Second Year Computer Engineering

Semester III

3.1 Applied Mathematics III

3.2 Logic Design

3.3 Data Structures Using C++

3.4 Integrated Electronics

3.5 Computer Oriented Numerical Techniques

3.6 Electrical Technology

Semester IV

4.1 Discrete Mathematical Structures

4.2 Principles Of Programming Languages

4.3 Computer Organization

4.4 Design And Analysis Of Algorithms

4.5 System Analysis And Design

4.6 Electronic Instrumentation

CE 3.1 APPLIED MATHEMATICS III

MODULE 1

Linear Algebra: Types of matrices, adjoint, inverse, elementary transformations, normal form-ranksystems of equations AX = B and AX = 0, Linearly independent systems, Eigen values – eigen vectors, Cayley Hamilton Theorem, minimal equation, diagonalisation, functions of matrices.

MODULE 2

Probability Distributions: Definition, properties, discrete/continuous distributions binomial, Poisson, normal. Samples – tests on large samples, correlation and regression.

MODULE 3

Transforms: Laplace – Definition, properties, inverse, convolution – periodic functions, applications. Fourier transforms.

MODULE 4

Transforms: Fourier and Z transforms – Definition, properties, inverse, convolution – periodic functions, applications.

TEXT BOOKS:

1. A Text Book of Matrices – Shanti Narayn, S. Chand & Company
2. Statistical Methods - Gupta S.P, S. Chand & Sons.
3. System and Signal Analysis – Chi – Tsong Chen, Holt, Rinse Hart and Winston Inc. (Sections: 4.1 – 4.8, 5.1 – 5.6, 6.4 – 6.6 of T.B: 3)

REFERENCE BOOKS:

1. Advanced Engineering Mathematics – Kreyazig Wiley
2. Engineering Mathematics Vol. III – P. Kandasamy et all, S.Chand & Co., New Delhi.

CE 3.2 LOGIC DESIGN

MODULE 1

Number Systems and Codes: Number system binary codes, error detection and correction. Logic Gates: Basic gates, Secondary gates, Boolean algebra, De-Morgan's Law, NOR, NAND as universal gates, EX-OR gate.

MODULE 2

Boolean Algebra: Algebraic simplification, Karnaugh Map, Methods of simplification, Q.M. method. Arithmetic Logic Units: binary addition, binary subtraction, Half adder, Full adders.

MODULE 3

Flip flops: RS latches, Level clocking, D latches, edge triggered D Flip flop, edge triggered JK Flip-flop, JK Mast Slave flip flop. Registers and Counters: Buffer Registers, shift registers, Controlled shift registers, Ripple counters, Synchronous counters, Ring counters.

MODULE 4

Introduction to Synchronous Sequential Circuits: Finite state, Model, Synthesis of synchronous sequential circuits.

TEXT BOOKS:

1. Digital Principles and Applications – A.P. Malvino, Donald P. Leach IV Edn, TMH
2. Digital Computer Electronics – Malvino II Edn., TMH

REFERENCE BOOKS:

1. Switching and Finite Automata Theory – Kohavi, II Edn., TMH
2. Digital Computer Design – Rajaraman & Radhakrishna, III Edn., PHI
3. Digital Computer Design Principles – M.R. Bhujade, Pitamber
4. Computer Architecture and Logic Design – Thomas C. BArtee, TMH
5. Modern Digital Electronics – R.P. Jain, II Edn., TMH.

CE 3.3 DATA STRUCTURES USING C++

MODULE 1

An overview of object oriented programming: Introduction to C++ programming, loops and decisions, structures, objects, classes operator overloading, inheritance, polymorphism, pointers, files, etc.

MODULE 2

Introduction to Data Representation and Data Structures: Arrays and applications. Stacks: Definition, Representation of stacks and applications. Queues: Definition, Representation of queues, circular queues and applications.

MODULE 3

List: Single linked list, linked stacks & queues other list structures like doubly linked list, circular linked list, examples and simulation. Trees: basic terminology, binary trees, representations, traversals. Graphs: basic terminology, representation of graphs, graph traversals.

MODULE 4

Sorting: Exchange sorts, selection and tree sorting, insertion sorts, merge & radix sorts. Searching: Basic search techniques like binary search, hashing. Introduction to advanced data structures.

TEXT BOOKS:

1. Data Structure Using C & C++ – Yedidya Langsam, Moshej Augenstein, Aaron M. Tenenbaum, Prentice Hall of India.

2. Data Structures, Algorithms and Applications in C++ - Sahni, MCH.

REFERENCE BOOKS:

1. Data Structures and Algorithms – Alfred V. Aho, John e. Hopcraft & J.D. Ullman, Addision Wesley.

2. Data Structures and Program Design in C – Robert L. Kruse, Prentice Hall of India.

3. Fundamentals of Data Structures – Ellis Horowitz and Sartaj Sahni, Galgotia Publications.

CE 3.4 INTEGRATED ELECTRONICS

MODULE 1

Operational Amplifiers: Characteristics, features, basic circuits and applications. Waveform generators.

MODULE 2

Voltage Regulators: Definition, design and letter using IC 723, Lm 105, Regulated P.S. 555 timer & its configurations. D/A convertors, A/D convertors, multiplexers, demultiplexers, decoders, encoders.

MODULE 3

Characteristics and comparisons of major logic families: Realizations of logic functions, gates. Design of sequential & Combinational logic circuits with LSI & MSI components.

MODULE 4

Timing Issues: Clock generator, synchronization at system level. Semiconductor memories: memory classification, architecture and building blocks, ROM, Nonvolatile Read-Write memories, RAM. Memory peripheral circuitry: address decoders, sense amplifiers, drivers/buffers and their timing control. Design of PLA and 4 Mbit SRAM

TEXT BOOKS:

1. OpAmps & Linear Integrated Circuits – Ramakant A. Gayakwad, II Edn., PHI

2. Digital Integrated Circuits, A Design Perspective – Jan M. Rabaey, PHI

3. Microelectronics – JAcob Milliman, TMH

REFERENCE BOOKS:

1. Integrated Electronics: Analog and Digital Electronic Circuits and Systems – MIllman and Halkias, TMH.

2. Electronics for Scientist & Engineers – Vishwanathan, Mehta and Rajaraman, PHI.

3. Introduction to System Design using Integrated Circuits – B.S. Sonde, Wiley Eastern

4. Digital Principles & Applications – Malvino & Leach, PHI

5. Microelectronics – Jacob Millman, Arvin GRabel, II Edn., MGH

CE 3.5 COMPUTER ORIENTED NUMERICAL TECHNIQUES

MODULE 1

Errors and Approximations: Introduction, sources of errors, problems in computations, safeguards against errors, floating point arithmetic, absolute error, relative error, percentage error – calculations. Interpolation: Newton's Interpolation formulae, Lagrange's interpolation, Newton's Divided difference Interpolation formula.

MODULE 2

Solution of Transcendental and Polynomial equations in one variable: Newton Raphson method, Regula Falsi method, successive bisection, secant method, etc.

MODULE 3

Solution of Linear Equation: Gauss's Elimination method, Pivoting, Computation of Matrix inverse using Gauss Elimination, Gauss Jordan methods. Iterative algorithms – Jacobi, Gauss Seidal methods. Eigen values and eigen vectors.

MODULE 4

Numerical Integration: Trapezoidal rule & Simpson's rules, Romberg's formula. Numerical Differentiation: Newton's forward and Newton's backward difference formulae. Solution of ordinary differential equations Euler's methods, Runge Kutta methods, Predictor Corrector method.

TEXT BOOKS:

1. Numerical Algorithms – E.V. Krishnamurthy and Sen, PHI
2. Introductory Methods of Numerical Analysis – S.S. Shastry, PHI

REFERENCE BOOKS:

1. Computer Oriented Numerical Methods – Rajaraman, PHI
2. First Course in Numerical Methods – A. Ratson, MGH
3. Numerical Methods in Engineering and Science – Dr. B.S, Grewal, Khana Publication

CE 3.6 ELECTRICAL TECHNOLOGY

MODULE 1

- Principles of electromechanical energy conversion
- DC Motor: principle, voltage equation, torque-equations, motor characteristics, speed control, starting
- Three Phase Induction Motor: Principle, construction, slip, torque-slip characteristics, starting, speed control.

MODULE 2

- Single phase Induction Motor: Principle of operation of split phase type, capacitor start motors.
- Stepper Motors: Types, principle of operation.
- Synchros: Construction, principle of operation and applications.
- Servomotors: DC servomotor, two-phase ac servomotor.

- Drives: Concept of an Electrical Drive, Classification, characteristics and braking of dc motors.

MODULE 3

- Working principle, construction, torque equations of the following analog instruments (a) PMMC (b) Moving iron (c) Electrodynamometer type

Shunts and multipliers for PMMC type instruments and extension of range,

- Electrodynamometer Wattmeter: construction, torque equation
- Induction type Energy meter: construction, torque equation

MODULE 4

- Potentiometers: DC potentiometer: slide wire type and Laboratory type (Crompton's Potentiometer), applications.
  AC Potentiometer: Drysdale Polar type Potentiometer.
- AC bridges : for measurement of inductance, capacitance and frequency: Maxwell Bridge, Hay's Bridge, Owen's Bridge, Schering bridge, Wein's Bridge, Wagner's Earth bridge.
- Illumination: Definitions, laws of Illumination
- Electrical heating: advantages, principle of resistance heating, high frequency eddy current heating, dielectric heating.

TEXT BOOKS :

1. A Text Book of Electrical Technology-- B.L Theraja.(Vol II)
2. A Course in Electrical and Electronics Measurement and Instrumentation---A.K. Sawhney

REFERENCE BOOKS:

1. Electrical Power : J.B. Gupta

2. A First Course on Electrical Drives: S.K. Pillai

CE 4.1 DISCRETE MATHEMATICAL STRUCTURES

MODULE 1

Set Theory: Relations, equivalence, ordered sets.

Functions: Relations:-binary, equivalence, partitions, partial ordering, lattices, pigeons holes principle.

MODULE 2

Algebraic structures: monoids, groups, rings, fields, vector spaces, integral domain-Homomorphisms, isomorphisms.

MODULE 3

Boolean Algebra: duality-properties-Boolean: lattices, functions, expressions, propositional calculus, design of digital networks, switching circuits, simplification.

Mathematical reasoning, induction, deduction, recurrence relations.

MODULE 4

Graph theory, paths, circuits, Eulerian, Hamiltonian paths, binary search trees, Spanning trees, transport networks.

TEXT BOOKS

1. Elements of Discrete Mathematics – C.L.Liu, McGraw Hill.

REFERENCE BOOKS

1. Discrete Structures, An introduction to Computer Sciences – Norris F.R., Prentince Hall.
2. Discrete Mathematical Structures with Applications to Computer Sciences – Tremblay J.P. and Manohar R., McGraw Hill, NY.
3. Discrete Mathematics in Computer Science-Stanant D.F. and Allister D.F., Prentice Hall.
4. Concepts in Discrete Mathematics – Sahani S.Narosna, New Delhi.
5. Basic Graph Theory – Parthasarathy K.R, TMH

CE 4.2 PRINCIPLES OF PROGRAMMING LANGUAGES

MODULE 1

Language Design Issues: Structure and Operation, Virtual computer, binding times, language Paradigms.

Language translation Issues: Program Language syntax, stages in translation; formal translation models.

Data types: Properties of types and objects, elementary data types structural data types.

MODULE 2

Encapsulation: Abstract data types encapsulation, by sub programs, type definitions, storage management.

Sequence Control: Implicit and Explicit sequence control, sequence control, sequence control for arithmetic; non arithmetic expressions, sequence control between structures.

MODULE 3

Sub program control: Sub program sequence control attributes of Data Control, shared data in subprograms.

MODULE 4

Characteristics and features of procedural languages, structural languages, logic programming languages with reference to suitable example of each.

Advances in language design

TEXT BOOK

1. Programming languages: Design and Implementation – Terrence W.Pratt, Marvin V.Zelkowig, PHI

REFERENCE BOOKS

1. Fundamentals of Programming Languages- Horowitz, Galgotia Pub.

2. Programming Languages – Tucker A.B., ISE McGraw Hill.

CE 4.3 COMPUTER ORGANIZATION

MODULE 1

Computer arithmetic: Integer representation, integer arithmetic, floating point representation, floating point arithmetic.

Computer System: System buses, Interconnection structure, Bus interconnection

MODULE 2

Memory: Internal memory, external memory, memory organisation.

Input/Output devices.

MODULE 3

Instruction Sets: Characteristics and functions, addressing modes and formats(8086 based) CPU structure and functions.

MODULE 4

Control unit operations, hardwired implementation, microprogramed control.

RISC processors: Characteristics and architecture, pipelining

Introduction to parallel processing

TEXT BOOKS

1. Computer Organisation and Architecture: Designing for Performance - William Stallings, Fourth edition, Prentice Hall of India.

REFERENCE BOOKS

1. Computer Systems Architecture- M.Morris Mano, Prentice Hall of India.

2. Structured Computer Organisation – Andrew S.Tanenbaum, Prentice Hall of India.

3. Computer Organisation – V.C.Hamachar, L.G. Vianesic, S.G. Zaky, McGraw Hill International Students Edition.

CE 4.4 DESIGN AND ANALYSIS OF ALGORITHMS

MODULE 1

Algorithm analysis and complexity, dynamic storage management and garbage collection, Recursion, lower bound theory.

MODULE 2

Techniques for algorithm design & analysis: Divide and conquer, dynamic programming.

MODULE 3

Greedy algorithms, basic search and traversal techniques.

MODULE 4

Backtracking, NP hard and NP complete problems.

TEXT BOOKS

1. Fundamentals of Computer Algorithms – E.Horowitz & S.Sahini, Galgotia publication.

2. Introduction to Algorithms – T.H.Cormen, C.E. Leiserson, R.L.Rivest, PHI

REFERENCE BOOKS

1. The Design and Analysis of Computer Algorithms – Aho Hopcraft & Ulman, Addison Wesley.

2. Algorithms – Robert Sedjewick, Addison Wesley.

3. Fundamentals of Algorithms – Brassord & Bratley, PHI

CE 4.5 SYSTEM ANALYSIS AND DESIGN

MODULE 1

System Design Overview: Systems Concepts and the Information Systems Environment, System development life cycle, role of System Analyst.

MODULE 2

System Analysis: Planning and initial investigation, information gathering, tools for structured analysis, feasibility study, cost/benefit analysis.

MODULE 3

System Design: Process and stages of system design, input/output and forms design, file organization and data base design.

MODULE 4

System Implementation: System testing and Quality assurance, Implementation and software maintenance, hardware/software selection and evaluation, project scheduling and software, security issues, recovery methods, codes and standards of behavior.

TEXT BOOKS

1. Systems Analysis and Design, Elias M.Awad , II Edn., Galkgotia

2. Introducing System Analysis and Design, Vol 1, Vol 2, Int. Edn., NCC

REFERENCE BOOKS

1. System Analysis and Design Methods, Jeffrey L.Whiten, & Lonnie D.Bentler, IV Edn., Galgotia.

2. Introduction to System Analysis and Design, Igor T. Hawrysziewycz, PHI.

3. Analysis and Design of Information Systems, V. Rajaraman, PHI.

4. Analysis and Design of Information Systems, J.A. Senn TMH

CE 4.6 ELECTRONIC INSTRUMENTATION

MODULE 1

Introduction: Measurement and errors, Systems of units of measurements, Standards of Measurements.

Electronic Instruments for measurement of basic parameters: Electronic multimeter, R meter, Digital Voltmeter, Vector impedence meter, R.F. power and voltage measurement.

MODULE 2

Oscilloscopes: Block diagram, CRT and circuits, Vertical deflection, delay line, multiple trace oscilloscopes, Probes and Transducers Oscilloscope techniques.

Signal generation: Sine wave, frequency synthesized, sweep frequency generators, pulse and square wave generators, function generators, audio frequency signal generators.

MODULE 3

Signal analysis: Wave analysers, harmonic distortion analysers & spectrum analysis.

Frequency counters and time interval measurements: Frequency counters, extending the range of frequency counter, Automatic and computing counters.

MODULE 4

Transducers: Classification of transducers, transducers for different physical quantities, strain gauges, displacement transducers, temperature measurements, photosensitive devices etc.

Analog and digital data acquisition systems: Instrumentation systems, interfacing transducers to electronic control and measuring systems, multiplexing.

TEXT BOOK

1. Modern Electonic Instrumentation and Measurement Techniques – A.D.Helfrick and W.D.Cooper, PHI

REFERENCE BOOKS

1. Electronic Instrumentation- H.S.Kalsi, TMH

2. A course in electrical and electronics measurement and Instrumentation – A.K. Sawhney, Dhanpat Rai and Co.(pvt.) Ltd.

3. Electronic Measurement and Instrumentation – Oliver and Cage, McGraw Hill