E.M.F. equation- equivalent circuit- losses and efficiency –all day efficiency- voltage regulation – phasor diagrams – OC and SC test- auto transformer- saving of copper – applications- CT and PT – applications

Parallel operations of single phase and three phase transformers- three phase transformer connections- star to star- star to delta- delta to delta-applications

MODULE –III

Alternators- E.M.F. equation-effects of harmonics on pitch factor and distribution factor- voltage regulation- mmf and emf method- parallel operation – synchronization

Synchronous motor- starting method- power developed by synchronous motor- applications- synchronous condenser

MMODULE – IV

Three phase Induction motor- types – torque equations- torque slip and torque speed characteristics- power flow diagram – efficiency – equivalent circuit- induction generator

Special machines – single phase FHP motor starting methods- double field revolving theory-types and applications – stepper motor –classifications and applications – servomotors – classifications and applications –shaded pole motors -applications

Text book

1. Hughes E., Electrical Technology, ELBS

Reference books

1. Cotton H., Electrical Technology Pitman
2. Golding, Electrical measurements and measuring instruments, ELBS

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any on

2K6 EC 304 : SOLID STATE DEVICES

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Energy bands and charge carriers in semiconductors - Direct and indirect band gap semiconductors - Concept of effective mass - Intrinsic and extrinsic semiconductors - Fermi level - Electron and hole concentrations at equilibrium - Temperature dependence of carrier concentrations - Conductivity and mobility - Quasi Fermi level - Diffusion and drift of carriers - Einstein relation - Continuity equation

Module II (13 hours)

PN junctions - Contact potential - Space charge at a junction - Current flow at a junction - Carrier injection - Diode equation - Minority and majority carrier currents - Capacitance of pn junctions - Reverse bias breakdown - Zener and avalanche breakdown - Abrupt and graded junctions - Schottky barrier - Rectifying and ohmic contacts - Tunnel diode - Varactor diode - Zener diode

Module III (13 hours)

Charge transport in a bipolar junction transistor - Current and voltage amplification - Concept of load line - Analysis of transistor currents - Ebers-Moll model - Early effect - Concept of Early voltage - Avalanche breakdown in transistors - Transit time effects - Hetero junction GaAs BJTs

Module IV (13 hours)

Junction FET - Pinch off and saturation - Gate control - VI characteristics - MOS capacitor - Accumulation, depletion and strong inversion - threshold voltage - MOSFET - p channel and n channel MOSFETs - Depletion and Enhancement mode MOSFETs - Substrate bias effects - Floating gate MOSFETs - Short channel effects - hot carrier effect – MESFET- CMOS inverter-characteristics

Text books

1. Streetman B.G., *Solid State Electronic Devices*, Prentice Hall of India
2. Sze S.M., *Physics of Semiconductor Devices*, Wiley Eastern
3. Michael A.Shur, *Physics of Semiconductor Devices*, Prentice Hall of India

Reference books

1. Millman & Halkias, Integrated Electronics, McGraw Hill
2. Baker R.J., Li H.W. & Boyce D.E., CMOS - Circuit Design, Layout and Simulation, Prentice Hall of India
3. Kwok K N., Complete Guide to Semiconductor Devices, McGraw Hill
4. Yang E.S., Microelectronics Devices, McGraw Hill

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 305: NETWORK THEORY

3 hours lecture and 1 hour tutorial per week

Module I (10 hours)

Circuit elements and sources - Dependent and independent sources - Network theorems - Review of Thevenin's & Norton's theorem - Superposition theorem - Maximum power transfer theorem - First and second order circuits - Zero state response - Zero input response-Complete Response-Step Response and Impulse response of first and second order circuits

Module II (13 hours)

S-Domain Analysis of Circuits - Review of Laplace transform - Convolution theorem and convolution integral - Transformation of a circuit into S-domain - Transformed equivalent of inductance, capacitance and mutual inductance - Impedance and admittance in the transform domain - Node analysis and mesh analysis of the transformed circuit - Nodal admittance Matrix- mutually coupled circuits - Input and transfer immittance functions - Transfer functions - Impulse response and Transfer function - Poles and Zeros - Pole Zero plots - Sinusoidal steady state from Laplace transform inversion - Frequency response by transform evaluation on j-axis - Frequency response from pole-zero plot by geometrical interpretation

Module III (16 hours)

Two port networks: Two port networks - Characterization in terms of impedance - Admittance - Hybrid and transmission parameters - Inter relationships among parameter sets - Reciprocity Theorem - Interconnection of two port networks - Series, parallel and cascade - Network functions - Pole zero plots and steady response from pole - zero plots

Symmetrical two port networks: T and π Equivalent of a two port network - Image impedance - Characteristic impedance and propagation constant of a symmetrical two port network - Properties of a symmetrical two port network

Symmetrical Two Port Reactive Filters: Filter fundamentals - Pass and stop bands - Behavior of iterative impedance - Constant - k low pass filter - Constant - k high pass filter-m-derived T and π sections and their applications for infinite attenuation and filter terminations - Band pass and band elimination filters

Module IV (13 hours)

Synthesis: Positive real functions - Driving point functions - Brune's positive real functions - Properties of positive real functions - Testing driving point functions - Application of maximum module theorems - Properties of Hurwitz polynomials - Even and odd functions - Strum's theorem - Driving point synthesis - RC elementary synthesis operations - LC network synthesis - Properties of RC network functions - Foster and Cauer forms of RC and RL networks

Text books

1. Gupta B.R. & Singhal V., Fundamentals of Electrical Networks, Wheeler Pub
2. Van Valkenberg M.E., Introduction to Modern Network Synthesis, Wiley Eastern
3. Van Valkenberg, Network Analysis, Prentice Hall of India

Reference books

1. Desoer C.A. & Kuh E.S., Basic Circuit Theory, McGraw Hill
2. Siskind, Electrical Circuits. McGraw Hill
3. Ryder J.D., Networks, Lines and Fields, Prentice Hall
4. Edminister, Electric Circuits, Schaum's Outline Series, McGraw Hill
5. Huelsman L.P., Basic Circuit Theory. Prentice Hall of India

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 306 : ELECTRONIC CIRCUITS -I

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

BJT circuit models - Hybrid π model - Small signal low frequency and small signal high frequency models of BJT - Effect of temperature on BJT model parameters - h parameter equivalent circuits of CC, CB and CE configurations - Current gain - voltage gain - input and output impedances BJT amplifiers: Biasing - Load line - Bias stabilization - Stability factor - Bias compensation - Analyses and design of CC, CE and CB configurations - RC coupled and transformer coupled multistage amplifiers - High frequency response

Module II (13 hours)

FET amplifiers: Biasing of JFET - Self bias and fixed bias - Biasing of MOSFETS - Feedback biasing and fixed biasing for enhancement and depletion mode MOSFETs - Analyses of common source - Common drain and common gate amplifier configurations

Module III (13 hours)

Feedback - Effect of feedback on amplifier performance - Voltage shunt - Voltage series - Current series and current shunt feedback configurations - Positive feedback and oscillators -Analysis of RC Phase Shift, Wein bridge, Colpitts, Hartley and crystal oscillators - Stabilization of oscillations

Module IV (13 hours)

Power amplifiers - Class A, B, AB, C, D & S power amplifiers - Harmonic distortion - Efficiency - Wide band amplifiers - Broad banding techniques - Low frequency and high frequency compensation - Cascode amplifier - Broadbanding using inductive loads

Text books

1. Millman & Halkias, Integrated Electronics, McGraw Hill
2. Sedra A.S & Smith K.C., Microelectronic Circuits, Oxford University Press
3. Boylestad R. & Nashelsky L., Electronic Devices & Circuit Theory', Prentice Hall of India

Reference books

1. Hayt W.H., Electronic Circuit Analysis & Design, Jaico Pub.
2. Bogart T.F., Electronic Devices & Circuits', McGraw Hill
3. Horenstein M.N., Microelectronic Circuits & Devices', Prentice Hall of India
4. Schilling D.L. & Belove C., `Electronic Circuits', McGraw Hill
5. Baker R.J., Li H.W & Boyce D.E., CMOS - Circuit Design, Layout & Simulation, Prentice Hall of India

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 307(P) : BASIC ELECTRONICS LAB

3 hours Practical per week

1. Series resonant and parallel resonant circuits - voltage and current amplification
2. Diode & Zener diode characteristics - dc and dynamic resistance
3. Constant -k low pass and high pass filters
4. First and second order LPF/HPF/BPF with R and C for a given cut-off frequency
5. Clipping circuits with diodes
6. Clamping circuits & voltage multipliers
7. Half wave rectifier with C, LC & CRC filters
8. Full wave rectifiers with C, LC & CRC filters
9. Zener diode regulator with emitter follower output - regulation curves
10. UJT characteristics & the relaxation oscillator
11. CB configuration - determination of h parameters
12. CE configuration - determination of h parameters
13. MOSFET characteristics in CS and CD modes

Sessional work assessment

Lab Practicals and Record	= 30
Test	= 20
Total marks	= 50

Reference books

1.Bhargava et.al., Basic Electronic Circuits and Linear Circuits, Tata McGraw Hill
2. Boylestead & Nashelski, Electronic Devices and Circuit Theory, 9th Ed, Pearson/PHI
3. Millman & Halkias, Integrated Electronics, Tata McGraw Hill

University evaluation will be for 100 marks of which 70 marks are allotted for writing the procedure/formulae/sample calculation details, preparing the circuit diagram/algorithm/flow chart, conduct of experiment, tabulation, plotting of required graphs, results, inference etc., as per the requirement of the lab experiments, 20 marks for the viva-voce and 10 marks for the lab record.
Note: Duly certified lab record must be submitted at the time of examination

2K6 EC 308(P) : ELECTRICAL ENGINEERING LAB

3 hours Practical per week

1. Plot open circuit characteristics of DC shunt generator for rated speed - Predetermine O.C.C. for other speeds - Determine critical field resistance for different speeds
2. Load test on DC shunt generator - Plot external characteristics - Deduce internal characteristics
3. Load test on DC series motor - Plot the performance characteristics
4. OC and SC tests on single phase transformer - Determine equivalent circuit parameters - Predetermine efficiency and regulation at various loads and different power factors - verify for unity power factor with a load test
5. Load test on 3 phase cage induction motor - Plot performance curves
6. Resistance measurement using a) Wheatstone's bridge b) Kelvin's double bridge
7. Measurement of self inductance, mutual inductance and coupling coefficient of a) Transformer windings b) air cored coil
8. Power measurement
9. Three voltmeter method b) three ammeter method
10. Power measurement in 3 phase circuit - Two wattmeter method
11. Extension of ranges of ammeter and voltmeter using shunt and series resistances

Sessional work assessment

Lab Practicals and Record	= 30
Test	= 20
Total marks	= 50

Text books

1. Hughes E., Electrical Technology, ELBS

University evaluation will be for 100 marks of which 70 marks are allotted for writing the procedure/formulae/sample calculation details, preparing the circuit diagram/algorithm/flow chart, conduct of experiment, tabulation, plotting of required graphs, results, inference etc., as per the requirement of the lab experiments, 20 marks for the viva-voce and 10 marks for the lab record.
Note: Duly certified lab record must be submitted at the time of examination

2K6 EC 401 : ENGINEERING MATHEMATICS III

3 hours lecture and 1 hour tutorial per week

Module I: (13 hours)

Complex analytic functions and conformal mapping: Complex functions – limits. derivative, analytic function- Cauchy-Riemann equations- elementary complex functions such as powers, exponential function, logarithmic, trigonometric and hyperbolic functions- Conformal mapping – Linear fractional transformations- mapping by elementary functions

Module II: (13 hours)

Complex integration: Line integral, Cauchy's integral theorem - Cauchy's integral formula – Taylor's series, Laurent series – residue theorem – evaluation of real integrals using integration around unit circle, around semicircle, integrating contours having poles on the real axis

Module III: (13 hours)

Jointly Distributed Random Variables: Joint distribution functions, independent random variables , covariance and variance of sums of random variables, joint probability distribution functions of random variables, conditional probability and conditional expectations. ***Curve fitting***: Method of least squares, correlation and regression, line of regression.

Module IV: (13 hours)

Vibrating strings: One dimensional wave equation – D' Alembert's solution – solution by method of separation of variables One dimensional heat equation - solution of the equation by the method of separation of variable Solutions of Laplace's equation over a rectangular region and a circular region by the method of separation of variable

Reference books

1. Kreyszig E. Advanced Engineering Mathematics. Wiley Eastern
2. Johnson, Miller and Freud. Probability and Statistics for Engineers, Pearson Education Asia.
3. Wylie .C.R. Advanced Engineering Mathematics, Mc Grawhill.
4. B.S. Grewal. Higher Engineering Mathematics, Khanna Publishers.
5. Freund. J.E. Mathematical Statistics, Prentice hall of India.

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 short type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 402 : COMPUTER PROGRAMMING

3 hours lecture and 1 hour tutorial per week

Module I (15 hours)
Overview of C – Variables, Expressions and assignments, Lexical Elements, Fundamental Data Types, Operators *Control Statements* – if, switch-case, for , while, do, goto, break, switch *Functions*- Parameter passing , scope rules, recursion

Module II (12 hours)
Arrays – One dimensional and Multi Dimensional, *Pointer*-Linked List, Arrays of Pointers, Dynamic Memory Allocations, *Strings* – Operations and functions , *Bitwise Operators and Enumeration Types , Structures and Unions, Files and File Operations*

Module III (13 hours)
Overview of Java Language- Constants, Variables and Data Types, Operators and Expressions *Control Structures* – Decision Making, Branching and Looping, *Object Oriented Programming* – Concept of Classes, Objects and Methods, Benefits Java and OOP- Polymorphism and Overriding of methods, Inheritance

Module IV (12 hours)
Arrays and Strings, Interfaces, Multiple Inheritance, Packages – Putting Classes together – Managing Errors and Exceptions – Applet Programming and Graphics Programming (Basics only) – Managing Input/Output Files in Java

Text books
1. Kelley, Al & Pohl, Ira.,., *A Book on C- Programming in C*, 4th Ed,, Pearson Education (Modules I &II)
2. Balagurusamy E., Programming with Java: A Primer, 3rd Ed., Tata McGraw-Hill (Module III &IV)

Reference books
1. Balagurusamy E., Programming in ANSI C, Tata McGraw Hill
2. Eckel, Bruce., *Thinking in Java*, 2nd Ed, Pearson Education

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern
Q I - 8 **short** type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 403 : COMMUNICATION ENGINEERING -I

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Random process: review of the theory of continuous random variables - joint distribution and density functions - conditional distribution functions - random process - ensemble average - stationarity - wide sense stationarity - time averages - ergodicity - correlation theory for WSS random process - power spectral density - Wiener - Khinchie Eiestein theorem - response of LTI systems to random process - guassian random process - filtered guassian random process - white guassian noise(**May be removed from the syllabus, Telephony can be considered)**

Module II (10 hours)

Noise: sources of noise - thermal noise - shot noise and flicker noise - filtered white noise - narrow band noise - quadrature representation - envelope and phase representation - signal to noise ratio - noise equivalent bandwidth - effective noise temperature - noise calculations for cascaded stages

Module III (15 hours)

Amplitude modulation: spectrum of amplitude modulated signal - power relations - AM generation and detection - DSB-SC generation and detection - SSB-SC generation and detection - VSB modulation - AM transmitter and receiver - TRF and superheterodyne receivers - noise analysis of AM receivers - SNR for envelope detection and coherent detection - SNR in DSB-SC and SSB-SC systems

Module IV (15 hours)

Frequency modulation: angle modulation - frequency modulation - narrow band FM - wide band FM - transmission bandwidth - generation of FM signals - direct and indirect methods - FM demodulators - noise in FM reception - threshold effect - pre-emphasis and de-emphasis

Text books

1. Simon Haykin, "Communication Systems", 3rd Edition, John Wiley & Sons
2. Ziemer R.E. & Tranter W.H., "Principles of Communication", JAICOP Publishing House
3. Dennis Roddy, John Coolen, "Electronic Communications", PHI

Reference books

1. Sam Shanmugam K., "Digital and Analog Communication Systems", John Wiley & Sons
2. Yannic Viniotis, "Probability for Electrical Engineers", McGraw Hill International
3. Lathi B.P., "Modern Digital and Analog Communication Systems", 3rd Ed., Oxford University Press.
4. Tomasi, Electronic Communication: Fundamentals Through Advanced, Pearson Education
5. Couch, Digital and Analog Communication Systems, Pearson Education

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 **short** type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 404 : SIGNALS & SYSTEMS

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)
Introduction to signals and systems - Classification of signals - Basic operations on signals - Elementary signals - Concept of system - Properties of systems - Stability, invertability, time invariance - Linearity - Causality - Memory - Time domain description - Convolution - Impulse response - Representation of LTI systems - Differential equation and difference equation representations of LTI systems

Module II (15 hours)
Fourier representation of continuous time signals - Fourier transform - Existence of the Fourier integral - FT theorems - Energy spectral density and power spectral density - Frequency response of LTI systems - Correlation theory of deterministic signals - Condition for distortionless transmission through an LTI system - Transmission of a rectangular pulse through an ideal low pass filter - Hilbert transform - Sampling and reconstruction

Module III (13 hours)
Fourier representation of discrete time signals - Discrete Fourier series and Discrete Fourier transform - Laplace transform analysis of systems - Relation between the transfer function and differential equation - Causality and stability - Inverse system - Determining the frequency response from poles and zeros

Module IV (12 hours)
Z Transform - Definition - Properties of the region of convergence - Properties of the Z transform - Analysis of LTI systems - Relating the transfer function and difference equation - Stability and causality - Inverse systems - Determining the frequency response from poles and zeros

Text books
1. Haykin S. & Veen B.V., Signals & Systems, John Wiley
2. Oppenheim A.V., Willsky A.S. & Nawab S.H., Signals and Systems, Tata McGraw Hill
3. Taylor F.H., Principles of Signals & Systems, McGraw Hill

Reference books
1. Lathi B.P., Modern Digital & Analog Communication Systems, Oxford University Press
2. Haykin S., Communication Systems, John Wiley
3. Bracewell R.N., Fourier Transform & Its Applications, McGraw Hill
4. Papoulis A., Fourier Integral & Its Applications, McGraw Hill

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern
Q I - 8 **short** type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 405 : ELECTRONIC CIRCUITS - II

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

RC circuit as integrator and differentiator - Compensated attenuators - Pulse transformer - Pulse response Switching characteristics of a BJT - BJT switches with inductive and capacitive loads - Non saturating switches - Emitter follower with capacitive loading - Switching characteristics of a MOS inverter - Resistive load & active load configurations - CMOS inverter - Dynamic power dissipation

Module II (13 hours)

Monostable and astable multivibrators - Collector coupled monoshot - Emitter coupled monoshot - triggering the monoshot - Collector coupled and emitter coupled astable multivibrator - Astable - monostable and bistable operations using negative resistance devices - Multivibrators with 555 IC timer- Astable, monostable, bistable circuits with logic gates

Module III (13 hours)

Phase Locked Loops - Phase detector (XOR & phase frequency detectors) - Voltage Controlled Oscillator (Current starved & source coupled CMOS configurations) - Loop filter - Analysis of PLL - Typical applications of PLL - Voltage and current time base generators - Linearization - Miller & bootstrap configurations

Module IV (13 hours)

Digital to analog converters - R-2R ladder - Binary weighted - Current steering - Charge scaling - Cyclic & pipeline DACs - Accuracy - Resolution - Conversion speed - Offset error - Gain error - Integral and differential nonlinearity - Analog to digital converters – Track and hold operation - Track and hold errors - ADC conversion techniques - Flash converter - Two step flash - Pipeline – Integrating - Staircase converter - Successive approximation converter - Dual slope & oversampling ADCs

Text books

1. Millman J. & Taub H., Pulse, Digital & Switching Waveforms, Tata McGraw Hill
2. Baker R.J., Li H.W. & Boyce D.E., CMOS - Circuit Design, Layout & Simulation, Prentice Hall of India

Reference books

1. Taub & Schilling, Digital Integrated Electronics, McGraw Hill
2. Sedra A.S.& Smith K.C., Microelectronic Circuits, Oxford University Press
3. D.A. Hodges., and G. Jackson., Analysis and Design of Digital Integrated Circuits, Mc Graw Hill

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 **short** type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 406 : DIGITAL ELECTRONICS

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Basic digital circuits - Review of number systems and Boolean algebra - Simplification of functions using Karnaugh map and Quine McCluskey methods - Boolean function implementation - Code converters - Encoders and decoders - Multiplexers and demultiplexers - ROMs - Combinational logic design using decoders - Multiplexers and ROMs

Module II (12 hours)

Hazards in combination circuits – static and dynamic.

Arithmetic circuits - Half and full adders and subtractors - Carry look ahead adders - BCD adder - Multiplier and divider circuits - Sequential circuits - Latches and flip flops (RS, JK, D, T and Master Slave) - Design and analysis of ripple counters - Shift registers - Johnson and ring counters

Module III (14 hours)

Design and analysis of sequential circuits - General model of sequential networks –

Hazards in sequential networks - synchronous design method - clock skew - asynchronous inputs - synchroniser failure and metastability

State diagrams – Synchronous counter design - Analysis of sequential networks - Derivation of state graphs and tables - Reduction of state table - Sequential network design

Module IV (14 hours)

Logic families - Fundamentals of RTL, IIL, DTL and ECL gates - TTL logic family - TTL transfer characteristics - TTL input and output characteristics - Tristate logic - Shottkey and other TTL gates - MOS gates - MOS inverter - CMOS inverter - Rise and fall time in MOS and CMOS gates - Speed power product - Interfacing BJT and CMOS gates .

Text books

1. Roth C.H., Fundamentals of Logic Design, Jaico Pub.
2. Mano M.M., Digital Design, Prentice Hall of India
3. Taub B. & Schilling D., Digital Integrated Electronics, McGraw Hill
4. Jain R.P., Modern Digital Electronics, Tata McGraw Hill
5. John F. Wakerly, "*Digital Design: Principles and Practices"*, PHI Inc

Reference books

1. Morris R.L., Designing with TTL Integrated Circuits, McGraw Hill
2. Katz R.H., Contemporary Logic Design, Benjamin/Cummings Pub.
3. Lewin D. & Protheroe D., Design of Logic Systems, Chapman & Hall

Sessional work assessment

Assignments	2x10 = 20
2 tests	2x15 = 30
Total marks	= 50

University examination pattern

Q I - 8 **short** type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 407(P) : ELECTRONIC CIRCUITS LAB

3 hours Practical per week

1. Feed back voltage regulator with short circuit protection
2. Biasing circuits- fixed bias-self bias- voltage divider.
3. Emitter follower with & without complementary transistors – Frequency and phase response for a capacitive load
4. Single stage RC coupled amplifier – Frequency response
5. Phase shift oscillator using BJT/FET
6. Hartley / Colpitts oscillator using BJT/FET
7. Power amplifier – Class A
8. Power amplifier – Class AB
9. Cascode amplifier – Frequency response
10. Cascaded RC coupled amplifier – Frequency response
11. Active load MOS amplifier
12. Wide band single BJT/MOS voltage amplifier with inductance
13. Single BJT crystal oscillator

Sessional work assessment

Lab Practicals and Record	= 30
Test	= 20
Total marks	= 50

Reference books

1. Boylestead & Nashelski, *Electronic Devices and Circuit Theory*, 9th Ed, Pearson/PHI
2. Millman & Halkias, *Integrated Electronics*, Tata McGraw Hill

University evaluation will be for 100 marks of which 70 marks are allotted for writing the procedure/formulae/sample calculation details, preparing the circuit diagram/algorithm/flow chart, conduct of experiment, tabulation, plotting of required graphs, results, inference etc., as per the requirement of the lab experiments, 20 marks for the viva-voce and 10 marks for the lab record.
Note: Duly certified lab record must be submitted at the time of examination

2K6 EC 408(P) : DIGITAL ELECTRONICS LAB

3 hours practicals per week

List of experiments:

1. Familiarization with TTL ICs
2. Characteristics of TTL NAND gate
3. Arithmetic circuits
4. Flip-Flops
5. Counters and Sequence generators
6. Twisted counters
7. Registers
8. Encoders and Decoders
9. Multiplexers and Demultiplexers
10. ADC and DAC
11. CMOS logic circuits
12. Multivibrators using logic gates

Sessional work assessment

Lab Practicals and Record	= 30
Test	= 20
Total marks	= 50

Reference books

1. Jain R.P., Modern Digital Electronics, Tata McGraw Hill
2. Mano M.M., *Digital Design*, Prentice Hall of India
3. Taub B. & Schilling D., *Digital Integrated Electronics*, McGraw Hill

University evaluation will be for 100 marks of which 70 marks are allotted for writing the procedure/formulae/sample calculation details, preparing the circuit diagram/algorithm/flow chart, conduct of experiment, tabulation, plotting of required graphs, results, inference etc., as per the requirement of the lab experiments, 20 marks for the viva-voce and 10 marks for the lab record.
Note: Duly certified lab record must be submitted at the time of examination

KANNUR UNIVERSITY

FACULTY OF ENGINEERING

Curricula, Scheme of Examinations & Syllabus for Semesters V & VI of B.Tech. Degree Programme in Electronics & Communication Engineering with effect from 2007 Admissions

FIFTH SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination	
		L	T	P/D		Hrs	Marks
2K6 EC 501	Engineering Mathematics IV	3	1	-	**50**	3	**100**
2K6 EC 502	Economics and Business Management	3	1	-	**50**	3	**100**
2K6 EC 503	Applied Electromagnetic Field theory	3	1	-	**50**	3	**100**
2K6 EC 504	Computer Organization & Architecture	3	1	-	**50**	3	**100**
2K6 EC 505	Linear Integrated Circuits	3	1	-	**50**	3	**100**
2K6 EC 506	Microprocessors and Microcontrollers	3	1	-	**50**	3	**100**
2K6 EC 507(P)	Linear Integrated Circuits Lab	-	-	**3**	**50**	3	**100**
2K6 EC 508(P)	Computer Programming Lab	-	-	**3**	**50**	3	**100**
TOTAL		**18**	**6**	**6**	**400**	-	**800**

SIXTH SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination	
		L	T	P/D		Hrs	Marks
2K6 EC 601	Environmental Engineering & Disaster Management	3	1	-	**50**	3	**100**
2K6 EC 602	Control Systems	3	1	-	**50**	3	**100**
2K6 EC 603	Radiation& Propagation	3	1	-	**50**	3	**100**
2K6 EC 604	Digital Signal Processing	3	1	-	**50**	3	**100**
2K6 EC 605	Digital Communication	3	1	-	**50**	3	**100**
2K6 EC 606	Elective-I	3	1	-	**50**	3	**100**
2K6 EC 607(P)	Communication Engineering Lab -I	-	-	**3**	**50**	3	**100**
2K6 EC 608(P)	Microprocessors & Microcontroller lab	-	-	**3**	**50**	3	**100**
TOTAL		**18**	**6**	**6**	**400**	-	**800**

Elective I

1.2K6 EC 606(A) : DESIGNING WITH VHDL

2.2K6 EC 606(B) : HIGH SPEED DIGITAL DESIGN

3.2K6 EC 606(C) : LINEAR SYSTEMS ANALYSIS

4.2K6 EC 606 (D) : DATA STRUCTURES & ALGORITHMS

5. 2K6EC 606(E) : ANALOG MOS CIRCUITS

2K6 EC 501: ENGINEERING MATHEMATICS – IV

3 hours lecture and 1 hour tutorial per week

Module I: Probability distributions (13 hours)

Random variables - Probability distributions - binomial distribution -Poisson distribution-normal distribution – Mean, variance and Moment generating function - Poisson process - chebyshev's theorem - Geometric Distribution - Uniform Distribution, Gamma distribution, Beta Distribution, Exponential Distribution and Hyper - Geometric Distributions.

Module II: Statistical inference (13 hours)

Population and Sample-Sampling Distributions of Mean and Variance-Point Estimation-Interval Estimation -Null Hypotheses and Significance tests-Hypotheses concerning one mean- Confidence Intervals of mean and variance -Estimation of Variances-Hypotheses concerning one variance-Hypotheses concerning two variance- Chi square test as test of goodness of fit.

Module III (Series solutions of differential equations (13 hours)

Power series method of solving ordinary differential equations - series solution of Bessel's equation – Recurrence formula for Jn(x) - expansions for J_0 and J_1 – value of $J_{1/2}$ - generating function for Jn(x) - Orthogonality of Bessel functions - Legendre's equation – series solution of legendary's differential equation - Rodrigues formula - Legendre Polynomials – Generating function for Pn(x)- Recurrence formulae for Pn(x) - Orthogonality of Legendre polynomials

Module IV Quadratic forms and Fourier transforms (13 hours)

Quadratic forms - Matrix associated with a quadratic form - Technique of Diagonalization using row and column transformations on the matrix - Definite, Semidefinite and Indefinite forms - their identification using the Eigen values of the matrix of the quadratic form.

Fourier Transform - Properties of Fourier Transforms – Linearity property - Change of scale property - shifting properties – Modulation property - Transform of the Derivative-simple problems - Fourier Cosine transform - Fourier Sine Transform.

Text Books

Johnson RA, Miller & Freund's Probability and Statistics for Engineers, Prentice Hall of India (For Module I and II only)

Reference Books

1. Wylie CR & Barrett LC, Advanced Engineering Mathematics, Mc Graw Hill
2. Kreyszig E, advanced Engineering Mathematics, John Wiley.
3. NP Bali & Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications
4. Dr.B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II - 2 questions (covering entire module) of 15 marks each from module I with choice to answer any one.
Q III - 2 questions (covering entire module) of 15 marks each from module II with choice to answer any one.
Q IV - 2 questions (covering entire module) of 15 marks each from module III with choice to answer any one.
Q V - 2 questions (covering entire module) of 15 marks each from module IV with choice to answer any one.

2K6 EC 502: ECONOMICS AND BUSINESS MANAGEMENT

3 hours lecture and 1 hour tutorial per week

Module 1 (12 hours)

Definition of economics – nature and scope of economic science – nature and scope of managerial economics – central problems of an economy – scarcity and choice - opportunity cost – objectives of business firms – forms of business – proprietorship – partnership – joint stock company – co-operative organisation – state enterprise

Module II (14 hours)

Consumption – wants – characteristics of wants – law of diminishing marginal utility – demand – law of demand – elasticity of demand – types of elasticity – factors determining elasticity – measurement – its significance in business – demand forecasting – methods of demand forecasting – supply – law of supply elasticity of supply

Module III (14 hours)

Production – factors of production – features of factors of production – division of labour – production function – Cobb – Douglas production function – production possibility curve – isoquants – marginal rate of technical substitution – properties of isoquants – law of variable proportions – returns to scale – isocost line – least cost combination of factors – expansion path – technical and economic efficiency – linear programming – graphical method – economies of large scale production

Module IV (12 hours)

Market structures and price determination – perfect competition – monopoly – monopolistic competition – oligopoly – kinked demand curve – money and banking – nature and functions of money – money market and capital market – commercial banks – functions – central banking functions – methods of credit control.

Text Books & Reference books

1. Varshney R.L & Maheshwari K.L, Managerial Economics, S Chand & company Ltd.
2. Dwivedi D.N, Managerial Economics, Vikas Publishing House Pvt Ltd.
3. Dewett K.K, Modern Economic Theory, S Chand & Company Ltd.
4. Barthwal A.R, Industrial Economics, New Age International Publishers
5. Benga T.R & Sharma S.C, Industrial Organisation And Engineering Economics, Khanna Publishing
6. Ahuja H.L, Modern Micro Economics – Theory And Applications, S Chand & Company Ltd.
7. Koutsoyiannis A, Modern Microeconomics, Macmillan Press Ltd.
8. Joel Dean, Managerial Economics, Prentice – Hall of India Pvt. Ltd.
9. Dewett. K.K. & Verma J.D, Elementary Economic Theory, S Chand & Company Ltd.
10. Jhingan M.L, Macro Economic Theory, Vrinda Publications Pvt. Ltd.

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 503: APPLIED ELECTROMAGNETIC FIELD THEORY

3 hours lecture and 1 hour tutorial per week

Module I: The electric field (12 hours)

Co-ordinate transformations - vector fields - divergence theorem - stokes theorem - static electric field - electric flux - gauss's law - electric scalar potential - electric dipole - field polarization in dielectrics - electrostatic boundary conditions - Laplace's and Poisson's equations - capacitance - capacitance of isolated sphere - capacitance between coaxial cylinders - capacitance between parallel wires - energy stored in electric field

Module II: The magnetic field (12 hours)

Steady current and current density in a conductor - Biot Savart's law and ampere's law - scalar and vector magnetic potentials - magnetic boundary conditions - magnetic torque and moment - magnetic dipole - magnetisation in materials - inductance - self and mutual inductance - inductance of solenoids, toroids and transmission lines - energy stored in magnetic field - Faraday's law of electromagnetic induction - motional and transformer emf

Module III: Maxwell's equations (14 hours)

Current continuity equation - displacement current - dielectric hysterisis - Maxwell's equations - wave equations - solutions for free space conditions - uniform plane wave - sinusoidal time variations - Poynting vector and Poynting theorem - wave equations for conducting medium - wave polarization

Module IV: Wave propagation & transmission lines (14 hours)

Propagation of waves through conductors and dielectrics - wave incidence normally and obliquely on a perfect conductor - wave incidence on the surface of a perfect dielectric - brewster angle - transmission lines - wave equations on transmission lines - phase velocity and group velocity - characteristic impedance - standing wave ratio - impedance matching - smith chart

Text & reference books

1. John D. Kraus, Electromagnetics, McGraw Hill
2. Mattew N.O. Sadiku, Elements of Electromagnetics, Addison Wesley
3. Edward C Jordan, Keith Balman, Electromagnetic Waves & Radiating Systems, 2nd Ed, PHI
4. David K. Cheng, Field and Wave Electromagnetics, Addison Wesley
5. Hayt W.H., Engineering Electromagnetics, McGraw Hill, Kogakusha
6. Guru & Hiziroglu, Electromagnetic Field Theory Fundamentals
7. Premlet B., Electromagnetic Theory with Applications, Phasor Books

Sessional work assessment

Two tests (2 x 15) = 30
Two assignments(2 x 10) = 20
Total marks = 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 504 : COMPUTER ORGANISATION & ARCHITECTURE

3 hours lecture and 1 hour tutorial per week

Module I (15 hours)

Basic structure of computer hardware and software – addressing methods and machine program sequencing- Computer arithmetic- logic design for fast adders- multiplication- Booth's algorithm- Fast multiplication- integer division – floating point number representation – floating point arithmetic

Module II (12 hours)

Control unit – instruction execution cycle – sequencing of control signals – hardwired control – PLAs – micro programmed control – control signals – microinstructions- micro program sequencing- Branch address modification – Prefetching of micro instructions –emulation –Bit slices

Module III (12 hours)

Memory organization – Semiconductor RAM memories-internal organization-Bipolar and MOS devices –Dynamic memories- multiple memory modules and interleaving – cache memories-mapping functions-replacement algorithms-virtual memory –address translation –page tables - memory management units- Secondary memory – disk drives – organization and operations- different standards-RAID Controls

Module IV (13 hours)

Input-output organizations-accessing I/O devices-direct memory access (DMA)- interrupts-interrupt handling-handling multiple devices-device identification-vectored interrupts-interrupt nesting-Daisy chaining-I/O interfaces- serial and parallel standards-buses-scheduling- bus arbitration-bus standards. Introduction to parallel organizations-multiple processor organization- symmetric multiprocessors-cache coherence-non uniform memory access-vector computation- introduction to CISC and RISC-architectures-comparisons

Text Books:

1. Hamacher C.V, "Computer Organisation-4th Edition", Mc Graw Hill, NewYork 1997
2. Stallings William,"Computer Organisation and architecture" 6th Edition Pearson Education 2003

References:

1. Hayes J.P, "Computer Organisation and Architecture-2nd Edition Mc Graw Hill
2. D.A Pattersen and J.L Hennesy "Computer Organisation and Design: The hardware /software Interface 2nd Edition" Harcourt Asia Private Ltd (Morgan Kaufman) Singapore 1998
3. Andrew S. Tanenbaum "Structured Computer Organisation- 4th Edition Pearson Education

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 505 : LINEAR INTEGRATED CIRCUITS

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

BJT differential amplifier analysis - concept of CMRR - methods to improve CMRR - constant current source - active load - current mirror - Darlington pair - differential input impedance - various stages of an operational amplifier - simplified schematic circuit of op-amp 741 - need for compensation - lead, lag and lead lag compensation schemes - typical op-amp parameters - slew rate - power supply rejection ratio - open loop gain - unity gain bandwidth - offset current & offset voltage

Module II (12 hours)

MOS differential amplifier - source coupled pair - source cross coupled pair - current source load and cascode loads - wide swing current differential amplifier - wide swing constant transconductance differential amplifier - CMOS opamp with and without compensation - cascode input opamp - typical CMOS opamp parameters

Module III (11 hours)

Linear opamp circuits - inverting and noninverting configurations - analysis for closed loop gain - input and output impedances - virtual short concept - current to voltage and voltage to current converters - instrumentation amplifier - nonlinear opamp circuits - log and antilog amplifiers - 4 quadrant multipliers and dividers - phase shift and wein bridge oscillators - comparators - astable and monostable circuits - linear sweep circuits

Module IV (16 hours)

Butterworth, Chebychev and Bessel approximations to ideal low pass filter characteristics - frequency transformations to obtain HPF, BPF and BEF from normalized prototype LPF - active biquad filters - LPF & HPF using Sallen-Key configuration - BPF realization using the delyannis configuration - BEF using twin T configuration - all pass filter (first & second orders) realizations - inductance simulation using Antoniou's gyrator

Text books

1. Jacob Baker R., Harry W Li & David E Boyce, '*CMOS- Circuit Design, Layout & Simulation*', PHI
2. Sergio Franco, '*Design with* Operational *Amplifiers and Analog Integrated Circuits*', McGraw Hill Book Company
3. James M Fiore, 'Operational *Amplifiers and Linear Integrated Circuits*', Jaico Publishing House
4. Gaykward, *Operational* Amplifiers, Pearson Education

Reference books

1. Gobind Daryanani, 'Principles of Active Network Synthesis & Design', John Wiley
2. Sedra A.S. & Smith K.C., "Microelectronic Circuits', Oxford University Press
3. Robert F Coughlin & Frederick F Driscoll, 'Operational Amplifiers and Linear Integrated Circuits', Fourth Edition, Pearson Education
4. Mark N Horenstein, 'Microelectronic Circuits & Devices', PHI

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 506 : MICROPROCESSORS & MICROCONTROLLERS

3 hours lecture and 1 hour tutorial per week

Module I (15 hours)

Intel 8086 processor – Architecture- Pin configuration - Memory addressing - Addressing modes - Instruction set - Assembly language programming - Assemblers - Interrupts - - Timing diagrams - Minimum and maximum mode - Multiprocessor configuration

Module II (12 hours)

Interfacing - Address decoding - Interfacing chips-Architecture and Programming- - Programmable peripheral interface (8255) - Programmable communication interface (8251) - Programmable timer (8254) - DMA controller (8257) - Programmable interrupt controller (8259) - Keyboard display interface (8279)

Module III (12 hours)

Introduction to 80386 - Memory management unit - Descriptors, selectors, description tables and TSS - Real and protected mode - Memory paging - Special features of the pentium processor - Branch prediction logic - Superscalar architecture

Module IV (13 hours)

Intel 8051 microcontroller –architecture –ports, timers, interrupts, serial data transmission, instruction set -programming

Text books

1. A.K Ray, K.M. Bhurchandi, Advanced Microprocessors and peripherals, 2nd Edition, TMH
2. Ajay V Deshmukh, Microcontrollers theory and applications, TMH
3. Hall D.V., *Microprocessors & Interfacing*, McGraw Hill
4. Brey B.B., *The Intel Microproessors - Architecture, Programming & Interfacing*, Prentice Hall
5. Liu Y.C. & Gibsen G.A., *Microcomputer System: The 8086/8088 Family*, Prentice Hall of India
6. Hintz K.J. & Tabak D., *Microcontrollers-Architecture, Implementation & Programming*, McGraw Hill
7. Myke Predko, Programming and Customising the 8051 Microcontroller,Tata Mc Graw Hill

Reference books

1. Intel Data Book Vol.1, *Embedded Microcontrollers and Processors*
2. Tribel W.A. & Singh A., *The 8088 and 8086 Microprocessors,* McGraw Hill
3. Intel Data Book *EBK 6496 16 bit Embedded Controller Handbook*

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 507(P) : LINEAR INTEGRATED CIRCUITS LAB.

3 hours practical per week

1. Measurement of op-amp parameters - CMRR, slew rate, open loop gain, input and output impedances
2. Inverting and non-inverting amplifiers, integrators and differentiators - frequency response
3. Instrumentation amplifier - gain, CMRR and input impedance
4. Single op-amp second order LFF and HPF - Sallen-Key configuration
5. Narrow band active BPF - Delyiannis configuration
6. Active notch filter realization using op-amps
7. Wein bridge oscillator with amplitude stabilization
8. Astable and monostable multivibrators using op-amps
9. Square, triangular and ramp generation using op-amps
10. Voltage regulation using IC 723
11. Astable and monostable multivibrators using IC 555
12. Design of PLL for given lock and capture ranges & frequency multiplication
13. Precision limiter using op-amps
14. Multipliers using op-amps - 1,2 & 4 quadrant multipliers

Text books

1. Gaykwad, *Operational* Amplifiers, Pearson Education
2. Robert F Coughlin & Frederick F Driscoll, 'Operational Amplifiers and Linear Integrated Circuits', Fourth Edition, Pearson Education
3. D. Roy Choudhary, Shail B. Jain, "Linear Integrated Circuits", New Age International Publishers
4. Sergio Franco, 'Design with Operational Amplifiers and Analog Integrated Circuits', McGraw Hill Book Company

Sessional work assessment

Laboratory practical and record - 35 marks
Tests – 15 marks
Total – 50 marks

2K6EC 508(P) : COMPUTER PROGRAMMING LAB.

3 hours practical per week

Set 1 (3 lab sessions)

C Programming - HCF (Euclid's algorithm) and LCM of given numbers - Conversion of numbers from binary to decimal, hexadecimal, octal and back – Generation of Prime Series and Fibonacci Series - Evaluation of functions like e^x, sin*x*, cos*x* etc. for a given numerical precision using Taylor's series - String manipulation programs: sub-string search, deletion

Set 2 (2 lab sessions)

C Programming - Matrix operations: Programs to find the product of two matrices - Inverse and determinant (using recursion) of a given matrix - Solution to simultaneous linear equations using Jordan elimination. Files: Use of files for storing records with provision for insertion - Deletion, search, sort and update of a record-Pointers-Using Arrays, Linked list, Stacks, Queues

Set 3 (2 lab sessions)

JAVA - String handling programs, Implementation of Inheritance, Polymorphism, Overriding and Exceptions

Set 4 (3 lab sessions)

JAVA- Input/Output File Operations, Applet and Graphic Programming

Reference books

1. Schildt H., *C: The Complete Reference*, Tata McGraw Hill
2. Kelley, Al & Pohl, Ira.,., *A Book on C- Programming in C*, 4th Ed,, Pearson Education
3. Balagurusamy E., Programming with Java: A Primer, 3rd Ed., Tata McGraw-Hill

Sessional work assessment

Lab practical & record	- 35 marks
Tests	- 15 marks
Total marks	- 50 marks

2K6 EC 601 ENVIRONMENTAL ENGINEERING & DISASTER MANAGEMENT

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Multidisciplinary nature of Environmental studies – Definition – scope and importance – need for public awareness

Natural resources – renewable and non-renewable resources – natural resources – forest resources - water resources –

Mineral resources – food resources – energy resources – Land resources – use, overuse and misuse of these resources with appropriate case studies to substantiate – effect on the environment – role of individual in conservation of natural resources – equitable use of resources for sustainable lifestyle.

Module II (12 hours)

Ecosystem – concept – structure and function – producers, consumers & decomposers – energy flow in the ecosystem- Ecological successive food chains - food webs (all in brief)

Ecological pyramids – introduction, types and characteristic features, structure and function of forest, grassland, desert and aquatic ecosystems (ponds, lakes, streams, rivers, oceans and estuaries)Biodiversity and its conservation – Introduction – definition : genetic species and ecosystem diversity – Biogeographically classification of India – value of biodiversity – consumptive and productive use, social, ethical, aesthetic and option values – biodiversity at global, national and local levels – India as a mega-diversity nation – hot spots of biodiversity – threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Module III ((14 hours)

Environmental Pollution – Definition – causes - effects and control measures of: Air Pollution – water Pollution – soil Pollution – marine Pollution – noise Pollution – thermal Pollution – Nuclear hazards.

Solid waste management – causes, effects and control measures of urban and industrial wastes – Role of an individual in preventing Pollution – Environmental Protection Act – Prevention and control of air and water Pollution – Wildlife Protection Act – Forest Conservation Act – Issues involved in Enforcement of Environmental Legislation – Public awareness.

Disaster Management – Principles of disaster management – nature and extent of disasters – natural disasters , hazards, risks and vulnerabilities – man-made disasters – chemical and industrial, nuclear, fire etc. – preparedness and mitigation measures for various hazards – financing relief expenditure – legal aspects - post disaster relief – voluntary agencies and community participation at various stages of disaster management – rehabilitation programmes.

Module IV (10 hours)

Social Issues and the Environment – From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting , watershed management – resettlement and rehabilitation of people ; its problems and concerns, case studies – environmental ethics : Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies – waste land reclamation – consumerism and waste products.

Human population and the environment – Population growth, variations among nations – population explosion – Family welfare programmes – Environment and human health – Pollution hazards, sanitation and health – Human rights for a clean environment – value education – HIV/AIDS – social concern – Women and Child welfare – role of Information Technology in environment and human health – Case studies.

FIELD WORK (5 HOURS)

- Visit to a local area to document environmental assets – river / forest / grassland / hill / mountain
- Visit to local polluted site – urban / rural / industrial / agricultural
- Study of common plants, insects , birds
- Study of simple ecosystems – pond, river, hill slopes, etc.

Text Books

1. Clarke. R.S. Marine Pollution. Clanderson Oress Oxford.`
2. Mhaskar A.K. Matter Hazardous. Techno-Science Publications.
3. Townsend. C., Harper. J. and Michael Begon, Essential of Ecology. Blackwell Science.
4. S. Deswal & A Deswal, A Basic Course in Environmental Studies, Dhanpat Rai & Co
5. Environmental Studies – Dr. B S. Chauhan, University Science Press.
6. Kurien Joseph & R. Nagendran, Essentials of Environmental Studies, Pearson Education.
7. Trivedi. R.K. and Goel. P.K. Introduction to air pollution. Techno-Science Publications.

Reference Books

1. Agarwal.K.C. Environmental biology. Nidi Publ.Ltd. Bikaner.
2. Bharucha erach, Biodiversity of India, Mapin Publishing Pvt.Ltd.
3. Brunner,R.C.. Hazardous Waste Incineration. McGraw Hill Inc.
4. Cunningham W.P., Cooper T.H., Gorhani E. & Hepworth M.T. Environmental Encyclope Jaico Publication House.
5. De A.K. Environmental Chemistry.Wiley Eastern Ltd.
6. Hawkins R.E. Encyclopediaof Indian Natural History, Bombay Natural History Society
7. Heywood V.H. & Watson R.T. Global Biodiversity Assessment. Cambridge Univ. Press.
8. Jadhav H. & Bhosale V.M. Environmental Protection and Laws. Himalaya Pub. House,
9. Odum E.P. Fundamentals of Ecology W.B. Saunders Co.
10. Rao M.N. & Datta A.K. Waste Water Treatment. Oxford & IBH Publ. Co. Pvt. Ltd.
11. Sharma B.K. Environmental Chemistry Goel Publ. House, Meerut
12. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances Standards, Vol.I & II.Enviro Media.
13. Wagner K.D. Environmental Management. W.B. Saunders Co.

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University Examination Pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module

Q II - 2 questions A and B of 15 marks from module I with choice to answer any one

Q III - 2 questions A and B of 15 marks from module II with choice to answer any one

Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one

Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 602: CONTROL SYSTEMS

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)
General schematic diagram of control systems - open loop and closed loop systems - concept of feedback - modeling of continuous time systems - Laplace transform - properties - application in solution of differential equations - transfer function - block diagrams - signal flow graph - mason's gain formula - block diagram reduction using direct techniques and signal flow graphs - examples - derivation of transfer function of simple systems from physical relations - low pass RC filter - RLC series network - spring mass damper - definitions of poles, zeros, order and type

Module II (14 hours)
Analysis of continuous time systems - time domain solution of first order systems - time constant - time domain solution of second order systems - determination of response for standard inputs using transfer functions - steady state error - concept of stability - Routh-Hurwitz techniques - construction of bode diagrams - phase margin - gain margin - construction of root locus - polar plots and theory of nyquist criterion - theory of lag, - lead and lag-lead compensators

Module III (16 hours)
Modeling of discrete - time systems - sampling - mathematical derivations for sampling - sample and hold - Z-transforms-properties - solution of difference equations using Z - transforms - examples of sampled data systems - mapping between s plane and z plane - cyclic and multi-rate sampling (definitions only) - analysis of discrete time systems - pulse transfer function - examples - stability - Jury's criterion - bilinear transformation - stability analysis after bilinear transformation - Routh-Hurwitz techniques - construction of bode diagrams - phase margin - gain margin.

Module IV (10 hours)
State variable methods - introduction to the state variable concept - state space models - physical variable - phase variable and diagonal forms from time domain (up to third order only) - diagonalisation - solution of state equations - homogenous and non homogenous cases (up to second order only) - properties of state transition matrix - state space representation of discrete time systems - solution techniques - relation between transfer function and state space models for continuous and discrete cases-relation between poles and Eigen values

Text books & Reference books

1. Benjamin C. Kuo, "Automatic Control Systems", 2nd Edition, Oxford University Press

2. Ogata K., "Modern Control Engineering", 3rd Edition, Prentice Hall India

3. Richard C. Dorf & Robert H. Bishop, "Modern Control Systems", 8th Edition, Addison Wesley

4. Benjamin C. Kuo, "Digital Control Systems", 2nd Edition, Oxford University Press

5. Ogata K., “Discrete Time Control Systems", Pearson Education Asia

6. Nagarath I.J. & Gopal M., “Control System Engineering”, Wiley Eastern Ltd.

7. Ziemer R.E., Tranter W.H. & Fannin D.R., "Signals and Systems", 4th Edition, Pearson Education Asia

Sessional work assessment

Two tests	2 x 15 = 30
Two assignments	2 x 10 = 20
Total marks	= 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions of 15marks from module I with choice to answer any one
Q III - 2 questions of 15marks from module II with choice to answer any one
Q IV - 2 questions of 15marks from module III with choice to answer any one
Q V - 2 questions of 15marks from module IV with choice to answer any one

2K6 EC 603 : RADIATION & PROPAGATION

3 hours lecture and 1 hour tutorial per week

Module I: Antenna fundamentals (13 hours)

Source of radiation - radiation from accelerated charges - oscillating electric dipole - power radiated by a current element - radiation from a half wave dipole - antenna field zones (analysis) - antenna parameters - patterns - beam area - radiation intensity - beam efficiency - directivity - gain - effective aperture - effective height - self impedance - mutual impedance - antenna theorems - reciprocity theorem - Babinet's principle

.

Module II: Antenna arrays (14 hours)

Linear antenna arrays - two element array of isotropic point sources - amplitude and phase characteristics - pattern multiplication - N-element array - analysis and design of broad - side array - end-fire array - binomial array

Module III: Special antennas (13 hours)

Travelling wave antenna - long wire - V and rhombic antennas - broad band dipole - folded dipole antenna - broad band antennas - Yagi-Uda antenna and horn antenna - reflector antenna - parabolic reflector antenna - cassegrain antenna - frequency independent antenna - log periodic antenna , microstrip antenna

Module IV: Radio wave propagation (12 hours)

Ground wave propagation - reflection from earth - space wave - surface wave - spherical earth propagation - tropospheric waves - ionospheric propagation - ionosphere - wave propagation in plasma - reflection and refraction of waves by the ionosphere - critical frequency - virtual height

Text Books

1. Jordan & BALMAIN, *Electromagnetic Waves and Radiating Systems*
2. John D. Kraus, *Antenna Theory*
3. Constantain A. Balanis, *Antennas*, McGraw Hill

Reference Books

1. Collin R.E., *Antennas & Radio Wave Propagation*
2. Ramo & Whinnery, *Fields & Waves in Communication Electronics*

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University Examination Pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions of 15marks from module I with choice to answer any one
Q III - 2 questions of 15marks from module II with choice to answer any one
Q IV - 2 questions of 15marks from module III with choice to answer any one
Q V - 2 questions of 15marks from module IV with choice to answer any one

2K6 EC 604: DIGITAL SIGNAL PROCESSING

3 hours lecture and 1 hour tutorial per week

Module I: Discrete Fourier transform (12 hours)

Discrete Fourier series - properties of DFS - periodic convolution – DTFT and DFT - properties - linear convolution using DFT - computation of DFT - circular convolution - decimation in time and decimation in frequency algorithms - FFT algorithm for a composite number

Module II (14 hours)

Signal flow graph representation - basic filter structures - structures for linear phase - finite word - length effects in digital filters - quantizer characteristics - saturation overflow - quantization in implementing systems - zero Input limit cycles

Module III: Digital filter design (14 hours)

Design of IIR digital filters from analog filters - Butterworth and Chebyshev filters - design examples - impulse invariant and bilinear transformation methods - spectral transformation of IIR filters - FIR filter design - linear phase characteristics - window method

Module IV: DSP hardware & advanced concepts (12 hours)

Digital Signal Processors – Architecture. General Purpose processors. Special purpose DSP hardwares. Applications and Design aspects. Evaluation boards for real time signal processing. Equalization of digital audio signals. Spectral analaysis of audio signals. Adaptive Digital Filter – Concepts and Applications. Multirate DSP – Concepts. Sampling rate alteration devices. Design of Decimators and Interpolators.

Text & Reference Books

1. Alan V Oppenheim, Ronald W Schafer, John R Buck, “Discrete-time Signal Processing”, 2nd Ed., Prentice Hall Signal Processing Series, Pearson
2. Feacher E C, Jerris B W, “Digital Signal Processing – A Practical Approach”, Addison Wisley
3.Proakis & Manolakkis, “Digital Signal Processing – Principle, Algorithms & Applications”, Prentice Hall India

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University Examination Pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions of 15marks from module I with choice to answer any one
Q III - 2 questions of 15marks from module II with choice to answer any one
Q IV - 2 questions of 15marks from module III with choice to answer any one
Q V - 2 questions of 15marks from module IV with choice to answer any one

2K6 EC 605: DIGITAL COMMUNICATION

3 hours lecture and 1 hour tutorial per week

Module I (11 hours)

Introduction - block diagram of a digital communication system. Separation of source coding and channel coding. Sources - digital and analog. Sampling Theorem - for lowpass and bandpass signals. Quantization. Channels. Digital Baseband transmission – Pulse Coded Modulation (PCM), Line coding schemes - ON/OFF, NRZ, Bipolar, Manchester signalling, differential encoding. Logarithmic Pulse Coded Modulation (Log PCM) and Companding. DPCM, Delta modulation, Adaptive delta modulation. Spectra of pulse modulated signals. SNR calculation of pulse modulated systems.

Analog Pulse Modulation - Pulse amplitude modulation(PAM), generation and demodulation. PAM/TDM system. Pulse position modulation(PPM), generation and demodulation. Pulse width modulation(PWM).

Module II (12 hours)

Characterization of Noise: Review of Gaussian Random Processes. Probabilistic view of channels. AWGN Channel model.

Characterization of signals: Motivation for signal space analysis - Conversion of continuous AWGN channel into a vector channel. Signal space. Introduction to vector spaces. linear independence, bases, dimension, projection. inner product. distance. norm. orthogonality. Geometric representation of signals. Introduction to L1 and L2 space. Gram-Schmidt orthogonalization procedure.

Communication over bandlimited channels: Pulse Shaping, ISI, Nyquist criterion for zero ISI, signalling with duobinary pulses, eye diagram, equalization, adaptive equalization, scrambling and descrambling

Module III (15 hours)

Communication over Additive Gaussian noise Channels: Maximum Likelihood Detection. MAP detection. The Optimum receicver for AWGN channel. Irrevelent noise. Correlation and Matched Filter recievers. Soft decision and Hard decision. Probability of error. Bit error rate. Optimum reciever for coloured gaussian noise. Carrier and Symbol synchronization.

Module IV (14 hours)

Modulation schems: Coherent binary schemes - ASK, FSK, PSK, MSK. Coherent M-ary schemes - QAM, QPSK, M-ary orthogonal signalling. Calculation of average probability of error for different schemes. Power spectra of modulated signals. Performance comparison of different digital modulation schemes.

Text & Reference Books

1. Simon Haykin, “Communication Systems”, 3rd Ed., John Wiley & Sons
2. Lathi B P, “Modern Digital & Analogue Communication”, 3rd Ed., Oxford University Press
3. Sklar, “Digital Communication”, 2E, Pearson
4. Gallager, Lecture Notes of Principles of Digital Communication, Open CourseWare MIT

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University Examination Pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions of 15marks from module I with choice to answer any one
Q III - 2 questions of 15marks from module II with choice to answer any one
Q IV - 2 questions of 15marks from module III with choice to answer any one
Q V - 2 questions of 15marks from module IV with choice to answer any one

2K6 EC 606(A): DESIGNING WITH VHDL

3 hours lecture and 1 hour tutorial per week

Module I (14 hours)

Identifiers, data objects, Data types, and operators in VHDL. Entity declaration. Architecture modeling - structural, behavioral & data flow. Constant, signal, aliases, and variable assignments. Conditional statements – if ..then ..else , when..else, with select , and case statements. Loop statements – for, while, loop, and generate statements. exit, next, block, assertion, and report statements..

Module II (14 hours)

Generics. Configurations - specification declaration, default rules, conversion functions, instantiation, and incremental binding. Subprograms - functions and procedures, operator overloading. Packages and libraries – package declaration, package body, design of file, design of libraries. Attributes - user defined and predefined.

Module III (12 hours)

Introduction to test bench generation –waveform generation, wait statement, text file reading and dumping results in text file. Testing – fault models, different faults. Fault simulation- ATPG, DFT, boundary scan, and BIST Top-down design, FSM implementation in VHDL.

Module IV (12 hours)

Design issues in synchronous machines-clock skew, gating the clock, asynchronous inputs. synchronizer failure, metastability resolution time, reliable synchronizer design. Moore & Melay machines. State encoding, interacting state machines. Introduction to CPLD, FPGA & design with CPLD and FPGA

Text & Reference Books

1. Kevin Skahill.: *VHDL for Programmable Logic*, Addison & Wesley.
2. John F. Wakerly: *Digital Design Principles and Practices,* PHI.
3. J Bhasker: *VHDL Primer*, Pearson Education.
4. Nawabi.: *VHDL - Analysis and Modelling of Digital Systems*, 2nd ed., Mc Graw Hill.
5. Douglas Perry: *VHDL*,Mc Graw Hill.
6. VHDL, IEEE Standard Reference Manual.

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University Examination Pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions of 15marks from module I with choice to answer any one
Q III - 2 questions of 15marks from module II with choice to answer any one
Q IV - 2 questions of 15marks from module III with choice to answer any one
Q V - 2 questions of 15marks from module IV with choice to answer any one

2K6 EC 606(B) : HIGH SPEED DIGITAL DESIGN

3 hours lecture and 1 hour tutorial per week

Module I (14 hours)

Introduction to high-speed digital design - frequency, time and distance - capacitance and inductance effects - high speed properties of logic gates - speed and power - measurement techniques - rise time and bandwidth of oscilloscope probes - self inductance, signal pickup and loading effects of probes - observing crosstalk

Module II (14 hours)

Transmission line effects and crosstalk - transmission lines - point to point wiring - infinite uniform transmission lines - effects of source and load impedance - special transmission line cases - line impedance and propagation delay - ground planes and layer stacking - crosstalk in solid ground planes, slotted ground planes and cross-hatched ground planes - near and far end crosstalk

Module III (12 hours)

Terminations and vias - terminations - end, source and middle terminations - AC biasing for end terminations - resistor selection - crosstalk in terminators - properties of vias - mechanical properties of vias - capacitance of vias - inductance of vias - return current and its relation to vias

Module IV (12 hours)

Stable reference voltage and clock distribution - stable voltage reference - distribution of uniform voltage - choosing a bypass capacitor - clock distribution - clock skew and methods to reduce skew - controlling crosstalk on clock lines - delay adjustments - clock oscillators and clock jitter

Text & Reference Books

1. Howard Johnson & Martin Graham, "*High Speed Digital Design: A Handbook of Black Magic*", Prentice Hall PTR
2. William S. Dally & John W. Poulton, "*Digital Systems Engineering*", Cambridge University Press
3. Masakazu Shoji, "*High Speed Digital Circuits*", Addison Wesley Publishing Company

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University Examination Pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions of 15marks from module I with choice to answer any one
Q III - 2 questions of 15marks from module II with choice to answer any one
Q IV - 2 questions of 15marks from module III with choice to answer any one
Q V - 2 questions of 15marks from module IV with choice to answer any one

2K6 EC 606(C) : LINEAR SYSTEMS ANALYSIS

3 hours lecture and 1 hour tutorial per week

Module I: System concepts and modelling of systems (11 hours)

Systems - subsystems - elements - systems approach - classification of systems - static and dynamic systems - linear and nonlinear systems - distributed and lumped systems - time invariant and time varying systems - stochastic and deterministic systems - system modeling and approximations - superposition principle - homogeneity and additivity - modelling of electrical systems - active and passive elements - resistance inductance and capacitance - dynamic equations using Kirchhoff's current and voltage laws. RL, RC and RLC circuits and their dynamic equations - block diagrams and signal flow graphs - masons gain formula

Module II: Modelling of non-electrical systems (11 hours)

Modelling of translational and rotational mechanical systems - differential equations for mass spring dashpot elements - D'Alembert's principle - rotational inertia - stiffness and bearing friction - gear trains - equivalent inertia and friction referred to primary and secondary shafts - dynamic equations for typical mechanical systems - electromechanical analogues - force-current and force-voltage analogue - capacitance and resistance of thermal, hydraulic pneumatic systems - dynamic equations for simple systems - comparison of electrical, electromechanical, hydraulic and pneumatic systems

Module III: Transfer function and time domain analysis (15 hours)

Use of Laplace transforms - concept of transfer function - impulse response - convolution integral - response to arbitrary inputs - transfer function of typical systems discussed in Module I - time domain analysis - test inputs - step - velocity and ramp inputs - transient and steady state response - first and second order - under damped and over damped responses - maximum overshoot - settling time - rise time and time constant - higher order systems - steady state error - error constants and error different types of inputs - Fourier series expansion of periodic functions - symmetry conditions - exponential form of Fourier series - Fourier integrals and Fourier transform - spectral properties of signals - analysis by Fourier methods

Module IV: State space analysis and stability of systems (15 hours)

Concept of state - state space and state variables - advantage over transfer function approach - state equations for typical electrical and mechanical and electromechanical systems - representation for linear time varying and time invariant systems - solution of state equation for typical test inputs - zero state and zero input response - concept of stability - bounded input bounded output stability - Lyapunov's definition of stability - a symptitic stability - stability in the sense of Lyapunov-Routh Hurwitz criterion of stability for single input single output linear systems described by transfer function model

Text & Reference Books

1. Cheng D.K. Addison Wesley, *Linear Systems Analysis*, Addison Wesley
2. Tripati J.N., *Linear Systems Analysis*, New Age International

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University Examination Pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions of 15marks from module I with choice to answer any one
Q III - 2 questions of 15marks from module II with choice to answer any one
Q IV - 2 questions of 15marks from module III with choice to answer any one
Q V - 2 questions of 15marks from module IV with choice to answer any one

2K6EC 606(D): DATA STRUCTURES & ALGORITHMS

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Review of data types - scalar types - primitive types - enumerated types - subranges structures types - character strings - arrays - records - sets - tiles - data abstraction - complexity of algorithms - time and space complexity of algorithms using “big oh” notation - recursion - recursive algorithms - analysis of recursive algorithms

Module II (12 hours)

Linear data structures - stacks - queues - lists - stack and queue implementation using array - linked list - linked list implementation using pointers

Module III (12 hours)

Non linear structures - graphs - trees - sets - graph and tree implementation using array linked list - set implementation using bit string, linked list

Module IV (16 hours)

Searching - sequential search - searching arrays and linked lists - binary search - searching arrays and binary search trees - hashing - introduction to simple hash functions - resolution of collisions - sorting: n^2 sorts - bubble sort - insertion sort - selection sort - NlogN sorts - quick sort - heap sort - merge sort - external sort - merge files

Text Books

1. Aho A.V., Hopcroft J.E. & Ullman J.D., *Data Structures and Algorithms*, Addison Wesley

Reference Books

1. Sahni S., Data Structures, Algorithms, & Applications in C++, McGraw Hill
2. Wirth N., *Algorithms +Data Structures = Programs*, Prentice Hall
3. Cormen T.H., Leiserson C.E., & Rivest R.L., *Introduction to Algorithms*, MIT Press

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University Examination Pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions of 15marks from module I with choice to answer any one
Q III - 2 questions of 15marks from module II with choice to answer any one
Q IV - 2 questions of 15marks from module III with choice to answer any one
Q V - 2 questions of 15marks from module IV with choice to answer any one

2K6EC 606(E) : ANALOG MOS CIRCUITS

3 hours lecture and 1 hour tutorial per week

Module I (11 hours)

Analog MOS models - low frequency model - MOS in saturation - high frequency model - variation of transconductance with frequency - temperature effects in MOST - noise in MOST (shot, flicker and thermal noise) - MOS resistors and resistor circuits - super MOST

Module II (14 hours)

Current sources and sinks - current mirror - cascode current source - transient response of simple current mirror - Wilson current mirror - regulated cascode current source/sink - voltage references - resistor MOSFET and MOSFET only voltage references - band gap references - various biasing schemes for voltage references

Module III (12 hours)

Common source - common gate and source follower amplifiers - class AB amplifier - active load configuration - transimpedance amplifier - cascode amplifier - push pull amplifier - amplifier based signal processing - the differential difference amplifier (DDA) - adder, multiplier, divider and filters using DDA

Module IV (15 hours)

Mixed signal circuits - CMOS comparator design - pre amplification - decision and post amplification stages - transient response - clocked comparators - analog multiplier - the multiplying quad - level shifting in multipliers - dynamic analog circuits - charge injection and capacitive feed through in MOS switch - sample and hold circuits - switched capacitor filters - switched capacitor implementation of ladder filters

Text & Reference Books

1. Jacob Baker R., Harry W Li & David E Boyce, `*CMOS - Circuit Design, Layout & Simulation*', PHI
2. Mohammed Ismail & Terri Fiez, Analog VLSI - Signal & Information Processing, MGH
3. Roubik Gregorian & Gabor C Temes, Analog MOS Integrated Circuits for Signal Processing, John Wiley

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University Examination Pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions of 15marks from module I with choice to answer any one
Q III - 2 questions of 15marks from module II with choice to answer any one
Q IV - 2 questions of 15marks from module III with choice to answer any one
Q V - 2 questions of 15marks from module IV with choice to answer any one

2K6 EC 607(P) : COMMUNICATION ENGINEERING LAB

3 hours practical per week

5. AM detection with simple and delayed AGC
6. Balanced modulator for DSB-SC signal
7. Mixer using JFET/BJT
8. FM generation (reactance modulator)
9. FM demodulation
10. PAM generation and demodulation
11. Generation and demodulation of PWM and PPM
12. Implementation of intermediate frequency amplifier
13. PLL characteristics and demodulation using PLL
14. AM generation and demodulation using opamps and IC multipliers
15. SSB generation and demodulation using integrated circuits

Text books

1. Simon Haykin, "Communication Systems", 3rd Ed., John Wiley & Sons

Sessional work assessment

Lab practical & record - 35 marks
Tests – 15 marks
Total – 50 marks

2K6 EC 608(P) : MICROPROCESSOR & MICROCONTROLLER LAB

3 hours practical per week

List of experiments

1. 8068 kit familiarization and basic experiments
2. Addition and Subtraction of Binary and unpacked BCD numbers
3. Double precision multiplication
4. Sorting algorithms
5. Searching algorithms
6. Interfacing with A/D converters
7. Interfacing with D/A converters
8. PWM motor control circuits
9. Serial communication between two kits
10. General purpose clock design
11. Interfacing with PCs
12. Data acquisition System using 8051 microcontroller
13. Stepper motor control using 8051 microcontroller

Text books

1. A.K Ray, K.M. Bhurchandi, Advanced Microprocessors and peripherals, 2nd Edition, TMH
2. Ajay V Deshmukh, Microcontrollers theory and applications, TMH
3. Hall D.V., Microprocessors & Interfacing, McGraw Hill
4. Brey B.B., The Intel Microproessors - Architecture, Programming & Interfacing, Prentice Hall
5. Liu Y .C. & Gibsen G.A., Microcomputer System: The 8086/8088 Family, Prentice Hall of India
6. Hintz K.J. & Tabak D., MicrocontrollersArchitecture, Implementation & Programming, McGraw Hill
7. Myke Predko, Programming and Customising the 8051 Microcontroller,Tata Mc Graw Hill

Sessional work assessment

Lab practical & record	- 35 marks
Tests	- 15 marks
Total marks	- 50 marks

KANNUR UNIVERSITY

FACULTY OF ENGINEERING

Curricula, Scheme of Examinations & Syllabus for Semesters VII & VIII of B.Tech. Degree Programme in Electronics & Communication Engineering with effect from 2007 Admissions

SEVENTH SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination	
	L	L	T	P/D		Hrs	Marks
2K6 EC 701	Microelectronics Technology	3	1	-	50	3	100
2K6 EC 702	Microwave Engineering	3	1	-	50	3	100
2K6 EC 703	Information Theory and Coding	3	1	-	50	3	100
2K6 EC 704	Television Engineering	3	1	-	50	3	100
2K6 EC 705	Elective II	3	1	-	50	3	100
2K6 EC 706(P)	Simulation Lab	-	-	3	50	3	100
2K6 EC 707(P)	Communication Engineering Lab –II	-	-	3	50	3	100
2K6 EC 708(P)	Mini Project	-	-	4	50	-	-
2K6 EC709(P)	Physical Education, Health & Fitness	-	-	-	50	-	-
TOTAL		15	5	10	450	-	700

Elective II

2K6 EC 705 (A) - Probability and Random Process
2K6 EC 705 (B) - Satellite Communication
2K6 EC 705 (C) - Soft Computing
2K6 EC 705 (D) - R F System Design
2K6 EC 705 (E) -Industrial Electronics
2K6 EC 705 (F) - Data Compression

EIGHTH SEMESTER

Code	Subject	Hours/Week			Sessional Marks	University Examination	
		L	T	P/D		Hrs	Marks
2K6 EC 801	Radar and Navigation	3	1	-	50	3	100
2K6 EC 802	Optical Communication	3	1	-	50	3	100
2K6 EC 803	Computer Communication & Networking	3	1	-	50	3	100
2K6 EC 804	Wireless Mobile Communication	3	1	-	50	3	100
2K6 EC 805	Elective III	3	1	-	50	3	100
2K6 EC 806(P)	Seminar	-	-	4	50	-	-
*2K6 EC 807(P)	Project & Industrial Training	-	-	6	100	-	-
2K6 EC 808(P)	Viva Voce	-	-	-	-	-	100
TOTAL		15	5	10	400	-	600
Aggregate marks for 8 semesters = 8400					3000		5400

*25 Marks is allocated for Industrial Training

Elective III

2K6 EC 805(A) – Advanced Digital Signal Processing
2K6 EC 805(B) – Digital Image Processing
2K6 EC 805 (C) –Communication Switching Systems
2K6 EC 805 (D) – Embedded System
2K6 EC 805 (E)– Secure Communications
2K6 EC 805(F)– Optimization Techniques

2K6 EC 701: MICROELECTRONICS TECHNOLOGY

3 hours lecture and 1 hour tutorial per week

Module 1 (12 hours)

Crystal growth and wafer preparation: - Diffusion of impurities - Flick's I and II law of diffusion-Ion implantation. Oxidation - deal-grove method Optical lithography - Modulation transfer function. Photo resists - types. Chemical vapor deposition (CVD) - Epitaxial growth. Etching - wet plasma & ion etching. Contacts & Metallization: - Schottky contacts & Implanted ohmic contacts.

Module 2 (12 hours)

MOS transistor: - Depletion & Enhancement types - Threshold voltage-NMOS inverter - various pull-ups - CMOS & BiCMOS inverter.

Introduction to IC technology: - Bipolar technology - Early bipolar & advanced bipolar processes. MOS technology: - NMOS, PMOS, CMOS, BiCMOS technologies, n well, p well, twin tub process. Hot carrier effects in BJT & CMOS-Latch up in CMOS

Module 3 (15 hours)

VLSI design fundamentals :- MOS layers-Stick diagrams - NMOS& CMOS design styles - Layouts – lambda based design rules - 2 micro meter design rules - Diagrams for NMOS & CMOS inverters & gates - Simple Combinational Logic Design (half & full adders, multiplexers).

Module 4 (13 hours)

Device isolation: - Junction & oxide isolation – LOCOS, SILO,SWAMI process - Trench isolation - Silicon on insulator isolation.

Introduction to nanotransistors – Energy level diagram- Fermi function- ohms law in nanometer scaled devices-electron and spin transport- current in a one level model- potential profile-ballistic nanotransistors – nanotransistors with scattering.

Text Books

1. The Science & Engineering of Microelectronics Fabrication: - Stephan A Campbell.
2. Basic VLSI Design: - Douglas A Pucknell & Kamran Eshraghian – PHI Third Edition, 2004
3. VLSI technology :- Sze S.M – MGH

Reference Books

1. Quantum Transport: Atom to Transistor: - S.Dutta – Cambridge University Press
2. Electronic Transport in Mesosiopic Systems: - S.Dutta – Cambridge University Press
3. Solid-state Physics: - Aschroft and Meizmin
4. Principle of CMOS VLSI Design:-Neil, H.E Weste & Kamran Eshraghian - Pearson Education
5. Introduction to NMOS & CMOS VLSI System Design :-Amar Mukhergee -PHI USA 1990
6. The Material Science of Microelectronics :- Klaus J Backmann – VCH publishers
7. Microelectronic Processing :- W Scott Ruska –MGH
8. CMOS – Circuit Design, Layout & Simulation :- Jacob Baker R., Harry W Li & David E Boyce – PHI
9. www. nanohub.org

Theory of ballistic transistors-IEEE Trans.Electron Dev.:-Rahman A.,Guo J.,Dutta S.and Landstorm M.(2003)

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.
Q II - 2 questions (covering entire module) of 15 marks each from module I with choice to answer any one.
Q III - 2 questions (covering entire module) of 15 marks each from module II with choice to answer any one.
Q IV - 2 questions (covering entire module) of 15 marks each from module III with choice to answer any one.
Q V - 2 questions (covering entire module) of 15 marks each from module IV with choice to answer any one.

2K6 EC 702: MICROWAVE ENGINEERING

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Introduction- Introduction to TE & TM Modes, Dominant Modes - Resonators - Rectangular and Circular wave guide resonators. Klystrons - Re-entrant cavities, Velocity modulation, Bunching (including analysis), Output power and beam loading, Reflex Klystron, , Admittance. Traveling wave tubes – Slow wave structures, Helix TWT, Amplification process, Convection current, Axial electric field, Wave modes, Gain consideration. Magnetron oscillators – Cylindrical magnetron, Cyclotron angular frequency, Power output and efficiency.

Module II (14 hours)

Microwave hybrid circuits – Waveguide tees, Magic tees, Hybrid rings, Corners, Bends, Twists. Formulation of S-matrix. Directional couplers – Two hole couplers, S-matrix of a directional coupler. Circulators and isolators. Microwave Network Analysis – Equivalent voltages and currents, Impedance, Impedance and Admittance matrices, scattering matrix, The transmission matrix. Signal flow graphs. Impedance matching and tuning – Matching with lumped elements, Single stub tuning, Double stub-tuning.

Module III (12 hours)

Solid state microwave devices – Microwave bipolar transistors – Physical structures, Power-frequency limitations. Principle of operation of Tunnel diode, MESFET. TEDs – Introduction Gunn diodes - Gunn oscillation modes. Avalanche Transit Time Devices – Introduction, IMPATT and TRAPATT Diodes Principle of Operation and Characteristics.. Measurement of Microwave power, Frequency and Impedance.

Module IV (13 hours)

Microwave filters – Periodic structures – Analysis of infinite periodic structures and terminated periodic structures, Filter design by image parameter method – Constant k, m-derived and composite. Filter design by insertion loss method. Filter transformation and implementation.

Microwave amplifiers and oscillators – Amplifiers – Gain and stability, Oscillator design – Basics.

Text Books:

1. Samual Y Liao,"Microwave devices and Circuits",2nd edition,Prentice Hall of India
2. Robert E. Collin: *Foundation of Microwave Engineering,* Mc. Graw Hill.

References:

1. David M Pozar : *Microwave Engineering,* 2nd Edn., John Wiley & Sons (Asia) Pvt. Ltd.
2. Wayne Tomasi : *Advanced Electronic Communication Systems,* PHI, (Chap. 7), 5th Ed, Pearson Education, 2001
3. K. C. Gupta : *Microwaves*, New Age International.
4. Sitesh Kumar Roy, Monojit Mitra : *Microwave Semiconductor Devices,* PHI - 2003

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 703: INFORMATION THEORY AND CODING

3 hours lecture and 1 hour tutorial per week

Module 1 (14 hours)

Information theory: - Concept of amount of information –units - Entropy -marginal, conditional and joint entropies - relation among entropies - Mutual information - information rate-channel capacity- redundancy and efficiency of channels. Binary memoryless source - extension of a binary memoryless source –Markov sorce –Entropy -lossless-source coding- Uniquely decodable codes- Instantaneous codes- Kraft's inequality - Optimal codes- Huffman code-Shannon's Source Coding Theorem - Lempel-Ziv coding – Channel coding theorem

Module 2 (8 hours)

Introduction to algebra - groups - fields - binary field arithmetic - construction of Galois field Basic properties - computations - vector spaces - matrices

Module 3 (18 hours)

Codes for error detection and correction: - Parity check coding, Linear block codes, Error detecting and correcting capabilities, Generator and Parity check matrices, Standard array and Syndrome decoding, Hamming codes, Encoding and decoding of systematic and unsystematic codes. Cyclic codes: - Generator polynomial, Generator and Parity check matrices, Encoding of cyclic codes, Syndrome computation and error detection, Decoding of cyclic codes. BCH codes-description-decoding-Reed Solomon codes

Module 4 (12 hours)

Convolution codes - encoder - generator matrix - state diagram – distance properties - maximum likelihood decoding - viterbi decoding - sequential decoding - Burst error correction – interleaved codes-Turbo coding- Turbo decoding

Text Books

1. Norman Abramson, *Information Theory*, John Wiley
2. Shu Lin, Costello D.J., *Error Control Coding - Fundamentals and applications*, Prentice
3. Simon Haykin, *Digital Communications*, John Wiley
4. Taub & Schilling, *Principles of Communication System*, Tata McGraw Hill

Reference books

1. Tomasi, *Electronic Communication, Fundamentals Through Advanced*, Pearson education
2. Sklar, *Digital Communication*, Pearson Education
3. T. Cover and Thomas, "Elements of Information Theory", John Wiley & Sons

Sessional work assessment

Two tests (2 x 15) = 30
Two assignments(2 x 10) = 20
Total marks = 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 704: TELEVISION ENGINEERING

3 hours lecture and 1 hour tutorial per week

MODULE—I(14 hrs)

Introduction-Image Continuity - Number of scanning lines - Interlaced scanning - Picture resolution - Camera tubes-Basic Block Schematic of Monochrome TV Transmitter and receiver, Gross structure, flicker& interlaced scanning ,number of scanning lines. Horizontal and Vertical resolution, Resolution and Bandwidth. Composite video signal- Vertical and horizontal synchronization, Vestigial Sideband Transmission, transmission of Sound signal. Modulation Positive and Negative Modulation and its comparison - Picture tubes. Television Cameras, Working Principle and operation of CCD cameras

MODULE –II (12 hrs)

Television camera and transmitters: Photoelectric effects, Working principle of image orthicon, vidicon, plumbicon, CCD, structure of CCD and its working, Monochrome and Colour television camera: block schematic explanation, TV transmitters. Colour TV picture tubes: colour signal transmission-modulaton-formation of chrominance signal. purity and convergence, Delta gun, PIL, Trinitron tubes, LCD screens.

MODULE—III (12hrs)

NTSC colour TV system- NTSC colour receiver- limitations of NTSC system – PAL colour TV system – cancellation of phase errors- PAL –D colour system- PAL coder – Pal-Decolour receiver- chromo signal amplifier- separation of U and V signals- colour burst separation – Burst phase Discriminator – ACC amplifier- Reference Oscillator- Ident and colour killer circuits- U and V demodulators- Colour signal matrixing – merits and demerits of the PAL system – SECAM system – merits and demerits .

MODULE –IV (14hrs)

Video coding and compression: Need for compression- video image representation – quantization of image data- intra frame compression techniques: DPCM –DCT based transform coding- Motion Compensation –H261 video conference coding standard-MPEG video compression- Digital TV, Working, HDTV- DVB-TSatellite, High Definition and Digital TV

Text books

1. The Electronics Hand Book edited by JC Whitaker ,IEEE Press
2. RR Gulati, Monochrome and Colour Television, New Asian Age
3. S P Bali ‘Colour Television - Theory and Practice‘
4. ‘Basic Television Engineering’: Bernad Grob, Mc Graw Hill.

Reference:

1. A.M Dhake, “Television and Video Engineerign”, Second edition, TMH, 2003.
2. Bernord Grob ‘Basic Television and Video Systems, 5th 1984 McGraw Hall
3. Kinsler , Frey, Coppens, Fundamentals of Acoustics , Wiley Eastern, 4 edition

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 705 (A): PROBABILITY AND RANDOM PROCESS

3 hours lecture and 1 hour tutorial per week

Module I: (13 hours)
Axioms of probability – Conditional probability – Total probability – Baye's theorem – Random variable – Probability mass function – Probability density functions – Properties –Moments – Moment generating functions and their properties

Module II: (14 hours)
Binomial – Poisson – Uniform – Exponential – Gamma – Normal distributions and their properties – Functions of a random variable – Chebyshev Inequality.

Module III: (13 hours)
Joint distributions – Marginal and conditional distributions – Covariance –

Correlation and regression – Transformation of random variables – Central limit theorem.

Module IV: (12 hours)
Definition and examples – first order – second order – strictly stationary – wide – sense stationary and Ergodic processes – Markov process – Binomial – Poisson and Normal processes – Sine wave process.

TEXT BOOKS

1. Ross S., "A First Course in Probability", Seventh Edition , Pearson Education, 2006.

2. S.Karlin and H.M. Taylor, "An Introduction to Stochastic Modeling", Academic Press, 2007.

Reference books

1. Veerarajan T., "Probabilitiy – Statistics and Random process", Second Edition , Tata McGraw–Hill, 2006.
2. Richard A Johnson, "Probability and Statistics for Engineers" Seventh Edition , Pearson Education, 2005.
3. Mood, Alexander McFarlane, "Introduction to Theory of Statistics", Tata McGraw – Hill,1974.

Sessional work assessment
Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern
Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 705 (B): SATELLITE COMMUNICATION

3 hours lecture and 1 hour tutorial per week

MODULE I (14 hours)

Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications. Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance. LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS: Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations

MODULE II (13 hours)

SATELLITE SUBSYSTEMS: Attitude and orbit control system, `telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.
EARTH STATION TECHNOLOGY: Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power test methods.

MODULE III (13 hours)

MULTIPLE ACCESS: Frequency division multiple access (FDMA) Inter modulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA Onboard processing, DAMA,Code Division Multiple access (CDMA), Spread spectrum transmission and reception.

MODULE IV (12 hours)

SATELLITE LINK DESIGN: Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, system design example
SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM: Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

TEXT BOOK:

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

REFERENCES:

1. Satellite Communications : Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
4. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 705 (C): SOFT COMPUTING

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Basic concepts – Single Layer Perception – Multi Layer Perception – Adaline – Madaline – Learning Rules – Supervised Learning – Back Propagation Networks – Training Algorithm – Practical Difficulties – Advanced Algorithms – Adaptive Network – Radial Basis – Network – Modular Network – Applications.

Module II (13 hours)

Unsupervised Learning – Competitive Learning Networks – Kohonen self organising networks – Learning Vector Quantization – Hebbian Learning – Hopfield Network –Content Addressable Nature – Binary Hopfield Network – Continuous Hopfield Network Traveling Salesperson Problem – Adaptive Resonance Theory – Bidirectional Associative Memory – Principle Component Analysis

Module III (13 hours)

Fuzzy Sets–Fuzzy Rules: Extension Principle, Fuzzy Relation – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Model – Sugeno Model – Tsukamoto Model– Fuzzy decision Making – Multiobjective Decision Making – Fuzzy Classification– Fuzzy Control Methods – Application.

Module IV(13 hours)

Adaptive Neuro Fuzzy Based Inference Systems – Classification and Regression Trees: Decision Tress – Cart Algorithm – Data Clustering Algorithms: K Means Clustering, Fuzzy C Means Clustering, Mountain Clustering, Subtractive Clustering, Rule Base Structure Identification – Neuro Fuzzy Control – Feedback Control Systems– Expert Control – Inverse Learning – Specialized Learning – Back Propagation Through Real Time Recurrent Learning .

TEXT BOOK

1. Jang J S R Sun C T and Mizutani E, "Neuro Fuzzy and Soft computing", Pearson Education, (Singapore) 2004.
2. Timothy J Ross, "Fuzzy Logic Engineering Applications", McGrawHill NewYork, 1997

REFERENCES

1. David E Goldberg, "Genetic Algorithms in Search Optimization and Machine Learning", Pearson Education, Asia, 1996.
2. Laurene Fauseett, "Fundamentals of Neural Networks" Prentice Hall, India, New Delhi, 1994.
3. S Rajasekaran and G A Vijayalakshmi Pai, "Neural networks Fuzzy logics and Genetic algorithms", Prentice Hall of India, 2003.
4. George J Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic", Prentice Hall

Sessional work assessment

Tests (2X15) – 30 marks

Assignments (2X10) – 20 marks

Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module

Q II - 2 questions A and B of 15 marks from module I with choice to answer any one

Q III - 2 questions A and B of 15 marks from module II with choice to answer any one

Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one

Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 705 (D): RF SYSTEM DESIGN

3 hours lecture and 1 hour tutorial per wee

Module I (15 hours)

Importance of RF Design – Electromagnetic Spectrum – RF behavior of Passive Components – Chip components and Circuit Board Considerations – Scattering Parameters – Smith Chart and Applications.

RF Filter Design: Overview – Basic Resonator and Filter Configuration – Special Filter Realizations – Filter Implementations – Coupled Filter.

Module II (13 hours)

RF Diodes – BJT, RF FETs – High Electron Mobility Transistors, Matching and Biasing Networks – Impedance Matching using Discrete Components – Microstrip Line Matching Networks – Amplifier Classes of Operation and Biasing Networks.

Module III (12 hours)

RF Amplifier Design: Characteristics – Amplifier Power Relations – Stability Considerations – Constant Gain Circles – Constant VSWR Circles– Low Noise Circuits – Broadband – High Power and Multistage Amplifiers

Module IV(12 hours)

Oscillators Mixers & Applications: Basic Oscillator Model – High Frequency Oscillator Configuration – Basic Characteristics of Mixers – Phase Locked Loops – RF Directional Couplers and Hybrid Couplers – Detector and Demodulator Circuits.

TEXT BOOK

1. Reinhold Ludwig and Powel Bretchko "RF Circuit Design Theory and Applications", 1st Edition, Pearson Education Asia, 2001
2. Ulrich L. Rohde and David P. NewKirk, "Microwave Circuit Design", John Wiley and Sons USA, 2000

REFERENCES

1. Joseph J. Carr, "Secrets of RF Circuit Design", 3rd Edition, McGraw Hill Publishers 2000.
2. Mathew M. Radmanesh, "Radio Frequency & Microwave Electronics", 2nd Edition, Pearson Education Asia, 2002.
3. Roland E., "Best Phase Locked Loops Design simulation and applications", 5th edition, McGraw Hill Publishers, 2003.

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 705 (E):– INDUSTRIAL ELECTRONICS

3 hours lecture and 1 hour tutorial per week

MODULE-I(13hours)

Measurement of length – Plainness – Area – Diameter – Roughness – Angle – Comparators – Gauge blocks – Optical Methods of length and distance measurements.Relative velocity – Translational and Rotational velocity measurement – Revolution counters and Timers - Magnetic and Photoelectric pulse counting stroboscopic methods - Accelerometers of different types - Gyroscopes.

MODULE-II(13 hours)

Force measurement – Different methods –Torque measurement – Dynamometers- Gyroscopic Force and Torque Measurement – Vibrating wire Force transducer
Basics of Pressure measurement – Deadweight Gages and Manometers types – Force-Balance and Vibrating Cylinder Transducers – High and Low Pressure measurement – McLeod Gage, Knudsen Gage, Momentum Transfer Gages, Thermal Conductivity Gages, Ionization Gazes, Dual Gage Techniques.

MODULE-III(13 hours)

Flow measurement - Head type, Area type (Rota meter), electromagnetic type, Positive displacement type, mass flow meter, ultrasonic type ,vertex shedding type, Hotwire anemometer .Laser Doppler Veloci-meter.
Volume Flow meter Plus Density measurement – Strain Gauge load cell method – Buoyancy method - Air pressure balance method – Gamma ray method – Vibrating probe method. Direct Mass Flow meters.

MODULE-IV(13 hours)

Radiation Fundamentals. Radiation Detectors. Radiation Thermometers. Optical Pyrometers.
Sound-Level Meter. Microphones. Time, Frequency, and Phase-Angle measurement. Liquid Level. Humidity. Chemical Composition.

TEXT BOOKS:

1. Measurement Systems – Applications and Design – by Doeblin E.O., 4/e, McGraw Hill International, 1990.
2. Principles of Industrial Instrumentation – Patranabis D. TMH. End edition 1997

REFERENCES:

1. Process Instruments and Control Handbook – by Considine D.M., 4/e, McGraw Hill International, 1993.
2. Mechanical and Industrial Measurements – by Jain R.K., Khanna Publishers, 1986.
3. Instrument Technology, vol. I – by Jones E.B., Butterworths, 1981.

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 705(F): DATA COMPRESSION

3 hours lecture and 1 hour tutorial per week

Module I (15 hours)

Data Representations – Fundamental Concepts in Video and Digital Audio – Storage Requirements for Multimedia Applications – Need for Compression – Taxonomy of Compression Techniques –Scalar and Vector Quantization Theory – Text compression - Adaptive Huffman Coding - Arithmetic Coding – Dictionary Techniques – LZW Family Algorithms .

Module II (13 hours)

Audio Compression Techniques – μ–Law and A–Law Companding – Frequency Domain and Filtering – Basic Sub Band Coding– Application to Speech Coding MPEG Audio – Progressive Encoding for Audio – Silence Compression - Speech Compression Techniques – Basics of Formant and CELP vocoders.

Module III (12 hours)

Predictive Techniques – DM– PCM –DPCM – Optimal Predictors and Optimal Quantization – Contour Based Compression – Transform Coding – JPEG Standard – Sub Band Coding Algorithms: Design of Filter Banks – Basics of JPEG 2000 Standards .

Module IV (12 hours)

Video compression techniques and standards- Motion estimation and compensation techniques - MPEG video coding - MPEG 1 and 2 standards - MPEG 4 - H.264 standards - Basics of DVI technology - Packet Video.

Text books

1. Khalid Sayood, "Introduction to Data Compression", 2nd Edition, Morgan Kauffman Harcourt, India,
2. Watkinson J., "Compression in Video and Audio", Focal Press, London, 1995.

Reference books

1. David Salomon, "Data Compression The Complete Reference", 2nd Edition, Springer Verlag, New York Inc., 2001.
2. Peter Symes , "Digital Video Compression" , McGraw Hill Pub, 2004.
3. Mark Nelson, "Data compression BPB", Publishers, New Delhi, 1998.
4. Yun Q. Shi Huifang, "Sun Image and Video Compression for Multimedia Engineering Fundamentals Algorithms & Standards", CRC press,

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6PTEC 706(P): SIMULATION LAB

3 hours practical per week Experiments using MATLAB/OCTAVE/DSP Kit

1. Fundamental operations-Convolution, Modulation etc
2. Digital Filter-IIR
3. Digital Filter- FIR
4. Up-sampling and down sampling operations in time domain and frequency domain
5. Implementation of FFT algorithm.
6. Mean Square Error estimation of a signals.
7. Huffman coding and decoding.
8. Implementation of LMS algorithm.
9. Time delay estimation using correlation function.
10. Comparison of effect in a dispersive channel for BPSK, QPSK and MSK.
11. Study of eye diagram of PAM transmission system.
12. Generation of QAM signal and constellation graph.

Sessional work assessment

Laboratory practical and record - 35 marks
Tests – 15 marks
Total – 50 marks

2K6 EC 707(P): COMMUNICATION ENGINEERING LAB II

3 hours practical per week

Microwave and Optical Experiments

1. Klystron characteristics.
2. Slotted line measurements-VSWR & Impedance.
3. Antenna radiation pattern measurements.
4. Directional Coupler & Isolator
5. Optical Fiber Experiments-Analog & Digital

Hardware Experiments

6. Generation and detection of BASK,BFSK,BPSK
7. Generation and Detection of QAM using multiplier IC
8. Implementation of A/D and D/A converters
9. Digital TDM
10. PN and Orthogonal Code Generation.
11. Spreader and de spreader for CDMA
12. Delta Modulation

Sessional work assessment
Laboratory practical and record - 35 marks
Tests – 15 marks
Total – 50 marks

2K6 EC 708(P): MINI PROJECT

4 hours practical per week

Each group consisting of Two members is expected to design and develop a moderately complex hardware /hardware with software system - a working model of the hardware system should be fabricated and tested - the assessment of all the mini-projects will be done by a committee consisting of three faculty members, specialized in various fields of electronics and communication engineering - the students will present and demonstrate the project work before the committee - a detailed report is also to be submitted - sixty percent of total marks will be awarded by the guide and the remaining forty percent will be awarded by the evaluation committee

Sessional work assessment

Design & Development - 20 marks
Demonstration – 20 marks
Report-10 marks
Total Marks – 50 marks

2K6 EC 709(P): PHYSICAL EDUCATION, HEALTH & FITNESS

Introductory Lectures:

Unit 1: Health and fitness: Modern concept of health and fitness, meaning, scope, need and importance of health, fitness and wellness.

Unit II: Exercise and fitness: Means and methods of developing fitness. Importance of physical activities and exercises in developing and maintaining good health, Physical fitness and well being.

Unit III : Sports and Physical education: Meaning and scope, role and importance of sports and games in the development of physical fitness and personality. Social values of sports. Rules of major games.

Practical Sessions:

(All classes will be conducted after the normal working hours of the college)

50 sessions of minimum 1 hour duration each are envisaged (including Theory and Practical). The student can opt for one of the following activities in line with the specific programme / schedule announced by the faculty.

Athletics, Badminton, Basketball, Cricket, Football, General fitness, Hockey, Kabadi, Table Tennis, Ball Badminton, Archery, Volley ball, Yoga (not all activities may be offered in a particular semester. More disciplines will be offered based on the availability of infrastructure and expertise).

In addition, health and fitness assessment such as height, Weight, Resting Pulse rate and blood Pressure will be carried out.

Objective :

1. Basically to inculcate awareness of health, general fitness and attitude to voluntary physical involvement.
2. To promote learning of basic skills in sports activities and secondarily to pave the way for mastering some of the skills through continued future involvement.

Scheme of assessment:

The student will be continuously assessed on his performance on the field of play. There will not be minimum mark for pass or fail. Total 50 marks will be given assessing their attendance, regularity, punctuality and performance for 50 hours of activity from 1st semester to 7th semester.

2K6 EC 801: RADAR AND NAVIGATION

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Radar Block diagram and operation- radar frequencies- the origins of Radar- the applications of Radar

Radar Equation: Prediction of range-minimum detectable signal- receiver noise-transmitter power- pulse repetition frequency and range ambiguity- antenna parameters-system losses and propagation effects.

Module II (13 hours)

MTI and Pulse Doppler Radar: Introduction to Doppler and MTI Radar-Delay-Line Cancellers-Staggered Pulse Repetition Frequencies-Doppler filter banks-Digital MTI processing-Moving target detector-limitations to MTI performance-MTI from a Moving platform - pulse Doppler Radar-other Doppler Radar topics-Tracking with Radar-Monopulse tracking-conical scan and sequential lobing-limitations to tracking accuracy-low-angle tracking-Tracking in range-other tracking Radar topics-comparison of trackers-Automatic Tracking with Surveillance Radars (ADT)

Module III (13 hours)

Detection of signals in Noise: Introduction -Matched filter Receiver-Detection criteria-Detectors-Automatic Detector-The Radar operator-Signal Management-Propagation radar waves-Atmospheric Refraction-standard propagation-Nonstandard propagation-The radar antenna-reflector antennas-Electronically steered phased array antennas-phase shifters-frequency-scan arrays

Radar Transmitters

Introduction-linear Beam power tubes-solid state RF Power sources-Magnetron-crossed field amplifiers-other RF power sources-other aspects of Radar Transmitter

Radar Receivers

The Radar receiver-Receiver noise figure-Superhetrodyne receiver-Duplexers and receiver protectors-Radar displays

Module IV (13 hours)

Introduction - Methods of Navigation-Radio Direction Finding-.Radio Ranges-Hyperbolic systems of Navigation (Loran and Decca) Doppler Navigation-The Doppler effect-Beam configurations-Doppler Frequency equations-track stabilization-Doppler Spectrum-components of the Doppler Navigation system-Doppler range equation-Accuracy of Doppler Navigation systems. Satellite Navigation System-The Transit System-Navstar Global Positioning System (GPS)

TEXT BOOK:

1. Merrill I. Skolnik,"Introduction to Radar Systems", Tata McGraw-Hill (3rd Edition) 2003
2. F.C Jordan & B. C.Balmann, "Electromagnetic waves & radiating System", P.H.I

REFERENCES:

1. Peyton Z.Peebles,"Radar Principles", Johnwiley, 2004.
2. J.C Toomay,"Principles of Radar", 2nd Edition-PHI, 2004.

Sessional work assessment

Tests (2X15) – 30 marks

Assignments (2X10) – 20 marks

Total – 50 marks

University Examination Pattern

Q I – 8 short answer type questions of 5 marks, 2 from each module.

Q II - 2 questions (covering entire module) of 15 marks each from module I with choice to answer any one.

Q III - 2 questions (covering entire module) of 15 marks each from module II with choice to answer any one.

Q IV - 2 questions (covering entire module) of 15 marks each from module III with choice to answer any one.

Q V - 2 questions (covering entire module) of 15 marks each from module IV with choice to answer any one.

2K6 EC 802: OPTICAL COMMUNICATION

3 hours lecture and 1 hour tutorial per week

Module I (14 hours)

Introduction to: The Electromagnetic Spectrum- Fiber Optic Communication System, Benefits and disadvantages Fiber Optics Transmission through Optical Fiber, Types of Fiber. Solution to Maxwell's equation in circularly symmetric step indexed optical fiber. Concept of single mode and multi mode fibers-V number-linearly polarized modes. Attenuation mechanism in single and multi mode optical fibers. Dispersion: dispersion shifted and dispersion flattened fibers polarization maintaining fibers. Basics of optical couplers, build out attenuators and optical switches

Module—II (12hours)

Optical Sources: Basic principle of LED and, LASER – structure- quantum efficiency -characteristics material used concept of line width, Distributed feedback (DFB) laser. Detectors: PIN -Avalanche Photodiode: - material used, working principle and characteristics Photo detector-responsivity-sensitivity- noise - response time- structure of detectors- receiver units.

Module –III(13 hours)

Coherent optical systems. Methods of modulation, Heterodyne and Homodyne systems, Noise in coherent systems Multichannel coherent systems. Intensity modulated direct detection systems. Detected signals and shot noise-ISI and equalization. Performance degradation due to fiber dispersion and non-linear effects in fiber propagation.

Module –IV(13 hours)

Optical amplifiers: semiconductors and rare earth doped fiber amplifiers-Raman amplifier-Brillouin amplifier-principle of operation-amplifier noise. Optical TDM, SCM, WDM and Hybrid multiplexing methods. Optical networks:- SONET/ SDH, DWDM, Optical CDMA, FDDI, performance of various systems.

Text books

1. Leonid Kazovsky, Sergio Benedetto and Alan Willner: `Optical Fiber Communication Systems' , Artech House, 1996.
2. John Senior: `Optical Fiber Communications', Second Edition, PHI, 1992
3. Silvello Betti, Giancarlo De Marchis and Eugenio Iannone : `Coherent Optical Communications Systems', John Wiley, 1995.
4. G.P.Agrawal : `Nonlinear Fiber Optics', Second edition, Academic Press, 2000.
5. Gerd Keiser: Optical Fibre Communications (3rd Ed.), McGraw Hill, 2000.

References

1. Fibre optic communication technology: Djafer K Mynbaev, Pearson Education.
2. Electronic communication: Dennis Roddy & John coolen, PHI. .
3. Optical communication system: John Gower, PHI
4. Fibre optics in telecommunication: Sharma, Mc Graw Hill
5. Optical fibre and fibre optic communication: Subir Kumar Sarkar, S Chand & co. Ltd
6. Optical communication: M Mukund Rao , Universities press.
7. Fiber Optic Communication: Palais, Pearson Education.

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 803: COMPUTER COMMUNICATION & NETWORKING

3 hours lecture and 1 hour tutorial per week

Module 1: (14 hours)

Characteristics of communication networks - traffic characterization and quality of service CBR, VBR, UBR traffic - network services - flow control - congestion control - error control - error detection - ARQ retransmission strategies - analysis - OSI model - Ethernet - token ring - FDDI - DQDB - frame relay

Module 2: (12 hours)

TCP/UDP - TCP congestion control - congestion avoidance - window adjustment in TCP - routing optimization in datagram networks - circuit switched networks - SONET - SDH- routing optimization in circuit switched networks

Module 3: (12 hours)

Markov chain- Discrete time and continuous time Markov chains- Poisson process- Queuing models for Data gram networks- Little's theorem- M/M/1 queuing systems- M/M/m/m queuing models- M/G/1 queue

Module 4: (14 hours)

ATM networks - main features - statistical multiplexing - addressing, signaling and routing - ATM header structure - ATM adaptation layer - IP over ATM-- IPV4, IPV6. Introduction to WSN ; MAC Protocols - classification, comparative analysis Overview/Architectures.

Text books and references:

1. Jean Walrand & Pravin Varaiya, "*High Performance Communication Networks*". Morgan Kaufman Publishers, 2nd Edition
2. James. F. Kurose and Keith.W. Ross, "Computer Networks, A top-down approach featuring the Internet", Addison Wesley, 2001.
3. D. Bertsekas and R. Gallager, "Data Networks", PHI, 2000.
4. Tannenbaum A., "*Computer Networks*", Prentice Hall
5. S. Keshav, "An Engineering Approach to Computer Networking", Addison Wesley
6. Peterson L.L. & Davie B.S., "Computer Networks: A System Approach", Morgan Kaufman Publishers.
7. Anurag Kumar, D. Manjunath, and Joy Kuri, Communication Networking: An Analytical Approach, Morgan Kaufman Publ. 2004.
8. C. Siva Ram Murthy and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols", Prentice Hall.

Sessional work assessment

Two tests (2 x 15) = 30
Two assignments(2 x 10) = 20
Total marks = 50

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 804: WIRELESS MOBILE COMMUNICATION

3 hours lecture and 1 hour tutorial per week

Module I (14 HOURS)

Introduction to Wireless Communication System: Evolution-wireless communication system Definitions-steps involved in making a cellular telephone call-Modern Wireless Communication Systems-2G-3G-4G

Module II (10 HOURS)

The Cellular Concept: Frequency Reuse-channel assignment strategies-handoff strategies-Interference and system capacity-improving coverage and capacity in cellular system-cell splitting-sectoring-repeaters for range extension-micro cell concept

Module III (12 HOURS)

Free space propagation models-ground reflection model-the basic propagation mechanisms-small scale multipath propagation-impulse response model of a multipath channel-parameters of mobile multipath channels-Types of small scale Fading.

Module IV (16 HOURS)

Spread spectrum and CDMA-Motivation- Direct sequence spread spectrum- Frequency Hopping systems- Time Hopping.- Anti-jamming- Pseudo Random (PN) sequence- Maximal length sequences- Gold sequences- Generation of PN sequences.- Diversity in DS-SS systems- Rake Receiver- Performance analysis. Spread Spectrum Multiple Access- CDMA Systems- Interference Analysis for Broadcast and Multiple Access Channels- Capacity of cellular CDMA networks- Reverse link power control- Hard and Soft hand off strategies.

Text Books:

1. T.S. Rappaport, "Wireless Communication, principles & practice", PHI, 2001
2. Andrea Goldsmith, "Wireless Communications", Cambridge University press.
3. Simon Haykin and Michael Moher, " Modern Wireless Communications", Person Education.

Reference Books:

1. G.L Stuber, "Principles of Mobile Communications", 2nd edition, Kluwer Academic Publishers.
2. Kamilo Feher, 'Wireless digital communication', PHI, 1995.
3. R.L Peterson, R.E. Ziemer and David E. Borth, "Introduction to Spread Spectrum Communication", Pearson Education.
4. A.J.Viterbi, "CDMA- Principles of Spread Spectrum", Addison Wesley, 1995.

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6PTEC 805 (A): ADVANCED DIGITAL SIGNAL PROCESSING

3 hours lecture and 1 hour tutorial per week

Module I (13 HOURS)

Introduction to Multi-rate Digital Signal Processing – Sample rate reduction - decimation by integer factors- sampling rate increase – interpolation by integer facto - Design of practical sampling rate converters: Filter Specification- filter requirement for individual stages - Determining the number of stages and decimation factors - Sampling rate conversion using poly-phase filter structure – poly-phase implementation of interpolators.

Module II(13 HOURS)

Adaptive Signal Processing – Adaptive filters – Concepts- Adaptive filter as a Noise Canceller - Other configurations of the adaptive filter - Main components of the adaptive filter – Basic Wiener filter theory – The basic LMS adaptive algorithm – Practical limitations of the basic LMS algorithm - Recursive Least Square Algorithm – Limitations - Factorization Algorithm.

Module III (13 HOURS)

Introduction to two dimensional signal and systems - 2D – DFT Transforms - Properties and applications - Discrete Hilbert Transform and Discrete Cosine Transform – Properties and Applications - Short term Fourier Transform - Gabor Transform - Properties and Applications.

Module IV (13 HOURS)

Wavelets – Wavelet Analysis – The Continuous Wavelet Transform - scaling - shifting - scale and frequency - The Discrete Wavelet Transform - One Stage filtering - Approximation and Details - Filter bank analysis – Multilevel Decomposition – Number of levels – Wavelet reconstruction – Reconstruction filter- Reconstructing Approximations and details- Multilevel Reconstruction - Wavelet packet synthesis- Typical Applications.

Text books:

1. Digital Signal Processing: Emmanuel C Ifeachor, Barrie W Jrevis, Pearson Education.
2. Theory and Applications of DSP: L.R Rabiner and B gold
3. Electronic filter Design Hand Book: A .B Williams and FT Taylor, McGraw

References

1.Wavelets and Subband Coding: Valterli & Kovaceric, PHI.

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 805 (B): DIGITAL IMAGE PROCESSING

3 hours lecture and 1 hour tutorial per week

Module I (13 hours)

Digital Image Fundamentals :Elements Of Digital Image Processing Systems – Elements Of Visual Perception – Psycho Visual Model – Brightness – Contrast, Hue, Saturation, Mach Band Effect Color Image Fundamentals – Rgb – Hsi Models – Image Sampling, Quantization– Dither– Two– Dimensional Mathematical Preliminaries .1D DFT 2D transforms – DFT DCT Discrete Sine Walsh Hadamard – Slant – Haar – KLT – SVD – Wavelet Transform

Module II (13 hours)

Image Enhancement and Restoration-Histogram Modification And Specification Techniques – Noise Distributions – Spatial Averaging – Directional Smoothing Median – Geometric Mean – Harmonic Mean Contraharmonic And Yp Mean Filters – Homomorphic Filtering – Color Image Enhancement Image Restoration – Degradation Model – Unconstrained And Constrained Restoration – Inverse Filtering – Removal Of Blur Caused By Uniform Linear Motion – Wiener Filtering – Geometric Transformations – Spatial Transformations Gray Level– Interpolation .

Module III (13 hours)

Image Segmentation and Recognition– Image Segmentation by Region Growing – Region Splitting and Merging – Edge Linking – Image Recognition – Patterns and Pattern Classes – Matching By Minimum Distance Classifier – Matching by Correlation – Back Propagation Neural Network – Neural Network Applications in Image Processing .

Module IV (13 hours)

Image Compression: Need for Data Compression – Huffman – Run Length Encoding – Shift Codes – Arithmetic Coding - QM/MQ codes– Vector Quantization – Block Truncation Coding – Transform Coding – DCT and Wavelet JPEG –JPEG 2000- MPEG Standards – Concepts of Context Based Compression .

TEXT BOOKS

1. Rafael C Gonzalez and Richard E Woods, "Digital Image Processing", Second Edition, Pearson Education Inc, 2004.

2. Milman Sonka Vaclav Hlavac Roger Boyle, "Image Processing Analysis and Machine Vision", 2nd Edition, Brooks/Cole Vikas Publishing House, 1999

Reference books

1. Anil K Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 2002.
2. David Salomon, "Data Compression the Complete Reference", 2nd Edition Springer Verlag, New York Inc, 2001.
3. William K Pratt, "Digital Image Processing", John Wiley, New York, 2002.

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 805 (C): COMMUNICATION SWITCHING SYSTEMS

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Electronic switching systems: basics of a switching system - electronic space division switching - stored program control - time division switching - time multiplexed space switching - time multiplexed time switching - two stage, three stage and N-stage combination switching

Module II (14 hours)

Digital circuit switching networks: two-stage network - three-stage network - n-stage network - non-blocking switches - blocking probability analysis of multistage switches - lee approximation - improved approximate analysis of blocking switch - examples of digital switching systems - AT & T 5ESS and NTI - DMS 100 switching systems

Module III (14 hours)

Elements of traffic engineering: network traffic load and parameters - grade of service and blocking probability - incoming traffic and service time characterization - blocking models and loss estimates - delay systems

Module IV (12 hours)

Signaling: customer line signaling - outband signaling - inband signaling - PCM signaling - inter register signaling - common channel signaling principles - CCITT signaling system No: 7 - digital customer line signaling

Introduction to ATM switching – Strict sense non block switch – self routing switches – Bense network – ATM routers – Design of typical switches.

TEXT BOOK:

1. Viswanathan T., *Telecommunication Switching Systems and Networks*, Prentice Hall of India Pvt. Ltd.
2. Schwartz M., *Telecommunication Networks - Protocols, Modeling and Analysis*, Addison Wesley Publishing Company

REFERENCES:

1. Flood J.E., *Telecommunications Switching Traffic and Networks*, Pearson Education Pvt. Ltd., Publishers
2. Freeman R.L., *Telecommunication System Engineering*, Wiley Inter Science Publications

Das J., *Review of Digital Communication*, New Age Internal (P) Ltd., Publishers

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 805 (D): EMBEDDED SYSTEMS

3 hours lecture and 1 hour tutorial per week

Module I (12 hours)

Embedded Computers – Characteristics of Embedded Computing Applications – Challenges in Embedded Computing System Design – Embedded System Design –Process Requirements – Specification – Architectural Design – Designing Hardware and Software Components – System Integration – Formalism for System Design – Structural Description, Behavioral Description – Design Example: Model Train Controller.

Module II (13 hours)

ARM Processor – Processor and Memory Organization – Data Operations – Flow of Control – SHARC Processor – Memory Organization – Data Operations – Flow of Control – Parallelism with Instructions – CPU Bus Configuration, ARM Bus, SHARC Bus – Memory Devices, Input/output Devices – Component Interfacing – Designing with Microprocessor Development and Debugging – Design Example Alarm Clock .

Module III(13 hours)

Distributed Embedded Architecture – Hardware and Software Architectures – Networks for Embedded Systems – I2C, CAN Bus – SHARC Link Ports – Ethernet – Myrinet– Internet, Network – Based Design – Communication Analysis – System Performance Analysis – Hardware Platform Design – Allocation and Scheduling – Design Example Elevator Controller

Module IV (14 hours)

Clock Driven Approach – Weighted Round Robin Approach – Priority Driven Approach – Dynamic versus Static Systems – Effective Release Times and Deadlines – Optimality of the Earliest Deadline First (EDF) Algorithm – Challenges in Validating Timing Constraints in Priority Driven Systems – Off–Line versus On–Line Scheduling.

TEXT BOOKS

1. Wayne Wolf, "Computers as Components Principles of Embedded Computing System Design", Morgan Kaufman Publishers, 2001.
2. Frank Vahid and Tony Givargi, "Embedded System Design A Unified Hardware/Software", John Wiley & Sons, 2000.

REFERENCES

1. Jane W S Liu, "Real Time systems", Pearson Education, Asia, 2000.
2. C M Krishna and K G Shin, "Real Time Systems", McGraw Hill 1997.

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 805(E): SECURE COMMUNICATIONS

3 hours lecture and 1 hour tutorial per week

Module I: (10 hours)

Rings and fields - Homomorphism- Euclidean domains - Principal Ideal Domains - Unique Factorization Domains -- Field extensions- Splitting fields - Divisibility- Euler theorem - Chinese Remainder Theorem - Primality

Module II: (13 hours)

Basic encryption techniques - Concept of cryptanalysis - Shannon's theory - Perfect secrecy - Block ciphers - Cryptographic algorithms - Features of DES - Stream ciphers - Pseudo random sequence generators - linear complexity - Non-linear combination of LFSRs - Boolean functions

Module III: (14 hours)

Private key and Public key cryptosystems - One way functions - Discrete log problem - Factorization problem - RSA encryption - Diffie Hellmann key exchange - Message authentication and hash functions -Digital signatures - Secret sharing - features of visual cryptography - other applications of cryptography -

Module IV: (15 hours)

Elliptic curves - Basic theory - Weirstrass equation - Group law - Point at Infinity -Elliptic curves over finite fields - Discrete logarithm problem on EC - Elliptic curve cryptography - Diffie Hellmann key exchange over EC - Elgamal encryption over EC - ECDSA

Text Books:

1. Douglas A. Stinson, "Cryptography, Theory and Practice", 2nd edition, Chapman & Hall, CRC Press Company, Washington
2. William Stallings, " Cryptography and Network Security", 3rd edition, Pearson Education

Reference Books:

1. Lawrence C. Washington, " Elliptic Curves", Chapman & Hall, CRC Press Company, Washington.
2. David S. Dummit, Richard M. Foote, " Abstract Algebra", John Wiley & Sons
3. Evangelos Kranakis, " Primality and Cryptography", John Wiley & Sons
4. Rainer A. Ruppel, " Analysis and Design of Stream Ciphers", Springer Verlag

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 805(F): OPTIMIZATION TECHNIQUES

3 hours lecture and 1 hour tutorial per week

Module I: Linear programming I (13 hours)

Systems of linear equations and inequalities - convex sets - convex functions - formulation of linear programming problems - theory of simplex method - simplex algorithm - Charne's M method - two phase method - duality in linear programming - dual simplex method

Module II: Linear programming II (13 hours)

Sensitivity analysis - parametric programming - bounded variable problems - transportation problem - development of the method - integrality property - degeneracy - unbalanced problems - assignment problem - development of the Hungarian method - routing problems

Module III: Nonlinear programming (13 hours)

Mathematical preliminaries of non-linear programming - gradient and Hessian - unimodal functions - convex and concave functions - role of convexity - unconstrained optimization - fibonacci search - golden section search - optimal gradient method - classical optimization - Lagrange multiplier method - Kuhn-tucker conditions - quadratic programming - separable convex programming - frank and wolfe method

Module IV: Dynamic programming & game theory (13 hours)

Nature of dynamic programming problem - Bellman's optimality principle - cargo loading problem - replacement problems - multistage production planning and allocation problems - rectangular games - two person zero sum games - pure and mixed strategies - 2 ▪ m and m ▪ 2 games - relation between theory of games and linear programming

REFERENCES

1. Bazarra M.S., Jarvis J.J. & Sherali H.D. '*Linear Programming and Network Problems*', John Wiley
2. Bazarra M.S., Sherali H.D. & Shetty C.M., *'Nonlinear Programming, Theory and Algorithms',* John Wiley
3. Hadley G., '*Linear Programming*', Addison Wesley, Narosa
4. Hillier F.S. & Lieberman G.J. *'Introduction to Operations Research'*, McGraw Hill
5. Ravindran A., Phillips D.T. & Solberg J. J., *Operations Research Principles and Practice*, John Wiley
6. Taha H.A., *Operations Research, An introduction*, P.H.I.
7. Wagner H.M., '*Principles of Operations Research with Application to Managerial Decisions'*, P.H.I.

Sessional work assessment

Tests (2X15) – 30 marks
Assignments (2X10) – 20 marks
Total – 50 marks

University examination pattern

Q I - 8 short answer type questions of 5 marks, 2 from each module
Q II - 2 questions A and B of 15 marks from module I with choice to answer any one
Q III - 2 questions A and B of 15 marks from module II with choice to answer any one
Q IV - 2 questions A and B of 15 marks from module III with choice to answer any one
Q V - 2 questions A and B of 15 marks from module IV with choice to answer any one

2K6 EC 806(P) SEMINAR

4 hours per week

Each student is expected to give a seminar on a topic of current relevance in Electronics and Communication Engineering –they have to refer published papers from standard journals-the seminar report must not be the reproduction of the original paper

Sessional work assessment

Presentation	= 30 marks
Report	= 10 marks
Discussion	= 10 marks
Total marks	= 50 marks

2K6 EC 807(P) PROJECT & INDUSTRIAL TRAINING

6 hours practical per week

Each student group consisting of not more than four members is expected to develop a complete product- the design and development of which may include hardware and /or software- the students will present and demonstrate the project work before the committee - a detailed report is also to be submitted

All students shall undergo an industrial training programme either by attending training program for a minimum of five days in a registered industry/Govt. establishment/Research institute or by visiting at least five reputed industries/Engineering establishments. They have to submit a report of the industrial training program.

The assessment of all the projects shall be done by a committee consisting of three or four faculty members specialised in the various fields of Electronics & Communication Engineering - the students will present their project work before the committee - the group average marks for the various projects will be fixed by the committee - the guides will award the marks for the individual students in a project maintaining the group average

A maximum of 25 marks will be awarded for the industrial training

Sessional work assessment	
Project work	: 75
Industrial Training	: 25
Total marks	: 100

2K6 EC 808(P) : VIVA VOCE

There is only University examination for Viva Voce. Examiners will be appointed by the university for conducting the viva voce. The viva voce exam will be based on the subjects studied for the B.Tech course, mini project, project & Industrial training and seminar reports of the student - the relative weightages would be as follows

Sessional work assessment

Subjects	: 30
Mini project	: 20
Project & Industrial Training	: 30
Seminar	: 20
Total marks	: 100