14. Analysis of Automobile Exhaust gas and Flue gas -Use of instruments like oxygen analyser. Orsat gas analyzer, Gas chromatography.

PROJECT & SEMINAR

M808 **0+0+4**

At the beginning of the seventh semester, students must submit an abstract of their undergraduate project. They must submit a preliminary report at the end of the semester. They will complete the project in the eighth semester.

Sessional marks for seminar will be out of 25. Sessional marks for project will be out of 75, in which 35 marks will be based on day to day performance assessed by the guide. Balance 40 marks will be awarded based on the presentation of the project by the students before an evaluation board consists of a minimum of 3 faculty members including the guide.

VIVA -VOCE

M809

A comprehensive Viva-voce examination will be conducted to assess the student's overall knowledge in the specified field of engineering. At the time of viva-voce, certified reports of seminar and project work are to be presented for evaluation.

B.TECH. DEGREE COURSE

SYLLABUS

ELECTRICAL & ELECTRONICS ENGINEERING BRANCH

THIRD SEMESTER

ENGINEERING MATHEMATICS - II

CMELPA 301 **3+1+0**

Module 1

Vector Differential Calculus: Differentiation of vector functions – scalar and vector fields – gradient, divergence and curl of a vector function – their physical meaning – directional derivative – scalar potential, conservative field – identities – simple problems.

Module 2

Vector Integral Calculus: Line, Surface and Volume Integrals, work done by a force along a path – Application of Greens theorem, Stokes theorem and Gauss divergence theorem.

Module 3

Function of Complex Variable: Definition of Analytic functions and singular points – Derivation of C. R equations in Cartesian co-ordinates – harmonic and orthogonal properties – construction of analytic function given real or imaginary parts – complex potential – conformal transformation of function like z^n, e^z, $1/z$, Sin z, $z + k^2/z$ – bilinear transformation. Cross ratio – invariant property – simple problems.

Module 4

Finite Differences: Meaning of Δ, ∇, E, μ, δ - interpolation using Newton's forward and backward formula – central differences – problems using Stirlings formula – Lagrange's formula and Newton's divided difference formula for unequal intervals.

Module 5

Difference Calculus: Numerical differentiation using forward and backward differences – Numerical integration – Newton-Cote's formula – trapezoidal rule – Simpson's $1/3^{rd}$ and $3/8^{th}$ rule – simple problems. Difference eqns. – solutions of difference equations.

References

1. Advanced Engg. Mathematics: Erwin Kreyszig, Wiley Eastern.
2. Higher Engg. Mathematics: Grawal B. S, Khanna Publ.
3. Numerical Methods in Science and Engg: M. K Venkataraman, National Publishing Co.
4. Numerical Methods: S. Balachandra Rao and G.K Shantha, University Press.
5. Advanced Engg. Mathematics: Michael D. Greenberg, Prentice – Hall
6. Numerical mathematical Analysis: James B. Scarborough, Oxford IBH Publishing Co.
7. Theory and Problems of Vector Analysis: Murray R. Spiegel, Schaum's outline series – McGraw Hill.
8. Finite Differences and Numerical Analysis: H.C Saxena, S. Chand & Co.Ltd.

MECHANICAL TECHNOLOGY

E 302 **3+1+ 0**

Module 1

Properties of Fluids: Pressure, density, bulk modulus, dynamic and kinematic viscosity, surface tension, capillary – fluid at rest, Pascal's law, applications, pressure head, vapor pressure, pressure measurement, manometers, gauges and pressure switch – pressure on immersed surfaces – floating body.

Module 2

Fluid in Motion: Euler's equation in one dimension. One dimensional incompressible Bernoulli's equation, interpretation of Bernoulli's equation as a energy equation. Flow through Orifices – measurement of fluid velocity, pitot tube – discharge measurement, venturimeter, orifice meter, Rota meter and notches.

Flow of compressible fluids through pipes – types of flow – critical Reynolds number – friction factors for laminar and turbulent flow – hydraulic gradient – minor losses – transmission of power through pipes.

Module 3

Hydraulic Turbines: Evolution of present day hydraulic turbines from the water wheel – classification – degree of action – Pelton wheel, Francis and Kaplan Turbines – constructional details and characteristics only (no problems based on velocity triangles) – governing of turbines – draft tube – specific speed – cavitation effects.

Module 4

Pumping Machinery: General classification – Dynamic pumps – working of centrifugal pumps, priming, vapour pressure, wear rings, hydraulic balancing, Classification of impellers, single and double suction impellers – types of casings – effect of vapour pressure on lifting of liquid – specific speed – performance pump characteristics: main, operating, ISO efficiency characteristics curves – NPSH _ multistage pumps – propeller pumps – pump in parallel & series operation – Theory, efficiency, performance curves & application of self-priming pump, jet pump, airlift pump, slurry pump & hydraulic ram (description only).

Module 5

Positive Displacement Pumps: reciprocating pumps, effect of vapour pressure on lifting of liquid – indicator diagram – acceleration head – effect of friction – use of air vessels – work saved – slip – efficiency – pump characteristics – applications – Cavitation in fluid machines – Rotary pumps: Gear, Screw, vane, root pumps – rotary axial & rotary radial piston pumps – thory, efficiency, performance curves – applications (Description only).

References

1. Fluid Mechanics & Hydraulic Machines: Abdulla Sheriff, Standard Publ.
2. Fluid Flows Machines: Govinda Rao N.S, TMH.
3. Fluid Mechanics & Hydraulic Machines: Jagadishlal, Metropolitan publ.
4. Fluid Mechanics: Massey B. S, ELBS
5. Centrifugal and Axial Flow Pumps: Stepanoff John A. J, Wiley & Sons.

ELECTRIC CIRCUIT THEORY

E 303 **2+2+0**

Module 1

Circuit Analysis: Concept of Linearity, Unilateral and Bilateral Systems – Passive and Active networks – Vector and Phasor – Sources of Energy – Independent and Dependent voltage and current Sources – Standard input signals – Source transformations - Mesh and Node Analysis – Driving point Impedance and Transfer Impedance – Driving point Admittance and Transfer Admittance.

Module 2

Coupled Circuits: Self-inductance and Mutual inductance – Coefficient of coupling – dot convention – Ideal Transformer – Analysis of multi-winding coupled circuits – Analysis of single tuned and double tuned coupled circuits.

Module 3

Network Theorems: Star-Delta transformations – Super position, Reciprocity, Substitution, Compensation, Thevinin, Norton, Millman, Tellegen and Maximum power transfer theorems.

Module 4

Three Phase Circuits: Generation of three phase voltages – Phase sequence – Line and Phase quantities – Analysis of unbalanced loads – Neutral shift – Symmetrical components – Analysis of unbalanced system – power in terms of symmetrical components.

Module 5

Graph theory: Introduction – Linear graph of a network – Tie-set and cut-set schedule – incidence matrix – Analysis of resistive network using cut-set and tie-set – Dual of a network.

Introduction to MATLAB and pSPICE – Simulation/Analysis of simple Electric Circuits using MATLAB and pSPICE.

References

1. Network Analysis: M.E Van Valkanburg
2. Circuits and Networks-Analysis and Synthesis: A. Sudhakar, S.P Shyam Mohan
3. Networks and Systems: D. Roy Choudhary, New Age Intl'.
4. Theory and Problems in Circuit Analysis: T.S.K.V Iyer, TMH
5. Electric Circuits: Edminister J, Schaum's Outline series
6. Engineering Circuit Analysis: W.H Hayt and J.E. Kemmerly – Mc Graw Hill.
7. Electric ciruit theory: Rajeswaran – Pearson Education

ELECTROMAGNETIC THEORY

E 304 **3+1+0**

Module 1

Review of Vector Analysis – Cartesian coordinate system – The Vector field – dot cross products – introduction to cylindrical and spherical coordinate systems.

Static Electric Field: Coulomb's law – electric field intensity – field intensity due to point charge, line charge, surface charge and volume charge distributions – electric flux – electric flux density – Gauss's law and its applications – divergence – Maxwell's first equation – the Del operator – Divergence theorem.

Module 2

Energy and Potential – Energy expended in moving a point charge in an electric field – Electric Potential between two points – potential at a point charge – potential at any point – due to discrete as well as distributed charges – Electric field lines and equipotential contours – electric dipoles – potential gradient – conservative nature of a field – Laplace and Poisson equations (Derivation only and not solution).

Module 3

Conductors, Dielectrics and Capacitance – current and current density – continuity equation – point form of Ohm's Law – conductor properties – polarisation – dielectric boundary conditions – capacitance – parallel plate capacitor – capacitance of isolated sphere, spherical shell, coaxial and cylinders and parallel wires – effect of earth on capacitance - method of images – energy stored in electrostatic field – dielectric strength and break down.

Module 4

The steady Magnetic Field – Biot-Savart's law – Ampere's circuital law - Curl – Stoke's theorem – magnetic flux and flux density – the scalar and vector magnetic potentials – magnetic force on a moving charge – force on a moving charge – force on a current element – force between current carrying wires – torque on closed circuits – magnetic boundary conditions – self and mutual inductances – energy stored in a magnetic field – skin effect – inductance of solenoids, torroids and two-wire transmission lines.

Module 5

Time varying fields – Faraday's laws of electromagnetic induction – Motional emf concept of displacement current – Maxwell's equations in point form and integral form – wave equation in free space – applications in transmission lines – Poynting vector and power flow – Poynting theorem – interpretations – instantaneous, average and complex pointing vector – power loss in conductors.

References

1. Engineering Electromagnetics: William H. Hayt Jr., McGraw Hill
2. Electromagnetics: John D. Karus and Carver K.R, McGraw Hill
3. Field Theory: Gangadhar K. A
4. Theory and Problems of Electromagnetics: Joseph Edminister, schaum's outline series
5. EMT with applications: B. Premlet

ELECTRICAL AND ELECTRONIC MEASUREMENTS

E 305 **2+1+0**

Module 1

Units and Dimensions: SI Units – Dimensions of Electrical quantities – dimensional equations.

Magnetic Measurements: Theory of Ballistic galvanometer – Flux meter – Lloyd Fischer Square.

Module 2 .

Measurement of Voltage: Potentiometers – slide-wire, Precision slide-wire, Vernier potentiometer – Calibration of Ammeter, Voltmeter and Wattmeter using potentiometer- AC potentiometer.

Measurement of Resistance: Low, medium, high – Wheatstone bridge- Kelvin's double bridge – Insulation Megger – Earth Megger.

Module 3

AC Bridges: Maxwell's bridge – Hay's bridge, Wien's bridge, Anderson Bridge, High voltage Schering Bridge. (Analysis and Phasor diagram required)

Module 4

Instrument Transformers: Principle of Current and Potential transformers – Phasor diagram – nominal ratio – phase angle error, Ratio error – Constructional features and applications.

Error Analysis in Measurements: Source of error – Instruments errors – Human errors – Environmental errors – Combination of errors – Mean and variance – Standard deviation – Limits of error.

Module 5

Illumination measurements: Units of illumination – laws of illumination – polar curves – Determination of MSCP and MHCP – Integrating meters – Lumer Brodhern type.

Temperature measurement: Thermoelectric effects, laws of thermoelectric circuits – common thermocouples.

References

1. Electrical Measurements and Measuring Instruments – Golding E.W, Wheeler and Co., 1991.
2. Electrical and Electronic Instrumentation and Measurements – Sawhney A.K, Dhanpat Rai and Co., 1992.
3. Modern Electronic Instrumentation and measurement Technique – Albert D. Helfrick and William D. Cooper, PHI, 1992.

POWER GENERATION AND DISTRIBUTION

E 306 **2+1+0**

Module 1

Economic Aspects: Load Curve- Load duration curve-Maximum demand- Average demand- Load factor- Diversity factor-Plant use factor.
Cost of Generation: Fixed and Running Charges- depreciation- straight line and sinking fund method Tariffs- Different types and comparison.

Module 2

Distribution Systems: Feeder- Distributor - Service mains- Radial and Ring mains- AC and DC Distributors- Calculations of voltage drop due to concentrated loads fed at one or more points-LT Lines- LT Capacitors – Installation- Size – Connections- Distribution system maintenance

Module 3

Design of Feeder- Kelvin's law- Limitations- Related 'Indian Electricity Act' Rules regarding generation and supply of electrical energy
Power factor improvement- necessity – methods – economics – capacity of phase advancing plant

Module 4

Underground Cables: Single core and three core cables – Insulation Resistance – Stress and capacitance of single core cables – Grading – Extra high voltage cables – Localisation of cable faults.

Module 5

High Voltage Generation:
D.C: Rectifier circuits - Voltage multiplier-Cascade circuits-Electrostatic machines
A.C.: Cascade transformers – series resonance circuits
Impulse Voltage: Single stages and cascade circuits

References

1. A Course in Electric Power: Soni M.L., P.V.Gupta
2. A Course in Electric Power: Uppal
3. Electric Power Distribution System: A.S. Pabla
4. Transmission and Distribution of Electric Energy: Cotton H
5. High Voltage Engineering: M. S. Naidu, V. Kamaraju

BASIC ELECTRICAL LAB

E 307 **0+0+4**

1. Study of AC and DC supply systems in Electrical Laboratory
2. Study of PMMC / MI voltmeters, ammeters, electro-dynamometer type watt meters, induction type energy meters, various loads like resistive, capacitive and inductive.
3. Testing of insulating oils and H.V testing on insulating materials.

4. Determination of voltage-current characteristics of linear resistance and a nonlinear resistance (e.g. incandescent lamp).
5. Verification of Kirchhoff's laws using resistive network.
6. Verification of superposition theorem in a resistive circuit with two given DC sources.
7. Verification of Thevinin's theorem in a DC circuit.
8. Verification of generalised reciprocity theorem in a DC circuit.
9. Verification of Maximum Power transfer theorem in a DC circuit
10. Three phase star and delta connection – measurement of line and phase values.
11. Measurement of three phase power at different power factors for balanced and unbalanced loads.
12. Study and measurement of symmetrical components for unbalanced system.
13. Determination of BH characteristics of a magnetic specimen.
14. RLC series and parallel circuit: measurement of current in various branches and verification by calculation – drawing of phasor diagram.
15. Determination of locus diagram RL and RC circuit.
16. Study of frequency – current relations of given series RLC circuit and condition for series resonance.
17. Measurement of single phase power – (a) Three ammeter method (b) three voltmeter method
18. Measurement of single phase power and energy using wattmeter and energy meter – calculation of error.
19. Determination of Power and Power factor of a given single phase circuit using watt meter and power factor meter – power factor improvement of the above circuit.
20. Determination of fusing time versus current characteristics for two specimens – fusing factor – study of various types of fuses.
21. Measurement of Neutral shift voltage for an unbalanced star connected system.

MECHANICAL LAB

E 308 **0+0+4**

HYDRAULICS LAB

1. Study of centrifugal pump and components
2. Study of reciprocating pump and components – single cylinder and multi cylinder
3. Study of impulse and reaction turbines
4. Performance characteristics of centrifugal pump
5. Performance characteristics of reciprocating pump
6. Performance characteristics of Pelton Wheel
7. Performance characteristics of Francis turbine
8. Performance characteristics of Kaplan turbine

HEAT ENGINES LAB

1. Load Test (Constant speed test) on petrol engine
2. Load Test (Constant speed test) on diesel engine
3. Variable speed test on petrol engine
4. Variable speed test on diesel engine
5. Cooling curve of I.C engine
6. Performance test on air compressors and blowers
7. Performance test on refrigeration unit
8. Performance test on air-conditioning unit

FOURTH SEMESTER

ENGINEERING MATHEMATICS - III

CMELRPTA 401 **3+1+0**

Module 1

Ordinary Differential Equations: Linear Differential Equations with constant coefficients – Finding P.I by the method of variation of parameters – Cauchy's equations – Linear Simultaneous equations – simple applications in engineering problems.

Module 2

Partial Differential Equations: Formation by eliminating arbitrary constants and arbitrary functions – solution of Lagrange's Linear equations – Charpit's method – solution of homogeneous linear partial differential equation – equation with constant coefficients - solution of one dimensional wave equation and heat equation using method of separation of variables – Fourier solution of one dimensional wave equation.

Module 3

Fourier Transforms: Statement of Fourier Integral Theorems – Fourier transforms – Fourier sine and cosine transforms – inverse transforms – transforms of derivatives – Convolution Theorem (no proof) – Parseval's identity – simple problems.

Module 4

Probability and Statistics: Binomial law of probability – The binomial distribution, its mean and variance – Poisson distribution as a limiting case of binomial distribution – its mean and variance – fitting of binomial and Poisson distributions – normal distribution – properties of normal curve – standard normal curve – simple problems in binomial, Poisson and normal distributions.

Module 5

Population and samples: Sampling distribution of mean (σ known) – sampling distribution of variance, F and Chi square test – Level of significance – Type 1 and Type 2 errors – Test of hypothesis – Test of significance for large samples – test of significance for single proportion, difference proportion, single mean and difference of mean (proof of theorems not expected).

References

1. Higher Engg. Mathematics: Grawal B. S, Khanna Publ.
2. Engineering Mathematics Vol.2: M. K Venkataraman, National Publishing Co.
3. Elements of Partial Differential Equations: Ian N. Sneddon, Mc Graw Hill Intl'
4. Miller and Fread's Probability and Statistics for Engineers: Richard A. Johnson, Pearson education/ PHI.
5. A Text Book of Engg. Mathematics, Vol.2: Bali and Iyengar, Lakshmi Publ. Ltd.
6. Advanced Engg. Mathematics: Erwin Kreyszig, Wiley Eastern.
7. Probability and Statistical Inferences: Hogg and Tam's, Pearson Education Asia.

NETWORK ANAYSIS AND SYNTHESIS

E 402 **2+1+0**

Module 1

Laplace transforms: Properties of Laplace Transforms – basic theorems – Laplace transform of gate function, impulse function and periodic functions – convolution integral – inverse Laplace transform – application of Laplace transforms to solution of Network problems.

Module 2

Fourier series: Evaluation of Fourier coefficients – wave form symmetries as related to Fourier coefficients – exponential form of Fourier series – steady state response to periodic signals.

Fourier Integral: Spectrum envelop for a recurring pulse – the Fourier Integral and Transforms – Application in Network analysis.

Module 3

Network Functions: Network functions for two port – poles and zeroes of network functions – restrictions on poles and zeroes for driving point functions and transfer functions. Two port parameters – short circuit admittance parameter – open circuit impedance parameters – Transmission parameters – Image parameters and Hybrid parameters. Ideal two port devices – ideal transformer – Gyrator – negative impedance converter.

Module 4

Filters: Classification of filters – Characteristics of ideal filters – Image impedance – Constant K low-pass, high-pass, and band-pass filters – m-derived low-pass, high-pass and band-pass filters.

Module 5

Network Synthesis: Realizability concept – Hurwitz property – positive realness – properties of positive real functions – Synthesis of R-L, R-C and L-C driving point functions – Foster and Cauer forms.

References

1. Network Analysis: M.E Van Valkenburg
2. Circuits and Networks – Analysis and Synthesis: A. Sudhakar and S.P Shyam Mohan
3. Networks and Systems: D. Roy Choudhary
4. Network Analysis and Synthesis: Franklin F. Kuo – John Wiley & Sons
5. Engineering Circuit Analysis: W.H. Hayt and J.E. Kemmerly – Mc-Graw Hill.

ELECTRONIC CIRCUITS

E 403 **3+1+0**

Module 1

Transistor Characteristics: CE, CB, CC Configurations – Biasing – Operating Point – Operating point instability – thermal runaway – bias stability – Stability factor – stabilization techniques – Fixed bias – Collector to Base bias – Emitter bias – Voltage divider bias – Stability against variation in I_{CO}.

FET: Principle of operation and characteristics – biasing FETs – self bias – FET amplifier.

UJT: Principle of operation and characteristics.

Module 2

Small Signal Analysis: h-parameter equivalent circuit of a BJT – comparison of CB, CE, and CC configurations – Determination of h – parameters from static characteristics – current and voltage gains, input impedance of a basic amplifier in h-parameters.

Multi-stage Amplifiers: RC coupling – Frequency response characteristics – bandwidth – cascading of amplifiers – gain and bandwidth.

Module 3

Feedback amplifiers: Positive and Negative feedback – types of negative feedback – Typical circuits –effect of negative feedback in amplifier performance.

Oscillators: Barkhausen criterion – classification of oscillators – Principle of operation of RC phase-shift, Hartley and crystal oscillators (analysis not required).

Module 4

Multi-vibrators: Principle of Operation and design of astable multi-vibrators – principle of bi-stable and mono-stable multi-vibrators – circuits.

Sweep generators: Principle of Sweep generation – basic transistor sweep circuit – Equation for sweep amplitude. Sweep generation using UJT relaxation oscillator circuit.

Wave shaping: Clipping and Clamping circuits using diodes – RC differentiating and Integrating Circuits.

Module 5

Power Amplifiers: Class A, B, AB and C operation – Efficiency of Class A and B – Push-pull amplifier – Complimentary Symmetry amplifiers.

References

1. Integrated Electronics: Millman and Halkias, TMH
2. Electronic Devices and Circuit Theory: Robert L. Boylestad and Louis Nashelsky, Pearson Education Asia, LPE.
3. Electronic Principles: Albert Paul Malvino, TMH
4. Electronic Devices and Circuits, An Introduction: Allen Mottershead, PHI

ELECTRICAL MACHINES - I

E 404 **3+1+0**

Module 1

D.C Machines: Generation of D.C – Action of Commutator – constructional details of D.C machine – magnetic circuit of D.C machines – D.C Armature windings – Induced emf – emf equation – torque developed in a D.C machine – generator and motor action – back emf – Armature mmf – magnitude and direction – Air-gap flux distribution curve on load – effect of saturation – Demagnetising and cross – magnetising armature mmf – variation with brush position – compensating winding – Commutation – time of commutation – emf in coil undergoing commutation – reactance emf – effect of brush shift – inter-poles.

Module 2

D.C Generator: Types of excitation – separately excited – self excited shunt, series and compound machines. OCC – Condition for self excitation – field critical resistance – critical speed – Load characteristics of generators – Load critical resistance – parallel operation of shunt, series and compound generators – equalizer connection – Losses – power flow diagram – efficiency - condition for maximum efficiency – applications – special machines – welding generator – Boosters.

Module 3

D.C Motors: Performance characteristics of shunt, series and compound wound motors – starting – 3-point and 4-point starters – Calculation of resistance elements for shunt motor starters – methods of speed control of shunt, series and compound wound motors – effect of an open field circuit – power flow diagram – efficiency – testing D.C machine – Swineburne's test – Hopkinson's test – Field's test – Retardation test.

Module 4

Transformers: Single phase transformer – Constructional details – Core – windings – Insulation – principle of operation – Inrush of switching currents – emf equation – magnetising current and core losses – no-load and load operation – Phasor diagram – equivalent circuit – losses and efficiency – condition for maximum efficiency – voltage regulation – approximate expression for voltage regulation – harmonics in single phase transformers - Magnetising current wave form – OC and SC tests – Sumpner's test.

Module 5

Three phase Transformer: Constructional features of three phase transformers – three phase connection of single phase transformers – oscillating neutral – tertiary winding – Scott connection – open delta connection – three phase to six phase connection – equal and unequal turns ratio – load sharing – distribution transformers – all day efficiency. Autotransformers – saving of copper – applications - tap-changing transformers - cooling of transformers.

References

1. The performance and Design of Direct Current Machines: A. E. Clayton and N. N Hannock
2. AC Machines: M.G. Say
3. Theory of Alternating Current Machinery: Alexander Langsdorf, TMH
4. Electrical Machines: R.K Rajput

COMPUTER PROGRAMMING

E 405 **3+1+0**

Module 1

Introduction to C: The C character set – identifiers and keywords – data types – user defined data types – constants and variables – declarations – operators – expressions – statements – library input-output functions

Control statements: if, if-else, switch, goto statements – conditional and comma operators.

Module 2

Iterative statements: 'while', 'do-while', 'for' statements – nested loops, break and continue statements.

Functions: Declarations, definition and access – passing arguments to a function – pass by value and pass by reference – recursion.

Storage classes: automatic variables – external variables – register variables – scope and life time of variables.

Module 3

Arrays: single dimensional arrays – multidimensional arrays – definition – initializing arrays- passing arrays to a function – matrix operations – addition, transpose and multiplication.

Strings: Definition – string handling functions – comparison, concatenation and sorting of strings.

Module 4

Pointers: Introduction – pointer declaration – operations on pointers.

Files: File pointers – data files: opening and closing – reading and writing.

Module 5

Structures and union: definition – initialization – accessing structure members – array of structures – passing structure to a function – sorting of structures – binary files – reading and writing of data blocks – union.

Dynamic memory allocation – self referential structures – basic concepts of linked lists – adding and deleting nodes – command line arguments – macros – C preprocessor.

References

1. Theory and Problems of Programming with C: B.S. Gotterfield, TMH
2. Programming in ANSI C: Balaguruswamy, TMH

3. Programming with ANSI & Turbo C: Ashok Kamthane, Pearson Education Asia
4. The Spirit of C, An Introduction to modern programming: Mullish & Cooper, Jaico Publishing Co.
5. Programming in C: Stephen G. Kochan, CBS Publ.
6. Computer Programming in C: V. Rajaraman, PHI EEE
7. The Official Borland Turbo C Survival Guide: Miller & Quilci, Wiley Eastern
8. Programming Techniques through C: M. G Venkateshmurthy, Pearson Education
9. Let us C: Yashwant Kanetkar, BPB publ.

ELECTRICAL AND ELECTRONIC INSTRUMENTS

E 406 **2+1+0**

Module 1

Principle of measuring instruments: Classification – indicating, recording and integrating instruments – Torque acting on the moving system – deflecting torque – methods of production – controlling torque – spring and gravity control – damping torque – electromagnetic and air friction damping.

Constructional features of instruments – torque to weight ratio of the moving system – basic theory of instruments – characteristics – damping coefficient – under damped – over damped and critically damped and critically damped instruments.

Module 2

Permanent magnet moving coil instruments: – Ammeters and Voltmeters – Torque relationship – Milliammeters and voltmeters – shunt and multipliers – sensitivity – multimeters.

Moving iron instruments: Attraction and Repulsion types – constructional features – Ammeters and Voltmeters – Errors and Compensation.

Module 3

Electrodynamometer instruments: Ammeters, Voltmeters and Watt meters – Sensitivity – Torque to weight ratio – methods of connection of current and potential coils- Errors and compensation – low power factor wattmeters – single phase wattmeters.

Induction type instruments: Wattmeters and energy meters – single phase and three phase – constructional features – Theory of operation – Errors and compensation – creep – maximum demand meters – Trivector meters.

Module 4

Rectifier Instruments: Principle of operation – Electrostatic instruments – voltmeters – characteristics, applications.

Electronic voltmeters – basic DC voltmeters – basic AC voltmeter using rectifier – basic electronic multi meter – function generator – RLC meter.

Cathode ray Oscilloscope: Principle – Application – Measurement of Voltage, current, phase and frequency. Multi-channel oscilloscopes – principle of operation and uses.

Module 5

Instruments for phase, frequency, speed, stroboscopic methods – Resonance frequency meters – Power factor meters – Synchroscope – phase sequence indicators.

Symbols for instruments – Indian standards specifications Grading of Instruments – Classification.

References

1. Electrical Measurements and Measuring Instruments – Golding E.W, Wheeler and Co., 1991.
2. Electrical and Electronic Instrumentation and Measurements – Sawhney A.K, Dhanpat Rai and Co., 1992.
3. Modern Electronic Instrumentation and measurement Technique – Albert D. Helfrick and William D. Cooper, PHI, 1992.

ELECTRICAL MEASUREMENTS LAB

E 407 **0+0+4**

1. Extension of instrument range by using
   a. Shunt and multipliers
   b. Instrument transformers
2. Measurement of 3-phase power using
   a. Single watt meter
   b. Two watt meters
   c. Three-phase watt meter
3. Calibration of flux meter using
   a. Standard solenoid
   b. Hibbertz magnetic standard
4. Determination of BH characteristics
5. Hysterisis loop using CRO
6. Separation of core losses in a given magnetic specimen
7. (a) Study of Multi meter
   (b) Measurement of R, L, C using LCR Bridge
8. Measurement of resistance using
   a. Wheatstone Bridge
   b. Kelvin's Double bridge
   c. Voltmeter and Ammeter – calculation of error due to voltmeter resistance
9. Calibration of ammeter, voltmeter and wattmeter and measurement of resistance using
   a. Simple slide-wire potentiometer
   b. Vernier Potentiometer
   c. Precision slide-wire potentiometer
10. Calibration of ammeter, voltmeter, wattmeter and measurement of impedance using A.C Potentiometer
11. Measurement of self inductance, mutual inductance and coupling coefficient.
12. Calibration of single-phase Energy meter by
    a. Direct loading
    b. Phantom loading with and without using phase shifting transformer

13. Calibration of three-phase Energy meter by
    a. Direct loading
    b. Phantom loading
14. Efficiency measurement of Lamps using Lux meter
15. Measurement of displacement using LVDT
16. Measurement of different parameters using Trivectormeter

COMPUTER PROGRAMMING LAB

E 408 **0+0+4**

Part A
Familiarisation

1. Study of Operating systems like DOS, Windows, Linux etc; Commands for use of files and directories, internal commands, external commands etc.
2. Familiarisation with word processing packages like MS Word, PageMaker etc.
3. Familiarisation with spread sheet packages like MS Excel.

Part B
Programming Experiments in C

Programming experience in C to cover control structures, functions, arrays, structures, pointers and files in accordance with syllabus of E 405.

1. Summation of series
2. Preparation of Conversion tables
3. Solution of quadratic equations
4. Array manipulation
5. Functions
6. Recursive functions
7. String manipulation – compare, copy, reverse operations
8. Matrix operations
9. Stack operations and simple programs using linked lists
10. Tabulation of marks and declaration of results – input and output using files
11. Creation of numeric and text files, merging and appending of files.

Part C
Application of numerical methods

1. Solution of algebraic and transcendental equations: bisections, Newton- Raphson method.
2. Numerical Integration – Simpson's $1/3^{rd}$ rule.

FIFTH SEMESTER

ENGINEERING MATHEMATICS - IV

CMELPA 501 **3+1+ 0**

Module 1

Complex Integration: Line integral – Cauchy's integral theorem – Cauchy's integral formula – Taylor's series – Laurent's series – Zeroes and singularities – residues – residue theorem – evaluation of real integrals using contour integration involving unit circle and semi circle.

Module 2

Numerical Solution of algebraic and transcendental equations: Successive bisection method – Regula – Falsi method – Newton – Raphson method – solution of system of linear equation by Jacobi's iteration method and Gauss – Sidel method.

Module 3

Numerical solution of Ordinary Differential Equations: Taylor's series method – Euler's method – Modified Euler's method – Runga – Kutta method (IV order) Milne's predictor-corrector method.

Module 4

z - Transforms: Definition of z – transforms – properties – z-transform of polynomial functions – trigonometric functions, shifting property, convolution property – inverse transform – solution of first and second order difference equations with constant coefficients using z-transforms.

Module 5

Linear Programming: Graphical solution – solution using simplex method (non-degenerative only) – duality in LPT – balanced TP – Vogel's approximation method – Modi method.

References

1. Advanced Engg. Mathematics: Erwin Kreyszig, Wiley Eastern.
2. Numerical Methods in Engg. and Science : Grawal B. S, Khanna Publ.
3. Higher Engg. Mathematics: Grawal B. S, Khanna Publ.
4. Numerical Methods in Science and Engg.: M. K Venkataraman, National Publishing Co.
5. Quantitative techniques: Theory and Problems: P.C Tulsian and Vishal Pandey, Pearson Education Asia
6. Complex Variable and Applications: Churchill and Brown, McGrawHill
7. Engineering Mathematics Vol.3: S.Arumugam, A.T Issac and A.Somasundaram, Scitech Publ.
8. Advanced Mathematics for Engineering students Vol-3: S. Narayanan, T.K.M Pillai & G. Ramanaiah, S.Viswanathan Printers & Publ.
9. Operations Research: Paneer Selvam, PHI

DIGITAL CIRCUITS

E 502 **3+1+0**

Module 1

Number Systems and Codes: Arithmetic using signed and unsigned numbers- Floating point representation- Normalized floating point representation-Gray Codes, ASCII and EBCDIC code.

Logic gates: Elements of Boolean algebra- Logic operations- AND, OR, NOT, NAND, NOR, XOR gates- De Morgan's Theorem- Realisation of combinational circuits using SOP and POS forms - K-map up to 4 variables- Half adder, full adder circuits. Half subtraction and Full subtraction circuits.

Module 2

Logic Families: DTL, TTL and CMOS families- comparison of characteristics- TTL NAND gate internal circuit- TTL characteristics- sinking and sourcing- fan-in and fan-out – CMOS characteristics – CMOS NAND and NOR gates.

Decoders: BCD to decimal, BCD to 7 Segment decoders- Encoders- Multiplexer- Demultiplexer.

Module 3

Sequential Circuits: JK Flip-flops- SR JK, T and D flip-flops- buffers- Tri-state buffers- racing- JK master-slave FF. Truth table and excitation table- conversion of flip-flops from one type to another.

Asynchronous counters: Ripple counter- disadvantages-Decoding errors- maximum frequency of the counter – modulo N ripple counter using CLEAR and PRESET inputs. Asynchronous UP- DOWN counters.

Module 4

Synchronous Counters: Methods to improve counter speed- synchronous serial and parallel counters – synchronous counter design – modulo N counter design for completely specific count sequence – lockout, design without lockout – Synchronous UP/DOWN counters. Counter IC 7490.

Module 5

Shift Registers: SISO, PIPO, PISO, PIPO types – Universal shift registers.

Counters using Shift Registers: Ring counter – twisted ring counter- Design for self starting ring counter.

References

1. Digital Principles and Applications: Malvino & Leach, TMH
2. Digital Fundamentals: Thomas L. Floyd
3. Digital Integrated Electronics: Taub & Schilling, McGraw Hill Intl.
4. Digital Electronics and Microcomputers: R.K. Gaur, Dhanpat Rai & sons
5. Engineering Approach to Digital Design: Fletcher – EEE Edition

COMMUNICATION ENGINEERING

E 503 **2+1+0**

Module 1

Modulation: Need for modulation, Amplitude modulation–Definition-Mathematical representation - Frequency spectrum - Power relations. Principle of single side band transmission – Advantages - Disadvantages. Frequency modulation – Definition – Mathematical representation - Frequency spectrum, Comparison between FM and AM.

Module 2

Transmitter: AM transmitter – high level and low-level systems - functional description of each block. FM transmitter – FET & BJT modulator.

Receiver: AM receiver – TRF receiver – Limitations. Superhetrodyne receiver – block schematic, choice of IF, image signal rejection.

Module 3

Television: Composite video signal – synchronizing pulse – blanking pulse-equalizing pulse, Video BW, Positive and negative modulation, Vestigial side band transmission, Television standards, Block schematic of monochrome TV transmitter and receiver.

Colour Television: Compatibility, characteristics of colour transmission and reception, luminance, hue & saturation, colour difference signal, I & Q signals, frequency interleaving, colour sub carrier.

Module 4

Radar: Basic radar system, radar range equation – performance factors, Pulsed radar, Continuous wave radar – advantages-limitations-applications, CW radar, MTI radar system. Radio navigational aids – ILS – GCA.

Module 5

SATELLITE COMMUNICATION: Geo-synchronous satellites – advantages and disadvantages, uplink & downlink, multiple access techniques – Basic principles of FDMA, TDMA, DA-FDMA, DA-TDMA.

References

1. Electronic Communication Systems: George Kennedy, TMH
2. Electronic Communication Systems: Wayne Tomasi, Pearson Education, LPE
3. Monochrome and Colour Television: R.R Gulati, Wiley Eastern
4. Introduction to Radar Systems: Skoluik, McGraw Hill Intl.
5. Satellite Communications: D.C Agarwal, Khanna
6. Radio Engineering: Mithal, Khanna

INDUSTRIAL MANAGEMENT AND ENGINEERING ECONOMICS

E 504 **3+2+0**

PART A: INDUSTRIAL MANAGEMENT

Module 1

Modern Concepts of Management: Scientific management – functions of management – planning – organizing – staffing – directing – motivating – communicating – coordinating – controlling – Organisational structures – line, line and staff, and functional relationships – Span of control – delegation – Management by objectives.

Module 2

Personnel Management: Objectives and functions of personnel management – recruitment – selection and training of workers – labour welfare – industrial fatigue – Industrial disputes – Trade unions – Quality circles.

Formation of Companies: Proprietary – Partnership – joint stock companies – public sector – joint sector and cooperative sector.

Module 3

Marketing Management: Pricing – Promotion – Channels of distribution – Market research – Advertising.

Production Management: Batch and mass production – inventory control – EOQ – Project planning by PERT /CPM – Construction of network (Basic Ideas only)

References

1. Industrial Management: O.P. Khanna
2. Industrial Management: K.K Ahuja
3. Marketing Management: Philip Kotler

PART B: ENGINEERING ECONOMICS

Module 4

Theory of demand and supply – price mechanisms – factors of production – land, labour, capital and organisation – National income – Difficulties in estimation – Taxation – Direct and indirect taxes – Progressive and regressive – black money – inflation – Causes and consequences.

Module 5

Indian Financial System – Reserve bank of India – Functions – Commercial banking system –Development financial institutions – IDBI –ICICI – SIDBI – IRBI- NABARD – Investment institutions – UTI – Insurance companies – Indian capital market – Stock market – Functions – Role of the public sector – Privatisation – Multinational corporations and their impact on the Indian economy.

References

1. Indian Economy: A.N Agarwal
2. Modern Economic Theory: K.K. Dewett
3. Principles of Economics: K.P.M. Sundharam & M.C Vaish.

LINEAR INTEGRATED CIRCUITS

E 505 **2+1+0**

Module 1

Operational Amplifiers: Differential amplifier – block diagram of a typical op amp – characteristics of an ideal op-amp – definitions of CMRR – slew rate – input offset voltage – differential input resistance – input voltage range – SVRR – large signal voltage gain – output voltage swing – output resistance – open-loop configurations – disadvantages – closed-loop configurations – non inverting amplifier – voltage follower – inverting amplifier – summing and scaling amplifier – integrator – differentiator – logarithmic amplifier.

Module 2

Basic Comparator: Astable and mono stable multivibrators - Schmitt trigger – zero crossing detector – precision rectifier – peak detector – sample and hold circuit – function generator (no analysis).

Module 3

Active filters: First order low pass filter, high pass filter, band pass filter, band reject filter (twin T notch filter). D/A converter – binary weighted resistor type – ladder type – A/D converter – simultaneous A/D converter – counter type – successive approximation converter – dual-slope converter – Digital voltmeter.

Module 4

Phase-locked-loop: Basic principles of PLL – block diagram – transfer characteristics – applications of PLL as FM demodulator, AM demodulator and frequency multiplier.

Module 5

Timer: The 555 timer – functional block diagram – astable and mono-stable operation of 555 timers.

Regulated Power Supplies: Zener voltage regulator – series voltage regulator using transistors (analysis not required) – Series op-amp regulator – IC voltage regulator – 723/317 general purpose switching regulator.

References

1. Op-amp and Linear Integrated Circuits: Ramakant Gayakwad, Pearson Education Asia, 4/e, LPE
2. Integrated Electronics: Millman and Halkias
3. Integrated Circuits: Botkar K.R
4. Linear IC: Roy Choudhary
5. Op-amp and Linear IC: Robert F. Coughlin
6. Electronic Devices and Circuit Theory: Robert L. Boylestad and Louis Nashelsky

POWER ELECTRONICS

E 506 **2+1+ 0**

Module 1

Power Semiconductor Devices: Power diodes, Power Transistors, Power MOSFET, IGBTs, Diac, Triac, GTOs – static characteristics and principle of operation.

SCRs: Static and dynamic characteristics – two transistor analogy – gate characteristics

Module 2

SCR ratings and specifications - Device protection – heat sink selection – series and parallel operation of SCRs.

SCR Triggering circuits – R, RC, UJT triggering circuits – diac triggering circuit – single pulse, continuous pulse carrier frequency triggering – pulse transformer – amplification and isolation of SCR gate pulses.

Module 3

Phase control: single phase half wave controlled rectifier circuit – single phase full wave controlled rectifier circuit – R, RL Loads – free wheeling – half controlled and fully controlled bridge with continuous and steady current – Expression for output voltage – wave forms – active and reactive power – effect of source inductance – line commutated inverter – 3-phase half wave and full wave controlled rectifier – expression for output voltage.

Module 4

Commutation of SCRs – classification of commutation schemes

Inverters: series and parallel inverters – single phase and three phase bridge inverters (schematic diagrams and wave forms only) – Mc Murray Inverter – Basic Principle of PWM.

Module 5

Choppers: Basic principle – Classification – Type A, B, C, D and E. (Analysis not required)

Basic Principle of Cycloconverters.

Control Circuits: Generation of control pulses – block schematic of firing circuits – linear and cosine comparison – Digital firing scheme.

References

1. Power Electronics – Circuits, Devices and Applications, M.H. Rashid, PHI/Pearson Edn.
2. Power Electronic Systems – Theory and Design, Jai P. Agarwal, Pearson Education Asia, LPE
3. Power Electronics, P.S Bhimbhra, Khanna publ., New Delhi
4. A Text Book of Power Electronics, S.N Singh, Dhanpat Rai & Co, 2000
5. Power Electronics – Converters, Applications and Design, Mohan N, Undeland T.M and Robbins W.P, John Wiley -1989
6. Power Electronics, Harish C. Rai, Galgotia Publ.

ELECTRICAL MACHINES LAB - I

E 507 **0+0+4**

D.C. Machines

1. Study of 3-point and 4-point starters for D.C machines – mode of connection – protective arrangements
2. OCC of self and separately excited D.C machines – critical resistances of various speeds. Voltage built-up with a given field circuit resistance. Critical speed for a given field circuit resistance
3. Load test on shunt and compound generator – deduce external, internal and armature reaction characteristics. Find load critical resistance.
4. Characteristics of D.C series machine as motor and generator.
5. Swineburne's and retardation test on D.C machines.
6. Brake test on D.C shunt, compound motors and determination o characteristics.
7. Hopkinson's test on a pair of D.C machines.
8. Separation of losses in a D.C machine.
9. Field's test on D.C machine.

Transformers

10. Polarity, transformation ratio, tests of single phase units and star-delta combination for 3-phase operation.
11. O.C and S.C tests on single phase transformers – calculation of performance using equivalent circuit – efficiency, regulation at unity, lagging and leading power factors. Verification by direct loading.
12. Sumpner's test on single phase transformers.
13. O.C and S.C tests on three-phase transformers.
14. Scott connection – check for 2 phase – predetermination of primary current for balanced and unbalanced secondary currents – verification by actual loading.
15. Parallel operation and load sharing of two single phase dissimilar transformers.
16. Separation of losses of single phase transformer into Hysterisis and eddy current losses.
17. Paralleling of Three-phase transformers and load sharing.
18. Auto transformer – equivalent circuit.

ELECTRONIC CIRCUITS LAB

E 508 **0+0+4**

1. Design and testing of clipping, clamping, RC integrator and differentiator circuits – Display of Transfer characteristics on CRO.
2. Design and testing of rectifier circuits – Half wave – Full wave (centre – tapped and bridge) circuits. Filter circuits.
3. Zener regulator design and testing.
4. BJT, FET and UJT characteristics.
5. Design and testing of CE amplifier – frequency response.
6. Design and testing of RC coupled and feedback amplifiers.
7. FET amplifier.

8. Sweep circuits – UJT and BJT based sweep generators – sweep circuit using constant current source (BJT).
9. Design and Testing of RC phase-shift Oscillator and LC Oscillator.
10. Design and Testing of Astable and Bi-stable Multi-vibrators.
11. Relay driving circuit using transistors.
12. Study of IC power amplifiers.

Optional

Simulation of the above circuits using EDA tools like pSPICE.
(Any experiment relevant to E 403 may be added)

References

1. Electronic Principles: A.P. Malvino – TMH
2. Electronic Devices: Floyd – Pearson Education, LPE
3. Electronic Devices and Circuit Theory: Robert L. Boylestad and Louis Nashelsky, Pearson Education Asia, LPE.

SIXTH SEMESTER

CONTROL SYSTEMS - I

E 601 **3+1+0**

Module 1

Introduction: Concept of a system – control system – open-loop system – levels of sophistication in a control system – mathematical model of physical systems – plant representation – transfer functions – block diagrams – signal flow graphs – effects of feedback on parameter variations, system dynamics and disturbance signals.

Module 2

Time response analysis: Type and order of a system – time domain analysis of systems – typical test input signals – response of first order systems to unit step, unit ramp, and unit impulse signals – step response of second order systems – performance characteristics of feed back control systems – time domain behaviour from pole-zero plot

Steady state errors and error constants – generalized error constants – improvement of performance by derivative control, integral control, PID control.

Module 3

Concepts of Stability: BIBO stability – asymptotic stability – Routh Hurwitz stability criterion – relative stability – root locus technique – construction of root loci – root contours – systems with transportation lag.

Module 4

Frequency response analysis: Correlation between time and frequency response – polar plots – bode plots – relative stability – phase margin and gain margin – minimum and non-minimum phase systems.

Module 5

Stability in Frequency domain: Nyquist stability criterion – relative stability.

Control System Components: synchros – resolvers – rotating amplifiers – magnetic amplifier – Amplidyne – Tachogenerators – DC and AC servo motors – Gyroscopes – stepper motor.

References

1. Modern Control Engineering: Katsuhiko Ogatta, Pearson Education Asia
2. Analog and Digital Control System Design: Chi Tsong Chen, Oxford University Press
3. Modern Control Systems: Dorf and Bishop, Addison Wesley, LPE, 9th Ed.
4. Control System Design & Principles: M. Gopal, TMH

ELECTRICAL MACHINES - II

E 602 **3+1+0**

Module 1

Synchronous Machines: Types – selection of alternators – constructional features of cylindrical and salient pole machines.

Armature windings: different types – phase grouping – single and double layer, integral and fractional slot winding – emf equation – distribution factor – coil span factor – tooth harmonic ripples – skewed slots – harmonics, elimination of harmonics – revolving magnetic field.

Module 2

Armature Reaction – Synchronous reactance – circuit model of synchronous machine.

Regulation – predetermination – emf, mmf and potier methods, saturated synchronous reactance – Phasor diagrams – short circuit ratio – two-reaction theory – Phasor diagram – slip test – measurement of X_d, X_q, losses and efficiency of synchronous machines.

Module 3

Parallel operation of alternators – load sharing – synchronising power and torque – governor characteristics – method of synchronising – synchroscope.

Synchronous Motor: Principles of operation – torque and power relationships – Phasor diagram – hunting in synchronous machines – damper winding – starting of synchronous motors.

Module 4

Synchronous machines connected to infinite bus – power angle characteristics of cylindrical rotor and salient pole machines – reluctance power – steady state stability limit – V-curves – inverted V-curves – O-curves – synchronous condenser – symmetrical short circuit of unloaded alternators – steady state, transient and sub-transient reactance – current variation during short circuit.

Module 5

Generalised Machine Theory: Dynamic representation of generalised machines – formation of emf equation – expression of power and torque – representation of DC machines – synchronous machine and Induction motor.

Excitation systems: different types – comparison – exciter ceiling voltage – excitation limits – exciter response – methods of increasing the response of an exciter.

Brushless Alternators: Principle of operation constructional features – excitation methods – voltage regulation.

References

1. The performance and Design of AC Machines: M.G. Say
2. Theory of Alternating Current Machinery: Alexander Langsdorf
3. A course in Electrical Engg. Vol.2: C.L Dawes
4. Power System Stability – Vol. 3: E.W Kimbark
5. Electrical Machines: P.S Bhimbra
6. Generalised Theory of Electrical machines: P. S Bhimbra
7. Theory and performance Electrical Machines: J.B Gupta

ELECTRICAL POWER TRANSMISSION

E 603 **3+1+0**

Module 1

Transmission Line Constants: Resistance – skin effect – proximity effect.
Inductance of single phase line – inductance of three phase line with symmetrical and unsymmetrical spacing – transposed line.
Capacitance of single phase line – capacitance of three phase line with symmetrical and unsymmetrical spacing – transposed lines – effect of earth on line capacitance – geometric mean distance – geometric mean radius

Module 2

Overhead Lines: Mechanical characteristics - Conductor – bundled conductors – line supports – spacing between conductors – sag and tension calculations – effect of ice and wind - sag at the time of erection – vibration and dampers
Line insulators: Different types – pin type – suspension type – strain type – potential distribution of a string of suspension insulator – string efficiency – equalization of potential – testing of insulators

Module 3

Performance of Transmission Lines: Classification of transmission lines – analysis of short lines- medium line by nominal pi and T methods – rigorous solution of long lines – A, B, C, D constants – Ferranti effect – losses in an open circuited line – power flow through transmission lines
Voltage Control: Different methods – static capacitor – tap changing transformer – booster transformer – phase modifier – power circle diagram – calculation

Module 4

Corona: Critical disruptive voltage – visual critical voltage – power loss – factors affecting – methods to reduce corona – radio interference effect
Substations: Types - general layout - neutral grounding – resistance earthing – reactance earthing – arc suppression coil earthing – grounding transformer - Power system earthing - measurement of earthing resistance

Module 5

Extra High Voltage Transmission: Need for EHV transmission – limitations of EHV AC transmission – requirements of EHV lines - reactive compensation in EHV systems – EHV systems in India.
HVDC Transmission - Advantages and disadvantages – Graetz circuit – inversion – kinds of d.c. links – economic distance of DC transmission

References

1. Modern Power System Analysis: Nagrath and Kothari, TMH
2. Electrical Power Systems: C. L. Wadhwa, New Age Int'l
3. Electrical Power: Uppal
4. A Course in Electrical Power Systems: Soni, Gupta, Bhatnagar
5. HVDC Power Transmission System: K. R. Padiyar
6. Power System Analysis: Bergen, Pearson, 2/e

DIGITAL SIGNAL PROCESSING

E 604 **2+1+0**

Module 1

Introduction: Elements of a Digital Processing System - Advantages of Digital over Analog Signal Processing. Applications of DSP.

Discrete-Time Signals and Systems: Elementary Discrete-Time Signals-Classification of Discrete-Time Systems - LTIV systems- -Causality, Stability.

Frequency Domain representation of discrete-time signals: Fourier transform of a sequence - properties of Fourier Transforms.

Module 2

Discrete Fourier Transform: Properties of DFT-Linearity-shifting property, symmetry property, Convolution of a sequence. Fast Fourier Transform Decimation-in time radix- two FFT- decimation in frequency radix-two FFT.

Module 3

Review of z transforms: inverse z-transform - properties of z- transforms.

Realisation of digital filters: Direct and cascaded structures for FIR filters - direct and cascade and parallel structures for IIR filters.

Module 4

FIR filters: characteristics of practical frequency selective filters-characteristics of FIR filters with linear phase - design of linear phase FIR filters using windows-rectangular, Hamming, Hanning and Kaiser windows, FIR filter design using frequency sampling.

Module 5

IIR filters: Properties of IIR filters-design of IIR digital filters from analog filters-Butterworth design-Chebyshev design - impulses invariant transformation-Bilinear transformation.

DSP chips: TMS 320C family - features and block schematic of simplified architecture.

References

1. Digital Signal Processing – Alan V. Oppenheim and Ronald W. Schafer, Pearson Education Asia, LPE
2. Digital Signal Processing - John G. Proakis and Dimitris G. Manolakis
3. Digital Signal Processing: A Practical Approach – Emmanuel C. Ifeachor and Barrie W. Jervis, Pearson Education Asia, LPE
4. An Introduction to Digital Signal Processing: Johny R. Johnson

MICROPROCESSORS AND APPLICATIONS

E 605 **3+1+ 0**

Module 1

Evolution of Processors – single chip microcomputer – Intel 8085 Microprocessor – signals – architecture of 8085 – ALU – register organisation – timing and control unit – microprocessor operations – instruction cycle – fetch, decode and execute operation – T-state, machine cycle and instruction cycle – timing diagram of opcode fetch, memory read, I/O read, memory write and I/O write cycles – wait state.

Module 2

Instruction set of 8085: Classification of instructions – different addressing modes – writing assembly language programs – typical examples like 8 bit and 16 bit arithmetic operations, finding the sum of a data array, finding the largest and smallest number in a data array, arranging a data array in ascending and descending order, finding square from look-up table. Counters and time delays – delay using one register, two registers and register pair.

Module 3

Stack and Subroutines: Stack pointer – stack operations – call-return sequence – examples

Interrupts of 8085: restart instructions – interrupt structure of 8085 – vectored locations – SIM and RIM instructions – software and hardware polling.

Module 4

Memory interfacing - ROM and RAM – interfacing I/O devices – address space partitioning – memory mapped I/O and I/O mapped I/O schemes – interfacing I/Os using decoders – the 8212 I/O device – interfacing LED and matrix keyboard – programmable peripheral devices – 8155 and 8255, block diagram, programming simple input and output ports.

Module 5

Different data transfer schemes: synchronous and asynchronous data transfer – programmed and interrupt driven data transfer.

Applications of microprocessor in system design: interfacing ADC 0808 – interfacing DAC 0800. DMA controller 8257-Interfacing of stepper motor – interfacing of 8279 keyboard /display controller- 8275 CRT controller.

Architecture and operation of 8086.

References

1. Microprocessor Architecture, Programming and Applications: R.S. Gaonkar, Penram Intl'
2. Fundamentals of Microprocessors and Microcomputers: B. Ram, Dhanpat Rai and Sons
3. 0000 to 8085: Introduction to Microprocessors and Engineers: P.K Ghosh, PHI
4. Microprocessors and Digital Systems: Douglas V. Hall, McGraw Hill
5. Introduction to Microprocessors: A.P Mathur, TMH
6. Digital Electronics and Microprocessors: Malvino, TMH

COMPUTER ORGANISATION

E 606 **2+1+ 0**

Module 1

Introduction: Functional block diagram of digital computer – processor organization – typical operation cycle: fetch, decode and execute – microprogrammed Vs hardwired control (basic concepts only) – bus structures.

Module 2

Arithmetic and Logic unit: Adders- serial and parallel adders- fast adders- carry look ahead adder- 2's complement adder/subtractor- multiplication and division operations (description using block schematic diagrams only)-design of Logic unit-one stage ALU.

Module 3

Memory System: memory parameters – main memory – cache memory – auxiliary memory – semiconductor RAM – Static RAM –Dynamic RAM – ROM – PROM – EPROM – E^2PROM – Flash Memory.

Programmable Logic Devices: PAL, PLA, FPLA. Applications.

Module 4

Memory Organisation: Internal Organisation of memory chips – cache memory – mapping functions – direct mapping – associative mapping – set associative mapping – memory interleaving – Hit and miss – virtual memory – organization – Address translation.

Module 5

Input/Output Organisation: access to I/O Devices – Interrupts – Enabling and Disabling of Interrupts – Handling multiple devices –Buses – Synchronous and Asynchronous buses.

Data Communication interfaces and standards: parallel and serial ports – RS232, RS423 serial bus standards –GPIB IEEE488 Instrumentation bus standard- PCI, SCSI, USB (basic ideas only).

References

1. Computer Organisation: V. Hamacher – Mc Graw Hill
2. Logic and Computer Design Fundamentals: M. Morris Mano
3. 2/e Pearson Computer Organisation and Design: P. Pal Chaudhari – PHI
4. Digital Computer Fundamentals: Thomas Bastee

DIGITAL LAB

E 607 **0+0+4**

1. Study of TTL gates
2. Characteristics of TTL gates
3. Realisation of sequential circuits
4. Study of SR. JK, D, T and JK Master-Slave Flip Flops
5. Study of seven segment display

6. Testing of different shift registers
7. Design and Testing of decoders and encoders
8. Design and testing of astable and mono-stable multivibrator using 555
9. Design and testing asynchronous and synchronous counters and modulo N counter
10. Design and testing of counters using shift registers
11. Realisation of ADC and DAC
12. Testing of arithmetic circuits using op-amps
13. Design and testing of square wave generation using op-amps
14. Study of IC Regulator Power supplies

SYSTEMS LAB

E 608 **0+0+4**

1. 8085 assembly language programming experiments
    a. 8-bit and 16 bit arithmetic operations
    b. Arranging a data array in descending and ascending order
    c. BCD to binary and binary to BCD conversion
    d. Finding square root of a number
    e. Finding out square root of a number using look-up table
    f. Setting up time delay and square wave generation
    g. Interfacing of LEDs, 7 segment displays
    h. Traffic control signals
    i. Interfacing of stepper motor
    j. Interfacing of ADC
    k. Interfacing of DAC
    l. Generation of firing pulses for SCR.
    m. Interfacing of Power devices
    n. Interfacing LCD displays
2. VCO circuits using IC 566, 4046B etc.
3. PLL systems using IC 565, 4046B etc.
4. Multiplexed Displays

SEVENTH SEMESTER

ELECTRICAL MACHINES - III

E 701 **3+1+ 0**

Module 1

Three phase Induction Motor: Construction – squirrel cage and slip-ring motor – principle of operation – slip and frequency of rotor current – mechanical power and developed torque – Phasor diagram – torque slip curve – pull out torque – losses and efficiency.

No load and locked rotor tests – equivalent circuit – performance calculation from equivalent circuit – circle diagram – operating characteristics from circle diagram – cogging and crawling and methods of elimination

Module 2

Starting of three phase squirrel cage induction motor – direct online starting – auto transformer – star-delta starting – starting of slip-ring motor – design of rotor rheostat – variation of starting torque with rotor resistance.

Speed control – pole changing – rotor resistance control – frequency control – static frequency conversion – Applications of Induction machines – single phasing – analysis using symmetrical components.

Module 3

Induction Generator: Theory – Phasor diagram – equivalent circuit - **Synchronous Induction motor**: – construction – rotor winding connections – circle diagram – pulling into step.

Single phase Induction motor: revolving field theory – equivalent circuit – torque slip curve – starting methods – split phase, capacitor start-capacitor run and shaded pole motors.

Module 4

Single phase Series Motor: Theory – Phasor diagram – circle diagram – compensation and interpole winding – Universal motor

Repulsion Motor: torque production – Phasor diagram – compensated type of motors – repulsion start and repulsion run induction motor – applications

Reluctance motor – Hysterisis motor

Module 5

Deep bar and double cage induction motor – equivalent circuit – torque slip curve – Commutator motors – principle and theory – emf induced in a commutator winding - - Poly-phase commutator motors – three phase series and shunt type – Schrage motor – characteristics – applications – use of commutator machines as frequency converters, phase advancers – expedor type and susceptor type – Walker and Scherbius advancers – Linear Induction motor – operation and application

References

1. Performance and Design of AC machines – M.G Say
2. Theory of Alternating Current machines - Alexander Lagnsdorf
3. A.C Commutator motor – Openshaw Taylor
4. Alternating Current machines – Puchstein & Lloyd

ELECTRICAL DRIVES AND CONTROL

E 702 **2+1+0**

Module 1

DC motors: Methods of Speed control – single phase rectifiers with motor load- single phase fully controlled bridge rectifier drives – half controlled bridge rectifier drives – freewheeling with regeneration – speed torque characteristics – power in load and source circuits

Module 2

3 Phase fully controlled bridge rectifier drives – free wheeling, freewheeling with regeneration – Dual converter fed DC motor drives – chopper fed drives – single, two and four quadrant chopper drives

Module 3

(Qualitative treatment only)

Speed control of 3 Phase induction motors – stator voltage control – principle – controller configurations – operation and applications

Slip power recovery scheme – principle – static Kramer's drive – static Scherbius' drive – applications

V/f control – constant torque and constant power control

Module 4

(Qualitative treatment only)

Voltage Source Inverter – Application to induction motor drives – v/f, e/f, flux weakening schemes of control – applications

PWM inverter drive

Current Source Inverter – application to induction motor drives – operation under fixed frequency – operation under variable frequency – applications

Module 5

(Qualitative treatment only)

Speed control of synchronous motors – adjustable frequency operation of synchronous motors – principles of synchronous motor control – Voltage Source Inverter Drive with open loop control – self controlled synchronous motor with electronic commutation – self controlled synchronous motor drive using load commutated thyristor inverter.

Principle of Vector control

References

1. Power Electronic Control of AC motors – J.M.D Murphy and F.G Turnbill, Pergumon Press 1988
2. Power Semiconductor controlled Drives – G.K Dubey, Prentice hall, 1989
3. Modern Power Electronics and AC Drives – Bose B.K, Pearson Education Asia -2002
4. Electric Drives – N.K De and P.K Sen, PHI New Delhi 2001
5. Power Electronics – M.D Singh and K.B Khanchandani, TMH, 1998
6. Mohammad A and E.L Sharkaw – Fundamentals of Electric Drives – Thomson Learning
7. Power Semiconductor Drives – Vedam Subramaniam, TMH

UTILISATION OF ELECTRICAL POWER

E 703 **2+1+0**

Module 1

Electric Drives: Advantages of Electric drives – factors affecting choice of motors – mechanical characteristic of DC and AC motors – motors for particular applications ..ike textile mill, steel mill, paper mill, mine, hoists, cranes – size and rating of motors.

Electrical Braking – plugging – dynamic and regenerative braking – energy returned to the mains

Module 2

Electric Traction: Advantages and disadvantage - speed time curves – analysis using trapezoidal speed time curve - mechanics of train movement – tractive effort – specific energy consumption – factors affecting specific energy consumption - train resistance – adhesive weight – coefficient of adhesion - traction motor & characteristics

Series-parallel control of D.C. series motor – shunt and bridge transition - energy saving by series parallel control.

Module 3

Electric Heating and Welding: Electric heating – resistance types – design of heating element – induction heating – types of high frequency heating – dielectric heating – methods of high frequency generation – direct and indirect arc furnaces – power supply and control for different types of arc furnaces – application.

Electric welding – resistance welding – arc welding – electronic welding control

Module 4

Illumination: Review of definitions and laws of illumination – requirements of good lighting -polar curves – Rousseau's construction - lighting calculation – design of interior and exterior lighting system - factory lighting – flood lighting – street lighting.

Refrigeration and Air Conditioning: Types of refrigeration and air conditioning systems – refrigerants – no frost refrigeration – trouble shooting – working of electrical systems – protection of motors.

Module 5

Energy Management: Necessity for Energy Management – Energy Saving – adopting non-conventional sources – Energy Management techniques (case study) applied to 1) Residential Buildings, 2) Industries/Organisations – Energy auditing

References

1. Utilisation of Electrical Energy: Openshaw Taylor
2. A Course in Electrical Power: Soni Gupta
3. Generation, Distribution & Utilization: C.L Wadhwa
4. Utilisation of Electric Power: N.V Suryanarayana, New Age Int'l.
5. Energy Conservation Handbook: Utility publication

CONTROL SYSTEMS - II

E 704 **3+1+0**

Module 1

Compensation and design of Control Systems: cascade compensation – lag, lead and lag-lead compensators – frequency domain methods – Bode plot method – Root-locus methods

Module 2

Digital Control Systems: the process of sampling – sample and hold circuits – Review of z transforms and its properties – solving difference equation by z transform methods – inverse z transform – the pulse transfer function – response between sampling instants – system characteristic equation – Jury's stability test.

Module 3

Non-Linear Control Systems: Common physical non linearities – the phase plane method – basic concepts – describing functions of saturation, dead zone non linearities – stability analysis using describing functions.

Module 4

State Variable Approach: state space representation – block diagram representation of linear system in state variable form – non uniqueness of the set of state variables – Eigen values of an n X n matrix – eigen vectors – transfer function – solution of homogeneous state equation – state transition matrix.

Module 5

State equations from transfer function – decomposition of transfer function – controllability and observability - pole placement compensation – state variable approach to discrete data system – vector matrix difference equation – solution of the general linear time invariant systems – vector matrix difference equation

References

1. Modern Control Engineering – Katsuhiko Ogatta, Pearson Education Asia/PHI
2. Modern Control Systems –Dorf and Bishop, Pearson Education Asia
3. Analog and digital Control System Design – Chi Tsong Chen, Oxford University Press
4. Discrete Time Control of Dynamic Systems – Katsuhiko Ogatta, Pearson Education Asia
5. Digital Control of Dynamic Systems – G.F Franklin, J. David Powell and Michael Workman, Pearson Education Asia

SYSTEM DESIGN WITH MICROCONTROLLERS

E 705 **2+1+0**

Module 1

Microcontrollers and Microprocessors - Comparison.

Intel 8051: Architecture–Block diagram-Oscillator and Clock-Internal Registers-Program Counter-PSW-Register Banks-Input and Output ports-Internal and External memory, Counters and Timers, Serial data I/O- Interrupts-SFRs.

Module 2

Programming of 8051: Instruction syntax-Types of instructions–Moving data-Arithmetic Instructions-Jump and Call Instructions-Logical Instructions-Single Bit Instructions.

Arithmetic programs. Timing subroutines –Software time delay- Software polled timer- Addressing Modes

Module 3

I/O Programming: Timer/Counter Programming-Interrupts Programming- Timer and external Interrupts- Serial Communication- Different character transmission techniques using time delay, polling and interrupt driven-Receiving serial data – polling for received data, interrupt driven data reception.

Module 4

Microcontroller system design: External memory and Memory Address Decoding for EPROM and RAM. Interfacing keyboard. 7 segment display and LCD display. Interfacing of ADC (0808) and DAC (808) to 8051.

Module 5

Designing a stand alone Microcontroller system: Typical system design examples (Block-Diagram level only) - Data acquisition system- Measurement of frequency - Temperature control

Introduction to PLCs: Basic configuration of PLCs

Text Books

1. The 8051 Microcontroller and Embedded Systems – Muhammad Ali Mazidi and Janice Gillispie Mazidi, Pearson Education Asia.
2. The 8051 Microcontroller – Architecture, Programming and Applications – Kenneth J. Ayala, Penram International Publishing (India), Second Ed.

Reference

1. Intel Data Book on MCS 51 family

Web Reference

1. www.intel.com

ELECTIVE - I

E 706 **3+1+0**

List of Electives

E 706.1 CMELR Optimisation Techniques (Common to all branches)
E 706.2 HVDC Engineering
E 706.3 Neural Networks
E 706.4 Object Oriented Programming
E 706.5 Biomedical Instrumentation

Note

New Electives may be added according to the needs of emerging fields of technology. The name of the elective and its syllabus should be submitted to the University before the course is offered.

OPTIMIZATION TECHNIQUES

CMELRTA 706-1

Module I

Classical optimization techniques: Single variable optimization - Multivariable optimization with no constraints - Hessian matrix - Multivariable saddle point - Optimization with equality constraints - Lagrange multiplier method.

Module 2

Constrained multivariable optimization: Multivariable optimization with inequality constraints - Kuhn-Tucker conditions - Convex programming problem - Quadratic programming.

Module 3

One-dimensional unconstrained minimization: Elimination methods - unrestricted search method - Fibonacci method -Interpolation methods - Quadratic interpolation and cubic interpolation methods.

Module 4

Unconstrained minimization: Gradient of a function - Steepest descent method - Newton's method -Powells method - Hooke and Jeeve's method.

Module 5

Integer - Linear programming problem: Gomory's cutting plane method - Gomory's method for all integer programming problems, mixed integer programming problems.

References

1. Optimization theory and application - S.S. Rao, New Age International P. Ltd.
2. Optimization Concepts and applications in Engineering - A. D. Belegundu, T.R. Chandrupatla, Pearson Education Asia.
3. Principles of Operations Research for Management - F. S. Budnick, D. McLeavey, R. Mojena, Richard D. Irwin, INC.
4. Operation Research an introduction - H. A Taha, Eastern Economy Edition.

HVDC ENGINEERING

E 706-2

Module 1

Introduction: Comparison of AC, DC transmission – Description of DC transmission systems – modern trends in thyristor valves – Pulse number of converters – choice of converter configuration – Review of Graetz circuit – Valve rating – Transformer rating – Simplified analysis of Graetz circuit without overlap only.

Module 2

HVDC System Control: principles of DC link control – converter control characteristics – system control hierarchy – firing angle control – individual phase control and equidistant phase control – comparison – advantages and disadvantages – current and extinction angle control – starting and stopping of DC link – power control

Module 3

Converter faults and protection: types of faults – commutation failure –arc through and misfire – protection against over currents – over voltages – surge arresters – protection against over voltages

Module 4

Harmonics and filters: Sources of harmonics in HVDC systems - Smoothing reactors – Corona and radio interference effects – harmonic distortion factor (derivation not required) – types of AC filters – DC filters (design not required)

Module 5

Multi-terminal DC systems: applications of MTDC systems – types – comparison.

Reactive power control: sources of reactive power – static VAR systems – TCR configuration (analysis not required) – Typical control system (block diagram only) for a TCR – operation of Thyristor switched capacitor

Text Book

1. HVDC Power Transmission Systems-Technology and System Interactions: K.R Padiyar, New Age Int'l.

Reference

1. Direct Current Transmission Vol 1: E.W Kimbark, Wiley

NEURAL NETWORKS

E 706-3

Module 1

Introduction: Principles -Artificial neuron - activation functions -Single layer and Multilayer networks - Training artificial neural networks - Perception - Representation - Linear Separability - Learning - Training algorithms.

Module2

Back propogation: Taining Algorithim - Application - Network Configurations - Network Paralysis - Local Minima - Temporal instability.

Module 3

Counter Propogation Networks: Kebenone layer - Training the cohenen layer - Pre initialising the weight vectors - statistical properties Training the Grosbery layer - Full counter propagation network - Application.

Module 4

Statistical Methods: Boltzmann's Training - Cauchy training - Artificial specific heat methods - applications to general non-linear optimization problems

Module 5

Hopfield nets: Recurrent networks - stability - Associative memory-applications - Thermo dynamic systems - Statistical Hopfield networks -Bidirectional associative memories - Continuous BAM - Adaptive resonance theory - Architeture classification - implimentation.

Text Book

1. Neural Computing & Practice - Philip D. Wasserman,

References

1. Adaptive pattern Recognition & Neural Networks - Pay Y.H.
2. An Introduction to neural computing - Chaoman & Hall
3. Artificial Neural Networks - Kishan Mehrota and Etal

OBJECT ORIENTED PROGRAMMING

E 706-4

Module 1

OOP concepts: Objects-classes-data abstraction-data encapsulation-inheritance-polymorphism-dynamic binding-comparison of OOP and Procedure oriented programming-object oriented languages.

OOP using C++: Classes and objects-class declaration-data members and member functions-private and public members-member function definition-inline functions-creating objects-accessing class members.

Module 2

Arrays of objects-objects as function arguments-pass by value-reference variables/aliases-pass by reference-function returning objects-static class members. **Constructors and destructors** -declaration, definition and use-default, parameterized and copy constructors-constructor overloading.

Module 3

Polymorphism: function overloading-declaration and definition-calling overloaded functions. Friend classes-friend functions-operator overloading-overloading unary - overloading binary operators- use of friend functions

Module 4

Inheritance: different forms of inheritance-base class-derived class-visibility modes-single inheritance-characteristics of derived class-abstract class
File handling in C++: file stream classes-file pointers-open (), close (), read (), write () functions-detecting end of file.

Module 5

Dynamic memory allocation: pointer variables-pointers to objects-new and delete operators-accessing member functions using object pointers-'this' pointer. **Run time polymorphism:** pointers to base class-pointers to derived class-virtual functions-dynamic binding.

References

1. Object Oriented Programming with C++ - Balagurusamy, McGraw Hill
2. Object Oriented Programming in Turbo C++ - Robert Lafore ,Galgotia Publications
3. C++Programming Language - Bjame Stroustrup, Addison Wesley
4. C++ primer -Stanely B.Lippman, PearsonEducation,Asia
5. Data Abstraction and OOP in C++ - Gordenkeith
6. Object Oriented Analysis & Design - Grady Booch, Addison Wesley

BIOMEDICAL INSTRUMENTATION

E706-5

Module 1

Physiology and generation of bio electric potential Cell Potentials stimulation and thresholds-Action potentials-propagation of action potentials-sodium pump-electro physiology of cardio pulmonary systems - Respiration and circulation - Cardio vascular system - Heart electro cardiogram - Measurement and analysis of EGG waveform-ECG recorder principles-block schematic of ECG recorder.

Module 2

Blood pressure-Characteristics of blood flow-Heart sounds Measurement of blood pressure-Direct and indirect methods-Pacemakers defibrillators- PH of blood- ESR and GSR- Temperature measurement of various parts.

Module 3

Respiratory system-measurement of respiration rate-Measurement of CO2 and O2 of exhaled air-Respiratory therapy equipment-inhalators, ventilators and respirators.

Module 4

Central Nervous systems-Anatomy of Nervous system-neuronal communication-Organisation of brain-Neuronal receptors-somatic nervous systems and spinal reflexes-EEG measurement and characteristic of sleep.

Module 5

Modern imaging systems – X ray machine – computer tomography – magnetic resonance imaging system – NMR components – ultrasonic imaging systems – Therapeutic equipments – dialysers – surgical diathermy machines – laser applications – physiotherapy and electro therapy equipments

References

1. Handbook of Biomedical instrumentation – R.S Khandpur
2. Medical and Clinical Engg. – Brtil Jacobson and John G
3. Biomedical Instrumentation and Measurements – Leslic Cromwell, F.J Weibel

ELECTRICAL DRAWING

E 707 **0+0+3**

PART A

DC Winding

1. Lap winding with equalizer rings.
2. Wave winding, dummy coils.

DC Machines

1. Dimensioned sketches of (a) front and end views of armature (b) commutator (c) brush holders (d) slot details.
2. Dimensioned sketches of yoke and pole assembly.
3. Dimensioned sketches of front and side views of an assembled medium size D.C machine.

Transformers

1. Sections of core type transformer limbs.
2. Dimensioned sketch (external view) of a distribution transformer with all accessories.
3. (a) Dimensioned sketch of sections of transformer limb.
   (b) Assembled sectional view of Power transformer.

PART B

AC Winding

Three – phase AC winding

1. Integral slot lap winding
2. Short chorded winding
3. Fractional slot winding
4. Mush winding

AC machines

Dimensioned sketches of parts and assembled views of

1. Salient pole alternator
2. Cylindrical rotor alternator
3. Dimensioned sketches of parts and assembled views of
4. Squirrel cage induction motor
5. Slip ring Induction motor

References

1. Electrical Engineering Drawing - S. K Bhattacharya
2. Electrical Engineering Drawing – K.L. Narang
3. Electrical Machine Design – A.K Sawhney

(University Examination Pattern: 3 questions from Part A, of which any two must be answered, and 3 questions from part B of which any two must be answered. All questions carry 25 marks each).

CONTROL AND POWER ELECTRONICS LAB

E 708 **0+0+4**

Part A: Control Systems Lab

1. Transfer Function of Separately excited DC generator
2. Transfer Function of Field-Controlled DC motor
3. Transfer Function of Armature-Controlled DC motor
4. Amplidyne characteristics and transfer function
5. Voltage regulation of DC generator using Amplidyne
6. Synchro characteristics, error detection and data transmission, differential Synchro
7. AC servo motor – speed transfer characteristics
8. Step and sinusoidal response of RLC circuits
9. Study of PID controller – design and experimental determination of frequency response of lag and lead networks
10. D.C servo motor position control system
11. Use of MATLAB for simulating transfer functions, closed-loop systems etc.

Part B: Power Electronics Lab

1. Study of V-I characteristic of SCRS triac.
2. Study of BJT, IGBT, GTO & MOSFET.
3. R, RC and UJT firing circuits for the control of SCRS.

4. Design and implementation of Ramp-Comparator and digital firing scheme for simple SCR circuits.
5. Automatic lighting control with SCRs and optoelectronic components.
6. AC phase control using SCR and Triac.
7. Speed control of DC motor using choppers and converters.
8. Generation and study the PWM control signal for Single phase dc to ac inverter.
9. Study and use of the single phase half controlled & fully controlled AC to DC Converter and effect of firing angle control on load voltage & wave Forms.
10. Study and use of back to back connected SCR/ triac Controlled AC Voltage controller and its wave forms with Variation of firing angle.
11. Study & use chopper circuit for the control of DC Voltage using (1) Pulse width control (2) Frequency Control.
12. Study of Single Phase inverter and its wave form.
13. Study of Three Phase firing circuit with synchronisation, and testing with three phase AC to DC bridge converter. Testing of wave forms of digital firing modules.
14. Study and Testing of a Three Phase bridge inverter with different types of loads.
15. Simulation of gating circuits and simple converter circuits.

PROJECT AND SEMINAR

E 709/E808

Each student is required to present a technical paper on a subject approved by the department. The paper should be in general reflecting the state-of-the-art. He/she shall submit a report of the paper presented to the department.

In addition to the seminar he/she shall undertake a project work (as a team or individually) in the 7th semester itself in consultation with the Guides. On completion of the project work, he/she shall present the work done before a panel of staff members, and submit a report of the project work, and submit a report of the project work done to the department.

EIGHTH SEMESTER

POWER SYSTEM ANALYSIS

E 801 **3+1+0**

Module 1

Power System Model: Representation – Single Line Diagram – per unit system – per unit impedance diagram – network model formulation – bus admittance matrix – formation of Y bus and Z bus using singular transformation – symmetrical components – sequence impedance and networks

Module 2

Power Flow Studies: Load flow problem – Gauss Siedal method – Newton Raphson method – algorithm for load flow solution – handling of voltage controlled buses, off nominal transformer ratios and phase shifting transformers

Module 3

Economic Load Dispatch: System constraints – Economic dispatch neglecting losses – optimal load dispatch including transmission losses – physical interpretation of co ordination equations – exact transmission loss formulae – modified co ordination equation – automatic load dispatching

Module 4

Symmetrical and unsymmetrical short circuit analysis: Different types of faults in power systems – symmetrical fault analysis – selection of circuit breakers – use of reactors

Unsymmetrical faults – analysis of single line to ground, line to line and double line to ground faults in power system – analysis of unsymmetrical fault using Z bus.

Module 5

Stability Analysis: Swing equation – power angle equation and power angle curve – inertia constant – steady state stability - transient stability – equal area criterion – application – numerical solution of swing equation – critical clearing time and angle – effect of clearing time on stability –methods of improving system stability – modified Euler's method – Rangakutta method – application to the solution of swing equation and computational algorithms

References

1. Power System Engineering: Nagrath and Kothari, TMH
2. Electrical Power Systems: C. L. Wadhwa, New Age Int'l
3. Power System Analysis: Bergen, Pearson Education Asia, LPE
4. Elements of Power System Analysis: William D. Stevenson
5. Power System Stability Vol. I: Kimbark E. W.

SWITCHGEAR AND PROTECTION

E 802 **3+1+0**

Module 1

Switchgear: Circuit breaker – basic principle of operation – arc phenomenon – initiation and maintenance of arc - arc interruption methods – arc voltage and current waveform in AC circuit breaking – re-striking and recovery voltage – current chopping – DC breakers – rating of circuit breakers - breaking capacity – making capacity – short time rating – working principle and important features of oil CB, minimum oil CB, air blast CB, vacuum CB and SF6 CB – auto high speed re-closing.

Module 2

Protective relaying: Main and back up protection – basic requirements of protective relaying – classification of relays – induction type – principle - inverse time characteristics – directional over-current and power relays – distance relays – definite distance and distance time relays – differential relays - negative phase sequence relay – static relays – basic static relay – block diagram of static over-current, static directional, static distance and static differential relays.

Module 3

Generator Protection: External and internal faults – differential protection – biased circulating current protection – self balance system – over-current and earth fault protection – protection against failure of excitation

Transformer protection: Differential protection – self-balance system of protection – over-current and earth fault protection – buchholz' s relay and its operation.

Module 4

Feeder protection: Protection of radial feeders – protection of parallel feeders – protection of ring mains – differential pilot protection for feeders – Merz Price voltage balance system – transley system

Transmission Line Protection: Definite distance and time distance protection – phase and earth fault protection – carrier current protection

Module 5

Surge Over-voltages: Causes – lightning and switching surges – protection against over-voltages – surge diverters thyrite and horn gap types – use of ground wires – insulation coordination.

Wave propagation:

Wave propagation on OH lines and UG cables – transmitted and reflected waves – surge impedance – velocity of propagation

References

1. Power System Protection and Switchgear: Ravindranath and Chander
2. Electrical Power Systems: C. L. Wadhwa, New Age Int'l
3. A Course in Electrical Power Systems: Sony, Gupta, Bhatnagar
4. Elements of Power System Analysis: William D. Stevenson
5. Traveling Waves on Transmission Systems: Bewsley L. V.
6. Power System Protection: M. A Date, B. Oza and N.C Nair,

INSTRUMENTATION

E 803 **2+1+0**

Module 1

Transducers: Classification – characteristics – static and dynamic characteristics – Instrumentation System – Functional description – input / output configuration – interfering and modifying inputs – Methods of correction – Loafing effect – Instrumentation amplifiers – Isolation amplifier – charge amplifier.

Module 2

Displacement Transducers: Resistance potentiometer – linearity and sensitivity – types – Resistance strain gauges – working principle – gauge factor – strain gauge circuitry – temperature effect and its compensation – load cells – LVDT – working principle – equivalent circuit – LVDT circuitry – Capacitive transducers – different types – piezoelectric transducers – working principle – piezoelectric crystal equivalent circuit.

Module 3

Temperature Measurement: Thermo electric effects – Laws – thermocouples – thermo electric circuits – Resistance Temperature Detector (RTD) – Bridge circuits – Thermistors – characteristics – pyrometer – radiation and optical pyrometers.

Module 4

Absolute acceleration – null type and servo type – strain gauge Accelerrometer – piezo electric accelerometer – Electromagnetic flow meter – ultrasonic flow meter – transit type and Doppler flow meter – Ultrasonic flaw detector – Optical transducers.

Module 5

PH measurement – Low Pressure measurement – McLaud gauge – Pirani gauge – ionisation gauge – thermal conductivity gauge – spatial encoder for angular measurement – wave analyser and spectrum analyser (block schematic) – scintillation counter – Hygrometer.

References

1. Measurement Systems – Application and Design: E.O Doeblin, TMH
2. Principles of Industrial Instruments: D. Patranabi, TMH
3. Industrial Instruments Fundamentals: E. Fribance, TMH
4. Electronic Instruments: H.S Kalsi
5. Instrumentation Devices and Systems: V. Rangan, G.R Sharma and V.S.V Mani

ELECTRICAL SYSTEM DESIGN

E 804 **3+1+0**

Module 1

Design of D.C Machines: Design specifications – output equation – output coefficient – specific loadings – choice of speed and number of poles – calculation of D and L – Armature design – choice of type of winding – number of sots – number of conductors per slot – current density – cross sectional area – slot insulation – length of air gap – field winding design – field ampere turns – excitation voltage per coil – conductor cross section – height of pole – design of ventilating ducts – design of commutator and brushes – Carter's coefficient – real and apparent flux density.

Module 2

Transformers: Design – single phase and three phase – output equation – specific magnetic loading – core design – single, stepped core - windings – number of turns – current density – area of cross section of conductors – types of coils – insulation – window area – window space factor – overall dimensions – cooling – design of cooling tank with tubes – design of distribution and power transformers – design of small transformers like 230V/6-0-6V.

Heating, cooling and temperature rise calculation – Continuous, short time and intermittent rating.

Module 3

Design of Synchronous Machines: Specific loading – output equation – output coefficient – main dimensions – types of winding – design of field system – turbo alternator – main dimensions – stator design – rotor design – damper winding design – comparison of water wheel and turbo alternators, cooling of turbo alternator.

Design of three phase Induction motors: output equation – output coefficient – main dimensions – rotor bar currents.

Module 4

Estimate the quantity of materials required and draw the electrical wiring layout of (a) residential building (b) Multi-storied building using rising mains (c) factory with one number of small and high rating motor at LT ot HT supply and many number of connected loads with suitable starters/switches and control panels (d) Cinema hall

Module 5

a. Design, layout and estimation of power supply arrangement for (1). A bulk Industrial consumer (2) An under ground power supply (3) An Over head line to a rural consumer.
b. Estimate and draw the layout of (1) indoor (2) outdoor 11KV transformer station with all accessories – single line diagram and physical layout
c. Design and draw the typical earthing installation like (1) pipe earthing (2) Plate earthing (3) earth mat / grid
d. Study the electrical wiring diagram of a typical automobile clearly showing all connected loads/ sources with specifications.

References

1. Electrical Machine Design: A.K Sawhney
2. Performance and Design of D.C Machine: Clayton
3. Performance and Design of A.C Machines: M.G Say
4. Design of Electrical Machines: V. N Mittal
5. Electrical Design Estimating and Costing: Raina & Bhattacharya

ELECTIVE - II

E 805 **3+1+0**

List of Electives:

E 805.01 CMELR Advanced Mathematics
E 805.02 Computer Aided Design of Induction Machines
E 805.03 Robotics
E 805.04 Advanced Power Systems
E 805.05 Advanced Microprocessors
E 805.06 System Software
E 805.07 Advanced Power Electronic Systems

Note

New Electives may be added according to the needs of emerging fields of technology. The name of the elective and its syllabus should be submitted to the University before the course is offered.

ADVANCED MATHEMATICS

CMELRT 805-1

Module 1

Green's Function

Heavisides, unit step function - Derivative of unit step function - Dirac delta function -properties of delta function - Derivatives of delta function - testing -functions - symbolic function - symbolic derivatives - inverse of differential operator - Green's function -initial value problems - boundary value problems - simple cases only.

Module 2

Integral Equations

Definition of Volterra and Fredholm Integral equations - conversion of a linear differential equation into an integral equation - conversion of boundary value problem into an integral equation using Green's function - solution of Fredhlom integral equation with separable Kernels - Integral equations of convolution type - Neumann series solution.

Module 3

Gamma, Beta functions

Gamma function, Beta function - Relation between them - their transformations - use of them in the evaluation certain integrals - Dirichlet's integral - Liouville's extension, of Dirichlet's theorem - Elliptic integral - Error function.

Module 4

Power Series solution of differential equation

The power series method - Legendre's Equation - Legendre's polynomial - Rodrigues formula - generating function - Bessel's equation - Bessel's function of the first kind - Orthogonality of Legendre's Polynomials and Bessel's functions.

Module 5

Numerical solution of partial differential equations.

Classification of second order equations- Finite difference approximations to partial derivatives - solution of Laplace and Poisson's equations by finite difference method - solution of one dimensional heat equation by Crank - Nicolson method - solution one dimensional wave equation.

References

1. Linear Integral Equation: Ram P.Kanwal, Academic Press, New York
2. A Course on Integral Equations: Allen C.Pipkin, Springer - Verlag
3. Advanced Engg. Mathematics: H.K.Dass, S.Chand
4. Advanced Engg. Mathematics: Michael D.Greenberge, Pearson Edn. Asia
5. Numrical methods in Engg. &Science: B.S.Grewal, Khanna Publishers
6. Generalized functions: R.F. Hoskins, John Wiley and Sons.
7. Principles and Techniques of Bernard Friedman: John Wiley and sons Applied Mathematics
8. Principles of Applied Mathematics: James P.Keener, Addison Wesley.
9. Numerical methods: P.Kandasamy, K.Thilagavathy, K.Gunavathy

COMPUTER AIDED DESIGN OF INDUCTION MACHINES

E 805-2

Module 1

CAD Orientation of Engineering design problems to computers. Design by analysis and synthesis approach – simulation of non-linearity – stator windings for 3 phase and single phase induction motors

Module 2

Main dimensions of three phase induction motors – standard specification – constructional features – specific electric and magnetic loading – output coefficient – main dimensions – computer programmes

Module 3

Core design – leakage reactances – rotor winding design – equivalent resistances – computer programmes

Module 4

Calculations from design data – Carters coefficient – no load current – equivalent circuit parameters – torque – efficiency and temperature rise – computer programmes

Module 5

Main dimensions of single phase induction motors – auxiliary winding and capacitor design – equivalent circuit parameters - torque – efficiency and temperature calculations using design data – computer programmes

References

1. Computer Aided Design of Electrical Equipments – Ramamoorthy M, Affiliated East-West press pvt. Ltd., New Delhi
2. Performance and Design of A.C Machines – M.G Say
3. Computer Aided Design of Electric Machinery – Venott C. G, MIT Press, London

ROBOTICS

E 805-3

Module 1

Introduction: Historical development-classification of robots-applications-robots kinematics- joints and links-degree of freedom-description of position, orientation, frames-mapping from one frame to another-compound transformations-inverse of transform matrix-transform equations-kinematics of three degree of freedom manipulators-Description of links-intermediate links in chain-First and last links in chain -Link parameters-affixing frames to links-derivation of link transformation matrix-Description of an industrial robot.

Module 2

Inverse manipulator kinematics - Workspace-solvability-multiple solutions-Algebraic solution.

Drive and control systems for robots: hydraulic systems and DC servomotors

Position control for robots-simple position control system-position control along a trajectory

Module 3

Robot end- effectors: Classification of end-effectors-drive System for grippers-mechanical grippers magnetic grippers-vacuum grippers-gripper force analysis and gripper design.

Module 4

Sensors and intelligent robots: need for sensing systems- sensing devices-piezoelectric sensors-linear position and displacement sensing absolute optical encoding-incremental optical encoder-position and direction measurement-velocity measurement—force and torque sensors-proximity sensors-range sensors-robot vision systems

Module 5

Trajectory planning for Robots: Joint space schemes-cubic polynomials with via points-Blending schemes - interfacing to microprocessors and computers.

References

1. Robotics and Image Processing - PA Janakiraman
2. Robotic Technology and flexible Automation - S R Deb
3. Robotics for engineers - Yoram Koren
4. Introduction to Robotics- Analysis, Systems and Applications: Saeed B. Nikku, Pearson Education Asia, LPE

ADVANCED POWER SYSTEMS

E 805-4

Module 1

Automatic generation and voltage control - load frequency Control (single area case) -turbine speed governing system - model of Speed system - Turbine model-generator load model - steady state analysis- dynamic response - control area concept.

Module 2

Unit commitment - constraints in unit commitment-spinning spinning reserve - thermal unit constraints - other constraints - unit commitment solution methods - priority - list methods - dynamic programming solution.

Module 3

Hydrothermal co-ordination - long range and short range hydro scheduling- hydro electric plant models - scheduling problems - the short term hydrothermal scheduling problem - short - term hydro— scheduling: a gradient approach - hydro units in series-dynamic programming solution to the hydrothermal scheduling problem.

Module 4

Interchange evaluation and power pools - economy interchange economy interchange evaluation - interchange evaluation with unit commitment multiple interchange controls -after - the fact production costing - other types of interchange - power pools - the energy broker system - centralized economic despatch of a power pool - allocating pool savings.

Module 5

Power system security - factors affecting power system security-contingency analysis: Detection network problem - network sensitivity methods - calculation of network sensitivity factors - correcting the generation despatch - sensitivity methods - linear programming.

References

1. Power System Engineering - I.J.Nagrath, D.P.Kothari
2. Power generation, operation and control - Allen J.Wood, Bruce Wollenberg, John Wiley & Sons

ADVANCED MICROPROCESSORS

E 805-5

Module 1

Intel 8086 - Pin out signals and functions - Internal architecture - Registers and flags - bus buffering and latching bus timing – Pipelining
Operating modes - minimum mode and maximum mode.

Module 2

Introduction to 8086 assembly language programming - addressing modes – instruction set classification - Writing simple programs eg. Arithmetic operations, reading data from input port etc.
8086 memory interface – memory bank – separate bank decoders and signals

Module 3

8087 internal block diagram and interfacing (Programming not required).
Intel 80186 Architecture - block diagrams - different integrated peripherals
Intel 286 - Block diagram - Hardware features - Additional instructions (Programming not required)

Module 4

Intel 8038 - memory system - I/O system - Protected mode – mmu - Descriptors and selectors - TSS, Memory paging mechanism.
Intel 80486 - Internal Architecture - memory management and cache memory.

Module 5

Introduction to Pentium - processors – memory system – I/O system - special Pentium registers - Pentium memory management.
Pentium II - Introduction - software changes Pentium III - Introduction - chip set, Bus
Pentium *IV* - Memory interface, Hyper pipelined technology (elementary treatment only).
Concept of RISC – comparison of CISC and RISC

References

1. The 80x86 Family - John Uffenbeck - Pearson
2. Microprocessor and Interfacing - Douglas V. Hall - McGraw Hill
3. The Intel Microprocessors - Barry B. Brey (6^{th} edition) – Pearson LPE
4. Advanced Microprocessors and Peripherals – A.K Ray and M. Bruchandy – TMH
5. An Introduction to the Intel family of Microprocessors – James L. Antonokos, Pearson LPE

SYSTEM SOFTWARE

E 805-6

Module 1

Introduction: Concept of system software - Classification of system software- Relationship of system software with the machine and the user. Assemblers: overview of the assembly process- single pass and two pass assemblers. Elementary ideas of macros -Macro definition- macro call macro expansion - macro processors.

Module 2

Linkers and Loaders: translated, linked and load time addresses- relocation and linking concepts- object module- loader- absolute loader, relocating loader- linking loaders -(elementary ideas only).

Compilers: Overview of compilation process - phases of a compiler - analysis phase -synthesis phase - lexical analysis - parsing - static and dynamic storage allocation-intermediate code generation - code generation (basic ideas only).

Module 3

Operating systems: Definition of operating system -functions of operating system - types of services-Types of operating systems- batch processing multiprogramming, multitasking - timesharing, real-time, distributed systems (brief descriptions only).

Process management- process concept- process states- scheduling - FCFS, Shortest Job first, round robin scheduling policies.

Module 4

Memory management- contiguous memory allocation - static and dynamic partitioning -swapping - non-contiguous allocation- fragmentation- concept of virtual memory- paging-page tables - page replacement- FIFO and LRU page replacement policies - segmentation -caching of secondary storage information.

File system - directory structures - file system implementation - sharing and security. Device management - basic principles of I/O device controllers - I/O scheduling policies.

Module 5

Introduction to distributed operating system: characteristics of distributed systems -advantages -client server model - remote procedure call.

Real time operating systems - Basic requirements - hard and soft real time systems - issues in real time systems- basic ideas of real time scheduling - reentrancy- real time embedded systems (basic ideas only).

References

1. Introduction to System Software - Dhamdhere D.M., Tata McGraw Hill
2. Systems Programming - Donovan J.I, McGraw Hill
3. Systems Programming - Dhamdhere D.M., Tata McGraw Hill & Operating Systems
4. Principles of compiler design - Aho & Ullman, Narosa Publishing
5. Operating System- Milenkovic, McGraw Hill
6. Operating System concepts - Peterson & Silberschatz, Addison Wesley
7. Real time systems & programming languages- Burns, Wellings, Addison Wesley
8. Introduction to RTS - Martin
9. Real time embedded Systems - Mathai Joseph, CERN

ADVANCED POWER ELECTRONIC SYSTEMS

E 805-7

Module 1

DC-DC converter topologies: Buck and boost converters - continuous and discontinuous current modes - buck-boost, C'uk converter - operation – control of dc-dc converters –PWM method - Full-bridge with bipolar and unipolar switching – output voltage equations.

Module 2

SMPS topologies: Basic block schematic of SMPS – isolated dc-dc topologies – forward and flyback – principles – (circuit and operation only). Push-pull topology – half bridge

Basics of SMPS control methods – voltage-mode and current-mode control (block diagrams and description only).

Module 3

Resonant Converters: Advantages of resonant converters over PWM converters – Classification - series and parallel resonant converters – half-bridge operation – discontinuous and continuous current modes (basic modes only, no analysis required) Principles of Zero voltage and Zero current switching (ZVS and ZCS switches only – no analysis required)

Module 4

PWM Inverters: Need for PWM techniques – various PWM techniques – principle of sinusoidal PWM – bipolar and unipolar PWM - modulation index – application to single phase bridges - disadvantages of SPWM – brief introduction to other PWM methods – current-mode control schemes (tolerance band control and fixed frequency control – description with block diagram only)

Module 5

Applications: Power factor correction – Actual power factor – Displacement factor and distortion factor – principles of input line current shaping using boost rectifiers. UPS – Different topologies – block schematics.

Electronic ballast – block schematics.

References

1. Power Electronics: Converters, Applications and Design – Mohan, Undeland and Robbins, John Wiley and Sons, 2nd ed.
2. Power Electronic Systems: Theory and Design – Jai P. Agrawal , Pearson Education Asia, LPE
3. Modern Power Electronics – P.C Sen, Wheeler Publ.

ELECTIVE - III

E 806 **2+1+0**

List of Electives:

E 806.01 Digital Protection of Power Systems
E 806.02 Insulation Technology
E 806.03 Computer Networks
E 806.04 Artificial Intelligence and Expert Systems
E 806.05 Opto-Electronics and Communication
E 806.06 VLSI Technology

Note

New Electives may be added according to the needs of emerging fields of technology. The name of the elective and its syllabus should be submitted to the University before the course is offered.

DIGITAL PROTECTION OF POWER SYSTEMS

E 806-1

Module 1

Need for protection-nature and causes of fault -zones of protection-classification of protective relays based on technology and function-instrument transformers used in protection circuit.
A/D converters- analog multiplexers-sample and hold circuits.

Module 2

Computer applications to protective relaying - simulation of power system disturbances-simulation of current and voltage transformers-simulation of distance relays during transient conditions.

Module 3

Offline application of computers-on line application of computers –Relay co-ordination programmes.

Module 4

Microprocessor based protective relays - multistage frequency relay - measurement of power system signals through phase locked loop interface - protection of alternators against loss of excitation.

Module 5

Microprocessor based over current relays-impedance relays- directional relay-reactance relay - distance relay - measurement of R and X - mho relay - quadrilateral relay - generalized interface for distance relays.

References

1. Madhava Rao T.S, "Power System Protection-Static relays"
2. Bddri Ram, "Power System Protection and Switchgear"
3. Singh L.P, "Digital Protection-Protective Relaying from electromechanical to microprocessors"
4. Arun G. Phadke, James S. Thorp, "Computer Relaying for Power systems"

INSULATION TECHNOLOGY

E 806-2

Module 1

Insulating materials - classification, brief study of preparation and properties of ceramics, mica, paper, PVC, PE Epoxy resin, teflon, SF6 transformer oil, polychlorobiphenyls (PCB) vacuum purification of transformer oil- drying and degassing. Impregnation of paper and cotton insulation.

Module 2

Dielectric properties - permittivity, complex permittivity, dielectric loss factors influencing permittivity, permittivity of mixtures, factors influencing tan delta, Measurement of resistivities, dielectric loss and constant, testing for tracking partial discharge measurements.

Module 3

Polarisation - internal fields, Clausins - Mossotd relation limitations, different types of polarisaiton. Electric fields in homogeneous dielectrics, mechanical force under electric fields, absorption currents.

Insulation problems in high voltage transformers, surge phenomena, insulation design to withstand surges in transformers, Elementary de-sign of insulating system of capacitors.

Module 4

Breakdown phenomena in gases - ionization processes, de-ionization processes, breakdown mechanisms, T ownrend's theory. Steramer theory, Paschen's law, breakdown in electronegative gases, uniform fields, non-uniform fields penning effect.

Module 5

Breakdown mechanisms in vacuum-breakdown in liquid dielectrics pure liquids and commercial liquids, breakdown in solid dielectrics - different types - intrinsic, electronic, thermal, electromechanical, tracing and tracking, partial discharges, partial discharges.

References

1. High Voltage Engineering: Naidu and Kamaraju
2. Ionisation, Conductivity and Breakdown in Liquids: Adam Czawski
3. High Voltage Engineering: Kuffel and Zeamgl
4. SF6 and Vacuum Insulation for High Voltage Applications: Naidu and Maller

COMPUTER NETWORKS

E 806-3

Module 1

Introduction: Goals and applications of networks - Network Topologies - Broadcast - Point to point - bus, star, ring, tree - Types of networks - LAN, MAN, WAN OSI reference model - TCP/IP reference model - Client server computing Physical layer - Packet switching -Transmission media - Fibre optic networks – ISDN

Module 2

Data link layer: Services - Data framing - Error handling - Data link protocols – Elementary protocols - Sliding window protocol(basic concepts only) - data link layer in the Internet- SL1P/PPP.

Module 3

Medium access sub layer: Channel allocation - static vs dynamic channel allocation - CSMA protocol - collision detection - wireless LANs - IEEE 802 standards - Ethernet - Token bus -Token ring - Bridges – FDDI

Module 4

Network layer: services - Routing - congestion control - internetworking - Principles - Gateways - Host - backbone network - Network layer in the Internet - IP protocol - IP address - Internet control protocols. Transport layer: Services - Internet Transport protocols - TCP and UDP.

Module 5

Application layer: services - Network security - Cryptography - DNS - DNS Namespace -Name servers - Network Management concepts. Internet services: E-mail - USENET - FTP -TELNET - gopher - WWW - WAIS – Archie

References

1. Computer Networks (3r edition) - Tanenbaum, Pearson Education Asia
2. Data and computer communications - William Stalling, Pearson Education Asia
3. Data Communication, Computer networks - F. Halsall, Addison Wesley and open systems
4. Computer Networks, A system approach - Peterson & Davie, Harcourt Asia
5. The Internet Book- Douglas E. Comer, Pearson Education Asia
6. Internet Complete Reference - Harley Harn Osborne

ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS

E 806-4

Module 1

Introduction to AI and problem solving concepts: Definition- pattern recognition-production systems - problem and production system characteristics - two-pail problem-analysis of AI techniques - criteria for success

Module 2

Knowledge representation - formal and non-formal logic: Representation evaluation criteria -level of representation -formal logic schemes -resolutions - predicate and prepositional logic -conversion to clause form -semantic networks-frames-scripts-production system

Module 3

Problem solving strategies dealing with uncertainty: Defining the problem - control strategies - exhaustive search - generate and test-space transformation models- forward versus backward reasoning -matching - weak methods - hill climbing -breadth and depth first searches - search algorithms.

Module 4

Expert system development process and knowledge acquisition: Definition - analysis of expert system problem solving - role and analysis of knowledge - architecture of the expert system - problem selection - formalization - implementation –evaluation.

Module 5

Knowledge acquisition techniques- cognitive behavior - knowledge representation development.

Expert system tools: Expert system shells -narrow tools -large hybrid expert system tools -PC based expert system tools knowledge acquisition tools.

References

1. Introduction to AI & Expert System - D. W. Patterson, Prentice hall of India
2. Principles of Artificial Intelligence& Expert Systems Development - David W.Rolston, Tata McGraw Hill
3. Artificial Intelligence - Elaine Rich, McGraw Hill
4. Principles of Artificial Intelligence - Nils J. Nilsson, Springer Verlag
5. Introduction to Artificial Intelligence - Charnaik & McDermott, Addison Wesley

OPTOELECTRONICS AND COMMUNICATION

E 806-5

Module 1

Review of P-N jn-characteristics - semiconductor-hetero junction-LEDs (-spontaneous emission-LED structure-surface emitting-Edge emitting-Injection efficiency-recombination efficiency-LED characteristics-spectral response-modulation-Band width.

Module 2

Laser diodes-Basic principle-condition for gain-Laser action-population inversion-stimulated emission-Injection faster diode-structure-temperature effects-modulation-comparison between LED and ILDs.

Module 3

Optical detectors-optical detector principle-absorption coefficient-detector characteristics-Quantum efficiency-responsivity- response time-bias voltage-Noise in detectors P-N junction-photo diode-(characteristics-P-I-N-photo diode-response-Avalanche photo diode (APD) multiplication process-B. W-Noise-photo transistor.

Module 4

Optical Fibre-structure-advantages-Types-propagation-wave equation-phase and group velocity-transmission characteristics-attenuation-absorption-scattering losses-dispersion-fibre bend losses-source coupling, splices and connectors-wave length division multiplexing.

Module 5

Optical fibre system-system design consideration-fibre -optic link-optical transmitter circuit-source limitations-LED drive circuit-Laser drive circuit-pre-amplifier-equalization-Fibre-optic link analysis-typical lira design.

References

1. Semiconductor Opto electronics Devices-Pallab Bhattacharya (Pearson Education)
2. Optical fibre Communication Systems-Principles and practice- John M Senior (PHI)
3. Optical communication Systems-John Gower (PHI)
4. Optical fibre Communication- Gerd keiser (PHI)

VLSI TECHNOLOGY

E 806-6

Module 1

Process steps in 1C fabrication: Crystal growth and wafer preparation-Czochralski process- apparatus- silicon shaping, slicing and polishing- Diffusion of impurities-physical mechanism- Pick's I and II law of diffusion- Diffusion profiles- complementary (erfc) error function- Gaussian profile- Ion implantation-Annealing process- Oxidation process- Lithography- Photolithography, Fine line lithography, electron beam and x-ray lithography- Chemical vapour deposition (CVD)- epitaxial growth- reactors-metallisation- patterning- wire bonding and packaging.

Module 2

Monolithic components: Isolation of components- junction isolation and dielectric isolation- Transistor fabrication- buried layer- impurity profile- parasitic effects-

monolithic diodes- schottky diodes and transistors- FET structures- JFET-MOSFET-PMOS and NMOS, control of threshold voltage (Vth)- silicon gate technology-Monolithic resistors- sheet resistance and resistor design- resistors in diffused regions-MOS resistors- monolithic capacitors- junction and MOS structures- 1C crossovers and vias.

Module 3

CMOS technology: Metal gate and silicon gate- oxide isolation- Twin well process- Latch up- BiCMOS technology- fabrication steps- circuit design process-stick diagrams- design rules- Capacitance of layers- Delay- Driving large capacitance loads- Wiring capacitance- Basic circuit concepts- scaling of MOS structures- scaling factors- effects of miniaturization.

Module 4

Subsystem design and layout- Simple logic circuits- inverter, NAND gates, BiCMOS circuit, NOR gates, CMOS logic systems - bus lines- arrangements-power dissipation-power supply rail distribution- subsystem design process-design of a 4 bit shifter.

Module 5

Gallium Arsenide Technology: Sub-micro CMOS technology- Crystal structure-Doping process- Channeling effect- MESFET- GaAs fabrication- Device modeling.

References

1. VLSI technology. S M Sze, Me Graw Hill pub,
2. Basic VLSI design: Douglas Pucknell, PHI
3. Principles of CMOS VLSI Design: H E Weste, Pearson Edn.
4. Integrated Circuits: K R Botkar, Khanna Pub.
5. CMOS circuit design layout and simulation: Barter, IEEE press.
6. Introduction to VLSI: Conway, Addison weslay.

ELECTRICAL MACHINES LAB II

E 807 **0+0+4**

1. Alternator regulation by synchronous impedance and mmf methods
2. Alternator regulation by Potier method
3. Alternator regulation by Blondel's method and verification by direct loading
4. Alternator V – curves for constant input/output
5. Synchronous motor V – curves and compounding curves
6. Alternator regulation by feeding back power to mains – use of synchroscope
7. Study of starters and load tests on double cage and single phase induction motors
8. Characteristics of cage / slip ring motors by circle diagram
9. Characteristics of induction generator and rotor hysterisis by Link's method
10. Synchronous Induction motor – predetermination of excitation current and verification
11. Characteristics of pole changing motor

12. Characteristics of Schrage motor – torque variation with load, predetermination of speed variation with brush shift and verification
13. Characteristics of cascade induction motor set
14. Experimental determination of torque slip curve of induction motor in unstable region upto about 40% slip
15. Experimental determination of variation of starting torque with rotor resistance in slip-ring induction motor
16. Predetermination of line current. Torque, power of a 3-phase induction motor under single phasing - verification
17. No load and blocked rotor tests on single phase induction motor and determination of equivalent circuit parameters
18. Determination of
    a. Continuous rating for specified temperature rise
    b. One hour rating by heat run test of a machine

PROJECT AND SEMINAR

E 709/E808

Each student is required to present a technical paper on a subject approved by the department. The paper should be in general reflecting the state-of-the-art. He/she shall submit a report of the paper presented to the department.

In addition to the seminar he/she shall undertake a project work (as a team or individually) in the 7th semester itself in consultation with the Guides. On completion of the project work, he/she shall present the work done before a panel of staff members, and submit a report of the project work, and submit a report of the project work done to the department.

B.TECH. DEGREE COURSE

SYLLABUS

ELECTRONICS & COMMUNICATION ENGINEERING BRANCH

THIRD SEMESTER

ENGINEERING MATHEMATICS - II

CMELPA 301 **3+1+0**

Module 1

Vector differential calculus: Differentiation of vector functions- scalar and vector fields- gradient - divergence and curl of a vector function - their physical meaning - directional derivative - scalar potential- conservative field – identities - simple problems.

Module2

Vector integral calculus: Line- surface and volume integrals- work done by a force along a path- application of Green's theorem- Stoke's theorem and Gauss divergence theorem.

Module 3

Function of complex variable: Definition of analytic function and singular points- derivation of C.R. equations in Cartesian co-ordinates- harmonic and orthogonal properties- construction of analytic function given real or imaginary parts- complex potential- conformal transformation of functions like Z^n, e^z, $1/z$, Sin z, $z + k^2/z$ - bilinear transformation- cross ratio- invariant property- simple problems.

Module 4

Finite differences: meaning of Δ, ∇, E, μ, δ - interpolation using Newton's forward and backward formula- central differences- problems using Stirlings formula- Lagrange's formula and Newton's divided difference formula for unequal intervals.

Module 5

Difference Calculus: Numerical differentiation using forward and backward differences. Numerical integration- Newton-Cote's formula- trapezoidal rule- Simpson's $1/3^{rd}$ and $3/8^{th}$ rule- simple problems- difference equations - solutions of difference equations.

References

1. Advanced Engg. Mathematics: Erwin Kreyzing- Wiley Eastern. Pub.
2. Higher Engg. Mathematics: B. S. Grewal- Khanna publishers.
3. Numerical methods in Science and Engineering: M K Venkataraman- National Pub.
4. Numerical methods: S Balachandra Rao- University Press.
5. Advanced Engineering Mathematics: Michael D Greenberg- PHI.
6. Theory and Problems of Vector analysis: Murray Spiegel- Schaum's- Mc Graw Hill.

NETWORK THEORY

LA 302 **2+1+0**

Module 1

Source transformation- Mesh and Node voltage Analysis – Coupled circuits – Dot conventions – Analysis of coupled circuits.

Module 2

Network theorems-Super position theorem- Reciprocity theorem - Thevenin's theorem- Norton's theorem- Millman's theorem- Maximum power transfer theorem- Tellegen's theorem- Graph of a network -Trees- co-trees -Incident matrix- cut- set matrix-tie-set matrix- Analysis of networks- equilibrium equations.

Module 3

Fourier Analysis and Laplace transform - Fourier analysis of periodic signals- Trignometric and exponential forms- Non periodic signals and Fourier transforms- Frequency spectrum of periodic waveforms - Laplace Transform- Review of theorems-Laplace transform of important signal waveforms - Periodic functions- Initial value and final value Theorems- DC&AC transients- Solution of network problems using Laplace transform.

Module 4

Two-port Networks and Filters - Voltage and Current ratios of two - port networks -Admittance- impedance- hybrid and transmission parameters of two port networks. Passive filters as two port networks- Characteristics of ideal filters-Image impedance- Constant K low pass- High pass and Band pass filters- m-derived filters-Composite filters.

Module 5

Network Synthesis – Realizability concept – Hurwitz property – positive realness – properties of positive real function – Synthesis of R, L, RC and LC driving point functions – Foster and Cauer forms.

References

1. Network analysis -M.E Van Valkenburg, PHI
2. Circuits and Networks – analysis & synthesis – A. Sudhakar & S P ShyamMohan
3. Network and Systems -D Roy Chaudhary
4. Network analysis and synthesis-Franklin F Kuo – John Wiley & Sons
5. Engineering Circuit Analysis-W H Hayt & Jack Kennerly – Mc-Graw Hill

ELECTRICAL TECHNOLOGY

LA 303 **2+1+0**

Module 1

D.C.Generator – O.C.C. – Condition for self excitation – field critical resistance – critical speed – Load characteristics of generators – Losses – power flow diagram – efficiency – Condition for maximum efficiency – Applications.

Module 2

D C motor – starter – 3 point and 4 point starters – torque equation – speed equation – speed torque – characteristics of shunt, series and compound motors – Losses – efficiency – Brake test – Swinburne's test – speed control – field control – armature control – series parallel control – applications.

Module3

Transformers: transformer on no-load and load operation – phasor diagram – equivalent circuit – regulation – losses and efficiency – o.c. and s.c. test – applications – Design of step down transformers like 230/6-0-6V, – Basic principles of 3 phase tranformer – autotransformer – applications.

Module 4

A.C Machines: 3 phase induction motors – rotating magnetic field – torque equation – slip – torque-slip characteristics – operating characteristics – starting of 3 phase induction motors – starters – single phase induction motors – constructional features – types – working and characteristics only (no analysis) – constructional features of synchronous machines – principle of operation of alternator – emf equation – regulation by emf and mmf method – principle of operation of synchronous motor – starting of synchronous motor.

Module 5

Special Machines: A C and D C servo motors – synchros – constructional features – working of a tachogenerator – stepper motors – construction, working, applications and specifications of stepper motors – universal motors - constructional features – typical applications – criteria for selection of motors – electromagnetic relays – contactors.

References

1. Electrical & Electronic Technology: Hughes, Pearson Education
2. Electrical Technology: H. Cotton
3. Electrical Machines: R.K.Rajput
4. Electrical Design Estimating & Costing: K.B.Raina & Bhattacharya
5. Electrical Machines & Power systems: Vincent Del Toro

SOLID STATE DEVICES

LA304 **3+1+0**

Module 1

Energy bands and charge carriers in semiconductors: energy bands- metals- semiconductors and insulators- direct and indirect semiconductors- charge carriers in semiconductors: electrons and holes- intrinsic and extrinsic material- n-material and p-material- carrier concentration: fermi level- EHPs- temperature dependance- conductivity and mobility- drift and resistance- effect of temperature and doping on mobility- hall effect.

Module 2

Diffusion of carriers- derivation of diffusion constant D- Einstein relation- continuity equation- p-n junctions: contact potential- equilibrium fermi levels- space charge at junctions- current components at a junction: majority and minority carrier currents- zener and avalanche breakdown- capacitance of p-n junctions.

Module 3

p-n junction diodes: volt-ampere characteristics- switching time- rectifier action- Zener diodes: volt-ampere characteristics- Tunnel diodes: tunneling phenomena- volt-ampere characteristics- Varactor diodes- Photo diodes: detection principle- light emitting diodes.

Module 4

Bipolar junction transistors: npn and pnp transistor action- open circuited transistor- biasing in active region- majority and minority carrier distribution- terminal currents- amplification and switching- α and β gain factors- emitter efficiency γ- schottky transistors- photo transistors.

Module 5

Field effect transistors: operation- pinch off and saturation- pinch off voltage- gate control- volt-ampere characteristics- MOSFETS: n MOS and p MOS: comparison- enhancement and depletion types- control of threshold voltage- MOS capacitance.

References

1. Solid state electronic devices - Ben G Streetman- Pearson Education
2. Microelectronic Devices: Nagchaudhari, Pearson Education
3. Integrated electronics – Millman and Halkias- Mc Graw Hill.
4. Physics of semiconductor devices - S M Sze- Mc Graw Hill.
5. Semiconductor devices – Nagchoudhary- Tata Mc Graw Hill.
6. Physics of semiconductor devices: Shur- PHI.
7. Theory of Semiconductor devices: Karl Hess- PHI.

ELECTRONIC CIRCUITS - I

LA 305 **3+1+0**

Module 1

Rectifiers and Power supplies: Half wave- full wave and bridge rectifiers- working- analysis and design- C filter analysis- regulated power supplies: series and shunt- design of regulated power supplies for specified output conditions- current limiting- short circuit protection- IC regulated power supplies.

Module 2

Transistor as an amplifier: Transistor at low frequencies- h parameter model analysis- expression of voltage and current gain- input and output impedance- CE- CB and CC configurations- comparison- transistor parameters from static characteristics- FET: operation- characteristics- small signal model.

Module 3

Transistor Biasing: operating point- DC and AC load lines- Q point selection- bias stability- definition of stability factors- derivation of stability factor for I_{CO} variation- fixed bias- collector to base bias- self bias circuits- bias compensation- compensation for I_{CO} and V_{BE}.

Module 4

RC Coupled amplifier: working- analysis and design- phase and frequency response- FET amplifier: biasing- analysis and design.

Module 5

Wave shaping circuits: clipping- clamping- RC integration- differentiation- transistor as a switch- astable multivibrator- working and design- UJT- working and applications- simple sweep circuit.

References

1. Electronic devices and circuits: Boylsted & Nashelsky- Pearson Edn.
2. Integrated Electronics: Millman & Halkias- Mc Graw Hill.
3. Electronic Principles: Malvino- Tata Mc Graw Hill.
4. Electronic devices and circuits: Bogart- UBS.
5. Electronic devices and circuits: Allen Mottershed- PHI.
6. Electronic devices: Floyd- Pearson Edn.
7. Electronic devices and applications: B Somanathan Nair- PHI.
8. Electronic devices and circuits: J B Gupta- S K Kataria & Sons Pub.

COMPUTER PROGRAMMING

LA 306 **3+1+0**

Module 1

Introduction to C: C fundamentals - The character set - identifiers and keywords - Data types - constants - variables and arrays - declarations - expressions - statements - symbolic constants- arithmetic operators - Relational and Logical operators - The conditional operator - Library functions - Data input and output - getchar – putchar, scanf, printf - gets and puts functions - interactive programming.

Module 2

Control Statements: While - do while - for - nested loops -if else switch- break - continue - The comma operator - go to statement, Functions - a brief overview - defining a function - accesing a function - passing arguments to a function - specifying argument - data types - function prototypes - Recursion.

Module 3

Program structure: storage classes - Automatic variables - external variables - multi file programs. Arrays: defining an array - processing an array - passing arrays in a function – multi dimensional arrays - array and strings. Structures and unions: defining a structure - processing a structure - user defined data types - passing structure to a function – self referential structures - unions.

Module 4

Pointers: Fundamentals - pointer declaration - passing pointers to a function - pointers and one dimensional arrays - operations on pointers - pointers and multi dimensional arrays – passing functions to other functions.

Module 5

Data files: Opening and closing of a data file - creating a data file - processing a data file, low level programming - register variables – bit wise operation - bit fields - enumeration - command line parameters - macros - the C pre-processor.

Text Book

1. Programming with ANSI and Turbo C: Ashok N Kanthane, Pearson Edn.

References

1. Theory and problems of programming with C- Gottfried, Schaum's series.
2. The C programming language: Kernighan & Ritche, PHI.
3. Programming Techniqes through C: Venkateshmurthy, Pearson Edn.
4. Programming in C: Balaguruswamy, Tata Mc Graw Hill.
5. Programming Ansi C: Ram Kumar.
6. Computer Programming: Rajaraman, PHI.

ELECTRICAL LAB

LA 307 **0+0+4**

1. Measurement of Electric power (single phase and three phase) and energy using wattmeter and energy meter.
2. Study of star-delta connections.
3. O.C.C. and Load characteristics of D.C. generators.
4. Swinburne's test.
5. Load characteristics of D.C. shunt, series and compound motors
6. O.C and S.C test on single-phase transformer.
7. Load test on step-up/step-down transformer; calculation of efficiency and regulation at different power factors.
8. Study of starting of three phase induction motors and load test on squirrel cage induction motor.
9. Load test on slipring induction motor.
10. Study of stepper and servomotors.
11. Load test on single phase induction motor.
12. Pre-determination of regulation of the alternator by emf and mmf method.

BASIC ELECTRONICS LAB

L 308 **0+0+4**

1. Familiarization of CRO, DVM, AF generator etc and soldering practice.
2. Characteristics - Diode, Transistor, FET, UJT. Determination of parameters.
3. Design and testing of DC power supplies for specified output.
4. Design of Single stage RC coupled amplifier. Determination of Band width.
5. Design of FET amplifier. Determination of Band width.
6. Wave shaping. Design of clipping, clamping, RC differentiator & Integrator.
7. Design of Astable multi-vibrator for specified time period - sharpening of edges.
8. Simple sweep circuit.
9. Familiarization of data sheets of components – OA79, 1N4001, SZ6.8, BC107, BC547, BC557, BFW10, 2N2646.
10. Simulation of simple circuits using Spice.

Note

New experiments may be added in the above list concerned to the relevant theory paper (LA 305).

FOURTH SEMESTER

ENGINEERING MATHEMATICS - III

CMELRPTA 401 **3+1+0**

Module 1

Ordinary Differential Equations: Linear Differential equations with constant coefficents - Finding P.I. by the method of variation of parameters – Cauchys equations- Linear Simultaneous eqns- simple applications in engineering problems.

Module 2

Partial Differential Equations - formation by eliminating arbitrary constants and arbitrary Functions - solution of Lagrange Linear Equations –Charpits Method – solution of homogeneous linear partial differential equation with constant coefficients – solution of one dimensional wave equation and heat equation using method of separation of variables – Fourier solution of one dimensional wave equation.

Module 3

Fourier Transforms: - Statement of Fourier Integral Theorems – Fourier Transforms – Fourier Sine & Cosine transforms - inverse transforms - transforms of derivatives – Convolution Theorem (no proof) – Parsevals Identity - simple problems.

Module 4

Probability and statistics: Binomial law of probability - The binomial distribution, its mean and variance - poisson distribution as a limiting case of binomial distribution - its mean and variance - fitting of binomial & poisson distributions - normal distribution - properties of normal curve - standard normal curve - simple problems in binomial, poisson and normal distributions.

Module 5

Population & Samples: Sampling distribution of mean (σ known) –Sampling distribution of variance, F and Chi square test – Level of significance - Type 1 and Type 2 errors – Test of hypothesis – Test of significance for large samples – Test of significance for single proportion, difference of proportions, single mean and difference of means (proof of theorems not expected).

References

1. Higher Engineering Mathematics - B.S. Grewal, Khanna Publishers.
2. Engineering Mathematics Vol.II -3rd year Part A & B - M.K. Venkataraman, National Publishing Company
3. Elements of Partial Differential Equations - Ian N.Sneddon.,McGraw Hill.
4. Miller and Fread's Probability and statistics for engineers – Richard A Johnson, Pearson Education Asia / PHI.
5. A text book of Engineering Mathematics (Volume II) – Bali and Iyengar, Laxmi Publications Ltd.
6. Advanced Engg. Mathematics Erwin Kreyszig, Wiley Eastern Ltd.
7. Probability and statistical inferences – Hogg and Tanis, Pearson Education Asia.

DIGITAL ELECTRONICS AND LOGIC DESIGN

LA 402 **3+1+0**

Module 1

Gates –Inverter - OR gates - AND gates - NOR Gates - De Morgan's Theorems - NAND Gates - EXCLUSIVE-OR Gates - Tristate Inverter - TTL Circuits - Digital Integrated Circuits - 7400 Devices - TTL Characteristics - TTL Overview - AND -OR- NOT Gates - Open-Collector Gates – CMOS gates.

Module 2

Boolean Algebra and Karnaugh Maps - Boolean Relations - Sum-of-Products method - Algebraic Simplification - Karnaugh maps – Pairs – Quads - and Octets - Karnaugh Simplifications - Don't-Care Conditions. Multiplexers - de-multiplexers - decoder and encoder.

Module 3

Arithmetic-Logic Units - Binary Addition - Binary Subtraction - Half Adders - Full Adders - Binary Adders - signed Binary Numbers - 2's Complement - 2's-Complement Adder-Subtractor.

Module 4

Flip Flops - RS Latches - Level Clocking - D Latches - Edge-Triggered D & T Flip-Flops - Edge-Triggered JK Master-slave Flip-Flop.

Module 5

Registers and Counters - Buffer Registers - Shift Registers - Controlled Shift Registers - Ripple Counters - Synchronous Counters - Ring counters - Modulo counters - Three-State Register. ROMs – PROMs and EPROMs - RAMs. A small TTL Memory.

References

1. Digital Fundamentals: Floyd, Pearson Edn.
2. Digital Design: Wakerly, Pearson Education.
3. Fundamentals of digital circuits: A Anand Kumar, PHI
4. Digital Integrated Electronics: Taub and Shilling, McGraw Hill,
5. Digital electronics: D C Green, Pearson Edn.
6. Digital Logic and state machine design: Comer, Oxford.
7. Digital electronic principles and applications: A K Maini, Khanna Pub.
8. Digital electronic principles: Malvino and Leach, Mc Graw Hill.
9. Logic and computer design fundamentals: M Morris Mano, Pearson Edn.

COMMUNICATION ENGINEERING

LA 403 **3+1+0**

Module 1

Introduction: communication systems – Modulation - need for modulation- bandwidth- Amplitude modulation - theory- mathematical representation- frequency spectrum - USB & LSB- power relation- Frequency modulation - theory- mathematical representation- frequency spectrum- Phase modulation- comparison of AM- FM- PM.

Module 2

Radio transmitters: AM transmitter - block diagram - Solid state modulators - circuit explanation- FM transmitter - reactance modulator- varactor diode modulator- Amstrong modulator.

Module 3

Radio receivers: Tuned radio frequency receiver- superheterodyne receiver - block schematic- selectivity- sensitivity- importance of IF - image frequency rejection - AM receivers - schematic explanation - RF amplifiers - circuit explanation - Mixer circuits - IF amplifiers - circuit explanation- simple diode detector - Automatic gain control circuit - simple and delayed AGC - FM receivers - block schematic explanation - amplitude limiting - FM demodulators: slope detectors- phase discriminator- ratio detectors.

Module 4

Side band communication: Single side band transmission - suppression of carrier - balanced modulator - filtering of unwanted sideband - SSB receivers - block schematic explanation - pilot carrier receiver - suppressed carrier receiver - Vestigial side band transmission - transmitter and receiver responses - advantages of VSB in television.

Module 5

Telephone Systems - Telephone subscribers loop circuit - subscribers line interface circuit - Pulse and tone signaling - Frequency assignments - Electronic telephone - block schematic of a telephone set- block schematic of single line analog SLIC board - two wire repeaters - Electronic private automatic branching exchange - basic block schematic- Power line communication: block schematic explanation- Facsimile - FAX transmitter and receiver.

References

1. Electronic communication Systems: Wayne Tomasi- Pearson Edn.
2. Electronic communication: Roody and Coolen- PHI.
3. Electronic Communication systems: George Kennedy- Mc Graw Hill.
4. Electronic and radio engineering: A P Mathur.
5. Telephony and Carrier current engineering: P N Das.
6. Modern communication Systems: Couch- PHI.

ELECTRONIC CIRCUITS - II

LA 404 **3+1+0**

Module 1

High frequency equivalent circuit of a transistor. Hybrid pi model - explanation of components -r parameters in terms of h parameters -Tuned amplifiers -principle - single tuned and double tuned amplifiers -frequency response -applications (no analysis) -multistage amplifiers -frequency response.

Module 2

Feedback -different types -positive, negative, voltage, current, series and shunt feedback -Feedback in amplifiers -its effect on amplifier performance -typical feedback arrangements -emitter follower -darlington emitter follower -cascade amplifier (principles only) -difference amplifier.

Module 3

Oscillators -conditions for oscillation -analysis and design of RC phase shift oscillator, general form of oscillator circuit -working of Hartley, Colpitt's, Crystal, tuned collector and Wien Bridge oscillators.

Module 4

Mono-stable multi vibrator -analysis -design -applications -triggering -Bistable multi-vibrator -analysis and design -different methods of triggering -commutating capacitor -Schmitt trigger -working -design.

Module 5

Large signal amplifier -harmonic distortion -analysis of class A, class B, class C and class D amplifiers -complimentary and symmetry stage -sweep generators - voltage and current sweeps -time base generators -linearisation -miller and bootstrap sweeps - applications.

References

1. Electronic devices and circuits -Boylsted & Neshelsky, Pearson Edn.
2. Integrated electronics -Millman & Halkias , Mc Graw Hill
3. Electronic principles -Malvino
4. Electronic devices and circuits -Bugart
5. Microelectronics Digital and Analogue -Botkar.

SIGNALS AND SYSTEMS

LTA 405 **2+1+0**

Module 1

Dynamic Representation of Systems - Systems Attributes- Causality - linearity- Stability- time-invariance. Special Signals- Complex exponentials- Singularity functions (impulse and step functions). Linear Time-Invariant Systems: Differential equation representation- convolution Integral. Discrete form of special functions. Discrete convolution and its properties. Realization of LTI system (differential and difference equations).

Module 2

Fourier Analysis of Continuous Time Signals and Systems - Fourier Series- Fourier Transform and properties- Parseval's theorem- Frequency response of LTI systems. Sampling Theorem.

Module 3

Fourier Analysis of Discrete Time Signals & Systems - Discrete-Time Fourier series- Discrete-Time Fourier Transform (including DFT) and properties. Frequency response of discrete time LTI systems.

Module 4

Laplace Transform - Laplace Transform and its inverse: Definition- existence conditions- Region of Convergence and properties- Application of Laplace transform for the analysis of continuous time LTI system (stability etc.) Significance of poles & zeros- Z-Transform - Z-Transform and its inverse: Definition- existence- Region of convergence and properties- Application of Z-Transform for the analysis of Discrete time LTI systems- Significance of poles and zeros.

Module 5

Random Signals - Introduction to probability. Bayes Theorem- concept of random variable- probability density and distribution functions- function of a random variable. Moments- Independence of a random variable. Introduction to random process. Auto and cross correlation. wide-sense stationarity- power spectral density White noise- Random processes through LTI systems.

References

1. Signals and Systems: Oppenheim Alan- V- Willsky Alan. S- Pearson Edn.
2. Communication Systems: Haykin Simon- John Wiley.
3. Signals and Systems: I J Nagrarth- Tata Mc Graw Hill.
4. Signals and Systems: Farooq Husain- Umesh pub.
5. Adaptive signal processing: W Bernad- Pearson Edn.

RELIABILITY AND HUMANITIES

LA 406 **2+1+0**

Module 1

Concepts of reliability: Definition of reliability- failure- classification of failures- measures of reliability- failure rate- mean time between failures (MTBF)- mean time to failure (MTTF).

Module 2

Failure pattern and fitting curves: Graphical plots- Bath tub curves- Hazard models- Constant hazard models- Linearly increasing hazard model- Weibull model.

Module 3

Manufacture for Quality and reliability: The need for prototype tests- the quality standard- planning to achieve required quality- basic concepts of sequencing.

Module 4

Control charts in statistical quality control: statistical quality control advantages- types of control charts- X and R chart- P chart- C chart- Re-engineering- Zero defects.

Module 5

Human relations: Human Behavior- Scope of Industrial psychology-Theories of Motivation-Handling of workers grievances-Workers participation in management-Industrial discipline-Industrial disputes-Industrial fatigue-Wages and incentives.

References

1. Reliability Engineering: L S Sreenath.
2. Reliability Engineering: A K Govil.
3. Industrial Engineering & Management: Banga and Sharma.

ELECTRONIC CIRCUITS LAB

LA 407 **0+0+4**

List of experiments

1. Power amplifiers: Design of class A and class AB push pull stage – verification of power output.
2. IC power amplifier.
3. Oscillators: Design of RC phase shift, Hartley & Colpitts oscillators.
4. Design of Mono-stable and bi-stable multi-vibrators.
5. Design of bootstrap sweep generator.
6. Schmitt trigger.
7. SCR, Triac firing circuits.
8. Feedback amplifier, design of two stage RC coupled amplifier.
9. Tuned amplifiers.
10. Design and testing of DC regulated power supplies (Fixed and variable).
11. Simulation of above circuits using PSPICE.

Note

New experiments may be added in accordance with subject LA 404

COMPUTER PRORAMMING LAB

LA 408 **0+0+4**

Part 1

1. Computer hardware familiarization.
2. Familiarization of MS-DOS commands, Microsoft Windows.
3. Familiarization of Microsoft Word, Adobe Acrobat Reader.

Part 2

Programming Experiments in C/C++: Programming experiments in C/C++ to cover control structures, functions, arrays, structures, pointers and files, classes, operator & function overloading, inheritance, polymorphism.

FIFTH SEMESTER

ENGINEERING MATHEMATICS -IV

CMELPA501 **3+1+0**

Module 1

Complex Integration: Line Integral –Cauchy's integral theorem- Cauchy's integral formula-Taylor's series-Laurent's series- zeros and singularities-Residues- residue theorem-Evaluation of real integrals using contour integration involving unit circle and semicircle.

Module 2

Numerical solution of algebraic and transcendental equations: Successive bisection method-Regula falsi method - Newton –Raphson method – solution of system of linear equations by Jacobi's iteration method and Gauss-Siedel method.

Module 3

Numerical solution of ordinary differential equation: Taylor's series method-Euler's method –Modified Eulers method - Runge – Kutta method (IV order)-Milne's predictor corrector method.

Module 4

Z – Transforms: Definition of Z transform- properties –Z transform of polynomial functions – trigonometric functions, shifting property, convolution property-inverse transform – solution of 1^{st} & 2^{nd} order difference equations with constant coefficients using Z transforms.

Module 5

Linear programming: graphical solution – solution using simplex method (non – degenerate case only) – Big-M method,two phase method- Duality in L.P.P.-Balanced T.P. – Vogels approximation method – Modi method.

References

1. Advanced Engineering Mathematics – Ervin Kreyszig, Wiley Eastern limited.
2. Numerical methods in Engineering & Science – Dr. B.S.Grewal, Kanna Publishers.
3. Higher Engineering Mathematics - Dr. B.S.Grewal, Kanna Publishers.
4. Numerical methods in Science & Engineering - Dr. M.K.Venkitaraman, National Publishing company.
5. Quantitative techniques Theory & Problems - P.C.Tulsian, Vishal Pandey, Pearson Education Asia.
6. Complex variables and applications - Churchill and Brown, McGraw-Hill.
7. Operations research - Panneer Selvam, PHI.
8. Engineering Mathematics Vol. III -S Arumugam, A.T.Isaac, A.Somasundaram, Scitech publications
9. Advanced Mathematics for Engg.students Vol. III- S.Narayanan, T.K.M.Pillay, G.Ramanaigh, S.Vishwananthan printers & publishers.

POWER ELECTRONICS

LA 502 **2+1+0**

Module 1

Power semiconductor Devices - History of development of Power Electronic devices- Constructional features- Characteristics- rating and specification- gate/base drive circuits-protection including cooling and application consideration of diodes- SCRS, GTO, BJTS, MCT, MOSFET and IGBT. Series and parallel operations of SCR- Electromagnetic interference.

Module 2

AC to DC Converters - Operation and analysis of Single phase and multi-phase uncontrolled and controlled rectifiers with R, RL and back EMF load- effect of source inductance- free wheeling effect- power factor improvement methods for phase Controlled rectifiers- filters. PWM chips: SG3524 and TL 494- Block schematic.

Module 3

AC to AC Voltage Converter - Operation and analysis of single phase integral cycle and phase controlled converters- Configuration of three phase controllers.

Module 4

DC to DC Converters - Chopper classification- Step down- step up and four quadrant converters operation- analysis and control with R, RL and EMF load- current and voltage Commutation circuits.

Module 5

DC to AC Converters - Single phase and three phase bridge inverters- VSI and CSI- voltage control - PWM & Square wave operation- Harmonics and their reduction techniques.

References

1. Power Electronics: Rashid Muhammad, Pearson Edn.
2. Power Electronics: Harish C Ray, Galgotia Pub.
3. Thyristors and Applications: Ramamoorthy.
4. Power Electronics: Converter, Applications and Design, Mohan Ned, John Wiley,
5. Power Semiconductor Circuits: Dewan, S.B. and Satrughan A, John Wiley & Sons, 1975.
6. Thyristorised Power Controllers: Dubey, G.K., Doradlla, S. R., Wiley Eastern, 1987.

APPLIED ELECTROMAGNETIC THEORY

L 503 **3+1+0**

Module 1

Review of vector analysis: Cartesian, Cylindrical and Spherical co-ordinates systems- Co-ordinate transformations. Static electric field: Coulomb's Law of point charges- Electric flux-Gauss's Law- Electrical scalar potential- different types of potential distribution- Potential gradient- Boundary conditions Capacitance: Capacitance of isolated sphere- capacitance between two concentric sphere shells- capacitance between coaxial cylinders- capacitance between parallel wires. Vector fields: Divergence and curl- Divergence theorem- Stokes theorem.

Module 2

Magnetic field: Steady current and current density in a conductor- Biot-Savarts Law- Ampere's Law- Helmholtz theorems- Faraday's law of electromagnetic induction- Solenoid, toroid, inductance of transmission line- Mutual inductance energy stored in magnetic fields- Magnetic dipole- Electric and Magnetic boundary conditions- vector magnetic potential.

Module 3

Maxwell's equations and travelling waves: conduction current and displacement current- Maxwell's equations- Plane waves- Poynting theorem and Poynting vector- Plane electromagnetic waves- Solution for free space condition- Uniform plane wave-wave equation for conducting medium- Wave polarization- Poisson's and Laplace equations.

Module 4

Guided waves between parallel planes- transverse electric and transverse magnetic waves and its characteristics- Rectangular wave guides- modes of propagation.

Module 5

Transmission lines -Transmission line equations- transmission line parameters- Skin effect- VSWR- Characteristic impedance- Stub matching- Smith chart - Phase velocity and group velocity.

References

1. Engineering Electromagnetics: W. H. Hayt, Mc Graw Hill Publications.
2. Electromagnetics: J. D. Kraus, Mc Graw Hill Publications.
3. Engineering electromagnetics: E. C. Jordan.
4. Field & Wave Electromagnetic: Cheng, Pearson Education.
5. Electromagnetics: Edminister, Schaum series, 2 Edn.
6. Electromagnetic Theory: B. Premlet.
7. Electromagnetic Theory: Sadiku, Oxford University Press.

COMPUTER ORGANISATION AND ARCHITECTURE

LA 504 **2+1+0**

Module 1

Basic structure of computer hardware and software- addressing methods and machine programming sequencing- different addressing modes- instruction sets- computer arithmetic logic design- fast adders- multiplication- Booth's algorithm- fast multiplication- integer division- floating point numbers.

Module 2

Control unit- instruction execution cycle- sequencing of control signals- hardwired control- PLAs- micro programmed controls- control signals- micro instructions - Micro program sequencing- branch address modification- pre fetching of micro instructions.

Module 3

Memory organization- semi conductor RAM memories- internal organization- bipolar and MOS devices- dynamic memories- multiple memory modules and interleaving- cache memories -mapping functions - replacement algorithms- virtual memories- address translation-page tables - memory management units- secondary memories- disk drives- standards.

Module 4

Input-Output organization- accessing I/O devices- direct memory access (DMA)- interrupts and interrupt handling- handling multiple devices- device identification- vectored interrupts- interrupt nesting- daisy chaining- I/O interfaces- serial and parallel standards- buses-scheduling- bus arbitrations- printers- plotters- VDUs.

Module 5

Introduction to parallel processing and architecture- classification- array processors- pipeline architecture- interconnection- networks- multistage networks- message passing architecture.

References

1. Computer organization – Hamacher C V, Mc Graw Hill.
2. Computer Systems and Architecture – Vincent P Heuring, H F Jordan, Pearson Edn.
3. Computer organization and Design – Pal Choudhary
4. Computer organization and Architecture – Hayes J P
5. Computer Org. & Architecture: Stallings, Pearson Education.

LINEAR INTEGRATED CIRCUITS

LA 505 **3+1+0**

Module 1

Introduction to operational amplifiers – Basic differential amplifier - dual input balanced output and unbalanced output- Internal block schematic of op amp - Pin identification- power supply requirements - typical data sheet - Op-amp parameters - ideal op amp - transfer curve - equivalent circuit- open loop configurations - frequency response of op amps - compensating networks - slew rate and its effect.

Module 2

Op amp in closed loop configuration: Different feed back configurations- Voltage series feedback and voltage shunt feedback - concept of virtual ground- voltage follower - V/I converters and its applications - Differential amplifiers with one op amp and 3 op amps- Use of offset minimizing resistor (R_{OM}) and its design.

Module 3

Op amp applications- Summer- Subtractor- Log amplifier- Antilog amplifier- Comparators: zero crossing- using voltage reference- regenerative (Schmitt trigger) comparators- Astable and monostable multivibrators- Triangular and sawtooth wave generators- Integrator and differentiator- RC phase shift and Wien bridge oscillators-Sample and hold circuit- Peak detector circuit.

Module 4

Filters and timers: LPF- HPF- BPF- Notch and all pass filters- I order and II order filters- Switched capacitor filter- Switched capacitor integrator. 555 timers – Functional block diagram- Astable multivibrator, monostable multivibrator and its applications.

Module 5

Specialized ICs and applications: Voltage regulator ICs – 78XX and 79XX series- 317 variable regulators- 1723 switching regulators- 566 VCO chip- Phase locked loop(PLL) - capture and lock range- 565 PLL - PLL applications: Frequency multiplication and division- AM demodulation- FM detection- FSK demodulation - LM 380 power amplifier - intercom using LM 380- 8038 Function generator chip - applications.

References

1. Op amps and Linear Integrated circuits: Ramakand Gaykwad- PHI publications.
2. Op amps and Linear Integrated circuits: R F Coughlin- Pearson Education.
3. Op amps and Linear Integrated circuits: Ravi Raj Dudeja- Umesh Publications.
4. Linear Integrated circuits: Roy Choudhary & Jain- Wiely Eastern Publications.
5. Integrated circuits: K R Botkar

MICROPROCESSORS AND MICROCONTROLLERS

L506 **3+1+0**

Module1

Introduction to microprocessors and microcomputers: Function of microprocessors- architecture of 8085- pin configuration and functions – tristate bus concept - generation of control signals - bus timings – de-multiplexing AD_0-AD_7 – flags - memory decoding - interfacing of RAM and EPROM - I/O addressing - I/O mapped I/O - and memory mapped I/O schemes - instruction execution - fetch/execute cycle - instruction timings and operation status.

Module 2

Atmel AT89C51 microcontroller – features - pin configurations - internal block schematic - pin descriptions - PORT0, PORT1, PORT2, PORT3, idle & power down mode - power control register - program protection modes - flash programming & verification.

Module 3

Memory organization - program memory - data memory - direct & indirect addressing area - Program status word - register banks - addressing modes - instruction set – arithmetic - logical and data transfer instructions - Boolean instructions - program branching instructions - Programming examples.

Module 4

Machine cycles – interrupts - interrupt sources - interrupt enable register - interrupt priority - interrupt control system - interrupt handling - single step operation - port bit latches and buffers - port structures and operation - accessing external memory – programming examples.

Module 5

Timer0 & Timer1 - TMOD SFR - mode0, mode1, mode2, mode3 - TCON SFR - serial interface - SCON SFR - mode0, mode1, mode2, mode3- block schematics- baud rates- power on reset circuit- ONCE mode- on chip oscillator- external program & data memory timing diagrams- I/O port timings – programming examples.

References

1. The 8051 Microcontroller: Muhammad Ali Mazidi, Pearson Education.
2. The 8051 Microcontroller: Kenneth J Ayala, Penram International
3. Microprocessors and Architecture: Ramesh S Goankar
4. Microcomputers and Microprocessors: John Uffenbeck, PHI
5. Web site of Atmel - www.atmel.com

DIGITAL IC LAB

LA 507 **0+0+4**

List of experiments

1. TTL & CMOS characteristics (7400, CD4001)
2. Interfacing of TTL & electromagnetic relay using transistor, opto coupler (4N33) & Darlington arrays (ULN2803).
3. Logic family interconnection (TTL to CMOS & CMOS to TTL)
4. Design of half adder & full adder using gates.
5. Design and testing of ripple & synchronous counters using JK flip flops (7473, 7476)
6. Counters using shift registers (Ring counter & Johnson counter).
7. Study of counter ICs (7490, 74190).
8. Design of astable & mono-stable multi-vibrators using gates.
9. Design of mono-shots using dedicated ICs (74123).
10. Logic design using multiplexers (74150).
11. Logic design using decoders (74138).
12. Adders, Subtractors, multipliers.
13. Design of 7 segment display circuits-static/dynamic (7447, FND542).
14. PRBS generator.
15. Digital circuit simulation using electronic work bench/ similar working tools.

Note

Any experiment related to LA402 may be added to the above list.

COMMUNICATION - I LAB

L 508 **0+0+4**

List of experiments

1. Passive filters – constant K and M derived.
2. Amplitude modulation.
3. Frequency modulation.
4. PWM using SG3525.
5. 555 Applications
6. 566 Applications
7. Study of 565 and its applications
8. Crystal oscillator
9. Oscillators using OP-AMP
10. Colpitts & Hartley oscillator.
11. Multiplexing using analog multiplexer IC's.

Note

Any other experiments may be added to the above list related to LA403.

SIXTH SEMESTER

INDUSTRIAL MANAGEMENT & ECONOMICS

LA 601 **3+2+0**

PART A: INDUSTRIAL MANAGEMENT

Module 1

Modern concept of Management: Scientific management-Functions of management-Planning-Organising- Staffing-Directing- Motivating-Communicating- Co-ordinating- Controlling-Organisational structures- Line, Line and staff and Functional relationships- Span of control- Delegation- Management by Objectives.

Module 2

Personnel management: Objectives and functions of personnel management-Recruitment-Selection and training of workers- Labour Welfare- Industrial Fatigue- Industrial disputes-Trade Unions- Quality circles. Formation of companies: Proprietory-Partnership-Joint stock companies- Public sector- Joint sector and Co-operative sector.

Module 3

Marketing Management: Pricing- Promotion- Channels of distribution- Market research-Advertising. Production Management: Batch and mass producti Inventory control- EOQ-Project planning by PERT/CPM- Construction Network (Basic ideas only).

PART B: ECONOMICS

Module 4

Theory of demand and supply- Price mechanism- Factors of production- Land, labour, capital and organization- National income- Difficulties in estimation-Taxation- Direct and indirect taxes- Progressive and regressive- Black money-Inflation-Causes and consequences.

Module 5

Indian financial system- Reserve bank of India: Functions- Commercial banking system-Development financial institutions- IDBI- ICICI- SIDBI- IRBI-NABARD- Investment institutions-UTI- Insurance companies- Indian capital market- Stock market- Functions- Role of the public sector- Privatisation-Multinational corporations and their impact on the Indian economy.

References

1. Industrial Management - O P Khanna, Dhanpat Rai Pub.
2. Industrial Management - K.K. Ahuja, Khanna Pub.
3. Marketing Management - Philip Kotler, PHI
4. Indian economy - A.N. Agarwal, Wishwa Prakashan
5. Modern economic theory - K.K Dewett, Shyam Lal charitable trust.

DIGITAL COMMUNICATION TECHNIQUES

L 602 **3+1+0**

Module 1

Random Signal Theory: Review of discrete and continuous random variables- Gaussian probability function- properties- error function- complementary error function. Base band data transmission: - Base band binary data transmission system- Inter symbol interference- Nyquist pulse shaping criteria- Optimum transmitting- Receiving filters.

Module 2

Correlative coding: -Duobinary Base band PAM system- Use of controlled ISI- M-ary signaling scheme (no analysis)- Binary versus M-ary signaling schemes- pre coding- Bipolar coding- Manchester coding- HDB coding- Equalization- Adaptive equalization- Eye pattern- Scrambler- Unscrambler.

Module 3

Digital transmission: - BPSK- DPSK- M-ary PSK- QPSK- BFSK- M-ary FSK- MSK- comparison.

Module 4

Digital transmission of Analog signals: - Sampling - Quantizing uniform non-uniform quantization -Companding- A law μ law PCM system- DPCM delta modulation system- slope over loading- ADM- CVSD- Quantization noise.

Module 5

Noise in communication system: - Noise types- SNR- Probability of error- Effective Noise temperature- Noise figure- Detection of binary signals in Gaussian noise: -Maximum likelihood Receiver structure- Matched filter- Correlation realization of matched filter- optimizing error performance- error probability performance of binary transmission system.

References

1. Digital Communications: Sklar,Pearson Education
2. Digital and Analog Communication System: K Sam Shanmugam.
3. Principles of Communication System: Taub & Shilling, TMH.
4. Digital Communication- Siman Haykin.
5. Communication Systems Engineering: Proakis, Pearson Education.
6. Digital & Analog Communication System- Leon W Couch, Pearson Education.

DIGITAL SIGNAL PROCESSING

LTA 603 **3+1+0**

Module1

Review of signals and systems: Introduction - advantages and limitations of Digital Signal Processing. Infinite Impulse Response (IIR) Filters - Signal Flowgraph- Basic Network structure for IIR filter- Direct- Cascade- Parallel Forms. Design of IIR Digital filters from analog filters- Butterworth design- Chebyshev design- design based on numerical solutions of differential equations- Impulse Invariant Transformation.

Module 2

Finite Impulse Response (FIR) Filters: Linear phase FIR filters- Frequency response of linear phase FIR filters - Location of the zeros of linear phase FIR filters. Realization of FIR- cascade - lattice design-Fourier Series method- using windows-rectangular- triangular or Barlett windows- Hanning- Hamming- Blackman- Kaiser windows.

Module 3

Discrete fourier Transform: Properties-Circular convolution- Linear Convolution using DFT- relation between Z- Transform and DFT- Fast Fourier Transform; decimation – in time and Frequency - FFT algorithms – General Computation using Radix 2 algorithm.

Module 4

Finite word length effects in digital filters: Introduction- Number Representation - Fixed Point- Sign-Magnitude - One's-complement- Two's - complement forms -Addition of two fixed point numbers- Multiplication in Fixed Point arithmetic - Floating point numbers- Block floating point numbers- quantization - truncation- rounding - effects due to truncation and rounding- Input quantization error - Product quantization error - Co-efficient quantization error- zero-input limit cycle Oscillations - Overflow limit cycle Oscillations - Scaling- Quantization in Floating Point realization IIR digital filters - Finite Word Length Effects in FIR Digital Filters- Quantization effects in the Computation of the DFT- quantization errors in FFT algorithms.

Module 5

Applications of digital signal processing: Speech Processing- speech analysis- speech coding- sub band coding- channel vecoder- homomorphic vecoder- digital processing of audio signals- Radar signal processing- DSP based measurements systems. Equi ripple FIR design- PCM DSP chips- a general study.

References

1. Digital signal processing: Ifechor- Pearson edn.
2. Desecrate time signal processing: Oppenhiem- Pearson edn.
3. Digital signal processing: Oppenhiem and Sheffer- PHI
4. Introduction to Digital signal processing: Johny R Johnson
5. Digital signal processing: Proakis and Manolakis.
6. Digital signal processing: P Ramesh Babu- Scitech Pub.

RADIATION & PROPAGATION

L 604 **2+1+0**

Module1

Retarded potentials: Radiation from an A.C current element monopoles and dipoles-power radiated from a dipole isotropic radiators- radiation pattern-radiation intensity-directive gain-power antenna efficiency-effective area-effective length and aperture-Reciprocity theorem-radiation resistance-antenna beam width.

Module 2

Antenna array: Classifications-Broad-side, End-fire arrays. Array of n- point, two point sources, multiplication of patterns -binomial array-stacked array folded dipole- reflector-Basic principles of antenna-parabolic reflector different methods-Chebyshev arrays- super directive arrays.

Module 3

VLF and LF transmitting antennas-effects of ground on antenna-performance-grounded antennas-effects of antenna height and effective height of antenna-medium frequency antennas-dipole antennas-V and inverted V antennas-Rhombic antenna-traveling wave antennas-folded dipole, Yagi-Uda antenna-Basic principles of radio direction finding-loop antennas, Microstrip antennas.

Module 4

Factors involved in the propagation of radio waves: the ground wave-Reflection of radio waves by the surface of the earth-space wave propagation-considerations in space wave propagation-atmospheric effects in space wave propagation-ionosphere and its effects on radio waves -mechanism of ionosphere propagation-refraction and reflection of sky waves by ionosphere-ray paths-skip distance-maximum usable frequency-vertical and oblique incidence-fading of signals - selective fading-diversity reception, Duct Propagation.

Module 5

Antenna measurements: Input impedance- SWR method- radiation pattern measurements- beam width measurements-gain measurements-measurements of radiation resistance -radiation efficiency.

References

1. Antennas and wave propagation - K. D. Prasad
2. Antennas - John Krauss, Mc Graw Hill
3. Antenna theory and design- A. Ballanis
4. Radio Engg - F E Terman, Mc Graw Hill.

ELECTRONIC INSTRUMENTATION

L 605 **3+1+0**

Module 1

Objectives of engineering measurement-Basic measuring system-block diagram and description-Performance characteristics of instruments-static and dynamic. Types of data-static-dynamic-transient-rise time, response time & settling time. Analog and digital information-comparison. Error -classification of measurement errors--sources of measurement errors.

Module 2

Transducers-parameters of electrical transducers-types-active and passive-analogue and digital types of transducers. Electromechanical type-potentiometric, inductive (self generating and non self generating type), capacitive, piezo electric, strain gauge, ionization and mechano electronic type. Opto electrical type-photo emissive, photo conductive and photo voltaic type. Frequency generating type-digital encoders-selection criteria for transducers.

Module 3

Intermediate elements-instrumentation amplifier, isolation amplifier. Data transmission elements-block diagram of telemetering system-classification of telemetering system-Electrical telemetering system--voltage, current and position type-RF telemetery-pulse telemetery (analog and digital)-pulse amplitude, pulse frequency, pulse duration and pulse position modulation.

Module 4

Bridge measurements - Wheatstone bridge - guarded Wheatstone bridge. AC bridges - Owen's bridge - Shering Bridge - Wein Bridge - Wagner ground connection. Recording techniques-strip chart recorders-basic principles of digital recording. Basic principles of Signal Analyzers-Distortion analyzer wave analyzer, spectrum analyzer.

Module 5

Basic measurements - Strain measurement - Pressure measurement - Flow measurement - Temperature measurement - Force & torque measurement. Multiplexing - D/A multiplexing and A/D multiplexing.

References

1. Measurement Systems - Doeblin, MGH.
2. Instrumentation-devices and systems - Rangan, Sarma & Mani, TMH.
3. Principles of Measurement & Instrumentation – Morris, PHI.
4. Transducers & Instrumentation – D.U. S Murthy, PHI.

CONTROL SYSTEMS

L 606 **3+1+0**

Module 1

Introduction to control system – Basic idea of control systems and their classifications – transfer function – transfer function of electrical, mechanical and electromechanical system – block diagram – signal flow graph – Mason's gain formula.

Module 2

Time domain Analysis – Type and order of a system – typical test signals for the time response of control system – impulse and step response of first and second order systems – steady state error – static and dynamic error coefficients – concepts of stability – Routh Hurwitz criterion – basic ideas of proportional, derivative and integral controllers.

Module 3

Frequency domain analysis – frequency response – frequency domain specifications – Bode Plot – Nicol's chart – Nyquist stability criterion – relative stability – gain margin – phase margin.

Module 4

Root Locus technique – basic theory and properties of root loci – procedure for construction of root loci – error detectors – servo motor – tacho generator – magnetic amplifier.

Module 5

State variable analysis and compensation techniques – introduction to state variable concepts – state variable description of linear dynamic systems – state equations – state transition matrix – representaion of state equations – lag compensator – lead compensator – lag lead compensator (design of compensators is not needed).

References

1. Modern control engineering – Katsuhiko Ogata, Pearson Edn
2. Control systems principles and design: M. Gopal, TMH.
3. Automatic control system – B.C. Kuo, PHI.
4. Control system design: Graham C Goodwin, PHI.
5. Modern Control Systems: Dorf, Pearson Education.

LINEAR IC LAB

L 607 **0+0+3**

List of Experiments

1. Measurement of op amp parameters.
2. Active filters: LPF, HPF, BPF, All pass & notch filters.
3. Square wave, Triangular, Saw tooth generation using op amp.
4. Logarithmic amplifiers.

5. Precision rectifiers.
6. Switched capacitor filter.
7. Sample and hold circuit.
8. 8038 function generators.
9. Analog to digital converters.
10. Digital to analog converters.

Note

Any experiment related to L505 may be added to the above list.

MINI PROJECT

L 608 **0+0+3**

The mini project will involve the design, construction, and debugging of an electronic system approved by the department. There will be several projects such as intercom, SMPS, burglar alarm, UPS, inverter, voting machine etc. The schematic and PCB design should be done using any of the standard schematic capture & PCB design software. Each student may choose to buy, for his convenience, his own components and accessories. Each student must keep a project notebook. The notebooks will be checked periodically throughout the semester, as part of the project grade.

In addition to this, the following laboratory experiments should also be done in the lab.

1. Astable and mono stable multi-vibrators using 555
2. Light activated alarm circuit
3. Speed control of electric fan using triac
4. Illumination control circuits
5. Touch control circuits
6. Sound operated circuits.
7. Schematic capture software (OrCAD or similar) familiarization.
8. PCB design software (OrCAD Layout or similar) familiarization.

A demonstration and oral examination on the mini project also should be done at the end of the semester. The university examination will consist of two parts. One of the lab experiments will be given for examination to be completed within 60 to 90 minutes with a maximum of 30% marks. 70% marks will be allotted for the demonstration and viva voce on the mini project.

SEVENTH SEMESTER

MICRO-CONTROLLER BASED SYSTEM DESIGN

LA701 **2+1+0**

Module 1

Various logic families - features – comparison – PLA – PAL- GAL -comparison – combinational PAL – PAL with flip-flops – study of 16L8, 22V10 GAL – dual port RAM – FIFO - FPGA - gate arrays.

Module 2

Embedded C compiler – advantages – memory models – interrupt functions – code optimization - 89C2051 micro-controller- architecture-comparison with 89C51- design of a simple trainer circuit using 89C51/89C2051 µC – interfacing of DIP switch, LED, 7 segment display, alphanumeric LCD – relay interface – design of a traffic light control system - interfacing programs using C and assembly language.

Module 3

Analog to digital converters- single slope, dual slope, successive approximation, sigma delta, flash – comparison - typical ICs - A/D interface – digital to analog converters – different types – D/A interface - optically isolated triac interface- design of a temperature control system- interfacing programs using C and assembly language.

Module 4

Serial bus standards - I^2C bus, SPI bus – operation – timing diagrams – 2 wire serial EEPROM – 24C04 – 3wire serial EEPROM – 93C46 - interfacing - serial communication standards - RS232, RS422, RS485 – comparison – MAX232 line driver/ receiver - interfacing – interfacing programs using C and assembly language - low voltage differential signaling – PC printer port – registers – interfacing - universal serial bus – PCI bus.

Module 5

Matrix key board interface - AT keyboard – commands – keyboard response codes - watch dog timers - DS1232 watch dog timer – real time clocks – DS1302 RTC – interfacing - measurement of frequency - phase angle - power factor – stepper motor interface - dc motor speed control – L293 motor driver - design of a position control system - interfacing programs using C and assembly language.

References

1. The 8051 Microcontroller: Muhammad Ali Mazidi, Pearson Education.
2. The 8051 Microcontroller: Kenneth J Ayala, Penram International.
3. Digital fundamentals: Floyd, Pearson Education.
4. Programming and customizing the 8051 µC: Myke Predko, TMH
5. Programming with ANSI C and turbo C: Kamthane, Pearson Education.
6. Microcomputers and Microprocessors: John Uffenbeck, PHI.
7. Web site of Atmel semiconductors - www.atmel.com

VLSI TECHNOLOGY

LA 702 **3+1+0**

Module 1

Process steps in IC fabrication: Crystal growth and wafer preparation- Czochralski process- apparatus- silicon shaping, slicing and polishing- Diffusion of impurities- physical mechanism- Fick's I and II law of diffusion- Diffusion profiles- complementary (erfc) error function- Gaussian profile- Ion implantation- Annealing process- Oxidation process- Lithography- Photolithography, Fine line lithography, electron beam and x-ray lithography- Chemical vapour deposition (CVD)- epitaxial growth- reactors- metallisation- patterning- wire bonding and packaging.

Module 2

Monolithic components: Isolation of components- junction isolation and dielectric isolation- Transistor fabrication- buried layer- impurity profile- parasitic effects- monolithic diodes- schottky diodes and transistors- FET structures- JFET- MOSFET- PMOS and NMOS, control of threshold voltage (V_{th})- silicon gate technology- Monolithic resistors- sheet resistance and resistor design- resistors in diffused regions- MOS resistors- monolithic capacitors- junction and MOS structures- IC crossovers and vias.

Module 3

CMOS technology: Metal gate and silicon gate- oxide isolation- Twin well process- Latch up- BiCMOS technology- fabrication steps- circuit design process- stick diagrams- design rules- Capacitance of layers- Delay- Driving large capacitance loads- Wiring capacitance- Basic circuit concepts- scaling of MOS structures- scaling factors- effects of miniaturization.

Module 4

Subsystem design and layout- Simple logic circuits- inverter, NAND gates, BiCMOS circuit, NOR gates, CMOS logic systems – bus lines- arrangements- power dissipation- power supply rail distribution- subsystem design process- design of a 4 bit shifter.

Module 5

Gallium Arsenide Technology: Sub-micro CMOS technology- Crystal structure- Doping process- Channeling effect- MESFET- GaAs fabrication- Device modeling.

References

1. Modern VLSI design: Wolf, Pearson Education.
2. VLSI technology: S M Sze, Mc Graw Hill pub.
3. Basic VLSI design: Douglas Pucknell, PHI.
4. Principles of CMOS VLSI Design: H E Weste, Pearson Edn.
5. Integrated Circuits: K R Botkar, Khanna Pub.
6. CMOS circuit design layout and simulation: Barter, IEEE press.
7. Introduction to VLSI: Conway, Addison weslay.

MICROWAVE AND RADAR ENGINEERING

L703 **3+1+0**

Module 1

Introduction to Microwaves- Characteristic features- advantages and applications- Wave guides- basic concepts and properties. Scattering matrix- Concept of N port scattering matrix representation- Properties of S matrix- S matrix formulation of two-port junction. Passive microwave devices- T junctions- H plane, E plane and EH plane Tee junctions, its S matrix and properties- Applications of Hybrid junction. Directional coupler-Termination- Gyrator- Isolator- Circulator- Phase changer- Attenuator.

Module 2

Microwave measurements- frequency- power- VSWR- impedance. Microwave tubes- High frequency limitations- Magnetron- Multicavity Klystron- Reflex Klystron- Traveling Wave Tube- principle of operation. Microwave Communication: Basic Principles of Microwave Links – Microwave relay Systems – block schematic of terminal transmitters and receivers – repeaters – basic principles of design of a microwave links.

Module 3

Microwave semiconductor devices- Principle of operation of Transistors and FETs. Transferred Electron Devices- Gunn diode- Gunn diode as an Oscillator and an amplifier- InP diode- Tunnel diode- principle of operation. Avalanche Transit time devices- IMPATT and TRAPATT devices- principle of operation.

Module 4

Radar range equation- Block schematic of pulse radar- Radar frequencies- Applications of radar- CW radar- applications of CW radar- CW radar with nonzero IF- FM CW radar-FM CW altimeter- MTI and Pulse Doppler radar.

Module 5

Direction finders- Instrument Landing System- Radio ranges. Navigation- Hyperbolic navigation- LORAN. Satellite navigation- Doppler navigation - Global positioning system- Different types of microwave antennas-basic principles.

References

1. Microwave devices and circuit: Samuel Liao, PHI.
2. Microwave and radar — A K Maini, Khanna Publishers.
3. Microwave and Radar Engg. — M Kulkarni.
4. Introduction to radar systems — Merrill I Skolnik, McGraw Hill.
5. Radar systems and radio aids to navigation — A K Sen & A B Bhattacharya.

OPTICAL FIBRE COMMUNICATION SYSTEMS

L704 **2+1+0**

Module 1

Recollection of basic principles of optics: ray theory- reflections at boundary- critical angle- total internal reflection - Optical wave guides - Propagation in fibre- expression for acceptance angle-acceptance cone – numerical aperture- V number - Index profile-effect of index profile on propagation.

Module 2

SI fibre and GI fibre - Brief description of modes in SI fibre and GI fibre- Pulse dispersion and Band Width limitation- Mode coupling – Attenuation in single mode and multimode fibres- Optic fibre cables- characteristics of cables- Optic fibre couplers: types of coupling – fibre to fibre joints- splicing techniques- optical fibre connectors.

Module 3

Optical sources- LEDs, LASER diodes- operating characteristics- photo-detectors-principles of photo detection – PIN diode – APD – operating principles – photo-multiplier tubes- source to fibre power launching – lensing schemes- modulation circuits.

Module 4

Basic optical communication systems- point-to-point link- rise time budget- protection techniques- WDM – transceiver requirements-TDM- optical amplifiers- SOAs – EDFAs- optical receivers- Introduction to optical fibre networks.

Module 5

OTDR - Measurements- numerical aperture- dispersion measurements- refractive index profile measurements- band width measurements- fibre attenuation measurements- cutoff wave length measurements- applications of fibre optic systems- future developments

References

1. Fibre optic communication technology: Djafer K Mynbaev, Pearson Education.
2. Electronic communication: Dennis Roddy & John coolen, PHI.
3. Optic fibre communication: John M senior, PHI.
4. Telecommunication principle circuits Systems and experiments: S.Ramabhadran, Khanna.
5. Optical communication system: John Gower, PHI
6. Fibre optics in telecommunication: Sharma, Mc Graw Hill
7. Optical fibre and fibre optic communication: Subir Kumar Sarkar, S Chand & co. Ltd
8. Optical communication: M Mukund Rao , Universities press.
9. Fiber Optic Communication: Palais, Pearson Education.
10. Digital Communication system with Satellites & Fibre Optics Applications: Kolimbris, Pearson Education.
11. Optical Networks - 3rd Generation Transport systems: Black, Pearson Education.

INFORMATION THEORY AND CODING

L705 **3+1+0**

Module 1

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.

Module 2

Discrete channels: - Symmetric channels, Binary Symmetric Channel, Binary Erasure Channel, Cascaded channels, repetition of symbols, Binary unsymmetric channel, Shannon theorem. Continuous channels: - Capacity of band limited Gaussian channels, Shannon-Hartley theorem, Trade off between band width and signal to noise ratio, Capacity of a channel with infinite band width, Optimum modulation system.

Module 3

Source coding: - Encoding techniques, Purpose of encoding, Instantaneous codes, Construction of instantaneous codes, Kraft's inequality, Coding efficiency and redundancy, Noiseless coding theorem. Construction of basic source codes: - Shannon-Fano algorithm, Huffman coding, Arithmetic coding, ZIP coding.

Module 4

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, RS codes, Burst error correction.

Module 5

Convolutional codes: - Encoding- State, Tree and Trellis diagrams, Maximum likelihood decoding of convolutional codes -Viterby algorithm, Sequential decoding -Stack algorithm. Interleaving techniques: - Block and convolutional interleaving, Coding and interleaving applied to CD digital audio system -CIRC encoding and decoding, interpolation and muting. ARQ: - Types of ARQ, Performance of ARQ, Probability of error and throughput.

References

1. Communication Systems: Simon Haykin, John Wiley & Sons. Pvt. Ltd.
2. Principles of Communication Systems: Taub & Schilling, Tata McGraw-Hill
3. Principles of Digital Communication: Das, Mullick & Chatterjee, Wiley Eastern Ltd.
4. Error Control Coding Fundamentals and Applications: Shu Lin & Daniel J. Costello Jr., Prentice Hall Inc.
5. Digital Communications Fundamentals and Applications: Bernard Sklar, Person Education Asia

OPTIMIZATION TECHNIQUES (ELECTIVE - I)

CMELRTA 706.1 **3+1+0**

Module1 Classical optimization techniques

Single variable optimization – Multivariable optimization with no constraints – Hessian matrix – Multivariable saddle point – Optimization with equality constraints – Lagrange multiplier method - Multivariable optimization with inequality constraints – Kuhn-Tucker conditions.

Module 2 One-dimensional unconstrained minimization

Elimination methods – unrestricted search method – Fibonacci method – Interpolation methods – Quadratic interpolation and cubic interpolation methods.

Module 3 Unconstrained minimization

Gradient of a function – Steepest descent method – Newton's method – Powells method – Hooke and Jeeve's method.

Module 4 Integer – Linear programming problem

Gomory's cutting plane method – Gomory's method for all integer programming problems, mixed integer programming problems.

Module 5 Network Techniques

Shortest path model – Dijkstra`s Algorithm – Floyd`s Algorithm – minimum spanning tree problem – PRIM algorithm – Maximal Flow Problem algorithm.

References

1. Optimization theory and application: S.S. Rao, New Age International P. Ltd.
2. Optimization Concepts and applications in Engineering: A. D. Belegundu, T.R. Chandrupatla, Pearson Education Asia.
3. Principles of Operations Research for Management: F. S. Budnick, D. McLeavey, R. Mojena, Richard D. Irwin, INC.
4. Operation Research an introduction: H. A. Taha, Eastern Economy Edition.
5. Operations Research: R. Panneerselvam, PHI

OBJECT ORIENTED PROGRAMMING IN C++ (ELECTIVE - I)

LA706-2 **3+1+0**

Module 1

Introduction to loops: Evolution of object oriented languages - Support for experiments and structure - process of language translation – Need of objects - Definition of Object - Oriented Language.

Module 2

Encapsulation & Inheritance: Building classes - Declaring objects Member functions - constructors and destructors members access control.

Module 3

POLYMORPHISM - Virtual functions - Defining virtual functions – Usage of virtual functions - Abstract classes - simulation using abstract classes.

Module 4

OVERLOADING: Overloading functions - Overloading operators to provide new meaning - Selecting Friend or Member Functions for Operator Overloading.

Module 5

DYNAMIC OBJECTS: Dynamic object allocation - Using references with dynamic memory allocation - Inline functions outside class definitions - Friend functions, Applications - Object oriented databases case study – some language (Simula, Smalltalk, C++, Ada) features.

References

1. Data abstraction & OOP in C++: Gordenkeeth, Wiley Eastern.
2. Object oriented programming usig C++: Pohl, Pearson Education.
3. Object oriented programming with C++: E. Balaguruswamy, TMH.
4. C++ Programming language: Strostroup, Pearson Education.
5. Object Oriented Programming in C++: Nabajyoti Bjarne.

NEURAL NETWORKS (ELECTIVE - I)

L706-3 **3+1+0**

Module 1

Introduction - Principles - artificial neuron - activation functions - Single layer & multi-layer networks - Training artificial neural networks - Perception - Representation - Linear separability - Learning - Training algorithms.

Module 2

Back Propagation - Training algorithm - Applications - network configurations - Network paralysis - Local minima - temporal instability.

Module 3

Counter Propagation networks: Kebenon layer - Training the cohenen layer - Pre initializing the wright vectors - statistical properties - Training the Grosbery layer - Full counter propagation network - Application.

Module 4

Statistical methods- Boltzmann's Training - Cauche training - Artificial specific heat methods - Applications to general non-linear optimization problems.

Module 5

Hopfield nets - Recurrent networks - stability - Associative memory - applications - Thermo dynamic systems - Statistical Hopfield networks – Bi-directional associative memories - Continuous BAM - Adaptive resonance theory - Architecture classification - Implementation.

Text Book

Neural Computing Theory & Practice - Philip D. Wasserman.

References

1. Neural Networks - Simon Haykins, Pearson Education.
2. Adaptive Pattern Recognition & Neural Networks - Pay Y.H.
3. An Introduction to neural computing - Chapman & Hall
4. Artificial Neural Networks - Robert J. Schalkoff, McGraw Hill
5. Artificial Neural Networks - B.Yegnanarayana, PHI

BIOMEDICAL ENGINEERING (ELECTIVE - I)

L 706-4 **3+1+0**

Module 1

Biometrics- Biomedical instruments- parameters- Man-instrument system- components- physiological systems of human body- cardiovascular system- The heart- Respiratory system- blood purification- The Kidney- Nervous system- Bioelectric potentials- Resting and Action potentials- propagation- bio-potential electrodes- Transducers- ECG-EEG-EMG.

Module 2

Biomedical measurements: ECG measurement- electrodes and leads- ECG recorder- different recorders. Blood pressure measurements- indirect measurement- sphygmomanometer- direct measurement techniques. Respiratory measurements- Lung volume and capacities- Spirometer- Gas exchange measurements. Clinical measurements: Blood cells- tests on blood cells- chemical tests- colorimeter- spectro photometer- continuous flow analyzer.

Module 3

Ultrasonic measurements: Characteristics of Ultrasound- Attenuation- Doppler effect- basic modes of transmission- pulsed, continuous, pulsed Doppler- Ultrasonic imaging- Block schematic of A mode, B mode, M mode instruments- Electronic scanners: Linear and Phased array- Applications of Ultrasound: Gynecology and obstetrics- blood flow measurements- cardiac imaging- echocardiography- echoencephalography.

Module 4

X ray imaging and measurements: x ray generation- x ray machine- C arm machine- image intensifiers- x ray films- photographic imaging- Fluoroscopy- computed tomography- CAT scan: block schematic- Gantry- detectors.

Module 5

Bio-telemetry: components in telemetry system- transmitter-receiver- pulse modulators- implantable units- applications. Intensive care unit: Planning and location of different instruments- Bedside monitors- Prosthetic instruments- artificial heart- pump oxygenators- hemodialysis- artificial kidney- different dialysers. Electrical safety: Physiological effects of electric current- let go current- shock hazards- need of grounding- isolation of patients- isolated power distribution system.

References

1. Introduction to biomedical technology: Joseph J Carr, Pearson Edn.
2. Biomedical Instrumentation & Measurements: Leslie Cromwell, PHI.
3. Biomedical Instrumentation: John G Webster, Houghton Mifflin Company.
4. A handbook to biomedical instrumentation: R S Khandpur, Tata Mc Graw Hill Pub.

PRINCIPLES OF REAL TIME SYSTEMS (ELECTIVE - I)

LA 706-5 **3+1+0**

Module 1

Introduction to Real Time Systems – Structure of real time systems, real time computer, task classes – Periodic, Aperiodic, critical, Non-critical, definition of real time systems – real time systems, embedded systems - Hard real time systems, soft real time systems, real time design issues.

Module 2

Real time kernel – polled loop systems, co-routines, interrupt driven systems – sporadic, fixed rate systems, hybrid systems, task control block - task status, scheduling – uni-processor scheduling – traditional rate monotonic, rate monotonic deferred server, EDF, IRIS tasks – multiprocessor scheduling – utilization balancing algorithm, next-fit, bin- packing algorithm, myopic offline, buddy strategy (no need of proofs) fault tolerant scheduling.

Module 3

Communication – Communication Media and message sending topologies, network architecture issues, protocols – contention – based, token - based, stop and go multi-loop, polled bus, hierarchal, round robin, fault tolerant routing – clocks and synchronization – fault tolerant synchronization in hardware, synchronization in software.

Module 4

Fault tolerance – definition, cause of failure, fault types, fault detection and containment, redundancy – hardware, software, time, information, integrated failure handling – reliability – parameter values – series – parallel systems, NMR clusters, combinational model, master chain model, fault latency, transient faults, software error models.

Module 5

Programming Languages – Desired language characteristics, Real time databases, characteristics, main memory databases, Transaction, Disk schedule algorithms, Databases for hard real time systems, maintaining serialization constituency.

Text Book

Real Time Systems - C.M Krishna, Kang G. Shini (McGraw Hill)

References

1. Real Time Systems, Design & Analysis - Philip Laplante (IEEE)
2. Real Time Systems - Krishna, Tata McGraw Hill

MICROPROCESSOR AND MICROCONTROLLER LAB

LA707 **0+0+3**

1. Familiarization of 8085 trainer kit, manual code entry, simple examples.
2. Design and construction of a simple flash programmer for 89C51/89C2051 μC.
3. Study of Intel Hex file format.
4. Computer aided assembly language program development for 89C51/89C2051.
5. Use of assembler, linker and simulator for 89C51/89C2051.
6. Programming examples. Sorting, arithmetic operations (Using assembler, simulator).
7. Programming examples using Embedded 'C' compiler for 89C51/89C2051.
8. Programming examples using timer, external interrupts.
9. Design and construction of the following interfacing modules.
   a) A/D converter.
   b) D/A converter.
   c) Alphanumeric LCD display.
   d) Matrix keyboard interface.
   e) Seven segment display.
   f) Extending I/O port using shift registers(74HC595, 74HC165).
   g) Stepper motor.
   h) Infra red transmission and reception.
   i) Opto isolated I/P and O/P.
   j) Serial EEPROM.
   k) Real time clock.
   l) Interfacing using RS 232 and printer port.

Note

Any other embedded processor with similar or better capability may be used instead of 89C51/89C2051.

COMMUNICATION II LAB

L708 **0+0+3**

1. Microwave measurements - VSWR, wavelength, Attenuation, Impedance.
2. Antenna Measurements - Gain, Directivity, Radiation Pattern of various types antennae.
3. Characteristics of Klystron.
4. Wave-guide Measurements.
5. Study of optical fibers and optical communication systems.
6. Delta modulation, PCM, PAM, PPM, PWM, ASK, PSK.
7. Experiments of Satellite communication system.
8. Display systems.
9. Study of PLC's.
10. Familiarization of Digital modulation and demodulation Trainer Kit.

EIGHTH SEMESTER

COMPUTER NETWORKS

LA 801 **3+1+0**

Module 1

Network goals -topologies- configurations-concept of internet- ISO-OSI 7 Layer Standard -peer processes-Functions of each layer-TCP/IP reference model - Transmission media -description and characteristics - base band and broad band transmission-synchronous and asynchronous -full duplex, half duplex links- Concepts of WAP technology.

Module 2

MODEMS-serial communication standards - X-21 digital interface- Need for data link layer-stop and wait and sliding window protocol-HDLC-terminal handling-polling-multiplexing- concentration-virtual circuit and data-grams - routing - congestion control.

Module 3

LAN- base band and broad band Lan's - carrier sense networks-CSMA/CD -ring network- shared memory -IEEE802 standards-introduction to X-25. Transport layer- design issues- establishing and releasing connection - flow control – buffering - crash recovery - a simple transport protocol on X-25.

Module 4

Session layer- design issues -data exchange - dialogue management - synchronization- remote procedure call-client server model - Presentation layer-data presentation-compression- network security-privacy- cryptography-presentation layer in ARPANET.

Module 5

Application layer - virtual terminal - file transfer protocol-E-mail-introduction to distributed system - ATM-protocol architecture -ATM logical connections -ATM cells -cell transmission- ATM adaptation layer -AAL protocols -basic principles of SDH and SONET.

References

1. Computer Networks: Andrew S Tannenbaum, Pearson Education.
2. An Engineering Approach to Computer Networking: Keshav, Pearson Education.
3. Computer Networking: A Top Down Approach: Kurose Pearson Education.
4. Computer Network & Internet: Comer, Pearson Education.
5. Data communication: Hausly
6. Computer Networks, protocols standards & interfaces, Uyless Balack
7. Local Area Networks: William Stallings, Pearson Education.
8. Understanding Data Communication and networks- 2nd ed-William A Shay (Vikas Thomson Learning)

ADVANCED COMMUNICATION SYSTEMS

L802 **3+1+0**

Module1

Satellite Communication - Satellite orbits – Geo synchronous orbit –orbital velocity – Round trip time delay - Antenna look angles - Satellite classifications - spacing - frequency allocation- System parameters analysis - link equations- Link Budget - Spacecraft subsystem (block schematic). Tracking and telecommand - Earth stations – Antenna systems – receiver subsystems (block) - functioning LNA – LNB - down converter - channel filters - demodulators- INTELSAT/INMARSAT –Overview of INSAT.

Module 2

Types of satellite communication system-FSS, DSS-Direct broadcasting and community broadcast - Multiple Access Techniques– Introduction- FDM-FM-FDMA, PSK-TDMA, SSMA, CDMA - Switching techniques – circuit – message - packet switching- Packet satellite network-domestic satellite system.

Module 3

The cellular concept – Introduction - Frequency reuse –channel assignment – Hand off strategies – prioritizing handoff –practical handoff – Co-channel interface and system capacity – channel planning – adjacent channel interference –Cell splitting – sectoring – repeaters – micro-cell concept- Blue tooth technology- Fundamentals and Applications.

Module 4

Wireless communication system-paging-cordless & cellular system –comparison-Second generation cellular networks-third generation cellular networks - Global System for Mobile – services and features – Architecture – Radio subsystem – channel types – frame structure - Global positioning Systems - basic concepts-system block - positioning – Applications.

Module 5

Spread spectrum Techniques and remote sensing- Pseudo noise sequences –time hopping-frequency Hopping – Robustness – Fast and Slow hopping – Hybrid & Chirp spread spectrum- Synchronization – acquisition – Tracking - Concepts of Jamming -Analysis of DS/SS – Analysis of avoidance-generation of signals-detection –Applications.

References

1. Electronic communication system fundamentals: Wayne Tomasi, Pearson Education.
2. Wireless communication principles and practice: T S Rappaport, Pearson Education.
3. Satellite communication: Gagliardi.
4. Digital Communication Fundamentals and Applications: B Sklar, Pearson Education.
5. Digital communication: Simon Haykin, John Wiley&Sons.
6. Space communication System: Filipowasky, McGrawHill.

ADVANCED MICROPROCESORS

LA803 **3+1+0**

Module 1

Intel 8086 Microprocessor - Internal architecture – Block diagram – Minimum and maximum mode operation – Interrupt and Interrupt applications – DMA data transfer – 8087 math coprocessor. 8086 memory organization – even and odd memory banks – segment registers – logical and physical address – advantages and disadvantages of physical memory.

Module 2

Addressing modes used in 80x86 family - Data addressing mode – register addressing, immediate addressing, direct addressing, register indirect addressing, base plus index addressing, register relative addressing, base relative plus index addressing, scaled addressing. Program memory addressing modes - direct program memory addressing, relative program memory addressing. Stack memory addressing mode.

Module 3

Intel 80286 Microprocessor - 80286 Architecture, system connection – Real address mode operation – Protected mode operation

Module 4

Intel 80386 Microprocessor - 80386 Architecture and system connection – Real operating mode – 386 protected mode operation – segmentation and virtual memory – segment privilege levels and protection – call gates – I/O privilege levels – Interrupts and exception handling – task switching – paging mode – 80386 virtual 86 mode operation.

Module 5

Advanced Intel Microprocessors - 80486 – Processor model – Reduced Instruction cycle – five stage instruction pipe line – Integrated coprocessor – On board cache – Burst Bus mode. Pentium – super scalar architecture – u-v pipe line – branch prediction logic – cache structure – BIST (built in self test) – Introduction to MMX technology.

References

1. The Microprocessors 6th Edition Barry B. Brey Pearson Edu.
2. Microprocessor and Interfacing 2nd Edition Douglous V. Hall TMH
3. The 80x86 family John Uffenbeck

TELEVISION ENGINEERING

L 804 **3+1+0**

Module 1

Elements of Television system: Basic block schematic of television transmitter and receiver, Analysis of Television pictures, Scanning, human factor consideration, flicker, interlaced scanning, number of scanning lines, Horizontal and vertical resolution, maximum video frequency, Colour resolution and bandwidth, Composite video signal, video signal dimensions, vertical and horizontal synchronization signal dimensions, channel bandwidth, vestigial side band transmission, channel bandwidth and allocations for colour transmission.

Module 2

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: Positive and negative modulation and its comparison, high level and low level modulation and its comparison. Colour TV picture tubes: purity and convergence, Delta gun, PIL, Trinitron tubes, LCD screens.

Module 3

Monochrome and colour reception, Monochrome receiver: Detailed block schematic, Yagi antenna, BALUN transformers, RF tuner, electronic tuning, SAW filters, IF conversion, VSB reception and correction, video detector, AGC: delayed AGC and Keyed AGC, video amplifier, cathode and grid modulation, sync separation, horizontal and vertical deflection circuits and wave forms, sound separation. Power supplies: SMPS and block schematic explanation, EHT generation and its wave form description, Typical ICs in different stages.

Module 4

Colour Television: Compatibility consideration, Colour response of human eye, Three colour theory, additive mixing of colours, chromaticity diagram, Luminance and chrominance, colour difference signal and its generation, Polarity of colour difference signal, Frequency interleaving and Colour burst signal, delay lines, Basic colour television systems: PAL and NTSC, Block schematic explanation.

Module 5

Television applications: CCTV and its functional block schematic, Cable television: converters, cable connections, Satellite television: Dish antenna, LNB, Down converters, Video discs: VCD and DVD, Digital recording, LASER source, High definition television.

References

1. Monochrome and colour television: R R Gulati, Wiley Eastern.
2. Colour Television, Theory and Practice: S P Bali, Tata Mc Graw Hill.
3. Television engineering: A M Dhake, Tata Mc Graw Hill
4. Basic Television Engineering: Bernad Grob, Mc Graw Hill.

ADVANCED MATHEMATICS (ELECTIVE - II)

CMELRT 805-1 **3+1+0**

Module 1 Green's Function

Heavisides, unit step function – Derivative of unit step function – Dirac delta function – properties of delta function – Derivatives of delta function – testing functions – symbolic function – symbolic derivatives – inverse of differential operator – Green's function – initial value problems – boundary value problems – simple cases only

Module 2 Integral Equations

Definition of Volterra and Fredholm Integral equations – conversion of a linear differential equation into an integral equation – conversion of boundary value problem into an integral equation using Green's function – solution of Fredhlom integral equation with separable Kernels – Integral equations of convolution type – Neumann series solution.

Module 3 Gamma, Beta functions

Gamma function, Beta function – Relation between them – their transformations – use of them in the evaluation certain integrals – Dirichlet's integral – Liouville's extension of Dirichlet's theorem – Elliptic integral – Error function.

Module 4 Power Series solution of differential equation

The power series method – Legendre's Equation – Legendre's polynomial – Rodrigues formula – generating function – Bessel's equation – Bessel's function of the first kind – Orthogonality of Legendre's Polynomials and Bessel's functions.

Module 5 Numerical solution of partial differential equations.

Classification of second order equations- Finite difference approximations to partial derivatives – solution of Laplace and Poisson's equations by finite difference method – solution of one dimensional heat equation by Crank – Nicolson method – solution one dimensional wave equation.

References

1. Linear Integral Equation: Ram P.Kanwal, Academic Press, New York
2. A Course on Integral Equations: Allen C.Pipkin, Springer, Verlag
3. Advanced Engg. Mathematics: H.K.Dass, S.Chand
4. Advanced Engg. Mathematics: Michael D.Greenberge, Pearson Edn. Asia
5. Numrical methods in Engg.&science: B.S.Grewal, Khanna Publishers
6. Generalized functions: R.F. Hoskins, John Wiley and Sons.
7. Principles and Techniques of: Bernard Friedman, John Wiley and sons Applied Mathematics
8. Principles of Applied Mathematics: James P.Keener, Addison Wesley.
9. Numerical methods: P.Kandasamy,K.Thilagavathy,K.Gunavathy, S.Chand & co

VHDL (ELECTIVE - II)

LA805-2 **3+1+0**

Module 1

Introduction: Hardware Abstraction- Basic Terminology- Entity Declaration- Architecture Body- Configuration Declaration- Package Declaration- Package Body- Model Analysis- Simulation- Basic Language Elements –Identifiers- Data Objects- Data Types- Operators.

Module 2

Behavioural Modelling: Entity Declaration- Architecture Body-Process Statement- Variable Assignment Statement- Signal Assignment Statement- Wait Statement- If Statement - Case Statement- Null Statement- Loop Statement- Exit Statement- Next Statement- Assertion Statement- Report Statement- Other Sequential Statements- Multiple Processes- Postponed Processes - Dataflow Modelling: Concurrent Signal Assignment Statement- Concurrent versus Sequential Signal Assignment- Delta Delay Revisited- Multiple Drivers- Conditional Signal Assignment Statement- Selected Signal Assignment Statement- the UNAFFECTED Value- Block Statement- Concurrent Assertion Statement- Value of a Signal

Module 3

Structural Modelling: Component Declaration- Component Instantiation- Resolving Signal Values - Generics and Configurations: Generics- Configurations- Configuration Specification- Configuration Declaration- Default Rules - Conversion Functions - Direct Instantiation- Incremental Binding.

Module 4

Subprograms and Overloading: Subprograms- Subprogram Overloading- Operator Overloading- Signatures- Default Values for Parameters - Packages and Libraries: Package Declaration- Package Body-Design File- Design Libraries- Order of Analysis- Implicit Visibility- Explicit Visibility.

Module 5

Advanced Features: Entity Statements- Generate Statements- Aliases- Qualified Expressions- Type Conversions- Guarded Signals- Attributes- Aggregate Targets- Shared Variables- Groups - Model Simulation: Simulation- Writing a Test Bench- Converting Real and Integer to Time- Dumping Results into a Text File- Reading Vectors from a Text File- A Test Bench Example- Initialising a Memory- Variable File Names- Hardware Modelling Examples: Modelling Entity interfaces- Modelling Simple Elements- - Different Styles of Modelling- Modelling Regular Structures- Modelling Delays- Modelling Conditional Operations- Modelling Synchronous Logic- State Machine Modelling- Interacting State Machines- Modelling a Moore FSM- Modelling a Mealy FSM- A Generic Priority Encoder- A Simplified Blackjack Program- A Clock Divider- A Generic Binary Multiplier- A Pulse Counter- A Barrel Shifter- Hierarchy in Design.

Text Book

VHDL Primer Third editions: J. Bhasker, Pearson Education Asia.

References

1. Introducing VHDL from simulation to synthesis: Sudhakar Yalamanchilli, Pearson Education Asia

MEDICAL ELECTRONICS (ELECTIVE - II)

L 805-3 **3+1+0**

Module 1

Bioelectric potentials Human cell – action potential – ECG waveform – relation with heart action- bio-potentials from brain- excitation and inhibition potentials- Electroencephalogram- muscle action- EMG- muscular servo mechanism. Bio-potential electrodes: Half cell potential- equivalent circuit between electrodes and skin – electrodes types- stimulating electrodes- biomedical transducers- classification- selection.

Module 2

Biomedical amplifiers – op amps- differential amplifiers- OPA 111: FET input op amp- data sheet- high impedance 50 Hz reject filter with gain- instrumentation amplifier – INA 101- pH probe amplifiers- pH probe electrometer- Bridge amplifiers- input protection- isolation amplifiers- basic design- carrier type isolation amplifier- synchronous demodulator- opto isolators- optical coupling- Transformer coupled isolation amplifiers- ISO212- Fiber optic isolation amplifier- chopper stabilized amplifier- differential chopper amplifier- input guarding- shield driver.

Module 3

ECG wave form- The standard lead system- Einthoven triangle- ECG preamplifier- Right leg drive circuit- shield drive- Typical ECG amplifier circuit- QRS complex detection- ECG digitization- improvement in resolution- ECG machine- mechanism- patient cables- ECG machine maintenance. Blood pressure measurements- Pressure transducers- Amplifiers- dc amplifiers- isolated dc amplifier- pulsed excitation amplifier- ac carrier amplifier- systolic, diastolic and mean detector circuit plethysmography- blood flow measurements- electromagnetic flow meter.

Module 4

EEG- Instrumentation requirements- Neuron membrane potential- EEG electrodes- Frequency bands- multi-channel EEG recording systems- preamplifiers- circuits- EEG telemetry systems. ICU monitoring system- intensive care equipments- cardio tachometers- lead fault indicator- central monitoring consoles- telemetry system.

Module 5

Medical Imaging: Computed tomography- basic principle - data accumulation- scanning motions – x ray tubes- collimators- detectors- image reconstruction- algorithms- display – resolution. Nuclear Magnetic Resonance- nuclear structure and angular momentum- magnetic dipole moment- alignment- Larmor frequency- RF magnetic field- Free Induction decay- Instrumentation- Imaging system.

References

1. Introduction to Biomedical equipment technology: J J Carr, Pearson Education.
2. Biomedical Instrumentation: John G Webster, Mifflin Hougton Co.
3. Medical Electronics: C Raja Rao, University Press.
4. Biomedical Instrumentation: R S Khandpur, TMH

ADVANCED MICRO-CONTROLLERS (ELECTIVE - II)

LA805-4 **3+1+0**

Module 1

Low pin count controllers – Atmel AVR family – ATTiny15L controller - architecture – pin descriptions – features – addressing modes – I/O space – reset and interrupt handling – reset sources - Tunable internal oscillator.

Module 2

Timers – Watch dog timer – EEPROM – preventing data corruption – Analog comparator – A/D converter – conversion timing – ADC noise reduction – PortB – alternate functions – memory programming – fuse bits – high voltage serial programming – algorithm.

Module 3

National semiconductor COP8 family - COP8CBR9 processor – features – electrical characteristics – pin descriptions – memory organization –EEPROM - security – brownout reset – in system programming – boot ROM. Idle timer – Timer1, Timer2, Timer3 -operating modes – PWM mode – event capture mode

Module 4

Power saving modes – Dual clock operation – Multi input wake up – USART – framing formats – baud rate generation – A/D conversion – operating modes – prescaler – Interrupts – interrupt vector table – Watch dog – service window – Micro-wire interface – waveforms.

Module 5

Microchip PIC16 family – PIC16F873 processor – features – architecture – memory organization - register file map – I/O ports – PORTA - PORTB – PORTC – Data EEPROM and flash program memory – Asynchronous serial port – SPI mode – I2C mode.

References

1. Design with PIC micro-controllers: John B Peatman, Pearson Education.
2. DS101374: National Semiconductor reference manual.
3. National semiconductor web site – www.national.com
4. 1187D: Atmel semiconductor reference manual.
5. Atmel semiconductor web site – www.atmel.com
6. DS30292B: Microchip reference manual.
7. Microchip semiconductor web site – www.microchip.com

E-COMMERCE (ELECTIVE - II)

LA805-5 **3+1+0**

Module1

Introduction to Electronic Commerce - E-Commerce Framework- Anatomy of E-Commerce Applications - E-Commerce Consumer & Organization Applications- E- Commerce and World Wide Web - Internet Service Providers - Architectural Framework for Electronic Commerce - WWW as the Architecture- Hypertext publishing.

Module 2

Network Security - Client-Server Network Security - CS Security Threats – Firewalls - Data & Message Security - Encrypted Documents - Security on the Web.

Module 3

Electronic Payment Systems - Types of Electronic Payment Systems - Digital Token Based Electronic Payment System - Smart Cards - Credit Cards - Risk in Electronic Payment Systems - Designing Electronic Payment Systems.

Module 4

Electronic Data Interchange - EDI Application in Business- EDI-Legal - Security and Privacy Issues - EDI standardization - EDI Envelope for Message Transport - Internet based EDI - Internal Information System- Work-flow Automation and Coordination- Supply Chain Management- Document Library- Types of Digital Documents- Corporate Data Warehouses.

Module 5

Recent Trends in E-Commerce - Multimedia in E-Commerce- Video Conferencing with Digital Videos- Broad Band Telecommunication- Frame & Cell Relays- Switched Multimegabit Data Service (SMDS)- Asynchronous Transfer Mode- Mobile Computing and Wireless Computing.

Text Book

Frontiers of Electronic Commerce: Ravi Kalakota & Andrew B Whinston, Pearson Education.

References

1. Global Electronic Commerce: J Christopher Westland & Theodore H K Clark.
2. E- Commerce The cutting edge of Business: Kamlesh K Bajaj & Debjani Nag.
3. E-Commerce: Strategy Technologies and Applications, TMH.

ADVANCED DIGITAL SIGNAL PROCESSING (ELECTIVE - III)

LA806-1 **3+1+0**

Module 1

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 2

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 3

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 4

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.

Module 5

General and special purpose DSP Processors - Computer Architecture for signal processing – Havard Architecture - Pipelining - Hardware Multiply and Accumulate – Special Instructions - Replication - On-chip Memory Cache - Extended Parallelism - SIMD – VLIW and static sûper-scalar Processing - Brief study of TMS320C4X and ADSP 2106 processors.

References

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 Desig Hand Book: A .B Williams and FT Taylor, McGraw Hill
4. Wavelets and Subband Coding: Valterli & Kovaceric, PHI.
5. Analog Devices & Texas Instruments Users Manuel of TMS320C4X and ADSP 2106x.

MULTIMEDIA SYSTEMS (ELECTIVE - III)

LA806-2 **3+1+0**

Module 1

INTRODUCTION: Definition of multimedia, multimedia, hardware, software applications and software environments - Media Types - Analog and digital video, digital audio, music and animation - Analog & Digital video - Memory storage - Basic tools - Authoring tools.

Module 2

BUILDING BLOCKS: Text - Hyper text - Sound - Sound cards - Standards - Image - Image types - Image compression, RLE, JPEG, MPEG - Fractal and Wavelet Compressions - Image file types - Animation - Capture and Playback techniques. (basic ideas only)

Module 3

MULTIMEDIA ENVIRONMENTS: The Compact Disc family, CD-interactive, Digital Video Interactive, QuickTime, Multimedia PC and Microsoft Multimedia Extensions.

Module 4

MULTIMEDIA PROGRAMMING: Framework: Overview, Media classes, Transform classes, Format classes and Component classes - Problems related to programming - Composition, Synchronisation, Interaction, Database integration.

Module 5

ADVANCED MULTIMEDIA: Moving pictures - Techniques realistic image synthesis, Virtual Reality - Full motion digital video - Video capture techniques - multimedia networks - Desktop video conferencing - Future multimedia.

References

1. Multimedia Programming Objects, Environments & Framework - Simon J. Gibbs, Dionysios C. Tsischritziz (Addison-Wesley Publishing Co.)
2. Multimedia- Making it work - Tay Van Ghan – Osborne Tata Mcgraw Hill
3. Authoring Interactive multimedia - Arch C Luther
4. Optimizing your Multimedia PC - L.J. Skibbe, Susan Lafe Meister - Comdex
5. Multimedia Bible - Winn L. Rosch, Sams
6. Multimedia Producers Bible- Ron Goldberg, Comdex
7. Multimedia Power Tools - Peter Jellam, Random house Electronic Pub.
8. Multimedia Computing - Mathew E. Hodger & Russel M. Sasnett, Addison wesley
9. Integrated Multimedia Systems - Palikom, The communication Wall Overview

SYSTEM SOFTWARE (ELECTIVE - III)

LA806-3 **3+1+0**

Module1

Introduction: Concept of system software, classification of system s/w. Assemblers: over view of assembly process, elementary ideas of macros & macro processors. Compilers: Overview of compilation process, Parsing- top down & bottom-up parsing, storage allocation. Interpreters: basic ideas only.

Module2

Operating Systems: types of OS, batch processing, multiprogramming, timesharing, real time OS. OS services UNIX OS –shells, Bourne Shell, C-shell-visual editor.

Module3

Information Management: File system- directory structure, basic file system calls, file protection, allocation methods disk blocks and inodes in UNIX. Device management.

Module4

Processor Management: CPU scheduling - scheduling algorithms, Multiprocessor scheduling, Process management in UNIX, concurrent process-critical section, semaphores, synchronization, concurrent languages.

Module5

Memory Management: swapping, partitions,, paging, segmentation, virtual memory concepts, page replacement, dynamic linking, caching of secondary storage, memory management in UNIX, Deadlocks: cause, detection, prevention, avoidance, recovery, combined approach to deadlock handling.

References

1. System programming and Operating Systems – D M Dhamdhere
2. System Software – an introduction to system Programming – Leland L Beck, 3ed.
3. Operating System – Peterson & Silberschatz, Addison Wesley
4. Operating Systems – Dietal H M
5. Design of UNIX Operating System – Maurice J Bach
6. UNIX System Programming – Stevens.

EMBEDDED SYSTEMS (ELECTIVE - III)

LA806-4 **3+1+0**

Module 1

Overview of Embedded System: -Embedded System, Categories of Embedded System, Requirements of Embedded Systems, Challenges and Issues in Embedded Software Development, Applications of Embedded Systems in Consumer Electronics, Control System, Biomedical Systems, Handheld computers, Communication devices.

Module 2

Embedded Hardware & Software Development Environment: - Hardware Architecture, Micro-Controller Architecture, Communication Interface Standards, Embedded System Development Process, Embedded Operating systems, Types of Embedded Operating systems.

Module 3

Embedded Communication System: Serial Communication, PC-to-PC Communication, Serial Communication with the 8051 Family of Micro-controllers, Protocol Converter, Voice-over-IP, Embedded Applications over Mobile Network example MP3 Sound Player.

Module 4

Real Time & Database Applications: - Real-Time Embedded Software Development, Sending a Message over a Serial Link, Simulation of a Process Control System, Controlling an Appliance from the RTLinux System, Embedded Database Applications using examples like Salary Survey, Energy Meter Readings.

Module 5

Java Applications & Future Trends in Embedded Systems: Networked Java-Enabled Information Appliances, Embedded Process Control System, Mobile Java Applications, Appliance Control using Jini, System on a Chip (SOC), Smart Cards and the Cashless Society, Security in Embedded Systems.

Text Book

Programming for Embedded Systems- Dreamtech Software Team, Wiley Dreamtech

Reference

1. Fundamentals of Embedded Software where C and Assembly Meet – Daniel W Lewis.

DIGITAL IMAGE PROCESSING (ELECTIVE - III)

LA806-5 **3+1+0**

Module 1

Image representation and modeling - Characteristics of a digital image - Elements of digital image processing systems - Image digitizers & scanners - Elements of visual perception - Brightness & contrast - Image sampling & Quantisation - Two dimensional Sampling theorem - Reconstruction of image from its samples - Aliasing.

Module 2

Image Transforms - Two dimensional orthogonal & unitary transforms - Properties of unitary transforms - Two dimensional DFT & its properties – Cosine – Hadamard – Haar – Sine - KL Transforms & their properties.

Module 3

Image Enhancement - Point processing - Histogram modeling & Equalization - Spatial Filtering - Filtering in the frequency domain - color Image processing.

Module 4

Image Restoration - Degradation model - Inverse filtering - Wiener Filter - Interactive restoration - Image analysis & vision -basic principles only.

Module 5

Image Coding & Compression- basic principles - run length coding - variable length coding - bit plane coding - loss-less predictive coding - lossy predictive coding - Transform coding - Image compression standards.

References

1. Digital image Processing: I.Gonzalez Rafel C, Pearson Education.
2. Fundamentals of digital image processing: Jain Anil K, PHI.
3. Digital Image Processing: Pratt William K, John Wiley.

SYSTEMS LAB

L807 **0+0+3**

1. Experiments based on Matlab.
   a. To test linearity, causality & stability of LTI system.
   b. To find DFT of a given sequence using DIT & DIF FFT algorithms.
   c. To find IFFT of a given sequence using DIT & DIF FFT algorithms.
   d. Program to design IIR filter using Bilinear transformation impulse invariant methods.
   e. Control system simulation experiments.
   f. Programs to design filters using window techniques.

2. Digital signal processing based on DSP processors.
3. Familiarization of PAL assembler.
4. Realization of combinational and sequential circuits using PAL.
5. Realization of simple digital circuits using VHDL.
6. Familiarization of FPGA trainer kits.
7. Realization of digital circuits using FPGA.

Note

Any other experiments may be added in accordance with the electives offered.

L 709 / 808 **PROJECT DESIGN AND SEMINAR** **0+0+2**

Each student is required to present a technical paper on a subject approved by the dept. The paper should in general reflect the state of the art. He / she shall submit a report on the paper presented to the department. In addition to the seminar he / she shall undertake a project work (as a team or individually) in the 7th semester itself in consultation with the guide (s), panel of staff members, and submit a report of the project work done to the department.

VIVA – VOCE

L809

A comprehensive Viva - voce examination will be conducted to assess the student's overall knowledge in the specified field of engineering. At the time of viva - voce, certified reports of seminar and project work are to be presented for evaluation.

B.TECH. DEGREE COURSE

SYLLABUS

COMPUTER SCIENCE & ENGINEERING BRANCH

THIRD SEMESTER

ENGINEERING MATHEMATICS - II

RT301 **3+1+0**

Module1

Mathematical Logic - Statements, connectives - Well formed formulas – Tautologoies - Equivalance of formulas - Duality law Tautological implications - Normal forms - the theory of inference for the statement - Calculus - validity, Consistency, Theorem proving - the predicate calculus - Inference Theory of the predicate calculus.

Module 2

Number Theory: Prime and Relatively prime numbers – Modular arithmetic – Fermat's and Euler's Theorems – Testing for Primability – Euclids Algorithm – Discrete Logarithms

Relations & Functions - Properties of binary relations - Equivalance relations and partitions - Functions and pigeon hole principle.

Module 3

Algebraic systems - general properties - Lattices as a partially ordered set - some properties of lattices - lattices as algebraic systems - sub lattices - direct product - homomorphism - some special lattices.

Module 4

Discrete Numeric Functions & generating Functions, Recurrence relations - Manipulations of Numeric functions - generating functions - Recurrence relations - Linear recurrence relations with constant coefficients - Homogeneous solutions - Particular solutions - Total solutions - solutions by the method of generating functions.

Module 5

Graph Theory: Basic concept of graphs, subgraphs, connected graphs, Paths, Cycles, Multigraph and Weighted graph - Trees - spanning trees.

References

1. Elements of Discrete Mathematics - C.L.Lieu, McGraw Hill.
2. Discrete mathematical structures with applications to Computer Science - J.P. Trembly, R. Manohar, McGraw Hill.
3. Discrete Mathematics - Richard Johnsonbaugh, Pearson Education Asia
4. Discrete Mathematical Structures - Bernard Kolman, Robert C. Bushy, Sharon Cutler Ross, PHI
5. A first look at Graph Theory - John Clark & Derek Allan Holton, Allied Publishers
6. Cryptography and network security principles and practice - William Stallings, Pearson Education Asia

MICROPROCESSOR SYSTEMS

R302 **3+1+0**

Module 1

CPU, I/P unit, O/P unit, Memory, Bus organizations, ALU, Control Unit, Registers, Execution of an instruction, Main memory, Addressing, Memory Address Register - Memory Data Register – Memory systems - Architecture of 8085- Pin Diagram - Registers.

Module 2

Instruction set of 8085 - Instruction Types – Arithmetic – Logic data transfer, Branch, Stack, I/O and Machine Control instructions - Addressing Modes - Direct and Indirect Addressing - Immediate Addressing - Implicit Addressing.

Module 3

Subroutines - Stack Operations - Call Return sequence- Programming Examples.
CPU of a microcomputer – timing and control unit – The fetch operation – Machine cycle and T- State instruction and data flow.

Module 4

Interrupts of 8085 - Hardware & Software Interrupts – Enabling, Disabling and masking of interrupts – Polling – HALT & HOLD states – Programmable interrupt controller – 8259

Module 5

Interfacing Memory and I/O devices - Address space partitioning - Memory mapped I/O - I/O mapped I/O - Memory interfacing - interfacing EPROM & RAM to 8085 – Data transfer schemes - Programmed data transfer - synchronous and asynchronous transfer - interrupt driven data transfer – DMA data transfer – DMA controller – 8257 – I/O channels.

References

1. Microprocessor Architecture, Programming and Applications with the 8085 - Gaonkar, New Age International
2. Microprocessors, interfacing and Applications - Renu Singh, B. P. Singh, New Age International
3. Microprocessors - B. Ram
4. Introduction to Microprocessors Systems - Adithya P. Mathur, PHI
5. Microprocessors Peripherals and Applications - Gilmore

SOLID STATE ELECTRONICS

RT303 **2+1+0**

Module 1

Transistor – Biasing - Stability - Thermal runaway. Transistor As an amplifier - RC coupled amplifier, Frequency Response, Gain Bandwidth relation - Cascading of transistors - cascade Darlington pair - emitter follower

Module 2

FET, FET amplifier – MOSFET, depletion and enhancement type - source drain characteristics and transfer characteristics.

Module 3

Oscillators - Concept of feed back - Transistorised phase shift oscillator - wien bridge Oscillator – Hartley Oscillator - Colpits Oscillator (Operation and Expression for frequency)

Module 4

Clipping, Clamping, Integration, Differentiation - Astable, Bistable and Monostable Multivibrators - Sweep generators, Simple Bootstrap sweep generators.

Module 5

Power supplies & Special semi conductor devices - Regulator power supplies – IC regulated Power supplies, 7805, 7905, LM317 – LED, LCD, Photodiode, Photo transistor, opto coupler. Seven segment display, SCR, UJT (basic concepts only), DIAC, TRIAC.

References

1. Integrated Electronics - Millman and Halkias, McGraw Hill
2. Pulse Digital and Switching wave forms - Millman and Taub, McGraw Hill
3. Electronics Devices & Circuits - Boylsted & Neshelsky, Pearson Education

PROBLEM SOLVING AND COMPUTER PROGRAMMING

RT 304 **3+1+0**

Module 1

Problem solving with digital Computer - Steps in Computer programming - Features of a good program - Modular Programming - Structured - Object Oriented - Top down and bottom up approaches - Algorithms - Flowchart - Pseudocode, examples

Module2

C fundamentals: Identifiers, keywords, data types, operators, expressions, data Input and Output statements, simple programming in C.

Module 3

Control statements & Functions: If - else, for, while, do - while, switch, break & continue statements, nested loops. Functions - parameter passing - void functions Recursion – Macros.

Module 4

Structured data types: Single dimensional arrays - multidimensional arrays, strings, structures & unions - Program for bubble sort.

Module 5

Pointers & files - Declaration, passing pointers to a functions- Accessing array elements using pointers - Operations on pointers - Opening & Closing a file - Creating & Processing a file, Command line arguments.

Text Book

1. Programming with C - Byron S. Gottfried, Tata McGraw Hill

References

1. Computer Programming in C - Kerninghan & Ritchie, PHI
2. Programming with ANSI and Turbo C - Ashok N. Kamthan, Pearson Eduacation
3. Let us - Yeaswanth Khanetkar, BPB
4. Programming in C - Stephen C. Kochan, CBS publishers
5. Using C in Program Design - Ronald Leach, Prism Books Pvt. Ltd, Bangalore
6. Mastering Turbo C - Bootle, BPB Publications
7. Programming and Problem Solving with PASCAL - Micheal Schneider, Wiley Eastern Ltd.
8. Pointers in C - Yeaswanth Khanetkar, PBP
9. C Programming - A Modern Approach - K.N. Iling W.W. Norton & Company Newyork
10. Structured and Object Oriented Problem Solving using C++ - Andrew C Staugaard Jr., PHI

HUMANITIES

RT305 **2+1+0**

PART A: PRINCIPLES OF MANAGEMENT

Module 1

Scientific Management – Evolution of management theory – Contributions of Taylor, Gilbreth, Gantt, Emerson – Definition and functions of management – Authority, Responsibility, Delegation and Span of control – Types of structures of Organisation – Types of Business firms – Job evaluation and merit rating – Wages – Types of incentives.

Module 2

Procedure for ISO and ISI certification – Design, Development and implementation of re-engineering – Inspection – SQC control charts – quality assurance – TQM – Zero defects.

PART B: ENGINEERING ECONOMICS

Module 3

The Indian financial system – Reserve bank of India – functions – commercial banking system – profitability of public sector banks – development financial institutions – IDBI, ICICI, SIDBI, IRBI – Investment institutions – UTI, Insurance companies– The stock market – functions – Recent trends.

Module 4

Indian Industries – Industrial pattern – structural transformation – industrial growth – inadequacies of the programme of industrialization – Large and small scale industries – industrial sickness and government policy – industrial labour – influence of trade unions.

Module 5

The tax framework – Direct and Indirect taxes – Impact and incidence – Progressive and regressive – functions of the tax system – Black money – magnitude and consequences – Public debt – Debt position of the central and state governments – Deficit financing – revenue deficit and fiscal deficit – Problems associated with deficit financing.

References

1. Management- Stoner, Freeman and Gilbert, PHI
2. Engineering Management- Mazda, Pearson Education
3. Indian Economy - Ruddar Datt, S Chand and Company Ltd.
4. Indian Economy – Problems of Development and Planning - A. N. Agarwal, Wishwa Prakashan.

LOGIC SYSTEM DESIGN

R306 **3+1+0**

Module 1

Addition, Subtraction, Multiplication & division of binary nos, BCD nos, excess-3 code, gray code, alphanumeric codes, error detection using parity bits - error correcting codes, haming code.

Module 2

Postulates of boolean algebra - basic theorems - Logic functions - truth tables - canonical forms - SOP, POS - methods of minimization of logic functions - K maps & quine mcclaskey method - realization using logic gates - NAND NOR gates - universal gates - don't care combinations - formation of switching function - from word statements.

Module3

Sequential logic - flip flops - SR, JK, T & D flip flops - master slave JK flip flop. Counters - asynchronous, binary decade, and up/down counters - synchronous binary decade, and up/down counters.

Module4

Adders - design - Half adder, Full adder, Half subtractor & Full subtractor - Carry look ahead adder, carry save adder, carry propagation adder.

Module 5

Registers - serial in & parallel in shift registers - left & right shift registers - static shift registers - typical IC's - counters using shift registers - ring counter, Johnson counter.

References

1. An introduction to digital computer design - Rajaraman & Radhakrishnan, PHI
2. Logic and Computer Design – M. Moris Mano, Charles R. Kime Pearson Education
3. Switching & finite automata theory - Zvi Kohavi, Tata McGraw Hill
4. Digital computer fundamentals - Thomas C. Bartee, Tata McGraw Hill.
5. Digital Computer Design - Malvino, Tata McGraw Hill.
6. Digital Design - Morris Mano, Pearson Education
7. Digital Design Principles & Practice – John F. Wakerly, Pearson Education

SOLID STATE ELECTRONICS LAB

R307 **0+0+4**

1. Characteristics of Silicon, Germanium, Zener diodes.
2. Characterisctics of CE, CB configurations of transistors; Characteristics of FET.
3. Clipping and clamping Circuits - RC differentiating and Integrating Circuits.
4. Half wave and full wave an Bridge rectifiers.
5. Single stage RC coupled amplifiers - Frequency response
6. Astable multivibrators using BJT.
7. Sweep Generator (Simple sweep)
8. Oscillators - Rc phase shift oscillator.

PROGRAMMING LAB

R308 **0+0+4**

1. Familiarisation with computer system microprocessor - peripherals - memory card etc.
2. Familiarisation of operating system - DOS Windows etc. (use of files, directories, internal commands, external commands, compilers, file manager, program manager, control panel etc.)
3. Familiarisation with word processing packages like wordstar and Msword
4. Progrmming experiments in C to cover control structures - functions - arrays - Structures - pointers and files.
5. Familiarisation of C++ and Visual tools.

Any experiment according to the syllabus of RT304 problem solving and Computer Programming can be included.

FOURTH SEMESTER

ENGINEERING MATHEMATICS - III

CMELRPTA 401 **3+1+0**

Module 1

Ordinary Differential Equations: Linear Differential equations with constant coefficents - Finding P.I. by the method of variation of parameters – Cauchys equations- Linear Simultaneous eqns- simple applications in engineering problems.

Module 2

Partial Differential Equations - formation by eliminating arbitary constants and arbitary Functions - solution of Lagrange Linear Equations – Charpits Method – solution of homogeneous linear partial differential equation with constant coefficients – solution of one dimensional wave equation and heat equation using method of separation of variables – Fourier solution of one dimensional wave equation.

Module 3

Fourier Transforms: - Statement of Fourier Integral Theorems – Fourier Transforms – Fourier Sine & Cosine transforms - inverse transforms - transforms of derivatives – Convolution Theorem (no proof) – Parsevals Identity - simple problems.

Module 4

Probability and statistics: Binomial law of probability - The binomial distribution, its mean and variance - poisson distribution as a limiting case of binomial distribution - its mean and variance - fitting of binomial & poisson distributions - normal distribution - properties of normal curve - standard normal curve - simple problems in binomial, poisson and normal distributions.

Module 5

Population & Samples: Sampling distribution of mean (σ known) –Sampling distribution of variance, F and Chi square test – Level of significance - Type 1 and Type 2 errors – Test of hypothesis – Test of significance for large samples – Test of significance for single proportion, difference proportion, single mean and difference of mean (proof of theorems not expected)

References

1. Higher Engineering Mathematics - B.S. Grewal, Khanna Publishers
2. Engineering Mathematics Vol. II -3rd year Part A & B - M.K. Venkataraman, National Publishing Company
3. Elements of Partial Differential Equations - Ian N.Sneddon.,McGrawhill International Edn.
4. Miller and Fread's Probability and statistics for engineers – Richard A Johnson, Pearson Education Asia / PHI
5. A text book of Engineering Mathematics (Volume II) – Bali and Iyengar, Laxmi Publications Ltd.
6. Advanced Engg. Mathematics - Erwin Kreyszig, Wiley Eastern Ltd.
7. Probability and statistical inferences – Hogg and Tanis, Pearson Education Asia

COMPUTER ORGANIZATION

R 402 **2+1+0**

Module 1

Introduction: Organization and Architecture – Review of basic operational concepts – CPU- single bus and two bus organization, Execution of a complete instruction – interconnection structures – layered view of a computer system.

Module 2

CPU - Arithmetic: Signed addition and subtraction – serial and parallel adder – BCD adder – Carry look ahead adder, Multiplication – Array multiplier – Booth's Algorithm, Division – Restoring and non-restoring division, floating point arithmetic - ALU Design.

Module 3

Control Unit Organization: Processor Logic Design – Processor Organization – Control Logic Design – Control Organization – Hardwared control – Microprogram control – PLA control – Microprogram sequencer, Horizontal and vertical micro instructions – Nano instructions.

Module 4

Memory: Memory hierarchy – RAM and ROM – Memory system considerations – Associative memory, Virtual memory – Cache memory – Memory interleaving.

Module 5

Input – Output: Printers, Plotters, Displays, Keyboard, Mouse, OMR and OCR, Device interface – I/O processor – Standard I/O interfaces – RS 232 C, IEEE 488.2 (GPIB).

References

1. Computer Organization - Hamacher, Vranesic and Zaky, Mc Graw Hill
2. Digital Logic and Computer Design - Morris Mano, PHI
3. Computer Organization and Architecture -William Stallings, Pearson Education Asia.
4. Computer Organization and Design - Pal Chaudhuri, PHI
5. Computer Organization and Architecture -M Morris Mano, PHI
6. Computer Architecture and Organization - John P Hayes, Mc Graw Hill

OBJECT ORIENTED PROGRAMMING

R403 **2+1+0**

Module 1

Introduction to OOP - Evolution of object oriented languages - Need of Objects - Definition of Object-Oriented Language – Classes and Objects – Creating and Using Classes and objects – Member functions and variables – Constructors and Destructors.

Module 2

Inheritance and Access Control - Member access control in classes – Friend functions and classes – Extending classes - Public Private and Protected Inheritance – Classification of Inheritance – Single – Multiple – Multilevel – Hierarchical – Hybrid.

Module 3

Polymorphism – Runtime and compile time polymorphism – overloading functions and operators – selecting friend member function for operator overloading - Virtual methods – pure virtual methods – Abstract classes - Defining and using of virtual methods, pure virtual methods and abstract classes – applications of abstract classes.

Module 4

Advanced Concepts- Virtual Destructors – Virtual Base Classes - Template classes – Creating and using templates – Namespaces

Module 5

Dynamic Objects - Dynamic object allocation - Inline functions.
Other Object oriented languages – Java – Object oriented features in Java – Comparison with C++

References

1. Object Oriented Programming in C ++ - Robert Lafore, Galgotia Pub.
2. Object Oriented Programming in C++ - Nabajyoti Barkakati, PHI
3. Structured and Object Oriented Problem Solving using C++ - Andrew C Staugaard Jr., PHI
4. Object oriented Programming with C++ - E. Balaguruswamy, TMH
5. Java 2 Complete Reference - Herbert, Schildt, TMH
6. The Java Programming Language 3rd Edition - Arnold, Gosling, Holmes, Pearson Education Asia
7. Object-oriented programming using C++ - Ira Pohl, Pearson Education Asia
8. C++ How to program - Dietel & Dietel, Pearson Education Asia
9. An Introduction to Object-oriented programming – Timothy Budd
10. Problem Solving with C++ - Walter Savitch, Pearson Education Asia
11. C++ Primer - Stanley B Lippman, Josee Zajoie, Pearson Education Asia

INTEGRATED CIRCUITS

R404 **3+1+0**

Module 1

Logic Families - DTL - TTL - ECL - I^2L & CMOS. Comparison of circuits. Tristate logic - Propagation delay - power dissipation - Noise margin window profile - comparison - Fan in - Fan out.

Module 2

Storage elements - Flip flops - Latches - Registers, Decoders, Multiplexers- Buffers - Memory systems - ROM types - RAM - BJT RAM cells - MOS RAMs,

RAM organization - flash memories - PLA - PAL - PGA - FPGA - PLD - CPLD - CDROM - Magneto optic storage.

Module 3

D/A Converters - Binary weighted resistor type - Ladder type A/D converters – counting type - Successive approximation type - Parallel comparator type dual slope type.

Module 4

Opamps: Characteristics - Basic principles - definitions - parameters - Input, Offset, Voltage, Input bias current, CMRR, slew rate - Ideal Opamp - inverting and non inverting opamps.

Module 5

Opamp Applications: Summing, Comparator, Differentiator - Integrator - Square wave generator - Triangular wave generator using opamps.

References

1. Digital Integrated Electronics - Taub & Shilling, McGraw Hill
2. Pulse Digital & Switching Wave forms - Millman & Taub., McGraw Hill
3. Digital design with standard MSI & LSI by T.R. Blakesley & John Willey.
4. Integrated Circuits - Botkar, Khanna Publishers

DATA STRUCTURES & PROGRAMMING METHODOLOGIES

R 405 **3+1+0**

Module 1

Principles of programming – System Life Cycle - Algorithm Specification- Recursive Algorithms- Documentation- Performance Analysis and Measurements- Time and Space complexity-Complexity calculation of simple algorithms.

Module 2

Study of basic data structures – Arrays- Structures-Sparse matrix – Stacks – Queues- Circular queues- Priority queues - Dqueues. Evaluation of expressions – Polynomial representation using arrays.

Module 3

Linked Lists - Linked stacks and queues - Doubly linked lists - Polynomial representation using linked lists, Strings – Data representation – Pattern matching.

Module 4

Trees - Binary Trees – Tree Traversal – Inorder - Preorder and Postorder, Graphs – Depth first and breadth first search.

Module 5

Sorting methods: Selection sort, Bubble sort, Insertion sort, Merge sort, Quick sort, Heap sort, Radix sort, External sorting methods (basic idea only).

References

1. Fundamentals of Data Structures in C++: Horowitz, Sahni & Mehta, Galgottia Pub.
2. Classic Data Structures: Samanta, PHI
3. Data Structures and program design in C: Robert Kruse, Pearson Education Asia
4. Data Structures using C & C++: Langsam, Augenstein & Tanenbaum
5. Fundamental Algorithms: Knuth.
6. Algorithms + Data Structures = Programs: N.Wirth, PHI
7. An introduction to Data Structures with applications: Trembley & Sorenson, McGraw Hill
8. Data structures in Java: Thomas Standish, Pearson Education Asia

ADVANCED MICROPROCESSORS & PERIPHERALS

R 406 **3+1+0**

Module1

Study of Interfacing ICs - 8255, 8252, 8251, 8279 (functions and internal block diagram only)

Module 2

Interfacing with 8085 - Interfacing keyboard – Hardware and Software approach – Interfacing seven segment displays - Interfacing D/A and A/D converters - Micro controllers (brief idea only)

Module 3

8086/88 Architecture, Block diagram – Addressing modes – memory addressing modes – Program memory addressing modes – stack memory addressing modes.

Module 4

Instructions format of 8086 – data transfer- arithmetic –branch – loop- flag manipulation- shift & rotate – string- REP instruction – writing simple program in 8086 – Additional features of 80286 – protected mode memory addressing.

Module 5

Additional features of 80386 – Paging mechanism – Interfacing coprocessors in 80386 – Additional features of Pentium Processors. Brief study of latest processors of Intel & AMD (Architecture not required) – Introduction to RISC processors

References

1. Microprocessor Architecture, Programming and Applications with the 8085 - Gaonkar, New Age International
2. The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro processors. Architecture, Programming and Interfacing – Barry B Bray, Pearson Education Asia
3. The 80X86 family - John Uffenbeck, PHI

4. Introduction to the Intel Family of Microprocessors - James L.Antonakos, Pearson Education Asia
5. Intel Microprocessors - A.K.Ray
6. Microprocessors and Interfacing - Douglas V. Hall, TMH
7. Advanced Microprocessors and Peripherals - A. K. Ray and K. M.Bhurchandi, TMH
8. The Intel 8086/88 Microprocessor Architecture, Programming Design and Interfacing – Bhupendra Singh Chhabra, Dhanpat Rai Publishing Company (P) Ltd
9. IBM PC and Clones - Govindarajalu, TMH

INTEGRATED CIRCUITS LAB

R407 **0+0+4**

1. OP-amp Characteristics
2. Inverting and Non-inverting amplifier using Op-amp - frequency response.
3. Differentiating and Integrating Circuits - frequency response.
4. Astable multivibrator using Op-amp.
5. A/D Converter.
6. D/A Converter.
7. Transfer Characteristics and specifications of TTL and MOS gates.
8. Study of flip flops
9. Synchronous and Asynchronous Counters
10. Astable and Monostable multivibrators using gates.
11. Study of shift registers and their applications.
12. Study of decoders and Multiplexers.

DATA STRUCTURES LAB

R408 **0+0+4**

Experiments based on the following:

1. Array and Linked list implementation of Stacks, Queues, Dqueues, Graphs, Binary Trees, Polynomials, Sparse matrix.
2. Infix, Postfix and Prefix conversions.
3. Sorting and Searching methods.
4. String representation and pattern matching

Any experiment according to the syllabus of R405 can be substituted.

DATA BASE MANAGEMENT SYSTEMS

RT503 **3+1+0**

Module 1

Basic Concepts - Purpose of database systems-Components of DBMS – DBMS Architecture and Data Independence- Data modeling - Entity Relationship Model, Relational – Network- Hierarchical and object oriented models-Data Modeling using the Entity Relationship Model.

Module 2

Structure of relational databases – relational databases – relational algebra- tuple relational calculus. Data definition with SQL, insert, delete and update statements in SQL – views – data manipulation with SQL

Module 3

Introduction to Transaction Processing- Transaction and System Concepts- Desirable properties of Transactions- Schedules and Recoverability- Serializability of Schedules-Query processing and Optimization- Concurrency Control- -assertions – triggers.

Oracle case study: The basic structure of the oracle system – database structure and its manipulation in oracle- storage organization in oracle - Programming in PL/SQL- Cursor in PL/SQL

Module 4

Database Design– Design guidelines– Relational database design – Integrity Constraints – Domain Constraints- Referential integrity – Functional Dependency- Normalization using Functional Dependencies, Normal forms based on primary keys- general definitions of Second and Third Normal Forms. Boyce Codd Normal Form–. Multivalued Dependencies and Forth Normal Form – Join Dependencies and Fifth Normal Form – Pitfalls in Relational Database Design.

Module 5

Distributed databases: Distributed Database Concepts- Data Fragmentation, Replication and Allocation Techniques- Different Types- Query Processing – semijoin -Concurrency Control and Recovery.

Text Book

1. Fundamentals of Database System Elmasri and Navathe (3rd Edition), Pearson Education Asia

References

1. Database System Concepts - Henry F Korth, Abraham Silbershatz, Mc Graw Hill 2nd edition.
2. An Introduction to Database Systems - C.J.Date (7th Edition) Pearson Education Asia
3. Database Principles, Programming and Performance – Patrick O'Neil, Elizabeth O'Neil
4. An Introduction to Database Systems - Bibin C. Desai

FILE STRUCTURES AND ALGORITHMS

R504 **2+1+0**

Module1

File Organization: - Operations on Files – Heap Files - Sequential Files – Indexed sequential files – Direct files – Secondary key retrieval.

Module 2

Index Structures for Files: - Single level Ordered Index-Multilevel Indexes-Indexes on multiple Keys. Searching - Sequential search, Binary search, Interpolation search.

Module 3

Hashing: - Static Hashing-Hash Tables-Different Hash Functions-Mid Square-Division-Folding-Digit Analysis, Dynamic Hashing. Collision-Collision Resolution Techniques-Extendible Hashing.

Module 4

Search trees: -AVL Trees, height balanced trees, weight balanced trees, Threaded Binary Trees, Multiway search Trees- B Trees-B+ Trees.

Module 5

Storage management: - Dynamic storage management- storage allocation & liberation – First fit, best fit – Buddy system- Garbage Collection & Compaction.

References

1. Fundamentals of Data Structures in C++: Horowitz, Sahni & Mehta, Galgotia publications
2. Fundamentals of Database Systems: Elmasri & Navathe, Pearson Education Asia
3. File Structures an Object-Oriented Approach with C++: Folk, Zoellick, Riccardi, Pearson Education Asia.
4. Data Structures using C & C++: Langsam,Augenstein & Tanenbaum, Pearson Education Asia
5. Data Structures, Algorithms and Applications in C++: Sahni Galgotia publications
6. Data structures & Program design in C: Robert Kruse Pearson Education Asia

LANGUAGE PROCESSORS

RT 505 **3+1+0**

Module 1 Assembler

Overview of the assembly process - Design of two pass assembler- Single pass assembler- Macros – Macro definition and usage- schematics for Macro expansion – Design of a Macro pre-processor - Macro Assembler.

Module 2 Introduction to Compilers

Compilers and Translators – Structure of a compiler – lexical analysis – syntax analysis – context free grammars – basic parsing techniques- top down and

bottom up parsing (brief idea only)- Recursive Decent parser – Shift reduce parser.

Module 3 Storage allocation

Data descriptors- Static and Dynamic storage allocation – Storage allocation and access in block structured programming languages – Array allocation and access- Compilation of expressions – Handling operator priorities – Intermediate code forms for expressions –code generator.

Module 4 Compilation of Control Structures

Control transfer- Conditional and Iterative constructs- Procedure calls – Code optimization – Optimization transformations – Local optimization and global optimization – Compiler writing tools – Incremental Compilers

Module 5 Loaders and Linkers

Loading – Program relocatability – linking – various loading schemes – linkage editing – Design of linkage editor – dynamic loading – overlays – dynamic linking.

Text Book

1. System Programming and Operating Systems - Dhamdhere Mc Graw Hill
2. Principles of Compiler Design - Aho A.V., Ullman Narosa Publications.

References

1. Systems programming - Donovan, Mc. Graw Hill.
2. System Software - An Introduction to Systems Programming- Leland L. Beck, Addison Wesley.
3. Compilers Principles Techniques And Tools Aho, Sethi, Ullman, Pearson Education Asia

DATA COMMUNICATION

RT 506 **2+1+0**

Module 1

Communication concepts – Analog modulation – Various schemes – AM, PM, FM –Sampling theorem - Analog pulse modulation – PAM, PWM, PPM – Generation of various modulated waves (Block diagram only) –Digital Pulse modulation (PCM).

Module 2

Multiplexing - Frequency Division Multiplexing (FDM) – Time Division Multiplexing (TDM), Synchronous Time Division Multiplexing –Statistical time Division multiplexing – Key Techniques - ASK, FSK, PSK, DPSK - Channel capacity - Shannon`s Theorem.

Module 3

Digital data transmission – Serial, Parallel, Synchronous, Asynchronous and Isochronous transmission. Transmission mode- Simplex - Half duplex - Full duplex, Noise- different types of noise – Basic Principles of Switching (circuit, packet, message switching)

Module 4

Error detection and Correcting codes: Hamming code – Block codes and convolution codes – ARQ techniques – Transmission codes – Baudot – EBCDIC and ASCII codes – Barcodes.

Module 5

Terminal handling – Point to point, Multidrop lines. Components of computer communication – Concentrators - Front end Processor – Transmission media – Guided media – Twisted pair cable, coaxial cable, fibre optic cable. GSM service and GSM system architecture.

References

1. Electronic communication system - Kennedy, Mc Graw Hill.
2. Principles of Communication System - Taub & Schilling Mc Graw Hill.
3. Introduction to Data Communications & Networking - Behurouz & Forozan Mc Graw Hill.
4. Data Communication, Computer Networks & Open Systems - Fred Halsall Pearson Education Asia
5. Principles & Application of GSM. - Vijay K. Garg Pearson Education Asia
6. Modern Digital & Analog Communication Systems – B.P Lathi Prism Books Pvt. Ltd.
7. Computer Networks - A.S. Tanenbaum, PHI
8. Data and Computer Communication - William Stallings, Pearson Education Asia
9. Communication Engineering - A. Kumar, Umesh Publications

MICROPROCESSOR LAB

R507 **0+0+4**

1. Familiarization of training kits.
2. Simple programs for Arithmetic and Data Transfer.
3. Study of MASM Programming.
4. Programming Peripheral Controllers.
5. Interfacing the Trainer Kit.
6. Any experiment according to the syllabus R302 can be substituted

DATABASE LAB

R508 **0+0+4**

Experiments for performing the following:

1. Creation, insertion, updation, deletion of tables, indexes, views
2. Simple queries, nested queries, use of arithmetic and string functions.
3. Simple PL/SQL programs, use of exceptions, savepoints, cursor, procedure, function, trigger, sequence generator.
4. Importing and Exporting data.
5. Database Administration
6. ODBC/JDBC Interface.
7. Implementation of File Structures

Any experiment according to the syllabus of RT503 can be substituted.

SIXTH SEMESTER

PC & PC BASED SYSTEMS

R601 **3+1+0**

Module 1 Introduction to PC

Hardware components – study of motherboards —Different types of ports, slots and connectors-Add-on cards-Power supply– SMPS- function & operations.

Module 2 Storage Devices

Floppy – Floppy Disk Controller - Disk Physical specification & operations – Disk magnetic properties – Cylinders – Clusters – Hard disks – Hard disk drive operation – Magnetic data storage - Sectors – Disk formatting – partitioning - Hard disk features – Hard disk data transfer modes –Programmed I/O – Direct memory access – Ultra DMA – Data addressing – Standard CHS addressing – Extended CHS addressing – Logical Block Addressing.

Module 3 Optical Storage

CD ROM, CD Technology, Sector layout, CD-R, CD-RW, CDROM, drive specifications- data transfer rate – Access time – Constant linear velocity – constant angular velocity - Buffers – Interface – Magneto optical drives – WORM devices –DVD- RAID – Holographic storage.

Module 4 Memory Management in PC

Parity – ECC – Static & Dynamic RAM – Memory Addressing – Segmented addressing - 64 KB Limits – 640 KB barrier – Logical, segmented, virtual, linear and physical memory addresses – Extended and Expanded memory – Cache memory – Video memory – HMA - Flat memory model – Advanced memory technologies.

Module 5 Bus Structures

ISA, PCI, PCMCIA, AGP, USB, Hard Disk Interfaces – IDE, EIDE, ATA – Communication ports – Serial – Parallel port – Keyboard / Mouse Interface connectors.

References

1. PC Hardware Complete Reference - Craig Zacker & John Rourke, Tata McGraw Hill
2. Inside the PC (8th Edition) - Peter Norton,BPB
3. The Indispensable PC Hardware Book - Messmer, Pearson Education
4. Troubleshooting and Repairing Your PC - Corey Candler, Wiley
5. Upgrading and repairing PC's (4th edition) - Scott Mueller, Pearson Education
6. IBM PC Assembly Language Programming - Abel, PHI
7. PC Upgrading Maintenance & Trouble shooting guide - Dr. S. K. Chauhan, Kataria

SOFTWARE ENGINEERING

RT 602 **2+1+0**

Module 1 Introduction to Software engineering

Introduction – Software and software Engg.- Phases in software development- Software development process models-Role of Management in software development –Role of Matrics and measurement –Software requirement specification(SRS) - Problem Analysis - validation .

Module 2 Project Planning

Cost Estimation – Uncertainties – models – COCOMO model – Project scheduling – average duration estimation – Project scheduling and milestones – staffing and personal plan – Rayleigh curve – personnel plan – team structure – software configuration – management plans – quality assurance plans – verification and validation – inspections and reviews - project monitoring plans - time sheets – reviews – cost schedule – milestone graph – risk management.

Module 3 System Design

Design Principles – Problem partitioning and hierarchy – abstraction – modularity – top down and bottom_up – strategies – module level concepts - coupling - cohesion – structured design methodology - verification - matrics.

Module 4 Coding

Top-down and Bottom-up - Structured Programming - Information Hiding - Programming style - Internal Documentation – Verification - Code Reading - Static Analysis - Symbolic execution - Proving Correctness - Code inspections – Unit testing.

Module 5 Testing

Testing fundamentals - Functional and Structured Testing - Testing Process - Comparison of Verification and Validation Techniques - Reliability assessment - Programmer Productivity - Error removal efficiency.

Text Book

1. An integrated approach to Software Engineering - Pankaj Jalote, Narosa Publication

References

1. Software Engineering - Roger S. Pressman, Tata McGraw Hill
2. Software Engineering - Ian Sommervilla, Pearson Education
3. Software Engineering Theory and Practice - Shari Lawrence, Pearson Education Asia
4. Fundamentals of Software Engineering –Rajib Mall, PHI
5. Fundamentals of Software Engineering – Carlo Ghezzi, Mehdi Jazayeri, PHI

PROJECT MANAGEMENT AND QUALITY ASSURANCE

R603 **2+1+0**

Module 1 PROJECT PLANNING

Overview – Capital expenditure - Phases of capital budgeting – Project development cycle – 7-s of project management – Requirements of a project manager – Forms of project organization.

Module 2 PROJECT ANALYSIS

Market Analysis – Technical Analysis - Financial Analysis – Risk Analysis – Social cost Benefit Analysis.

Module 3 CONTROL OF PROJECT

Control Systems – Control of major constraints – Project management software & information systems.

REVIEW: Performance of Evaluation – Abaudonment Analysis – Behavioral issues in Project Management

Module 4 TOTAL QUALITY MANAGEMENT

Quality systems – ISO 9000 series – ISI – Benchmarking – Quality Function development (QFD) – Total Productive Maintenance (TPM) – ISO 14000.

Module 5 CONCEPTS IN SAMPLING

Sampling designs and schemes – Errors in sampling – Simple random sample – stratified random sample – Cluster sample.

Sample size destination – Estimating population mean – Estimating population proportion.

References

1. Projects preparation, Apprisal, Budgeting & Implementation – Prasanna Chandra – Tata McGraw Hill
2. Projects – Planning, Analysis, Selection, Implementation & Review - Prasanna Chandra – Tata McGraw Hill
3. Project Management - Harvey Maylor - Pearson Education
4. Total Quality Management – Dale H. Besterfield – Pearson Education
5. Quality control and Improvement – Amitava Mitra – Pearson Education
6. Quality assurance and TQM – Jain & Chitale – Khanna Publishers

COMPUTER NETWORKS

RT 604 **3+1+0**

Module 1

Introduction: ISO-OSI Reference Model – TCP/IP Reference Model – Comparison Network hardware-Repeaters, Routers, Bridges, Gateways, Hub, Cable Modem.

Physical Layer: Transmission Media– ISDN system Architecture – Communication Satellites – geostationary satellites - Medium Earth Orbit Satellites- Low earth orbit satellites– Satellite v/s Fiber

Module 2

Data Link Layer: Design issues-Error Detection and correction – Elementary Data link protocols- Sliding window protocols. .

LAN Protocols: Static & Dynamic channel allocation in LAN's and WAN's, Multiple access protocols – ALOHA – Pure ALOHA – Slotted ALOHA – Carrier Sense Multiple Access protocols – persistent and non-persistent CSMA – CSMA with collision detection – IEEE 802.3 standards for LAN

Module 3

Network layer: Virtual Circuits, Datagrams, Routing Algorithm – Optimality principle - Flooding - Flow Based Routing - Link state routing – Distance vector routing – Multicasting – Link state multicasting – Distance vector multicasting - Congestion Control Algorithms – General principles – Packet discarding – Choke packets - Congestion prevention policies – Traffic shaping – Leaky bucket algorithm – Flow specifications – jitter control

Module 4

Transport Layer: - Transport Service - Elements of transport protocols – Internet Transfer Protocols UDP and TCP – ATM – Principle characteristics.

Module 5

Application Layer: Domain name system – DNS name space – Resource records – Name servers – operation of DNS - Electronic Mail – MIME

Mobile networks: Mobile telephone systems, Bluetooth - Components – Error correction – Network topology – Piconet and scatternet – L2CAP layers – Communication in Bluetooth networks

References

1. Computer Networks (Fourth Edition): Andrew S.Tanenbaum, Pearson Education Asia/ PHI
2. An Introduction to computer networking: Kenneth C. Mansfield Jr., James L. Antonakos, Prentice-Hall India
3. Communication Network: Leon, Garcia, Widjaja Tata McGraw Hill.
4. Computer Networks (Second Edition): Larry L Peterson & Bruce S Davie, (Harcourt India)
5. Computer Networking: James F Kurose & Keith W Ross, Pearson Education
6. Introduction to Data Communications and Networking: Behrouz, Forouzan, McGraw Hill

NETWORK COMPUTING

RT 605 **3+1+0**

Module 1

HTML Documents Basic Tags for Font & Paragraph Formatting Lists, Tables, Frames, image Maps

Cascading Style Sheets Style Element, Inline style sheets, Embedded style sheets, External Style sheets, CLASS Attribute, Absolute and relative positioning of elements, DIV & SPAN Tags.

Module 2

Dynamic HTML Pages Client side scripting - Java Script – variables, Arithmetic operations – message boxes, Arrays, control statements, functions, event handling, document object model.

Dynamic updating of pages with JAVA Script.

Embedding ActiveX controls - using the structured graphics – ActiveX Control.

Module 3

Java programming – Features of Java, Creating & using classes in Java – Static classes – Inheritance – Final methods, variables and classes – Interfaces - Nested classes – Inner classes – Anonymous Inner classes – Exception handling – Creating & using exceptions, Multithreaded programs and thread synchronization, creating and using packages. Creating GUI with AWT and Swing – -JDK1.1 event model

Module 4

Network Programming with Java - Features of Java – Applets & Application – Life cycle of applets - Security features for applets - Inter applet communication – Threads & Thread synchronization – TCP/IP Programming with Java – Iterative & Concurrent servers. Datagrams, IP multicasting, RMI (Structure and Working of a simple RMI Program only)

Module 5

HTTP Protocol working – HTTP methods, GET, PUT, DELETE, POST, HEAD

Server side scripting – HTML Forms & CGI – GET & POST, Basic working of a CGI supported web server – Simple CGI program in C to validate user name & Password. Email: Working of SMTP and POP protocols (Overview only).

References

Module 1,2,5

1. Internet and World Wide Web How to program - Deitel,Deitel & Nieto, Pearson Education Asia
2. HTML, DHTML, Java Script, Perl, CGI - Evan Bayross, BPB

Module 3,4,5

3. Java 2 Complete reference - Herbert Schildt, Tata McGraw Hill

4. Java 2, AWT, Swing, XML and JavaBeans Programming Black Book – Steven Holzner, Wiley Dreamtech
5. The Java Programming Language 3rd Edition - Arnold, Gosling, Holmes, Pearson Education Asia
6. Using Java 2 Platform - Joseph Weber, PHI
7. Computer Networks - Tenanbaum, PHI/ Pearson Education Asia

Additional References

8. Unix Network Programming - Stevens W Richard, PHI
9. TCP/IP Protocol suite, 2/e -Behrouz A. Forouzan, TMH

ALGORITHM ANALYSIS AND DESIGN

R606 **3+1+0**

Module 1 Introduction and Complexity

What is an algorithm – Properties of an Algorithm, Difference between Algorithm, Computational Procedure and Program, Study of Algorithms; Pseudo-code Conventions; Recursive Algorithms –Space and Time Complexity – Asymptotic Notations – 'Oh', 'Omega', 'Theta', Common Complexity Functions; Recurrence Relations and Recurrence Trees for Complexity Calculations; Profiling. –Deterministic and non - deterministic algorithms.

Module 2 Divide and Conquer

Control Abstraction, Finding Maximum and Minimum, Binary Search, Divide and Conquer Matrix Multiplication, Stressen's Matrix Multiplication, Merge Sort, Quick Sort.

Module 3 Greedy Strategy

Control Abstraction, General Knapsack Problem, Optimal Storage on Tapes, Minimum Cost Spanning Trees – Prim's Algorithm, Kruskal's Algorithm – Job sequencing with deadlines.

Module 4 Dynamic Programming

Principle of Optimality, Multi-stage Graph, All-Pairs Shortest Paths, Travelling Salesman Problem.

Lower Bound Theory - Comparison Trees for Searching and Sorting, Oracles and Adversary Arguments – Merging, Insertion & Selection Sort; Selection of 'k'th Smallest Element.

Module 5 Backtracking

Control Abstraction - Bounding Functions, Control Abstraction, N-Queens Problem, Sum of Subsets, Knapsack problem.

Branch and Bound Techniques – FIFO, LIFO, and LC Control Abstractions, 15-puzzle, Travelling Salesman Problem.

Text Book

1. Fundamentals of Computer Algorithms - Horowitz and Sahni, Galgotia

References

1. Computer Algorithms – Introduction to Design and Analysis - Sara Baase & Allen Van Gelder, Pearson Education
2. Data Structures algorithms and applications - Sahni, Tata McGrHill
3. Foundations of Algorithms - Richard Neapolitan, Kumarss N., DC Hearth & Company
4. Introduction to algorithm- Thomas Coremen, Charles, Ronald Rivest -PHI

SYSTEM SOFTWARE LAB

R607 **0+0+4**

1. Symbol table construction
2. Single pass and two pass assembler.
3. Macro processor module binder (with limited Instruction set)
4. Lexical analyzer.
5. Bottom Up and Top Down Parser.
6. Code generation.
7. Generation of code for linkers & loaders. Working of device drivers, process scheduling methods.

Any experiment according to the syllabus of RT505 can be substituted.

MINI PROJECT

R608 **0+0+4**

The aim of the mini project is to prepare the students for the final year project. The topic for the mini project should be simple as compared to the main project, but should cover all the aspects of a complete project.

SEVENTH SEMESTER

OBJECT ORIENTED MODELING AND DESIGN

RT 701 **2+1+0**

Module 1

Introduction: object oriented development-modeling concepts – object oriented methodology – models – object oriented themes-Object Modeling– links and associations – advanced links and association concepts – generalization and inheritance - grouping constructs – a sample object model

Advanced Object Modeling: aggregation – abstract classes – generalization as extension and restriction – multiple inheritance – metadata – candidate keys – constraints.

Module 2

Dynamic modeling: Events and states – Operations – Nested state diagrams – Concurrency – Advanced dynamic modeling concepts – A sample dynamic model – Relationship of Object and Dynamic models.

Functional modeling: Functional models – Data Flow Diagrams - Specifying operations – Constraints – A sample functional model – Relation of functional to Object and Dynamic models.

Module 3

Analysis: Analysis in object modeling, dynamic modeling and functional modeling, Adding operations- Iterating the analysis

System Design: Breaking system into subsystems - Identifying concurrency-allocating subsystems to processors and tasks, managing of data stores. Handling of global resources- handling boundary conditions-Common Architectural Frameworks

Module 4

Object Design: Overview of Object design – Combining the three models – Designing algorithms – Design optimization – Implementation of control – Adjustment of inheritance - Design of association – Object representation – Physical packaging – Documenting design decisions-Comparison of methodologies

Module 5

Other Models: Booch's Methodology- Notations, models, concepts. Jacobson Methodology- architecture, actors and use-cases, requirement model, Analysis Model, Design model, Implementation model and Test Model-Unified Modeling Language (UML).

Text Book

1. Object Oriented Modeling and Design -JamesRumbaugh, Prentice Hall India
2. Object Oriented Analysis and Design with Applications - Grady Booch, Pearson Education Asia

References

1. Object Oriented Software Engineering - Ivan Jacobson, Pearson Education Asia
2. Object Oriented Software Engineering - Berno Bruegge, Allen H. Dutoit, Pearson Education Asia
3. Object Oriented Analysis and Design using UML - H. Srimathi, H. Sriram, A. Krishnamoorthy
4. Succeeding with the Booch OMT Methods -A practical approach - Lockheed Martin, Addison Wesley
5. UML and C++ practical guide to Object Oriented development - Richard C.Lee & William, Prentice Hall India

COMPUTER GRAPHICS

RT 702 **3+1+0**

Module1

Introduction to Computer Graphics: Basic concepts in Computer Graphics – Applications of Computer Graphics, Interactive Graphics system – Raster scan and Random scan systems – Generating a raster image, Application of raster scan graphics. Video Display Devices, Display processors – Display files – graphical input & output devices.

Module 2

2D Graphics: Line drawing algorithms – DDA, Bresenham's – Bresenham's Circle drawing algorithm - 2D Transformations, Clipping – Line clipping – Polygon Clipping, Windowing.

Module 3

3D Graphics: 3D display methods, 3D Object Representation – Polygon Surfaces – Quadratic surfaces – Spline Representations – Bezier Curves and Surfaces – B-Spline Curves and Surfaces, 3D Transformations.

Module 4

3D Rendering: Three-Dimensional Viewing - Projections, Clipping, Visible Surface Detection – Classification of Visible surface detection algorithms – Back-face Detection, Depth- Buffer Method, Scan-line Method.

Surface Rendering Methods-Basic illumination Models – Polygon–rendering Methods, Gouraud Shading, Ray-Tracing Methods.

Module 5

Advanced Technologies: Fractals – Classification of Fractals – Self-Squaring Fractals, Animation- Raster Animation, Morphing.

Text Book

1. Computer Graphics (C version) - Donald Hearn & Pauline Baker (Pearson Education Asia)

References

1. Computer Graphics - Donald Hearn & Pauline Baker (Prentice Hall of India)
2. Principles of Interactive Computer Graphics – William .N. Newman, Robert .F. Sproull (second edition), McGraw Hill edition
3. Computer Graphics Principles & Practice -Foley, VanDam, Feiner, Hughes (second edition in C), Addison Wesley
4. Fundamentals of Computer graphics & multimedia- D. P. Mukherjee, Prentice Hall of India
5. Java 2 complete reference - Herbert, Schildt, Tata McGraw Hill
6. Computer Graphics - Roy A Plastack & Gordon Kally (Schanmi Series McGraw Hill edition)

THEORY OF COMPUTATION

R703 **3+1+0**

Module 1

Introduction to the theory of computation – Set theory – Definition of sets – Properties – Countability – Uncountability – Equinumerous sets – Functions – Primitive recursive and partial recursive functions – Computable and non computable functions – Diagonalization principle – Formal representation of languages – Chomsky Classification.

Module 2

Introduction to Automata theory – Definition of Automation – Finite Automata – Formal definition – Language acceptability by Finite Automata – Transition Diagrams and Transition systems - Deterministic and Nondeterministic finite automation – Finite Automation with -Transitions – Eliminating -Transitions - Conversion of NFA to DFA – Regular operations – Regular Expressions – Pumping lemma for regular languages – Applications of finite state automata – Lexical analysers – Text search.

Module 3

Pushdown Automata – Formal definition – Language acceptability by PDA – Deterministic and nondeterministic PDA – Context free grammar - Applications of PDA – Parsing.

Module 4

Turing Machines – Formal definition – Language acceptability – Universal Turing Machines – Halting Problem of Turing Machines – Church's Thesis - Godelization.

Module 5

Algorithmic complexity – Tractable and intractable problems – Complexity classes – Class P – Class NP – NP Complete and NP Hard problems.

References

1. Introduction to the Theory of Computation- Michael Sipser, Brooks/Cole (Thomson Learning)
2. Theory of Computer Science – K.L.P. Mishra, N. Chandrashekharan. Prentice Hall of India
3. Elements of the theory of computation -Harry R Lewis, Christos H Papadimitriou Prentice Hall of India / Pearson Education Asia
4. The Theory of Computation - Bernard M Morct (Pearson Edn)
5. Introduction to Automata Theory, Languages & Computation John Hopcroft, Rajeev Motwani & Jeffry Ullman (Pearson Edn)

ADVANCED SOFTWARE ENVIORNMENTS

R704 **2+1+0**

Module 1

Windows Programming – Components of Windows API- Distinction with ordinary programs – Event Driven Programming – WinMain Function – Creating Windows – Message loop – Window procedures - Menus & Buttons – Drawing on Windows.

Module 2

MFC Features & Advantages – MFC Classes – Life cycle of an MFC application – The CWinApp Classes – Creating windows – Message maps and event handling – Menus & Buttons - Drawing on MFC windows – Handling mouse & Keyboard events.

Module 3

CORBA – Introduction – Features – Fundamental concepts in Distributed objects – CORBA IDL – stub & Skeleton - implementing a simple CORBA server and CORBA client with C++.

Module 4

CORBA object reference – Managing references at server – CORBA factories – CORBA object creation in C++ & JAVA – CORBA Exceptions – Destroying CORBA objects - comparison of CORBA & DCOM Architectures.

Module 5

X-Windows – Clients & Servers - Basic Architecture of X-Windows systems – Layers in XWindows Architecture – XWindows Programming – Simple Hello World Application in X. Command line options and resources – connecting to X-Display – creating windows and graphics context – Handling events – creating child windows.

References

Module1, 2

1. Visual C++ Programming - Yashwanth Kanetkar (BPB)
2. Programming Windows Fifth Edition – Charles Petzold Microsoft Press
3. Visual C++ Programming Bible – Leinecker & Archer IDG Books
4. Visual C++ Handbook - Osborne, TMH

Module 3, 4

5. COM & CORBA side by side – Janson Pritchard, Pearson Education Asia

Module 5

6. X-Windows system programming – Nabajyoti Barkakati (2nd Edition), Prentice Hall of India

WEB TECHNOLOGIES

RT 705 **2+1+0**

Module 1

Introduction to SGML – features - XML, XML as a subset of SGML – XML Vs HTML – Views of an XML document – simple XML documents – Starting & Ending of Tags – Attributes of Tags – Entity References – Comments - CDATA section

Module 2

Document Type declarations – Creating XML DTDs – Element type declaration – Attribute List Declaration – Attribute types – Attribute defaults – Displaying XML Data in HTML browser as HTML tables – Storing XML data in HTML document – Converting XML to HTML with XSL minimalist XSL style sheets – XML applications

Module 3

Java Beans: Features – Designing Java Beans – Creating and using properties – Induced - bound and constrained properties - using and creating events – Introspection – creating & using BeanInfo clauses – customization – providing custom property editors and GUI interfaces.

Module 4

JSPs - Creating simple JSP Pages – templating – Request time expression – Request & Response objects – Reading parameter values – Using Javabeans in JSPs - Reading & setting Properties of JavaBeans – Connecting forms & bean properties – Serialized beans – declaring variables & methods in pages – scriptlets – conditionals, loops & execution handling in JSPs with scriptlets – Accessing beans via scriptlets.

Module 5

EJB – Basics of EJB – Types of Beans – Development of Session Beans – Steps – Creating & Implementing Interfaces – Writing Deployment descriptors – Packaging and deploying bean - using the bean from a client – Development of stateful session bean. Entity beans – Features (Basics of developing and using entity beans)

References

Module1, 2

1. XML by Example: Building Ecommerce applications - Sean McGrath,Pearson Education Asia

Module3

2. Using JAVA 2 Platform Special Edition Java 2, AWT, Swing, XML and Java Beans - Joseph L. Weber, Prentice Hall of India
3. Programming Black Book - Steven Holzner, Wiley Dreamtech

Module4

4. Java Server pages - Larne Pekowsky – Pearson Education Asia
5. JSP: Java server pages - Barry Burd, IDG Books India

Module 5

6. Mastering Enterprise Java Beans and the Java 2 Platforms, Enterprise Edition – EdRoman (WILEY computer publishing)
7. EJB Design Patterns - Floyd Marinescu

Additional Reference

8. Internet & Web Technologies - Raj Kamal, TMH

ELECTIVE - I

R706 **3+1+0**

List of electives

1. Optimization Techniques
2. Operating System Kernal Design
3. Principles of Real Time Systems
4. Windows Programming
5. Mobile Computing
6. Software Architecture
7. Lan Technology

Note

New Electives may be added according to the needs of emerging fields in technology. The name of the elective and its syllabus should be submitted to the university before the course is offered.

OPTIMIZATION TECHNIQUES (ELECTIVE - I)

CMELRTA 706-1 **3+1+0**

Module1: Classical optimization techniques

Single variable optimization – Multivariable optimization with no constraints – Hessian matrix – Multivariable saddle point – Optimization with equality constraints – Lagrange multiplier method- Multivariable optimization with inequality constrains – Kuhn-Tucker conditions.

Module 2: One-dimensional unconstrained minimization

Elimination methods – unrestricted search method – Fibonacci method – nterpolation methods – Quadratic interpolation and cubic interpolation methods.

Module 3 Unconstrained minimization

Gradient of function – Steepest descent method – Newton's method – Powells method – Hooke and Jeeve's method.

Module 4 Integer – Linear programming problem

Gomory's cutting plane method – Gomory's method for all integer programming problems, mixed integer programming problems

Module 5 Network Techniques

Shortest path model - Dijkstra's Algorithm Floyd's Algorithm – minimum spanning tree problem – PRIM algorithm – Maximal Flow Problem algorithm

References

1. Optimization theory and application - S.S. Rao, New Age International P. Ltd.
2. Optimization Concepts and applications in Engineering - A. D. Belegundu, T. R. Chandrupatla, Pearson Education Asia.
3. Principles of Operations Research for Management - F. S. Budnick, D. McLeavey, R. Mojena, Richard D. Irwin, INC.
4. Operation Research an introduction - H. A. Taha, Eastern Economy Edition.
5. Operations Research – R. Panneerselvam, PHI

OPERATING SYSTEM KERNEL DESIGN (ELECTIVE - I)

R706-2 **3+1+0**

Module 1

Operating system – Basic Structure - Kernel – monolithic and microkernel architectures – Overview of UNIX kernels – Process kernel Model - reentrant kernels -Signals –Interrupts – Timer interrupts - System calls – Implementation of simple system calls – Booting procedure.

Module 2

Processes and Tasks – Process relationship – process creation – Process Scheduling – Scheduling algorithm – SMP Scheduler

Synchronization in kernel – Synchronization techniques - Interprocess communication using semaphores, messages and shared memory

Module 3

Memory Management – The architecture independent memory model in Linux – memory pages – Virtual address space and linear address calculation – Virtual address space for a process – User segment – Virtual memory areas – Kernel Segment – Memory allocation in kernel segment – Block device caching mechanisms in Linux – paging – Page cache and management – handling page faults.

Module 4

Linux File systems: Basic principles – kernel representation of file systems – layered file system architecture – Virtual file system – filesystem registration – mounting.

The ext2 File system – Directories in ext2 – block allocation and addressing - extensions in ext2 file system

Module 5

Device drivers – Character and block devices – polling – interrupt sharing – implementing a device driver for PC speaker

References

1. Linux Kernel Internals 2nd edition – Beck (Pearson Education Asia)
2. Understanding the Linux Kernel - Daniel P Bovet and Marco Cesati (O'Reilly)
3. Linux Device Drivers – Rubini A. (O'Reilly)
4. Operating System Concepts - Silbershatz and Galvin (John Wiley)
5. Linux Kernel Online Book– David A Rusling (http://www.linuxdoc.org/LDP/tlk/tlk.html)
6. Linux Kernel Book – Card R, E Dumas, F Mevel (John Wiley)
7. Unix Internals Then New Frontiers – Vahalia U (PHI)
8. Red Hat Linux 7.1 Bible – Christofer Negus (IDG Books)

PRINCIPLES OF REAL TIME SYSTEMS (ELECTIVE - I)

RT706-3 **3+1+0**

Module 1

Introduction to Real Time Systems – Structure of real time systems, real time computer, task-classes – Periodic, Aperiodic, critical, Non-critical, definition of real time systems – real time systems, embedded systems - Hard real time systems, soft real time systems, real time design issues.

Module 2

Real time kernel – polled loop systems, co-routines, interrupt driven systems – sporadic, fixed rate systems, hybrid systems, task control block - task status, scheduling – uniprocessor scheduling – traditional rate monotonic, rate monotonic deferred server, EDF, IRIS tasks – multiprocessor scheduling – utilization balancing algorithm, next-fit, bin- packing algorithm, myopic offline, buddy strategy (no need of proofs) fault tolerant scheduling.

Module 3

Communication – Communication Media and message sending topologies. network architecture issues, protocols – contention – based, token - based, stop and go multiloop, polled bus, hierarchal, round robin, fault tolerant routing – clocks and synchronization – fault tolerant synchronization in hardware, synchronization in software.

Module 4

Fault tolerance – definition, cause of failure, fault types, fault detection and containment, redundancy – hardware, software, time, information, integrated failure handling – reliability – parameter values – series – parallel systems, NMR clusters, combinational model, master chain model, fault latency, transient faults, software error models.

Module 5

Programming Languages – Desired language characteristics, Real time databases, characteristics, main memory databases, Transaction, Disk schedule algorithms, Databases for hard real time systems, maintaining serialization constituency.

Text Book

1. Real Time Systems - C.M Krishna, Kang G. Shini (Tata McGraw Hill)

References

1. Real Time Systems, Design & Analysis - Philip Laplante (IEEE)
2. Real Time Systems- Krishna, Tata McGraw Hill

WINDOWS PROGRAMMING (ELECTIVE - I)

RT706-4 **3+1+0**

Module 1

Introduction - Concepts of Windows Programming - Event Driven Programming – Languages that support Windows Programming – Visual Basic – Java – Visual C++

Visual Basic Programming: Basic Language features – Variables, data types, constants, control statements – Forms – Creating and Using basic Controls – text boxes, labels, buttons - Event handling procedures – Properties Window – Common properties for Controls. Message boxes

Module 2

Visual Basic Programming (Contd) Standard Controls – List boxes, Comboboxes, Image box, picture box, Shape controls, Timer, Scrollbars, Frames, Checkboxes, Option Boxes – Frames - File, Drive and Directory List boxes.- MDI and SDI interfaces – Menus

Module 3

ActiveX controls - RichTextBox, Tree View Control, List view Control, Progessbar, Flexgrid Control, Common dialog Controls – Font, File, Print Dialogs – Creating Custom activex controls – Creating Events and properties for ActiveX controls.

Module 4

Graphics and Multimedia – Drawing Graphics in Windows - setting colors - Drawing text, lines, ellipses, arcs, circles – plotting points –Filling figures with colors and patterns – Using clipboards to transfer images between applications Printing graphics and text – Creating animations with Picture clip control - applying image effects – stretching, flipping, embossing, egraving, blurring, sweeping – Using the Multimedia Control – Handling multimedia Errors

Module 5

Database Access – Using DAO, RDO and ADO for accessing databases – Creating tables, inserting, deleting and updating records – Using the Data Control – Using the ADO Data Control

Using Windows API: Using DLL Procedures in Visual Basic – Declare statement – Handling C++ and Windows Data types – Playing sound with API funtions – Capturing Images from the screen – Handling mouse outside Applications window – Making an 'always on top' window.

References

1. Visual Basic 6 Programming Black Book – Steven Holzner (Dreamtech Press)
2. Programming Windows fifth Edition - Charles Petzlod (Microsoft Press)
3. Visual Basic - Ivan Petrosaus (BPB)
4. Visual Basic - Garry Cornell (BPB)
5. Using Visual Basic - Resselman (PHI)

MOBILE COMPUTING (ELECTIVE - I)

RT706-5 **3+1+0**

Module 1

Introduction: - Short History, Mobile telephone systems

Simplified Reference model. Multi carrier modulation. Cellular systems.

Module 2

Wireless Communication Systems: -Telecommunication Systems-GSM & DECT-Architecture and Protocols.Satellite Systems-GEO, LEO, MEO.

Broadcast Systems-Broadcast transmission, Digital Audio Broadcasting-Multimedia Object Transfer Protocol. Digital Video Broadcasting.

Module 3

Wireless LAN and ATM: - Infra red and Radio Transmission, Infrastructure and ad hoc networks, 802.11- Bluetooth- Architecture, Applications and Protocol, Layers, Frame structure, comparison between 802.11 and 802.16.
Wireless ATM- Services, Reference Model, Functions, Radio Access Layer. Handover- Reference Model, Requirements, Types, handover scenarios.
Location Management, Addressing, Access Point Control Protocol (APCP).

Module 4

Mobile Network and Transport Layers:- Mobile IP- Goals, Requirements, IP packet delivery, Advertisement and discovery. Registration, Tunneling and Encapsulation, Optimization, Reverse Tunneling, IPv6, Dynamic Host configuring protocol, Ad hoc networks – Routing, DSDV, Dynamic source routing. Hierarchical Algorithms.
Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Transmission.

Module 5

Wireless Application Protocol & World Wide Web
WAP- Architecture, Protocols-Datagram, Transaction, Session -Wireless Application Environment-WML- Features, Script- Wireless Telephony Application.
WWW- HTTP, Usage of HTML, WWW system architecture.

Text Book

1. Mobile Communications – Jochen Schiller, Preason Education Asia

References

1. Computer Networks – Andrew S. Tanenbaum, PHI
2. Communication Networks -Fundamental Concepts and Key Architectures Leon-Garcia & Indra Widjaja, Tata McGraw Hill

SOFTWARE ARCHITECTURE (ELECTIVE - I)

RT706-6 **3+1+0**

Module 1

Introduction to Software architecture – Architectural styles – pipes and filters – data abstraction and object oriented organization – Event based, Implicit invocation, Layered systems – Repositories – Interpreters – Process control – Heterogeneous Architectures.

Module 2

Shared Information Systems – Integration in software Development Environment – Integration in the design of Buildings – Architectural structures for shared information systems

Module 3

Guidance for user interface architecture Quantified design space – Formal models and specifications-The value of architectural formalism – Formalizing the architecture of a specific system – Formalizing the architectural style – Formalizing an architectural design space

Module 4

Linguistic issues - Requirements for architecture – Description languages – first class connectors – Adding implicit invocation to factorial processing languages.

Module 5

Tools for architectural design – Unicon – Exploiting style in architectural design environments – Architectural interconnection

Reference

1. Software Architecture – perspectives on an emerging discipline - Mary Shaw, David Garlan, PHI

LAN TECHNOLOGY (ELECTIVE - I)

R706-7 **3+1+0**

Module 1

Classification of LAN - Life cycle of LAN- Models for Communication - Topology - LAN standards - IEEE 802.2 LLC, IEEE 802.x MAC, FDDI.

Module 2

Protocols: LAN protocols, protocol evaluation factors – CSMA – CSMA/CD, CSMA/CA – polling – Token passing – Ethernet – ACRNETs – IBM/PC network – IBM token ring.

Module 3

Traditional interconnection components – Repeater, Bridges, Routers, Network interface cards, Types of switch, port switching & segment switching – combined speed – Hubs.

Module 4

LAN Operating System – Peer – to –peer network – Function & responsibility – Print spooler – Current Network Operating Systems.

Module 5

Management & security – security levels – printing environment – opportunities, driver, printing queue – LAN security – physical security – logical security.

Text Book

1. Local area networks: Management, Design & security- Arne Mikalsen Per Borgesen – WILEY- dreamtech
2. Local Area Network - S. K. Basandra, S. Jaiswal

References

1. Local Area Networks - John E McNamara
2. Understanding Local Area Network- Stan Schutt – PHI
3. Handbook of LAN Technology - Paul J. Fortier – McGraw Hill
4. Networking Technologies - Jaisal – Galgotia Publications
5. Networking and Connectivity - Gary R. McClain – Academic Press
6. Wireless LANs - Raymond P. Wenig – Academic Press
7. TCP/IP Networking – A Guide to the IBM Environment - David M. Peterson – McGraw Hill
8. Introduction to Local Area Networks- Robert M. Thomas – BPB
9. LAN- Peter Hodson – BPB
10. LAN- Gerd E. Kerser – McGraw Hill
11. The Business Guide to Local Area Networks - William Stallings

COMPUTER HARDWARE AND NETWORKING LAB

R707 **0+0+3**

Familiarisation with PC Components

1. Diagnostic S/Ws, Cards, Design & Programming of add-on cards familiarisation with device drivers, Micro controllers etc.
2. Experiments for communication with peripheral devices using C and MASM.
3. Experiments for serial and parallel port communication using C and MASM.
4. Faimiliarisation with network configuration (routing, DNS, File Servers etc...)
5. Lan trouble shooting, Network problems and recovery, Network diagnostics softwares.

References

1. Upgrading & Repairing PC's - Scott Muller (PHI)
2. Red hat Linux Bible- Cristofer Negas (IDG Books)
3. TCP/IP Bible –Rob Scringer (IDG Books)

NETWORK PROGRAMMING LAB

R708 **0+0+3**

Experiments using interprocess communication and Network communication, synchronisation & IPC using semaphore, pipe & messages.

Programs for FTP and socket based chat.
Implementation of File Transfer - Communication through serial port - Communication through TCP/IP port

Efficient error checking algorithms (Eg: CRC)

Remote Procedure Call, Remote Method Invocation.

Programs with HTML, DHTML, Applets, Java Script, Java, XML, Java Beans, JSP and EJB.

Any experiments according to the syllabus of RT604 Computer Networks, RT605 Network Computing and RT705 Web Technologies may be substituted

References

1. UNIX Network programming - Stevens. (PHI)
2. Using Java2 Platform – Weber (AWL)

PROJECT & SEMINAR

R709/ R808 **0+0+3**

Each student is required to present a technical paper on subject approved by the department. The paper should in general reflect the state of the art. He/ She submits a report of the paper to the department.

In addition to the seminar He/She shall undertake a project work in the 7th semester itself in consultation with the guide(s). On completion of the project work, He/She shall present the work done before a panel of staff members, and submit a report of the project work done to the department.

EIGHTH SEMESTER

SECURITY IN COMPUTING

RT 801 **2+1+0**

Module1

Introduction: Security basics – Aspects of network security – Attacks – Different types – Hackers – Crackers – Common intrusion techniques –Trojan Horse, Virus, Worm – Security services and mechanisms.

Module 2

OS Security – Protection Mechanisms –Authentication & Access control – Discretionary and Mandatory access control – Authentication mechanisms – Official levels of computer security (DoD) - Security breaches – Concept of a hole - Types of a holes – Study of the security features for authentication, access control and remote execution in UNIX, WINDOWS 2000

Module 3

Cryptography: Basic Encryption & Decryption – Transposition & substitution ciphers – Caesar substitution – Polyalphabetic substitutions – Crypt analysis – Symmetric key algorithms – Fiestel Networks – Confusion – Diffusion – DES Algorithm – Strength of DES – Comparison & important features of modern symmetric key algorithms – Public key cryptosystems – The RSA Algorithm – Diffice Hellman key exchange – comparison of RSA & DES – Message Authentication & Hash functions – Digital signature

Module 4

Network & Application Security: Kerberos – X509 Authentication service – IP security Architecture – Secure socket layer – Electronic mail security – Pretty Good privacy – S/MIME – secure Electronic Transactions – Firewalls - Security mechanisms in JAVA platform – Applet security – Security policy and Security Manager.

Module 5

Database Security: - Security issues – SQL security DAC based on granting & revoking privileges – MAC for multilevel security – Statistical database security.

Text Books

1. Module1, 4 Network Security Essentials Applications & Standards, William S., Pearson Education Asia
2. Module2 Modern operating System, Andrew S. Tanenbaum, Pearson Education Asia
3. Using JAVA 2 platform, Joseph L. Weber, Prentice Hall of India
4. Module3 Cryptography and network security principles and practice, William Stallings, Pearson Education Asia
5. Information theory coding and cryptography, Ranjan Bose, TMH
6. Module 4,5 Designing security Architecture Solutions, Jay Ramachandran, Wiley Dreamtech
7. Module5 Database Security Mechanisms for Computer Network, Sead Muftic, John wiles

References

1. Security in Computing - Charles P. Pfleeger IEEE Computer Science Press
2. Database Security Mechanisms for Computer Network- Sead Muftic, John wiles
3. Designing Security Architecture Solutions – Jay Ramachandran, Wiley dreamtech
4. Firewalls Complete - Marcus Gonsalvus, TMH
5. Networking Technologies - Jaisal, Galgotia Publication
6. Security in Computer Operating System - G.O.Shea, NCC Blackwell Manchester Oxford
7. Mastering JAVA security: Cryptography, Algorithms and Architecture - Rich Helton, Wiley Dreamtech
8. Implementing IPv6- Mark A. Miller P.E, IDG Books

HIGH PERFORMANCE COMPUTING

R802 **2+1+0**

Module1

Introduction to parallel processing - Trends towards parallel processing - Parallelism in uniprocessor - Parallel computer structures-Architecture classification schemes - Indian contribution to parallel processing.

Module 2

Principles of pipelining and vector processing - Linear pipelining - Classification of pipeline processors - General pipelines - Instruction and Arithmetic pipelines – Design of Pipilined instruction unit-Prinnciples of Designing Pipeline Processors-Instruction prefetch and branch handling- Dynamic pipelines - Architecture of Cray-1.

Module 3

Array processors - SIMD array processors - Interconnection networks - Static vs dynamic networks - mesh connected networks - Cube interconnection networks - Parallel algorithms for array processors - SIMD matrix multiplication-Parallel sorting on array processors - Associative array processing - Memory organization.

Module 4

Multiprocessor architectures and Programming - Loosely coupled and Tightly coupled multiprocessors - Interconnection networks - Language features to exploit parallelism - Process synchronisation mechanisms.

Module5

Dataflow computers - Data driven computing and Languages - Data flow computers architectures - Static data flow computer -Dynamic data flow computer -Data flow design alternatives.

Text Book

1. Computer Architecture & Parallel Processing - Kai Hwang & FayeA.Briggs, McGraw Hill

References

1. Elements of Parallel computing - V. Rajaraman - PHI
2. Super Computers - V. Rajaraman - Wiely arstern
3. Parellel Processing for Super Computers & AI - Kai Hwange & Douglas Degneot
4. Mc Graw Hill
5. Highly parallel computing - George S. Almasi, Allan Gottlieb - Benjamin Cumings Publishers.
6. HIgh Performance Computer Architecture - Harold S. Stone, Addison Wesley.
7. Advanced Computing - Vijay P.Bhatkar, Asok V.Joshi, Arirban Basu, Asok K.Sharma.

PRINCIPLES OF PROGRAMMING LANGUAGES

R803 **3+1+0**

Module1

Introduction – Role of programming languages - Effects of Environments on languages - Language Design issues - Virtual computers and binding times, Language Paradigms.

Module2

Data types - Specification of data types, implementation of elementary data types, Declarations, type checking and type conversion - Assignment and Initialisation - Structured data types - Specification of data structure types, Implementation of data structure type - Declarations and type checking for data structures.

Module 3

Abstract data types, Encapsulation by subprogram - Type definition, storage management - Sequence Control - Implicit and Explicit sequence control, sequencing with arithmetic expressions, sequence control between statements.

Module 4

Subprogram control - Subprogram sequence control, attributes of data control, Shared data in subprograms - Abstract data types revisited, Inheritance, Polymorphism.

Module 5

Advances in Language design - Variations of subprogram control, Parallel programming, Introduction to exception handling - Exception handling in JAVA, Hardware developments, software architecture.

Text Book

1. Programming Languages, Design & Implementation - Terrence W. Pratt, Marvin V. Zelkowitz., Pearson Education Asia / Prentice Hall of India

Reference

1. Programming Languages - Robert W Sebesta, Pearson EducationAsia

ARTIFICIAL INTELLIGENCE

RT 804 **3+1+0**

Module 1

Introduction – Definitions – AI application areas – Example problems- Problems and problem spaces - Problem characteristics – Problem solving by searching, Searching strategies – Breadth first search, Uniform cost search, DFS, Depth – Limited search, Bi-directional search – Constraint satisfaction search.

Module 2

Informed search, A* algorithm, Heuristic functions – Inventing Heuristic functions - Heuristic for constraint satisfaction problem – Iterative deepening – Hill climbing – Simulated Annealing.

Module3

Game playing and knowledge structures – Games as search problem – Imperfect decisions – Evaluation functions – Alpha – Beta pruning – state of art game programs, Introduction to frames and semantic nets.

Module 4

Knowledge and Reasoning – Review of representation and reasoning with Logic – Inference in first order logic, Inference rules involving quantifiers, modus ponens, Unification, forward and backward chaining – Resolution.

Module 5

Introduction to Prolog – Representing facts – Recursive search – Abstract data types – Alternative search strategies – Meta predicates, Matching and evaluation, meta interpreters – semantic nets & frames in prolog.

Text Books

Module 1,2,3,4

1. Artificial Intelligence – A modern approach, Stuact Russell – Peter Narang, Pearson Education Asia
2. Artificial Intelligence Rich E. - McGraw Hill Booq Company

Module 5

3. Artificial Intelligence, George F Luger, Pearson Education Asia

References

1. An Introduction to Artificial Intelligence – Eugene Charniak & Drew McDermot, Pearson Education Asia

ELECTIVE - II

R805 **3+1+0**

List of electives

1. Advanced Mathematics
2. Client-Server Computing
3. E-Commerce
4. Analysis and Modeling of Digital Systems
5. Distributed Computing
6. User Interface Design

Note

New Electives may be added according to the needs of emerging fields in technology. The name of the elective and its syllabus should be submitted to the university before the course is offered.

ADVANCED MATHEMATICS (ELECTIVE - I)

CMELR 805-1 **3+1+0**

Module 1 Green's Function

Heavisides, unit step function – Derivative of unit step function – Dirac delta function – properties of delta function – Derivatives of delta function – testing functions – symbolic function – symbolic derivatives – inverse of differential operator – Green's function – initial value problems – boundary value problems – simple cases only

Module 2 Integral Equations

Definition of Volterra and Fredholm Integral equations – conversion of a linear differential equation into an integral equation – conversion of boundary value problem into an integral equation using Green's function – integral equation with separable Kernels – Integral equations of convolution type – Neumann series solution.

Module 3 Gamma, Beta functions

Gamma function, Beta function – Relation between them – their transformations – use of them in the evaluation certain integrals – Dirichlet's integral – Liouville's extension of Dirichlet's theorem – Elliptic integral – Error function.

Module 4 Power Series solution of differential equation

The power series method – Legendre's Equation – Legendre's polynomial – Rodrigues formula – generating function – Bessel's equation – Bessel's function of the first kind – Orthogonality of Legendre's Polynomials and Bessel's functions.

Module 5 Numerical solution of partial differential equations.

Classification of second order equations- Finite difference approximations to partial derivatives – solution of Laplace and Poisson's equations by finite difference method – solution of one dimensional heat equation by Crank – Nicolson method – solution one dimensional wave equation.

References

1. Linear Integral Equation- Ram P.Kanwal, Academic Press, New York
2. A Course on Integral Equations - Allen C.Pipkin, Springer – Verlag
3. Advanced Engg. Mathematics - H.K.Dass, S.Chand
4. Advanced Engg. Mathematics- Michael D.Greenberge, Pearson Edn. Asia
5. Numrical methods in Engg. & Science - B.S.Grewal, Khanna Publishers
6. Generalized functions - R.F. Hoskins, John Wiley and Sons.
7. Principles and Techniques of Bernard Friedman - John Wiley and sons Applied Mathematics
8. Principles of Applied Mathematics- James P.Keener, Addison Wesley.
9. Numerical methods - P.Kandasamy, K.Thilagavathy, K.Gunavathy, S.Chand & co

CLIENT SERVER COMPUTING (ELECTIVE - II)

RT 805-2 **3+1+0**

Module 1 Introduction

History - uses - Client Server Computing & Hetrogenous Computing - Cross Platform Computing Distributed Computing - The costs of Client Server Computing - Advantages and Disadvantages - Client Server Databases.

Module 2 Design

Fundamentals of client server design - Managing the interaction of client and server - Communications Techniques protocols & Client server interaction protocols - Preparing applications for client server - Optimizing applications for client server - Example client server implementations - Request acceptance dispatching - Execution of requests - Client server interaction using message.

Module 3 Multitasking

Multi programming vs multitasking - Processor - Advantages and draw backs of multiple processor - Child and parent processor - Case study Novell Netware and Windows NT - Developing server applications - Threads - Server communication model.

Module 4 Synchronization

Scheduling implementations - processing queues - context switching pre emptive systems - critical sections - mutual exclusion - semaphores - semaphore implementations in NT & Netware.

Module 5 Communications

Network communication - Inter process communication - Building portable client server applications.

References

1. Novell's Guide to Client-Server Application & Architecture- Jeffrey D.Schqnk, Novell Press.
2. Client Server Computing - Dawna Travis Dewire, McGraw Hill.
3. Developing Client Server Applications - W.H.Inman, BPB.
4. Guide to Client Server Databases - Joe Salemi, BPB.
5. Client Server Strategies- David Vaskevitch, Galgotia.

E-COMMERCE (ELECTIVE - II)

R805-3 **3+1+0**

Module1 Introduction to Electronic Commerce

E-Commerce Framework, Anatomy of E-Commerce Applications, E-Commerce Consumer & Organization Applications. E- Commerce and World Wide Web – Internet Service Providers, Architectural Framework for Electronic Commerce, WWW as the Architecture, Hypertext publishing.

Module 2 Network Security

Client-Server Network Security, CS Security Threats, Firewalls, Data & Message Security, Encrypted Documents, Security on the Web.

Module 3 Electronic Payment Systems

Types of Electronic Payment Systems, Digital Token Based Electronic Payment System, Smart Cards, Credit Cards, Risk in Electronic Payment Systems, Designing Electronic Payment Systems.

Module 4 Electronic Data Interchange

EDI Application in Business, EDI-Legal, Security and Privacy Issues, EDI standardization, EDI Envelope for Message Transport, Internet based EDI, Internal Information System, Work-flow Automation and Coordination, Supply Chain Management, Document Library, Types of Digital Documents, Corporate Data Warehouses

Module 5 Recent Trends in E-Commerce

Multimedia in E-Commerce, Video Conferencing with Digital Videos, Broad Band Telecommunication, Frame & Cell Relays, Switched Multimegabit Data Service (SMDS), Asynchronous Transfer Mode, Mobile Computing and Wireless Computing.

Text Book

1. Frontiers of Electronic Commerce - Ravi Kalakota & Andrew B Whinston, Pearson Education Asia

References

1. Global Electronic Commerce – J Christopher Westland & Theodore H K Clark
2. E- Commerce The cutting edge of Business - Kamlesh K Bajaj & Debjani Nag
3. E-Commerce - Strategy, Technologies and Applications, TMH

ANALYSIS AND MODELING OF DIGITAL SYSTEMS (ELECTIVE - II)

RT805-4 **3+1+0**

Module1

Introduction to VHDL: Digital system design - Role of hardware description language- Modeling digital systems – events, propagation delays and concurrency – waveforms and timing – signal values – shared signals – simulation model – synthesis model – Field Programmable Gate Arrays.

Module 2

Basic language concepts simulation: signals – Entity architecture – concurrent statements – Constructing VHDL models using CSAs – delays.

Synthesis: Interface from declarations, simple CSA statements, conditional signal assignment statements, and selected signal assignment statements.

Module3

Modeling behavior Simulation: The process construct – programming constructs – the wait statement – attributes – generating clocks and periodic waveforms – using signals – modeling state machines – constructing VHDL models – programming errors.

Synthesis: language directed view – inference from within process – issues – signals vs. variables – latch vs. flip flop – the wait statement – state machine.

Module 4

Modeling structure: Describing structure – structural VHDL model – hierarchy, abstraction and accuracy – generics – component instantiation and synthesis – the generate statement subprograms: functions – procedures – sub program and operator overloading – packages and libraries.

Module 5

Basic I/O operations – the package TEXTIO – ASSERT statement – terminology and directory structure – simulation mechanics – synthesis mechanics – identifiers – data objects – data types – operators.

Text Book

1. Introductory VHDL - Sudhakar Yalamanchili, Pearson Education Asia.

References

1. VHDL primer - J Bhaskar, Pearson Education Asia
2. Analysis and modeling of digital systems - Zainalabedin Navabi, McGraw Hill.

DISTRIBUTED COMPUTING (ELECTIVE - II)

RT805-5 **3+1+0**

Module I Introduction

Introduction to Distributed Systems, evolution, characteristics, design issues, user requirements, Network technologies and protocols – overview, MACH, AMOBEA- overview.

Module 2 Distributed file system

File service components, design issues, interfaces, implementation techniques, Sun Network File System – architecture and implementation, other distributed file systems – AFS, CODA. Name services – SNS name service model.

Module 3 Communication in distributed systems

Client server communication, Group communication, Message passing – features, synchronizations, RPC – model, implementation, stub generation, messages, marshalling, Server management. Distributed shared memory – Architecture, design issues, structure of shared memory space, replacement strategy, thrashing. Synchronization – clock synchronization, event ordering, mutual exclusion

Module 4 Resource and Process management

Features of scheduling algorithms, Task assignment approach, load balancing, load sharing, Process migration mechanisms, Threads – scheduling.

Module 5 Consistency maintenance

Transaction recovery – methods- intention lists, Fault tolerance – failures, Byzantine failures.

Deadlocks in distributed systems – detection and prevention, centralized and distributed approaches.

References

1. Distributed Systems – Concepts and designing - George Coulouris, Jean Dellimore, Tim Kindberg - Pearson Education Asia
2. Distributed Operating Systems - Andrew S. Tenenbaum Pearson Education Asia
3. Distributed Operating Systems - Concepts and design - Pradeep. K, Sinha, PHI

USER INTERFACE DESIGN (ELECTIVE - II)

RT805-6 **3+1+0**

Module 1 Introduction

Importance of user interface – definition, importance of good design, brief history – Graphical User Interface – Web User Interface – Principles of User interface design.

Module 2 Design Process

Human Interaction with computers, Importance of Human Characteristics, Human consideration, Human Interaction speeds – Understanding Business function

Module 3 Screen Designing

Design goals - screen meaning and purpose, organizing screen elements- ordering of screen data and content – screen navigation and flow – visually pleasing composition – amount of information – focus and emphasis – presenting information simply and meaningfully – information retrieval on web – Statistical graphics – Technological considerations in Interface Design.

Module 4 Windows and components

Menus and navigation schemes, selection of windows, Selection of device based and screen based controls - text and messages – icons and images – Multimedia – colours- uses, problems, choosing colours.

Module 5 Software tools

Specification methods, interface building tools

Interaction devices: keyboard and function keys - pointing devices- speech recognition, digitization and generation – image and video displays – printers.

Text Book

1. The Essential Guide to User Interface Design 2nd Edn. – Wilbert O. Galitz, Wiley Dreamtech
2. Designing the User Interface 3rd Edn. – Ben Shneiderman, Pearson Education Asia

References

1. Human Computer Interaction – John M. Carroll, Pearson Education Asia
2. The Essentials of User Interface Design - Alan Cooper, Wiley Dreamtech

ELECTIVE - III

R806 **3+1+0**

List of electives

1. Multimedia Systems
2. Embedded Systems
3. Neural Networks
4. Genetic Algorithms and Applications
5. Advanced Networking Trends
6. Data Processing and Analysis Techniques
7. Biometrics

Note

New Electives may be added according to the needs of emerging fields in technology. The name of the elective and its syllabus should be submitted to the university before the course is offered.

MULTIMEDIA SYSTEMS (ELECTIVE - III)

R806-1 **3+1+0**

Module 1 Introduction

Definition of multimedia, multimedia, hardware, software applications and software environments - Media Types - Analog and digital video, digital audio, music and animation - Analog & Digital video - Memory storage - Basic tools - Authoring tools.

Module 2 Building Blocks

Text - Hyper text - Sound - Sound cards - Standards - Image - Image types - Image compression, RLE, JPEG, MPEG - Fractal and Wavelet Compressions - Image file types - Animation - Capture and Playback techniques. (basic ideas only)

Module 3 Multimedia Environments

The Compact Disc family, CD-interactive, Digital Video Interactive, QuickTime, Multimedia PC and Microsoft Multimedia Extensions.

Module 4 Multimedia Programming

Framework: Overview, Media classes, Transform classes, Format classes and Component classes - Problems related to programming - Composition, Synchronisation, Interaction, Database integration.

Module 5 Advanced Multimedia

Moving pictures - Techniques realistic image synthesis, Virtual Reality - Full motion digital video - Video capture techniques - multimedia networks - Desktop video conferencing - Future multimedia.

References

1. Multimedia Programming Objects, Environments & Framework - Simon J. Gibbs, Dionysios C. Tsischritziz (Addison-Wesley Publishing Co.)
2. Multimedia - Making it work - Tay Van Ghan – Osborne - Tata Mcgraw Hill
3. Authoring Interactive multimedia - Arch C Luther
4. Optimizing your Multimedia PC - L.J. Skibbe, Susan Lafe Meister - Comdex
5. Multimedia Bible - Winn L. Rosch. Sams
6. Multimedia Producers Bible - Ron Goldberg, Comdex
7. Multimedia Power Tools - Peter Jellam, Random house Electronic Pub.
8. Multimedia Computing - Mathew E. Hodger & Russel M. Sasnett, Addison wesley
9. Integrated Multimedia Systems Overview - Palikom, The communication Wall

EMBEDDED SYSTEMS (ELECTIVE - III)

RT806-2 **3+1+0**

Module1 Overview of Embedded System

Embedded System, Categories of Embedded System, Requirements of Embedded Systems, Challenges and Issues in Embedded Software Development, Applications of Embedded Systems in Consumer Electronics, Control System, Biomedical Systems, Handheld computers, Communication devices.

Module 2 Embedded Hardware & Software Development Environment

Hardware Architecture, Micro-Controller Architecture, Communication Interface Standards, Embedded System Development Process, Embedded Operating systems, Types of Embedded Operating systems.

Module 3 Embedded Communication System

Serial Communication, PC-to-PC Communication, Serial Communication with the 8051 Family of Micro-controllers, Protocol Converter, Voice-over-IP, Embedded Applications over Mobile Network example MP3 Sound Player.

Module 4 Real Time & Database Applications

Real-Time Embedded Software Development, Sending a Message over a Serial Link, Simulation of a Process Control System, Controlling an Appliance from the RTLinux System, Embedded Database Applications using examples like Salary Survey, Energy Meter Readings.

Module 5 Java Applications & Future Trends in Embedded Systems

Networked Java-Enabled Information Appliances, Embedded Process Control System, Mobile Java Applications, Appliance Control using Jini, System on a Chip (SOC), Smart Cards and the Cashless Society, Security in Embedded Systems.

Text Book

1. Programming for Embedded Systems- Dreamtech Software Team, Wiley Dreamtech

Reference

1. Fundamentals of Embedded Software where C and Assembly Meet – Daniel W Lewis.

NEURAL NETWORKS (ELECTIVE - III)

RT806-3 **3+1+0**

Module 1

Introduction - Principles - artificial neuron - activation functions - Single layer & multilayer networks - Training artificial neural networks - Perception - Representation - Linear separability - Learning - Training algorithms.

Module 2

Back Propagation - Training algorithm - Applications - network configurations - Network paralysis - Local minima - temporal instability.

Module 3

Counter Propagation networks: Kebenon layer - Training the cohenen layer - Pre initialising the wright vectors - statistical properties - Training the Grosbery layer - Full counter propagation network - Application.

Module 4

Statistical methods - Boltzmann's Training - Cauche training - Artificial specific heat methods - Applications to general non-linear optimization problems.

Module 5

Hopfield nets - Recurrent networks - stability - Associative memory - applications - Thermo dynamic systems - Statistical Hopfield networks - Bidirectional associative memories - Continous BAM - Adaptive resonance theory - Architecture classification - Implimentation.

Text Book

1. Neural Computing Theory & Practice - Philip D. Wasserman.

References

1. Neural Networks - Simon Haykins
2. Adaptive Pattern Recognition & Neural Networks - Pay Y.H.
3. An Introduction to neural computing - Chapman & Hall
4. Artificial Neural Networks - Robert J. Schalkoff, McGraw Hill
5. Artificial Neural Networks - B.Yegnanarayana, PHI

GENETIC ALGORITHMS AND APPLICATIONS (ELECTIVE - III)

RT806-4 **3+1+0**

Module 1 Architecture-Altering Operations

Introduction, Previous Methods of Determining the Architecture of a Multi-Part Program - On the origin of new function- Architecture-Altering operations for Subroutines -Automatically Defined Iterations, Loops, Recursion, Storage. Self-Organization of Hierarchies and Program Architecture - Rotating the Tires on an Automobile – Boolean Parity Problem- Time-Optimal Robot Control Problem - Multi-Agent Problem - Using Architecture Altering Operations for Subroutines. Transmembrane Segment Identification Problem using Architecture-Altering Operations for Iterations-Fibonacci Sequence- Cart Centering.

Module 2 Genetic Programming Problem Solver (GPPS)

Elements of GPPS 1.0-Problems Illustrating GPPS 1.0 - Elements of GPPS 2.0 - Problems Illustrating GPPS 2.0 - Previous Work on Automated Analog Circuit Synthesis.

Module 3 Automated synthesis of analog electrical circuits

Synthesis of a Low-pass Filter and High-pass Filter The Role of Crossover in Genetic Programming.

Module 4 Evolvable Hardware

Evolvable Hardware and Rapidly Re-configurable Field-Programmable Gate Arrays

Discovery of cellular Automata Rules: Discovery of a Cellular Automata Rule for the Majority Classification Problem.

Module 5 Programmatic Motifs for molecular Biology

Automatic Discovery of Protein Motifs –Programmatic Motifs and the Cellular Location Problem.

Parallelization and Implementation Issues: Computer Time- Parallelisation of Genetic Programming –Implementation Issues.

Text Book

1. Johin R. Koza, Forrest H Bennett III, David Andre, Martin A. Kean, " Genetic Programming III: Darwinian Invention and Problem Solving", Morgan Kaufmann, .1999

Reference

1. Genetic Algorithms for VLSI Design, Layout and test Automation - Pinaki Mazumder, Elizabeth M Rudnick (Pearson Education Asia)

ADVANCED NETWORKING TRENDS (ELECTIVE - III)

RT806-5 **3+1+0**

Module 1

Ethernet Technology – Frame format – Interface Gap – CSMA/CD – 10 mbps Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless Ethernet – SONET – Sonet multiplexing, Sonet frame structure

Module 2

ISDN - Definition - Protocol architecture - System architecture - Transmission channels - ISDN interface, B-ISDN.

Module 3

ATM – ATM Principles – BISDN reference model – ATM layers – ATM adaption Layer – AAL1, AAL2, AAL3/4, AAL5 – ATM addressing – UNI Signaling – PNNI Signalling

Module 4

SATELLITE COMMUNICATION: Satellite communication principles - Geo stationary satellites - block schematic of satellite earth station - VSAT - VSAT networks - applications in personnel communication. (basic ideas only)

Module 5

Wireless Lan – Infrared Vs Radio transmission – Infrastructure & ad hoc n/w – IEEE 802.11 – Hiper Law – Bluetooth – Physical Layer – MAC layer – Networking – Security

References

Module 1

1. An introduction to Computer Networking - Kenneth C Mansfield, Jr., James L. Antonakos, PHI

Module 1,2,3

1. Communication Networks Fundamental Concepts & Key Architecture - Leon-Garcia – Widjaja, Tata McGraw Hill
2. Mobile Communication - Jochen Schiller, Pearson Education Asia

DATA PROCESSING AND ANALYSIS TECHNIQUES (ELECTIVE - III)

RT806-6 **3+1+0**

Module 1

Introduction to COBOL programming -elements of COBOL divisions, sections and paragraphs -Table writing - complete program in COBOL using various options verbs, statements- conditional statements.

Module 2

Table Handling – Occur clause – PERFORM verb – SET verb, SEARCH verb – Occurs depending clause – Sorting a Table.

Module 3

Processing of various file structures in COBOL Language – File description – Fixed Length Record – Statements – Sequential File with variable length record – Sorting and merging of files – Direct access files.

Module 4

Data warehousing – Definition – Multidimentional datamodel – OLAP operation – Data warehouse architecture – Warehouse Server – Metadata – OLAP Engine.

Module 5

Data mining – Definitions, KDD Vs Data mining, DBMS Vs DM – DM Techniques, Issues and Challenges in DM – DM application areas.

References

1. COBOL programming - M K Roy & D Ghosh Dastidar, Tata McGraw Hill
2. Data mining Techniques - Arun K Pujari (Universal Press)
3. Data mining Concepts and Techniques - Jawei Han & Micheline Kamber (Morgan Kunfmann Pub.)
4. Data Mining - Pieter Adriaans, Dolf Zantinge, Person Education Asia
5. Structured COBOL Programming - E. Rajasekar & S.Selvi (Anuradha Agencies)
6. Structured COBOL- A. S. Philippakis & Leonard, J. Kazmier (Tata McGraw Hill)

BIOMETRICS (ELECTIVE -III)

RT806-7 **3+1+0**

Module 1

Introduction – Benefits of biometric security – verification and identification – basic working of biometric matching – accuracy – false match rate – false nonmatch rate – failure to enroll rate – derived metrics – layered biometric solutions

Module 2

Finger scan – features – components – operation (steps) – competing finger scan technologies – strength and weakness

Facial scan - features – components – operation (steps) – competing facial scan technologies – strength and weakness

Module 3

Iris scan - features – components – operation (steps) – competing iris scan technologies – strength and weakness

Voice scan - features – components – operation (steps) – competing facial scan technologies – strength and weakness

Module 4

Other physiological biometrics-Handscan-retina scan- AFIS (automatic fingerprint Identification systems)-Behavieral Biometrics-Signature scan-Key stroke Scan.

Module 5

Biometrics Application – Biometric Solution Matrix-Bioprivacy-Comparison of privacy factor in different biometrics technologies-Designing privacy sympathetie biometric systems-Biometric standards- (BioAPI, BAPI)-Biometric middleware.

Reference

1. Biometrics -Identify Verification in a Networked World - Samir Nanavati, Michael Thieme, Raj Nanavati- WILEY-dreamtech

GRAPHICS AND MULTIMEDIA LAB

R807 **0+0+4**

Point plotting, line and circle drawing, Line and Polygon clipping, transformations, hidden line elimination, curves, polygon hatching, Multimedia programming, Visual programming, Animation

Any experiment according to the syllabus of R702 Computer Graphics may be substituted

PROJECT & SEMINAR

R709/ R808 **0+0+4**

Each student is required to present a technical paper on subject approved by the department. The paper should in general reflect the state of the art. He/ She submits a report of the paper to the department.

In addition to the seminar He/She shall undertake a project work in the 7th semester itself in consultation with the guide(s). On completion of the project work, He/She shall present the work done before a panel of staff members, and submit a report of the project work done to the department.

VIVA -VOCE

R809

A comprehensive Viva-voce examination will be conducted to assess the students overall knowledge in the specified field of engineering. At the time of Viva-voce, certified report of seminar, mini project and project work are to be presented for evaluation.

B.TECH. DEGREE COURSE

SYLLABUS

POLYMER ENGINEERING BRANCH

THIRD SEMESTER