Course Curriculum for the Programme of AMIETE in Computer Science & Engineering

Appendix-C

SECTION A

Part - I

Sl No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AC51	Engineering Mathematics – I *	4	-
2	AC52	C & Data Structures *	4	-
3	AC53	Electronic Devices & Circuits *	4	-
4	AC54	Linear ICs & Digital Electronics *	4	-
5	AC55	Object Oriented Programming with C++ **	4	-
6	AC91	Data Structures with C & C++lab **	-	4
		Total Credits	20	4

Part - II

Sl No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AC56	Engineering Mathematics – II *	4	-
2	AC57	Signals & Systems *	4	-
3	AC58	Computer Organization **	4	-
4	AC59	Operating Systems & Systems Software **	4	-
5	AC60	Computer Graphics **	4	-
6	AC61	Database Management Systems **	4	-
7	AC92	DBMS Lab **		4
		Total Credits	24	4

All the students have to pass a course in "Communication Skills & Technical Writing" which will not be counted for the overall percentage

SECTION B

Part - I

Sl No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AC62	Operations Research & Engineering Management *	4	-
2	AC63	Software Engineering **	4	-
3	AC64	Design & Analysis of Algorithms **	4	-
4	AC65	Discrete Structures	4	-
5	AC66	Microprocessors & Microcontrollers *	4	-
6	AC93	Analysis & Design of Algorithms Lab **	-	4
		Total Credits	20	4

Part - II

Sl No	Sub Code	Title	Examination Credits	
			Theory	Practicals
1	AC67	Data Communication & Computer Networks **	4	-
2	AC68	Finite Automata & Formula Languages	4	-
3		Elective – I	4	-
4		Elective – II	4	-
5	AC94	µP & µC Lab	-	4
6	AC69	Project Work	-	8
7	AC70	Seminar	-	4
		Total Credits	16	16

For Electives I & II, students can chose any two of the following elective subjects

Sl No	Sub Code	Title
1	AC71	Unix Systems Programs **
2	AC72	Linux Internals **
3	AC73	C # and .Net **
4	AC74	Artificial Intelligence & Neural Networks **
5	AC75	Internet Applications **
6	AC76	Cryptography & Network Security **
7	AC77	DSP †
8	AC78	Advanced Microprocessors

1	AC99	Communication Skill & Technical Writing

NOTE: * Subjects common to ET / CS / IT Streams
** Subjects/ Electives and labs common to CS / IT Streams
† Electives common to ET / CS streams

Appendix 'B'

OUTLINE SYLLABUS
AMIETE (COMPUTER SCIENCE & ENGINEERING)

AC51 ENGINEERING MATHEMATICS – I

- Partial differentiation and its application
- Multiple integrals
- Linear algebra
- Numerical Methods
- Solutions of ordinary differential equation
- Linear differential equation of higher order
- Special Functions and Series solutions of Differential equations
- Bessel & Legendre differential equation

AC52 C & DATA STRUCTURES

- Introduction to the C language and data types
- C operators
- Control structures
- The *printf* function, the *scanf* function, address and pointers
- Arrays
- Functions and Recursion
- Strings
- Structures, Unions and files
- Arrays, Searching and Sorting
- Stacks, Queues and linked lists
- Trees
- Graphs

AC53 ELECTRONIC DEVICES AND CIRCUITS

- Circuit Theory
- Semiconductors, Diodes and Diode Circuits
- Transistors and Other Devices
- Small-Signal Models, Amplification and Biasing
- Small-Signal Amplifiers-Frequency Response
- Large-Signal Amplifiers
- Feedback Amplifiers and Oscillators
- Integrated Circuits Fabrication

AC54 LINEAR ICs AND DIGITAL ELECTRONICS

- Introduction
- Operational Amplifier
- Operational Amplifier Characteristics
- Operational Amplifier Applications
- Comparator and Waveform Generator
- Voltage Regulator
- D-A and A-D Converters
- Introductory Concepts
- Number Systems and Codes
- Describing Logic Circuits
- Combinational Logic Circuits
- Digital Arithmetic
- MSI Logic Circuits
- Flip-Flops and their Applications
- Counters and Registers

AC55 OBJECT ORIENTED PROGRAMMING WITH C++

- Overview
- Declarations and Expressions
- Statements
- Array, Pointer and Structure
- Functions
- Data Abstraction through Classes and User-defined Data types
- Operator Overloading
- Class Relationships
- Template
- Exception Handling
- The Standard Library in C++

AC91 DATA STRUCTURES WITH C & C++ LAB

AC56 ENGINEERING MATHEMATICS – II

- Complex Analysis
- Vector Calculus
- Numerical Methods
- Partial differential equation
- Probability and Theoretical distribution

AC57 SIGNALS AND SYSTEMS

- Signals
- Linear-Time Invariant Systems
- Fourier Series Representation of Periodic Signals
- The Continuous-Time Fourier Transform
- The Discrete-Time Fourier Transform
- Time and Frequency Characterization of Signals and Systems
- Sampling
- The Laplace Transform
- The Z-Transform
- Random Processes

AC58 COMPUTER ORGANIZATION

- Basic Structure of Computers
- Machine Instructions and Programs
- Input/Output Organization
- Memory System
- Arithmetic
- Basic Processing Unit

AC59 OPERATING SYSTEMS & SYSTEMS SOFTWARE

- Evolution of OS Functions
- Processes
- Scheduling
- Deadlocks
- Process Synchronization
- File Systems
- Memory Management
- Language Processors
- Data Structures For Language Processing
- Scanning and Parsing
- Macros and Macro Processors
- Linkers
- Assemblers
- Compilers and Interpreters

AC60 COMPUTER GRAPHICS

- Introduction to Computer Graphics
- Getting Started Drawing Figures
- More Drawing Tools
- Clipping
- Transformation of Objects
- Modeling Shapes with Polygonal Meshes
- Three-Dimensional Viewing
- Rendering Faces for Visual Realism
- Tools for Raster Displays
- Curves

AC61 DATABASE MANAGEMENT SYSTEMS

- Databases and Database Users
- Database System - Concepts and Architecture
- Data Modeling using the Entity-Relationship model
- The Relational Data Model and Relational Database Constraints
- The Relational Algebra and Relational Calculus
- Relational Database Design by ER – to – Relational Mapping
- SQL-99: Schema Definition, Basic constraints and Queries
- Relational Database Design
- File Organizations and Indexes
- Algorithms for Query Processing and Optimization
- Introduction to Transaction Processing Concepts and Theory

AC92 DBMS LAB

AC62 OPERATIONS RESEARCH & ENGINEERING MANAGEMENT

- What is Operations Research?
- Modeling with Linear Programming
- The Simplex Method and Sensitivity Analysis
- Duality and Post-Optimal Analysis
- Transportation Model and its Variants
- Network Models
- Decision Analysis and Games
- Queuing Systems
- Introduction to Engineering Management
- The Organization
- Strategy Formulation
- Decision Making
- Information Presentation
- Forecasting Models for Decision Making
- Markets and Marketing
- Product Management, Sales and Distribution
- Management Skills
- Effective Communications

AC63 SOFTWARE ENGINEERING

- Socio-Technical Systems
- Software Processes
- Project Management
- Software Requirements
- Requirements Engineering Processes
- System Models
- Rapid Software Development
- Formal Specification
- Architectural Design
- Distributed Systems Architectures
- Objected-Oriented Design
- Software Reuse
- Component-based Software Engineering
- User Interface Design
- Critical Systems Development
- Verification and Validation
- Software Testing
- Software Cost Estimation
- Quality Management
- Process Improvement
- Configuration Management

AC64 DESIGN & ANALYSIS OF ALGORITHMS

- Introduction
- Fundamentals of the analysis and algorithm efficiency
- Brute force
- Divide and conquer

- Decrease and conquer
- Transform and conquer
- Dynamic programming
- Greedy technique
- Space and time tradeoffs
- Limitations of algorithmic power
- Coping with limitations of algorithmic power

AC65 DISCRETE STRUCTURES

- Set theory
- Mathematical Logic
- Mathematical Induction and Recursive Definitions
- Relations
- Functions Groups
- Coding Theory
- Rings

AC66 MICROPROCESSORS & MICROCONTROLLERS

- Evolution of Microprocessors
- Fundamentals of a Computer
- Number Representation
- Fundamentals of Microprocessor
- First Assembly Language Program
- Instruction set of 8085
- Chip select logic
- Addressing of I/O ports
- Architecture of 8085
- Assembly language programs
- Use of PC in writing and executing 8085 programs
- Interrupts in 8085
- 8255 Programmable peripheral interface chip
- Programs using interface modules
- Interfacing of I/O devices
- Intel 8259A, 8257, 8253, 8251A
- Intel 8051 microcontroller

AC93 ANALYSIS & DESIGN OF ALGORITHMS LAB

AC67 DATA COMMUNICATION AND COMPUTER NETWORKS

- Data Communications, Data Networking, and the Internet
- Protocol Architecture, TCP/IP, and Internet-Based Applications
- Data Transmission
- Transmission Media
- Signal Encoding Techniques
- Digital Data Communication Techniques
- Data Link Control Protocols
- Multiplexing
- Circuit Switching and Packet Switching
- Routing in Switched Networks
- Congestion Control in Data Networks
- Local Area Network Overview
- High-Speed LANs
- Wireless LANs
- Internetwork Protocols
- Internetwork Operation
- Transport Protocols
- Internet Applications

AC68 FINITE AUTOMATA & FORMULA LANGUAGES

- Introduction to Automata
- Finite Automata
- Regular expressions
- Properties of Regular Languages
- Context-free grammars and languages
- Pushdown Automata
- Properties of Context-Free Languages
- Turing Machines

AC71 UNIX SYSTEMS PROGRAMS

- Introduction
- File I/O
- Files and Directories
- Standard I/O Library
- System Data Files and Information
- The Environment of a Unix Process
- Process Control
- Process Relationships
- Signals
- Terminal I/O
- Daemon Processes
- Inter Process Communication

AC72 LINUX INTERNALS

- Linux-the Operating System
- Compiling the Kernel
- Introduction to the Kernel
- Memory Management
- Inter-process communication
- The Linux File system
- Device Drivers Under Linux
- Network Implementation
- Modules and Debugging
- Multi-Processing

AC73 C# & .NET

- The Philosophy of .NET
- Building C# Applications
- C# Language Fundamentals
- Object-Oriented Programming with C#

- Exceptions and Object Lifetime
- Interfaces and Collections
- Callback Interfaces, Delegates and Events
- Understanding .NET Assemblies

AC74 ARTIFICIAL INTELLIGENCE & NEURAL NETWORKS

- Overview of Artificial Intelligence
- Symbolic Logic
- Knowledge Acquisition and Representation
- Reasoning and KRR Systems
- Uncertainty
- Search Techniques
- Expert Systems
- Neural Networks
- Applications of Artificial Intelligence

AC75 INTERNET APPLICATIONS

- Hypertext Markup Language
- More HTML
- Cascading Stylesheets
- Cascading Stylesheets 2
- An Introduction to JavaScript
- Objects in JavaScript
- Dynamic HTML with JavaScript
- Programming in Perl 5
- CGI Scripting
- Building Web Applications with Perl
- An Introduction to PHP
- Building Web Applications with PHP
- XML: Defining Data for Web Applications

AC76 CRYPTOGRAPHY & NETWORK SECURITY

- Introduction
- Mathematics of Cryptography
- Traditional Symmetric Key Ciphers
- Modern Symmetric Key Ciphers
- Data Encryption Standard (DES)
- Encipherment using Modern Symmetric Key Ciphers
- Asymmetric Key Cryptography
- Integrity, Authentication, and Key Management
- Cryptographic Hash Functions
- Digital Signature
- Security at the Application Layer
- Security at the Transport Layer

AC77 DIGITAL SIGNAL PROCESSING

- Sampling of Continuous-Time Signals
- Transform Analysis of Linear Time-Invariant Systems
- Structures for Discrete-Time Systems
- Filter Design Techniques
- The Discrete Fourier Transform
- Computation of the Discrete Fourier Transform
- Fourier Analysis of Signals using the Discrete Fourier Transform
- Discrete Hilbert Transforms

AC78 ADVANCED MICROPROCESSORS

- 8086 Architecture and Programming model
- 8086 Addressing modes
- Instruction Templates
- Data transfer and Data conversion instructions
- Arithmetic and Logical instructions
- Process control instructions
- String instructions
- Branch instructions
- Interrupts and related instructions
- 8087 Numeric co-processor and Instruction Set
- Assembly language programs
- BIOS and DOS services
- Assembly language programs using recursion
- Assembly language programs using BIOS and DOS services
- Assembly language programs using co-processor
- C language programs using BIOS and DOS services
- 80286, 808386, 80486 and Pentium processor

AC94 µP & µC LAB

AC69 PROJECT WORK

AC70 SEMINAR

AC99 COMMUNICATION SKILLS AND TECHNICAL WRITING

- Communication: Its Types and Significance
- Grammar
- Syntax
- Reading Skills
- Writing Skills
- Listening Skills
- Speaking Skills
- Technical Report
- Self Development

Appendix-J

AMIETE (CS)
STREAMWISE DETAILED SYLLABUS

Introduction

Most of the Student Members of the IETE are working engineers/ technicians/science graduates or under graduates. Thus, due to occupational reasons and other factors these students are deprived of a formal education and therefore have to learn the subjects through self-study only.

Review of Syllabus

2. IETE periodically reviews the syllabi of AMIETE and the aim of these reviews is not only to renovate and modernize the contents but also to make them contemporary. The syllabi for both Electronics & Telecommunications (ET),Computer Science & Engineering (CS) and Information Technology (IT) streams have been reviewed recently.

3. Keeping the above aspects in view and based on feed backs/suggestions received from the students, this syllabus has been formulated to meet the following criteria:-

- The Syllabus should cater to the technological advancements.
- The textbooks should be available and affordable to the students.
- In the absence of a formal coaching to the students, there should be a reasonable correlation between the topics in a subject and the textbooks.

Salient Features

4. Some salient features of the syllabus are:-

- Each subject has a code preceding it (viz AE51, AC51 and AT51 are codes for Mathematics-I in ET, CS and IT streams respectively).
- In order to guide the student and to enable him/her to prepare well for an examination, each subject is divided into 8 units and each unit has the course contents to be covered in 7 or 8 hours.
- The textbooks have been numbered in Roman Numerical (viz I, II, III)
- The chapters and sections are mentioned inside the bracket e.g. I (2.1) would indicates chapter 2 and section 1 of textbook-I.

Scheme of the Examination

5. For all theory subjects the Question Paper contains

- 10 objective questions for 20 marks covering the complete syllabus
- 8 questions are from each unit and each question carries 16 marks.

6. Regular feed back from the students, academicians, corporate members and professionals is requested to keep this syllabus updated, so that our students keep abreast of latest technological changes. Though every effort has been made to identify standard and best textbooks for each subject, we welcome suggestions on availability of better and cheaper textbooks.

AC51 ENGINEERING MATHEMATICS – I

UNIT I

PARTIAL DIFFERENTIATION AND ITS APPLICATION 08 hrs

Introduction to function of two or more variables; Partial derivatives; Homogeneous functions – Euler's theorem; Total derivatives; Differentiation of Implicit functions; change of variables; Jacobians; properties of Jacobians; Taylor's theorem for functions of two variables (only statement); Maxima and Minima of functions of two variables; Lagrange's Method of undetermined Multipliers; Rule of differentiation under integral sign.

I (5.1, 5.2, 5.4, 5.5 (1), 5.5 (2), 5.7 (1), 5.7 (2), 5.11 (1), 5.11 (2), 5.12, 5.13)

UNIT II

MULTIPLE INTEGRALS 08 hrs

Introduction to Double Integrals; Evaluation of Double Integrals; Evaluation of Double Integrals in polar coordinates; change of order of integration; Triple Integrals; Evaluation of Triple Integrals; Area by Double Integration; volume as Double Integral; volume as Triple Integral.

II (6.1 to 6.9 except 6.6)

UNIT III

LINEAR ALGEBRA 07 hrs

Introduction to determinants and matrices; Elementary row operations on a matrix: Rank of a matrix: Consistency of system of linear equation; Gauss elimination Method to solve system of Linear equations; Eigen Values and Eigen Vectors of Matrix; Properties of Eigen values; Solution of a system of linear equations.

I (2.1, 2.2, 2.5, 2.8 (1), 2.8 (2), 2.11 (1), 2.14 (1), 2.15, 28.6 (1)); II (3.39)

UNIT IV

NUMERICAL METHODS 07 hrs

Introduction; Solution of algebraic and transcendental equations; Regula – falsi method; Newton-Raphson method; Numerical solution of ordinary differential equation; Taylor's Series method; Euler's Method; Modified Euler's Method; IV order Runge Kutta method; Gauss – Siedel Method to solve system of linear equations; Power method to obtain the dominant Eigen value of a Matrix and its corresponding Eigen Vector.

I (28.1, 28.2 (2), 28.2(3), 31.1, 31.3, 31.4, 31.5, 31.7, 28.7 (2), 28.9)

UNIT V

SOLUTIONS OF FIRST ORDER AND FIRST DEGREE ORDINARY DIFFERENTIAL EQUATION 07 hrs

Definition and Practical approach to differential equation; solutions of differential equation and geometrical meaning of differential equation; Solution by the Method of variable separable; Homogeneous differential equation; Equation reducible to homogenous differential equation; Linear equations; Bernoulli's equation; Exact equation; To find orthogonal trajectories of the given family of curves; Physical applications.

I (11.1, 11.2, 11.4 (1), 11.4 (2), 11.5, 11.6, 11.7, 11.8, 11.9, 11.10, 11.11)
II (12.3, 12.4 (a), 12.4 (b), 12.5)

UNIT VI

LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER 07 hrs

Definition and General form of Linear differential equation of higher order; the operator D; complete solution of Linear differential equation as a sum of complementary function (C.F) and particular integral (P.I); Rules for finding the complementary function; the inverse operator 1/f (D); Rules for finding Particular integral; method of variation of parameter to find the Particular integral; Cauchy and Legendre Homogenous Linear equations; Simultaneous Linear equations with constant coefficients.

I (13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8, 13.9, 13.11)

UNIT VII

SPECIAL FUNCTIONS AND SERIES SOLUTIONS OF DIFFERENTIAL EQUATIONS 08 hrs

Gamma functions; Recurrence formula for Γ (n); value of Γ (½); Beta Function; Symmetry of Beta Function; Relation between Gamma and Beta Function; Illustrative examples; Series solution of Differential equations (Method of Frobenius); Validity of series solution; series solution when X=0 is an ordinary point of the equation; series solution when X=0 is a regular singularity of the equation.

II (15.1 to 15.7 and 15.11 to 15.14)

UNIT VIII

BESSEL AND LEGENDRE DIFFERENTIAL EQUATION 08 hrs

Bessel equation-Bessel functions Recurrence formula for $J_n(x)$; Generating Function for $J_n(x)$; Equations Reducible to Bessel's equation Orthogonality of Bessel functions; Legendre's differential equation; Legendre Polynomials; Rodrigue's formula; Orthogonality of Legendre polynomials.

I (16.5 to 16.11, 16.13, 16.14 (1), 16.14 (2), 16.17)

Text Books:

I. Higher Engineering Mathematics, Dr. B.S.Grewal, 40th edition 2007, Khanna publishers, Delhi.
II. Text book of Engineering Mathematics, N.P. Bali and Manish Goyal, 7th Edition 2007, Laxmi Publication (P) Ltd.

Reference book:

1. Advanced Engineering Mathematics, H.K. Dass, 17th Revised Edition 2007, S.Chand & Company Ltd, New Delhi.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC52 C & DATA STRUCTURES

PART A: C PROGRAMMING

UNIT I

INTRODUCTION TO THE C LANGUAGE AND DATA TYPES 07 hrs

The first program in C, Inputting the data, The control statement, The iteration loop, The *do…while* loop, The *switch* statement, Various data types in C, The integer data type family, Overflow in *char* and *unsigned char* data types, The *char* type, Octal numbers, Hexadecimal numbers, Representation of floating-point numbers, Type conversion, Forced conversion, Type casting.

C OPERATORS

Arithmetic operator, Relational operator, Logical operator, Ternary operator, Increment operator, Comma operator, Bitwise operator, Operator precedence.

I (1, 2, 3)

UNIT II

CONTROL STRUCTURES 08 hrs

Control structures, The *if* statement, Scope of an *if* clause, The *if…else* statement, The *if…else…if* statement, The *switch* statement, The *while* loop, The *do…while* loop, The *for* loop, The *for* loop with a comma operator, The *break* statement, The *continue* statement.

THE *printf* FUNCTION, THE *scanf* FUNCTION, ADDRESS AND POINTERS

printf, *scanf*, Placeholders in *printf* and *scanf*, Address, Pointers

I (4, 5, 6, 7)

UNIT III

ARRAYS 08 hrs

Arrays, Address of each element in an array, Accessing an array using pointers, Manipulating arrays using pointers, Two-dimensional arrays, Three-dimensional arrays, Pointer arrays.

FUNCTIONS AND RECURSION

Functions, The concept of (system) stack, The sequence of execution during function call, Parameter passing, Call by reference, The concept of Global variables, Resolving variable references, Syntax of function definition, Calling function, Dynamic memory allocations, Recursion, Stack overheads in recursion, Writing a recursive function.

I (9, 10, 12, 13)

UNIT IV

STRINGS 07 hrs

Strings as an array of characters, String definition, Strings as parameters.

STRUCTURES, UNIONS AND FILES

Structures, Complex structure definitions, Memory allocation to structure, Programming with structures, Structure pointers, Union, The concept of files, Direct access files.

I (14, 15, 16, 17)

PART B: DATA STRUCTURES

UNIT V

ARRAYS, SEARCHING AND SORTING 07 hrs

Arrays, Application of arrays, Manipulations on the list implemented using an array, Transpose of a matrix, Bubble sort, Binary search, Merging of two sorted lists, Merge sort, Implementation of heaps, Heap sort, Quick sort.

I (18)

UNIT VI

STACKS, QUEUES AND LINKED LISTS **08 hrs**

The concept of stack and queues, Stacks, Applications of stacks, Queues, Circular queues, Applications of queues, The concept of linked lists, Inserting a node using recursive programs, Deleting the specified node in a singly linked list, Inserting a node after the specified node in a singly linked list, Circular linked lists, Doubly linked lists, Insertion of a node in a doubly linked list, Deleting a node from a doubly linked list, Polynomial representation, Sorting and reversing a linked list, Merging two sorted lists, Merging of two circular lists.

I (19, 20)

UNIT VII

TREES **07 hrs**

The concept of tree, Binary tree and its representation, Binary tree traversal, Binary search tree, Counting the number of nodes in a binary search tree, Searching for a target key in a binary search tree, deletion of a node from a binary search tree.

I (21)

UNIT VIII

GRAPHS **08 hrs**

Graphs, Representations of graphs, Computing in-degree and out-degree of a node of a graph using adjacency matrix representation, Depth first traversal, Breadth first traversal, Connected component of a graph, Depth first spanning tree, Breadth first spanning tree, Minimum cost spanning tree, Directed acyclic graph (DAG).

I (22)

Text Book:

I. C & Data Structures, P.S. Deshpande and O.G. Kakde, Dreamtech Press, 2005.

Reference Books:

1. Data Structures – A Pseudocode Approach with C, 2nd Edition, Richard F. Gilberg and Behrouz A. Forouzan, Thomson Course Technology, 2005.
2. C Programming and Data Structures, 3rd Edition, E. Balagurusamy, Tata McGraw Hill, 2007.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks, selecting atleast **TWO** questions from each part.

AC53 ELECTRONIC DEVICES AND CIRCUITS

UNIT I

CIRCUIT THEORY 07 hrs

Introduction; Voltage and Current Sources; Resistance; The Basic laws of Electric Circuits; Resistances in Series and Parallel; General Methods of Network Analysis; Network Theorems; Step Response of RC Circuits; Duality of Networks; Sinusoidal Steady-State Circuit Analysis; Resonance; Miller's Theorem; Two-port Networks.

I (10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7, 10.8, 10.9, 10.10, 10.11, 10.12, 10.13)

UNIT II

SEMICONDUCTORS, DIODES AND DIODE CIRCUITS 08 hrs

Introduction to Electronics, Typical Electronic Systems; Classification of Electronic Systems and Devices; The Future; Conduction in Solids; Doped Semiconductors; Junction Diodes; DC Analysis of Diode Circuits; Zener Diode as Voltage Regulator; Diode Circuits with Time-Varying Sources; Transition and Diffusion Capacitances; Switching Characteristics of a Diode; Special Purpose Diodes; Rectifiers and Power Supplies; Filters; Some Diode Wave Shaping Circuits; Additional examples.

I (1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11, 1.12, 1.13, 1.14, 1.15, 1.16, 1.17)

UNIT III

TRANSISTORS AND OTHER DEVICES 08 hrs

Introduction; Bipolar Junction Transistor; Junction Field Effect Transistor and Metal Oxide Semiconductor Field Effect Transistor; Four-Layer Devices – Thyristors; Additional Examples.

I (2.1, 2.2, 2.3, 2.5, 2.6)

UNIT IV

SMALL-SIGNAL MODELS, AMPLIFICATION AND BIASING 08 hrs

Introduction, Small-signal Transistor Models; Hybrid-π Model; h-Parameter Model; Transistor Biasing; Bias Design, AC Gain, Input-Output Impedances; Some Special Circuits; Darlington Pair; Feedback Pair; Emitter Coupled Pair; CMOS Circuits; Additional Examples.

I (3.1, 3.2, 3.3, 3.4, 3.5, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13)

UNIT V

SMALL-SIGNAL AMPLIFIERS-FREQUENCY RESPONSE 08 hrs

Introduction; Single-Stage RC-Coupled Amplifier; Frequency Response; Tuned Amplifier; Gain-Bandwidth Product; Multistage Amplifiers; Additional Examples.

I (4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.8)

UNIT VI

LARGE-SIGNAL AMPLIFIERS 07 hrs

Amplifier Classes; Class-A Power Amplifiers; Transformer-Coupled Power Amplifier; Class-B Power Amplifier; Complementary-Symmetry Circuits; Distortion in Amplifiers; Class-AB Amplifiers; Class-C Power Amplifiers; Additional Examples.

I (5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.10)

UNIT VII

FEEDBACK AMPLIFIERS AND OSCILLATORS 07 hrs

Feedback Concepts; Types of Feedback Circuits; Block Diagram Representation of Feedback Amplifiers; Effect of Feedback on Impedances; Some Negative Feedback Circuits; Properties of Negative Feedback; Stability in Feedback Amplifiers; Oscillator Operation; Phase Shift Oscillators; Wein Bridge Oscillators; Tuned Oscillators; Crystal Oscillators; Unijunction Oscillator; Additional Examples.

I (6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.15)

UNIT VIII

INTEGRATED CIRCUITS FABRICATION **07 hrs**

Introduction; Pre-Fabrication Stage; IC Fabrication; The Planar Processes; Illustration-A Simple IC Fabrication; Monolithic Transistors-Bipolar; Fabrication of MOSFET; Monolithic Diodes; Integrated Resistors; Integrated Capacitors; Metal-Semiconductor Contact; Characteristics of IC Components; Monolithic Circuit Layout; Levels of Integration.

I (9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 9.11, 9.12, 9.13, 9.14)

Text Book:

I. Electronic Devices and Circuits, I. J. Nagrath, PHI (2007).

Reference Books:

1. Millman's Electronic Devices and Circuits, Jacob Millman, Christos C Halkias and Satyabrata Jit, Second Edition, 2007 First reprint, Tata-McGraw Hill Publication.
2. Electronic Devices and Circuits, Fourth Edition, David A Bell, PHI (2006).

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC54 LINEAR ICs AND DIGITAL ELECTRONICS

PART A: LINEAR ICs

UNIT I

INTEGRATED CIRCUIT FABRICATION & OPERATIONAL AMPLIFIER 07hrs

Introduction, Classification; IC Chip Size and Circuit Complexity; Fundamentals of Monolithic IC Technology; Basic Information of Op-Amp; The Ideal Operational Amplifier; Operational Amplifier Internal Circuit.

I (1.1, 1.2, 1.3, 1.4, 2.1, 2.2, 2.3, 2.4, 2.4.1, 2.4.2)

UNIT II

OPERATIONAL AMPLIFIER CHARACTERISTICS 04 hrs

Introduction; DC Characteristics; AC Characteristics; Frequency Response; Stability of Op-Amp (Qualitative Analysis); Slew Rate; Analysis of Data Sheets of an Op-Amp.

I (3.1, 3.2, 3.3, 3.3.1, 3.3.2, 3.3.4, 3.4)

OPERATIONAL AMPLIFIER APPLICATIONS 03 hrs

Introduction; Basic Op-Amp Applications; Instrumentation Amplifier; AC Amplifier; V to I and I to V Converters.

I (4.1, 4.2, 4.3, 4.4, 4.5)

UNIT III

OPERATIONAL AMPLIFIER APPLICATIONS (Continued…) 06 hrs

Op-Amp Circuits using Diodes; Sample and Hold Circuit; Differentiator; Integrator; Monolithic Power Amplifiers.

I (4.6, 4.7, 4.10, 4.11, 4.13)

COMPARATORS 02 hrs

Introduction; Comparator; Regenerative Comparator (Schmitt Trigger).

I (5.1, 5.2, 5.3)

UNIT IV

WAVEFORM GENERATORS AND 555 TIMER 05 hrs

Square Wave Generator; Astable Multivibrator; Monostable Multivibrator; Triangular Wave Generator; Description of Functional Diagram of 555 Timer; Monostable Operation; Astable Operation.

I (5.4, 5.5, 5.6, 8.1, 8.2, 8.3, 8.4, (8.3.1 and 8.4.1 not Included))

VOLTAGE REGULATOR D-A AND A-D CONVERTERS 03 hrs

Introduction; Series Op-Amp Regulator; Basic DAC Techniques; A-D Converters

I (6.1, 6.2, 10.1, 10.2, 10.2.1, 10.2.2, 10.3, 10.3.1, 10.3.4)

PART B: DIGITAL ELECTRONICS

UNIT V

INTRODUCTORY CONCEPTS 03 hrs

Introduction; Numerical Representations; Digital and Analog Systems; Digital Number Systems; Representing Binary Quantities; Digital Circuits / Logic Circuits; Parallel and Serial Transmission; Memory; Digital Computers.

II (1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8)

NUMBER SYSTEMS AND CODE's 04 hrs

Introduction; Binary to Decimal Conversions; Decimal to Binary Conversions; Octal Number System; Hexadecimal Number System; BCD Code; Putting it all together; The Byte; Nibble and Word; Alphanumeric Codes; Parity Method for Error Detection.

II (2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9)

UNIT VI

DESCRIBING LOGIC CIRCUITS **04 hrs**

Introduction; Boolean Constants and Variables; Truth Tables: OR, AND, NOT Operations; NOR, NAND Gates; Boolean Theorems; De-Morgan's Theorems; Universality of NAND and NOR Gates.

II (3.1, 3.2, 3.3, 3.4, 3.5, 3.9, 3.10, 3.11, 3.12)

COMBINATIONAL LOGIC CIRCUITS **04 hrs**

Introduction; Sum of Product Form; Simplifying Logic Circuits; Algebraic Simplification; Designing Combinational Logic Circuits; Karnaugh Map Method (3 and 4 Variables); Exclusive OR and Exclusive NOR Circuits.

II (4.1, 4.2, 4.3, 4.4, 4.5, 4.6)

UNIT VII

DIGITAL ARITHMETIC: OPERATIONS AND CIRCUITS **04 hrs**

Introduction; Binary Addition; Representing Signed Numbers; Addition and Subtraction in 2's Complement System; BCD Addition; Arithmetic Circuits; Parallel Binary Adder; Design of a Full Adder; Carry Propagation; BCD Adder.

II (6.1, 6.2, 6.3, 6.4, 6.7, 6.9, 6.10, 6.11, 6.13, 6.16)

MSI LOGIC CIRCUITS **04 hrs**

Introduction; Decoders; Encoders; Multiplexers; De-Multiplexers (Application Not Included); Magnitude Comparator.

II (9.1, 9.4, 9.5, 9.7, 9.8)

UNIT VIII

FLIP-FLOPS AND THEIR APPLICATIONS **04hrs**

Introduction; NAND Gate Latch; NOR Gate Latch; Clock Signals and Clocked Flip-Flops; Clocked SR Flip-Flop; Clocked JK Flip-Flop; Clocked D Flip-Flop; D Latch; Asynchronous Inputs.

II (5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8)

COUNTERS AND REGISTERS **03 hrs**

Introduction; Asynchronous Counters; Propagation Delay in Ripple Counters; Synchronous (Parallel) Counters; Integrated Circuit Registers; Parallel In / Serial Out; Parallel In / Parallel Out; Serial In / Serial Out; Serial In / Parallel Out registers; Shift Register Counters.

II (7.1, 7.5, 7.6, 7.15, 7.16, 7.17, 7.18, 7.19, 7.21)

Text Books:

I Linear Integrated Circuits, Revised Second Edition, D Roy Choudhury, Shail B. Jain, New Age International Publishers.

II Digital Systems – Principles and Applications, Ninth Edition, Ronald J Tocci, Neal S Widmer and Gregory L. Moss, Pearson Education, 2008.

Reference Books:

1. Operational Amplifiers and Linear IC's, Second Edition, David A Bell, PHI.
2. Digital Fundamentals, Thomas L. Floyd and R. P. Jain, Eighth edition, Pearson Education Publisher.
3. Digital Electronics and Microprocessors – Problems and Solutions, R. P. Jain, 2007, Tata-McGraw Hill.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks, selecting atleast **TWO** questions from each part.

AC55 OBJECT ORIENTED PROGRAMMING WITH C++

UNIT I

OVERVIEW **07 hrs**

Programming Paradigms, Need for Object-Oriented Programming, Basics of OOP, OO Languages, Structure of C++ Program, Some Terminologies, First C++ Program, Getting familiar with OOP terms

DECLARATIONS AND EXPRESSIONS

Introduction – Fundamental Data types, Qualifiers, Reference Data types, Variables, Constants, Operators and Expressions, Operator Precedence and Associativity.

I (1.1.3, 1.2, 1.3, 1.4, 1.5.1, 1.5.2, 1.6, 1.7, 2.1)

UNIT II

STATEMENTS **08 hrs**

Introduction – Labeled Statement, Expression Statement, Compound Statement, Control Statement, Jump Statement, Declaration Statement

ARRAY, POINTER AND STRUCTURE

Introduction – Array, Addresses and Pointers, Pointers and Functions, Structure

I (3.1, 4.1)

UNIT III

FUNCTIONS **07 hrs**

Introduction – Declaration, Definition and Call, *Inline* Functions, *main* Function Arguments, Reference Variables, Function Overloading, Default Arguments, Parameter Passing, Recursion, Scope of Variables, Return – by – value and Return – by – reference, Pointers to Functions

I (5)

UNIT IV

DATA ABSTRACTION THROUGH CLASSES AND USER-DEFINED DATA TYPES **07 hrs**

Introduction, Class – Class Members, Controlling access to Members of a Class, Constructor, Destructor, Dynamic Memory Management

I (8)

UNIT V

OPERATOR OVERLOADING **08 hrs**

Introduction – Restrictions, Overloading Unary Operators, Overloading Binary Operators, Overloaded Function Calls, Overloaded Subscripting, Overloaded Class Member Access, Cast operator, User-defined Conversions, Overloaded Increment and Decrement, Overloaded Non-member Operator, Overloaded *new* and *delete*

I (9)

UNIT VI

CLASS RELATIONSHIPS **08 hrs**

Introduction, Polymorphism, Inheritance

I (10)

UNIT VII

TEMPLATE **07 hrs**

Class Template, Member Function Inclusion, Function Template, Parameter Values for Templates, Template Specialization, Template Inheritance, Namespace, Named Namespace, Using Named Namespace, Namespace Alias, Unnamed Namespace, Exception Handling

I (11.2, 11.3)

UNIT VIII

THE STANDARD LIBRARY IN C++ **08 hrs**

Standard Library Functions – Input and Output, iostream class Hierarchy, Class ios, Other Stream Classes, Standard Template Library

I (12)

Text Book:

I. C++ and Object-Oriented Programming Paradigm, Debasish Jana, Second Edition, PHI, 2005

Reference Books:

1. Big C++, Cay Horstmann, Timothy A. Budd, Wiley India, 2005.
2. C++ Primer, Stanley B. Lippman, Josee Lajoie, Barbara E. Moo, 4th Edition, Addison Wesley, 2005

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC91 DATA STRUCTURES WITH C & C++ LAB

List of Experiments

1. Write a C program to find the number of and sum of all integers greater than 100 and less than 200 that are divisible by a given integer *x*.

2. Write a C program to print the Floyd's triangle given below

```
1
2  3
4  5   6
7  8   9   10
11 …   …   …   15
```

3. Given a number, write a C program using *while* loop to reverse the digits of the number. For eg., the number 12345 should be printed as 54321.

4. Write a C program to read *n* numbers into an array, and compute the mean, variance and standard deviation of these numbers.

5. Write a C program which will read some text and count all occurrences of a particular word.

6. Use recursive calls to evaluate $f(x) = x - x^3/3! + x^5/5! - x^7/7! + \ldots$

7. Write a program to read in an array of names and to sort them in alphabetical order.

8. Sort a sequence of *n* integers using Quick sort technique and then search for a key in the sorted array using Binary search technique.

9. Write an interactive C/C++ program to create a linear linked list of customer names and their telephone numbers. The program should be menu-driven and include features for adding a new customer, deleting an existing customer and for displaying the list of all customers.

10. Write a C/C++ program to create a circular linked list so that the input order of data items is maintained. Add the following functions to carry out the following operations on circular linked lists.
    a. Count the number of nodes.
    b. Write out the contents.
    c. Locate and write the contents of a given node.
11. Write a C/C++ program to merge two circular linked lists.

12. Write a C/C++ program that will remove a specified node from a given doubly linked list and insert it at the end of the list. Also write a function to display the contents of the list.

13. Write a C/C++ program to implement a queue in which insertions, deletions and display can be performed.

14. Write a C/C++ program to construct a binary tree and do inorder, preorder and postorder traversals, printing the sequence of vertices visited in each case.

15. Write a C/C++ program which accepts a graph as an adjacency matrix, and which performs depth first traversal on it and prints out the sequence of vertices visited.

Note:

- Minimum of 13 experiments to be conducted.
- All the programs have to be executed using **Turbo C/C++** or similar environment.

AC56 ENGINEERING MATHEMATICS – II

UNIT I

COMPLEX ANALYSIS **08 hrs**

Introduction; Function of complex variable w= f (z); Limit of a complex function; continuity of w - f (z); Derivative of f (z); Analytic function; Cauchy Riemann equations (both in Cartesian and polar form); Harmonic functions; Application to flow problems; construction of Analytic functions using Milne Thomson method; Geometric representation of w = f (z); standard transformation; Bilinear transformation; conformal transformation; Special conformal Transformations.

I (20.1, 20.2(1), 20.2(2), 20.3(1), 20.3(2), 20.4, 20.5(1), 20.6, 20.7, 20.8, 20.9, 20.10)

UNIT II

COMPLEX INTEGRATION **07 hrs**

Line integral of w=f(z); Cauchy's theorem; Cauchy's integral formula; Morera's theorem; Series of complex terms; Taylor's and Laurent's series; singularities of analytic function; Types of singularities; Residues; residue theorem; calculation of residues.

I (20.12, 20.13, 20.14, 20.15, 20.16, 20.17, 20.18, 20.19)

UNIT III

VECTOR CALCULUS **08 hrs**

Introduction to vectors; Differentiation of vectors; curves in space; velocity and acceleration; scalar and vector point functions; vector operator del; Del applied to scalar point functions; Gradient; Del applied to vector point functions; Divergence and curl; Physical interpretation of Divergence and Curl; Del applied twice to point functions and products of point functions; vector identities.

I (8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7(1), 8.7(2), 8.8, 8.9)

UNIT IV

VECTOR INTEGRATION **08 hrs**

Integration of vectors; Line integral; surfaces; surface integral; Green's theorem in a plane (only statement and problems); Stoke's theorem (only statement and problems); volume integral; Gauss divergence theorem (only statement and problem).

I (8.10 to 8.16)

UNIT V

NUMERICAL METHODS **07 hrs**

Forward difference operator Δ; backward difference operator ∇; central difference operator δ; shifting operator E (only the definition); Interpolation; Newton Gregory forward and backward interpolation for equal intervals; Lagrange's formula for unequal intervals; Divided differences; Newton's divided difference formula; Inverse interpolation; Numerical differentiation using Newton Gregory forward and backward interpolation formula; Numerical integration; Newton–Cote's quadrature formula; trapezoidal rule; Simpson's $1/3^{rd}$ & Simpson's $3/8^{th}$ rule; Weddle's rule

I (29.8(1), 29.8(2), 29.8(3), 29.9)

II (22.1, 22.3, 22.4, 22.6, 22.7, 22.10, 22.11, 22.11(a), 22.11(b), 22.11(c), 22.11(d), 22.11(e))

UNIT VI

PARTIAL DIFFERENTIAL EQUATION **07 hrs**

Introduction; Formulation of partial differential equations; solutions of a partial differential equations; Equations solvable by direct integration; Lagrange's linear partial differential equation of first order; Solutions of non linear partial differential equations by Charpit's method; Solution of homogenous partial differential equation by the method of separation of variables.

I (17.1, 17.2, 17.3, 17.4, 17.5, 17.7, 18.2)

UNIT VII

THEORY OF PROBABILITY **07 hrs**

Introduction; Basic terms and definitions; probability and set notation; theorem of total probability; independent events; theorem of compound probability; conditional probability ; Baye's theorem.

I (26.1, 26.2, 26.3, 26.4, 26.5(1), 26.5(2), 26.6); II (21.48)

UNIT VIII

RANDOM VARIABLES **08 hrs**

Random Variable; Discrete and continuous random variables; discrete and continuous probability distribution; probability mass and density function; mean and variance of discrete and continuous probability distribution; theoretical distributions; Binomial distribution; constants of the Binomial distribution; Binomial frequency distribution; Applications Binomial distribution; Poisson's distribution; constants of the Poisson distribution; Applications Poisson distribution; Normal distribution.

I (26.7, 26.8(1), 26.9, 26.10, 26.14(1), 26.14(2), 26.14(3), 26.14(4), 26.15(1), 26.15(2), 26.15(3), 26.16)

Text Books:

I. Higher Engineering Mathematics –Dr. B.S.Grewal, 40th Edition 2007, Khanna Publishers, Delhi.
II. A Text book of engineering Mathematics – N.P. Bali and Manish Goyal , 7th Edition 2007, Laxmi Publication(P) Ltd.

Reference book:

1. Advanced Engineering Mathematics- H.K. Dass- 17th Revised Edition 2007, S.Chand & Company Ltd, New Delhi.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC57 SIGNALS AND SYSTEMS

UNIT I

SIGNALS AND SYSTEMS 03 hrs

Continuous and Discrete-Time Signals; Transformations of the Independent Variable; Exponential and Sinusoidal Signals; Unit Impulse and Unit Step Functions; Continuous and Discrete -Time Systems; Basic System Properties.

I (1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6)

LINEAR-TIME INVARIANT SYSTEMS 04 hrs

Discrete-Time LTI Systems: The Convolution Sum; Continuous-Time LTI Systems: The Convolution Integral; Properties of Linear Time-Invariant Systems; Causal LTI Systems Described by Differential and Difference Equations.

I (2.0, 2.1, 2.2, 2.3, 2.4)

UNIT II

FOURIER SERIES REPRESENTATION OF PERIODIC SIGNALS 07 hrs

Response of LTI Systems to Complex Exponentials; Fourier Series Representation of Continuous-Time Periodic Signals; Convergence of the Fourier Series; Properties of Continuous-Time Fourier Series; Fourier Series Representation of Discrete-Time Periodic Signals; Properties of Discrete-Time Fourier Series; Fourier Series and LTI Systems; Filtering; Examples of Continuous-Time Filters Described by Differential Equations; Examples of Discrete-Time Filters Described by Difference Equations.

I (3.0, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11)

UNIT III

THE CONTINUOUS-TIME FOURIER TRANSFORM 07 hrs

Representation of Aperiodic Signals; The Continuous-Time Fourier Transform; The Fourier Transform for Periodic Signals; Properties of Continuous-Time Fourier Transform; The Convolution and Multiplication Properties; Fourier Transform Properties and Fourier Transform Pairs; Systems Characterized by Linear Constant-Coefficient Differential Equations.

I (4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7)

UNIT IV

THE DISCRETE-TIME FOURIER TRANSFORM 08 hrs

Representation of Aperiodic Signals: The Discrete-Time Fourier Transform; The Fourier Transform for Periodic Signals; Properties of Discrete-Time Fourier Transform; The Convolution and Multiplication Properties; Fourier Transform Properties and Fourier Transform Pairs; Duality; Systems Characterized by Linear Constant-Coefficient Difference Equations.

I (5.0, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8)

UNIT V

TIME AND FREQUENCY CHARACTERIZATION OF SIGNALS AND SYSTEMS 04 hrs

The Magnitude-Phase Representation of The Fourier Transform; The Magnitude-Phase Representation of The Frequency Response of LTI Systems; Time-Domain Properties of Ideal Frequency-Selective Filters; Time-Domain and Frequency-Domain Aspects of Non Ideal Filters; First-Order and Second-Order Discrete-Time Systems.

I (6.0, 6.1, 6.2, 6.3, 6.4, 6.6)

SAMPLING 04 hrs

Representation of a Continuous-Time Signal by its Samples; The Sampling Theorem; Reconstruction of a Signal From its Samples Using Interpolation; The Effect of Under Sampling; Aliasing; Discrete-Time Processing of Continuous-Time Signals; Sampling of Discrete-Time Signals.

I (7.0, 7.1, 7.2, 7.3, 7.4, 7.5)

UNIT VI

THE LAPLACE TRANSFORMS **08 hrs**

The Laplace transform; The Region of Convergence for Laplace Transforms; The Inverse Laplace Transform; Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot; Properties of the Laplace Transform; Laplace Transform Pairs; Analysis and Characterization of LTI Systems Using the Laplace Transform.

I (9.0, 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7)

UNIT VII

THE Z-TRANSFORM **08 hrs**

The Z-Transform; The Region of Convergence for the Z-Transform; The Inverse Z-Transform; Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot; Properties of the Z-Transform; Z-Transform Pairs; Analysis and Characterization of LTI Systems using Z-Transforms.

I (10.0, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7)

UNIT VIII

RANDOM PROCESSES **07 hrs**

Introduction; Mathematical Definition of a Random Process; Stationary Processes; Mean, Correlation and Covariance Functions; Ergodic Processes; Transmission of a Random Process Through a Linear Time-Invariant Filter; Power Spectral Density; Gaussian Process; Noise; Narrowband Noise; Summary and Discussion.

II (1.1 to 1.10, 1.15)

Text Books:

I. Signals and Systems, A.V. Oppenheim and A.S. Willsky with S. H. Nawab, Second Edition, PHI Private limited, 2006.
II. Communication Systems, Simon Haykin, 4^{th} Edition, Wiley Student Edition, 7^{th} Reprint 2007.

Reference Books:

1. Signals and Systems, Second Edition, S. Haykin and B. Van Veen, John Wiley & Sons.
2. Schaum's Outline of Theory and Problems of Signals and Systems, McGraw-Hill Publishing Company Ltd.
3. Signals and Systems, M.J. Roberts, Tata McGraw-Hill Publishing Co. Ltd.
4. Probabilistic Methods of Signal and System Analysis, Third Edition, G.R. Cooper and C.D. McGillem, Oxford University Press.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC58 COMPUTER ORGANIZATION

UNIT I

BASIC STRUCTURE OF COMPUTERS **07 hrs**

Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Performance – Processor Clock, Basic Performance Equation, Clock Rate, Performance Measurement, Historical Perspective

MACHINE INSTRUCTIONS AND PROGRAMS

Numbers, Arithmetic Operations and Characters, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing.

I (1.1 to 1.4, 1.6.1, 1.6.2, 1.6.4, 1.6.7, 1.8, 2.1 to 2.4)

UNIT II

MACHINE INSTRUCTIONS AND PROGRAMS (CONTD.) **08 hrs**

Addressing Modes, Assembly Language, Basic Input and Output Operations, Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions

I (2.5 to 2.10, 2.12)

UNIT III

INPUT/OUTPUT ORGANIZATION **08 hrs**

Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access, Buses

I (4.1, 4.2.1 to 4.2.5, 4.4, 4.5)

UNIT IV

INPUT/OUTPUT ORGANIZATION (CONTD.) **07 hrs**

Interface Circuits, Standard I/O Interfaces

I (4.6, 4.7)

UNIT V

MEMORY SYSTEM **07 hrs**

Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions, Replacement Algorithms, Performance Considerations

I (5.1 to 5.4, 5.5.1, 5.5.2, 5.6)

UNIT VI

MEMORY SYSTEM (CONTD.) **08 hrs**

Virtual Memories, Secondary Storage

Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders

I (5.7, 5.9, 6.1, 6.2)

UNIT VII

ARITHMETIC (CONTD.) **08 hrs**

Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Integer Division, Floating-point Numbers and Operations

I (6.3 to 6.7)

UNIT VIII

BASIC PROCESSING UNIT **07 hrs**

Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control, Microprogrammed Control - Microinstructions

I (7.1 to 7.4, 7.5.1)

Text Book:

I. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 5th Edition, TMH, 2002

Reference Books:

1. Computer Organization & Architecture, William Stallings, 7th Edition, PHI, 2006
2. Computer Systems Design and Architecture, Vincent P. Heuring & Harry F. Jordan, 2nd Edition, Pearson Education, 2004

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC59 OPERATING SYSTEMS & SYSTEMS SOFTWARE

PART A: OPERATING SYSTEMS

UNIT I

EVOLUTION OF OS FUNCTIONS **07 hrs**

OS Functions, Evolution of OS Functions, Batch Processing Systems, Multiprogramming Systems, Time Sharing Systems, Real Time Operating Systems, OS Structure

PROCESSES

Process Definition, Process Control, Interacting Processes, Implementation of Interacting Processes, Threads

I (9, 10)

UNIT II

SCHEDULING **08 hrs**

Scheduling Policies, Job Scheduling, Process Scheduling

DEADLOCKS

Definitions, Resource Status Modeling, Handling Deadlocks, Deadlock Detection and Resolution, Deadlock Avoidance

I (11.1 to 11.3, 12.1 to 12.5)

UNIT III

PROCESS SYNCHRONIZATION **08 hrs**

Implementing Control Synchronization, Critical Sections, Classical Process Synchronization Problems, Semaphores

FILE SYSTEMS

Directory Structures, File Protection, Allocation of Disk Space, Implementing File Access, File Sharing

I (13.1 to 13.3, 13.5, 17.1 to 17.5)

UNIT IV

MEMORY MANAGEMENT **07 hrs**

Memory Allocation Preliminaries, Contiguous Memory Allocation, Noncontiguous Memory Allocation, Virtual Memory Using Paging, Virtual Memory Using Segmentation

I (15)

PART B: SYSTEM SOFTWARE

UNIT V

LANGUAGE PROCESSORS **07 hrs**

Introduction, Language Processing Activities, Fundamentals of Language Processing, Fundamentals of Language Specification, Language Processor Development Tools

DATA STRUCTURES FOR LANGUAGE PROCESSING

Search Data Structures, Allocation Data Structures

I (1, 2)

UNIT VI

SCANNING AND PARSING **08 hrs**

Scanning, Parsing

MACROS AND MACRO PROCESSORS

Macro Definition Call, Macro Expansion, Nested Macro Calls

LINKERS
Relocation and Linking Concepts, Design of a Linker, Self-Relocating Programs
I (3, 5.1 to 5.3, 7.1 to 7.3)

UNIT VII

ASSEMBLERS **07 hrs**
Elements of Assembly Language Programming, A Simple Assembly Scheme, Pass Structure of Assemblers, Design of A Two Pass Assembler, A Single Pass Assembler for IBM-PC
I (4)

UNIT VIII

COMPILERS AND INTERPRETERS **08 hrs**
Aspects of Compilation, Memory Allocation, Compilation of Expressions, Compilation of Control Structures, Code Optimization, Interpreters
I (6)

Text Book:
I. Systems Programming and Operating Systems, D. M. Dhamdhere, Tata McGraw-Hill, Second Revised Edition, 2005

Reference Books:
1. Operating System Concepts by Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Peter Baer Galvin, Wiley, John & Sons, 2004
2. Operating Systems Internals and Design Principles, Fifth Edition, William Stallings, Pearson Education, 2007
3. Operating Systems Design and Implementation, Third Edition, Andrew S. Tanenbaum, Albert S. Woodhull, Pearson Education

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks, selecting atleast **TWO** questions from each part.

AC60 COMPUTER GRAPHICS

UNIT I

INTRODUCTION TO COMPUTER GRAPHICS **07 hrs**

What is Computer Graphics?, Where Computer Generated Pictures are Used, Elements of Pictures created in Computer Graphics, Graphics Display Devices, Graphics Input Primitives and Devices

I (1)

UNIT II

GETTING STARTED DRAWING FIGURES **08 hrs**

Getting Started Making Pictures, Drawing Basic Graphics Primitives, Making Line Drawings, Simple Interaction with the Mouse and Keyboard

MORE DRAWING TOOLS

Introduction, World Windows and Viewports, Developing Canvas Class, Relative Drawing, Figures Based on Regular Polygons, Drawing Circles and Arcs, Using the Parametric Form of a Curve

I (2, 3.1, 3.2, 3.4 to 3.8)

UNIT III

CLIPPING **08 hrs**

Clipping Lines, Intersections of Lines with Planes and Clipping, Polygon intersection problems - The Cyrus-Beck Clipping Algorithm, Sutherland-Hodgman Clipping

I (3.3, 4.7, 4.8.3, Case Study 4.6)

UNIT IV

TRANSFORMATIONS OF OBJECTS **07 hrs**

Introduction, Introduction to transformations, 3D Affine Transformations, Changing Coordinate Systems

I (5.1 to 5.4)

UNIT V

MODELING SHAPES WITH POLYGONAL MESHES **08 hrs**

Introduction, Introduction to Solid Modeling with Polygonal Meshes

THREE DIMENSIONAL VIEWING

Perspective Projections of 3D Objects, Producing Stereo Views, Taxonomy of Projections

I (6.1, 6.2, 7.4, 7.5, 7.6)

UNIT VI

RENDERING FACES FOR VISUAL REALISM **07 hrs**

Introduction, Introduction to Shading Models, Flat Shading and Smooth Shading, Removing Hidden Surfaces

I (8.1 to 8.4)

UNIT VII

TOOLS FOR RASTER DISPLAYS **08 hrs**

Introduction, Manipulating Pixmaps, Combining Pixmaps, Defining and filling regions of pixels, Manipulating Symbolically Defined Regions, Filling Polygon-defined Regions, Aliasing, Antialiasing techniques

I (10.1to10.3, 10.5 to 10.8)

UNIT VIII

CURVES **07 hrs**

Introduction, Describing Curves by means of Polynomials, Bezier Curves for Curve Design, Properties of Bezier Curves

I (11.1, 11.2, 11.4, 11.5)

Text Book:

I. Computer Graphics Using OpenGL, F.S. Hill, Jr., Second edition, PHI/Pearson Education, 2005

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC61 DATABASE MANAGEMENT SYSTEMS

UNIT I

DATABASES AND DATABASE USERS 08 hrs

Introduction, An Example, Characteristics of Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of using the DBMS Approach.

DATABASE SYSTEM - CONCEPTS AND ARCHITECTURE

Data models, Schemas, and Instances, Three-schema architecture and data independence, Database language and interfaces, The Database system environment, Centralized and Client/server Architectures for DBMS's, Classification of database management system.

DATA MODELING USING THE ENTITY-RELATIONSHIP MODEL

Using High-level Conceptual data models for database design, An Example database application, Entity types, Entity Sets, Attributes, and Keys, Relationship types, Relationship sets, Roles, and Structural Constraints, Weak entity types, Refining the ER design for the company database, E/R diagram, Naming Conventions, and Design Issues.

I (1.1 to 1.6, 2, 3.1 to 3.7)

UNIT II

THE RELATIONAL DATA MODEL AND
RELATIONAL DATABASE CONSTRAINTS 08 hrs

Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations and Dealing with the Constraint violations.

THE RELATIONAL ALGEBRA AND RELATIONAL CALCULUS

Unary relational operations: SELECT and PROJECT, Relational Algebra Operations from Set theory, Binary relational operations: JOIN and DIVISION, Additional relational operations, Examples of queries in relational algebra, The Tuple Relational Calculus

I (4, 5.1 to 5.6)

UNIT III

RELATIONAL DATABASE DESIGN
BY ER - TO - RELATIONAL MAPPING 08 hrs

Relational database design using ER – to - Relational Mapping

SQL-99: SCHEMA DEFINITION, BASIC CONSTRAINTS AND QUERIES

SQL Data Definition, Specifying Basic Constraints in SQL, Schema Change Statements in SQL, Basic Queries in SQL, More Complex SQL queries, Insert, Delete and Update Statements in SQL, Specifying General Constraints as Assertions, Views (Virtual tables) in SQL, Database programming: Issues and techniques, Embedded SQL, Dynamic SQL and SQLJ

I (6.1, 7.1 to 7.6, 7.8 to 7.11)

UNIT IV

RELATIONAL DATABASE DESIGN 08 hrs

Informal design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms based on Primary keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Multivalued Dependencies and Fourth Normal Forms, Join Dependencies and Fifth Normal Forms.

I (8)

UNIT V

FILE ORGANIZATIONS AND INDEXES 07 hrs

Introduction, Secondary Storage Devices, Buffering of Blocks, Placing File Records on Disk, Operations on Files, Files of Unordered Records (Heap Files), Files of Ordered records (Sorted files), Hashing Techniques, Other Primary File Organizations, Indexing Structures for Files - Types of single-level ordered indexes, Multilevel indexes, Dynamic Multilevel indexes using B-Trees and B^+-Trees, Indexes on Multiple keys

I (9.1 to 9.9, 9.12.1 to 9.12.4)

UNIT VI

ALGORITHMS FOR QUERY PROCESSING AND OPTIMIZATION 07 hrs

Translating SQL queries into Relational Algebra, Algorithms for External Sorting, Algorithms for SELECT and JOIN operations, Algorithms for PROJECT and SET operations, Implementing Aggregate Operations and Outer Joins, Combing operations using pipe-lining, Using Heuristics in Query Optimization, Using Selectivity and Cost Estimates in Query Optimization, Overview of Query Optimization in Oracle, Semantic Query Optimization

I (10)

UNIT VII

TRANSACTION PROCESSING CONCEPTS 07 hrs

Introduction to Transaction Processing, Transaction and System Concepts - Desirable Properties of Transactions, Characterizing Schedules Concurrency Control Techniques - Two-phase Locking Techniques for Concurrency control, Concurrency Control based on Timestamp Ordering, Multiversion Concurrency Control Techniques, Validation (Optimistic) Concurrency Control Techniques, Granularity of Data Items and Multiple Granularity Locking,

I (11.1, 11.2.4, 11.3, 11.4.1 to 11.4.5)

UNIT VIII

TRANSACTION PROCESSING CONCEPTS (CONTD.) 07 hrs

Database Recovery Concepts, Recovery techniques – Recovery techniques based on deferred update, Recovery techniques based on immediate update, Shadow paging, The ARIES Recovery Algorithm

I (11.5, 11.6.1 to 11.6.4)

Text Book:

I. Fundamentals of Database Systems, Elmasri, Navathe, Somayajulu, Gupta, Pearson Education, 2006

Reference Books:

1. Database System Concepts, Silberschatz, Abraham Korth, Sudarshan S., Fourth Edition, Mc-Graw Hill, 2006
2. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, Third Edition, Mc-Graw Hill, 2003

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC92 DBMS LAB

List of Experiments

1. Draw an ER diagram to capture the requirements as stated below:

A database is needed to capture information pertaining to the running of various clubs by the recreation cell of an institution.

- Details such as name, date of birth, gender are needed for each member.
- Club details are needed such as the activity type (oratorical, music, dance, instrumental music etc) and contact phone number.
- Team details required to include team name and the days on which the team practices.
- Tutor details such as tutor name, address and telephone number are also needed, along with details of the skill each tutor is qualified in.
- Rules governing the involvement of members and tutors in the teams and clubs are as follows:

    - Members may head only one team and every team has to have a head. Tutors teach at least one team and every team has at least one tutor.
    - Every member must belong to at least one team and each team has a number of members.
    - Every team must belong to a club and clubs must have at least one team.
    - Every club has a member who is the president but a member may only be president of one club.

Draw the ER Diagram for the above requirement. Map the ER diagram to the Relational Model.

Create tables identified and insert five tuples in each of the tables created. The students are required to carefully take care of the constraints on each of the table.

2. Consider the following three tables – SAILORS, RESERVES and BOATS having the following attributes

    SAILORS (Salid, Salname, Rating, Age)
    RESERVES (Sailid, Boatid, Day)
    BOATS (Boatid, Boat-name, Color)

Use the above schema and solve the queries using SQL

i) Find the name of sailors who reserved green boat.
ii) Find the colors of boats reserved by “Ramesh”
iii) Find the names of sailors who have reserved a red or green boat.
iv) Find the Sailid’s of sailors with age over 20 who have not registered a red boat.

3. Consider the following relational database schema:

    STUDENT (Student_id, Sname, Major, GPA)
    FACULTY (Faculty_id, fname, dept, designation, salary)
    COURSE (Course_id, Cname, Faculty_id)
    ENROL (Course_id, Student_id, grade)

    Use the above schema and solve the queries using SQL

    i) List the names of all students enrolled for the courses “CS-53”

ii) List the names of students enrolled for the courses “CS-53” and have received “A” grade.
iii) List all the departments having an average salary of above Rs20,000.
iv) Give a 15% raise to salary of all faculty.
v) List the names of all faculty members beginning with “R” and ending with letter “U”.

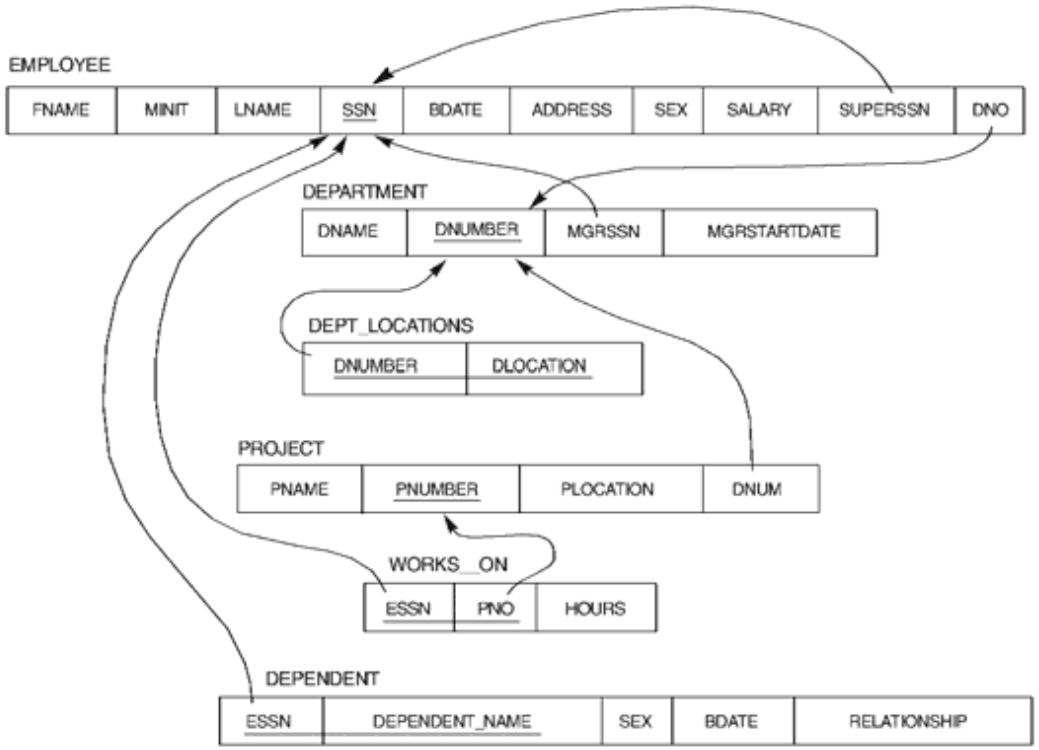
4. Write the SQL commands to create a database schema for the following relational schema:

CUSTOMER (CUST_ID, CUST_NAME, ANNUAL_REVENUE, CUST_TYPE)
CUST_ID must be between 100 and 10,000
ANNUAL_REVENUE defaults to $20,000
CUST_TYPE must be manufacturer, wholesaler, or retailer
SHIPMENT (SHIPMENT_#, CUST_ID, WEIGHT, TRUCK_#,
DESTINATION, SHIP_DATE)
Foreign Key: CUST_ID REFERENCES CUSTOMER, on deletion cascade
Foreign Key: TRUCK_# REFERENCES TRUCK, on deletion set to null
Foreign Key: DESTINATION REFERENCES CITY, on deletion set to null
WEIGHT must be under 1000 and defaults to 10
TRUCK (TRUCK_#, DRIVER_NAME)
CITY (CITY_NAME, POPULATION)

Perform the following queries:

a) What are the names of customers who have sent packages (shipments) to Sioux City?
b) What are the names and populations of cities that have received shipments weighing over 100 pounds?
c) List the cities that have received shipments from customers having over $15 million in annual revenue.
d) Create views for each of the following:
    i. Customers with annual revenue under $1 million.
    ii. Customers with annual revenue between $1 million and $5 million.
    iii. Customers with annual revenue over $5 million.
e) Use these views to answer the following queries:
    i. Which drivers have taken shipments to Los Angeles for customers with revenue over $5 million?
    ii. What are the populations of cities, which have received shipments from customers with revenue between $1 million and $5 million?
    iii. Which drivers have taken shipments to cities for customers with revenue under $1 million, and what are the populations of those cities?

5. Consider the following schema for the COMPANY relational database Schema.



Perform the following (any five) queries:

a) For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birthdate.
b) For each employee, retrieve the employee's name, and the name of his or her immediate supervisor.
c) Make a list of all project numbers for projects that involve an employee whose last name is 'Smith' as a worker or as a manager of the department that controls the project.
d) Retrieve the name of each employee who has a dependent with the same first name as the employee. {using Exists and Nested query}
e) Retrieve a list of employees and the projects each works in, ordered by the employee's department, and within each department ordered alphabetically by employee last name.
f) Give all employees in the 'Research' department a 10% raise in salary.
g) For each project on which more than two employees work, retrieve the project number the project name and the number of employees who work on the project.
h) Retrieve the Name and Address of all Employees who work for the ‘Research’ Dept.
i) Find the names of the employees who work on all projects controlled by department number 2.
j) Retrieve all employees in department ‘3’ whose salary is between 10,000 and 20,000

6. Consider the Insurance database given below. The primary keys are underlined and the datatypes are specified.

PERSON (driver – id #: String, name: string, address: strong)
CAR (Regno: string, model: string, year: int)
ACCIDENT (report-number: int, date: date, location: string)
OWNS (driver-id #:string, Regno:string)

PARTICIPATED (driver-id: string, Regno:string, report-number:int, damage amount:int)

a) Create the above tables by properly specifying the primary keys and the foreign keys.
b) Enter atleast five tuples for each relation.
c) Demonstrate how you
   I. Update the damage amount for the car with a specific Regno in the accident with report number 12 to 25000.
   II. Add a new accident to the database.
d) Find the total number of people who owned cars that were involved in accident in 2002.
e) Find the number of accidents in which cars belonging to a specific model were involved.
f) Generation of suitable reports.

7. Consider the following relations for an order processing database application in a company.

CUSTOMER (cust #: int, cname: string, city: string)
ORDER (order #: int, odate: date, cust #: int, ord-Amt: int)
ORDER – ITEM (order #: int, *Item* #: int, qty: int)
ITEM (item #: int, unit price: int)
SHIPMENT (order #: int, warehouse#: int, ship-date: date)
WAREHOUSE (warehouse #: int, city: string)

a) Create the above tables by properly specifying the primary keys and the foreign keys.
b) Enter atleast five tuples for each relation.
c) Produce a listing: CUSTNAME, #oforders, AVG_ORDER_AMT, where the middle column is the total number of orders by the customer and the last column is the average order amount for that customer.
d) List the order# for orders that were shipped from all the warehouses that the company has in specific city.
e) Demonstrate how you delete item# 10 from the ITEM table and make that field null in the ORDER _ITEM table.
f) Generation of suitable reports.

8. Consider the following database of student enrollment in courses and books adopted for each course:

STUDENT (regno: string, name: string, major: string, bdate:date)
COURSE (course #:int, cname:string, dept:string)
ENROLL (regno:string, course#:int, sem:int, marks:int)
BOOK_ADOPTION (course# :int, sem:int, book-ISBN:int)
TEXT (book-ISBN:int, book-title:string, publisher:string, author:string)

a) Create the above tables by properly specifying the primary keys and the foreign keys.
b) Enter atleast five tuples for each relation.
c) Demonstrate how you add new textbook to the database and make this book be adopted by some department.
d) Produce a list of text books (include Course #, Book-ISBN, Book-title) in the alphabetical order for course offered by the ‘CS’ department that use more than two books.
e) List any department that has all its adopted books published by a specific publisher.
f) Generation of suitable reports.

9. The following tables are maintained by a book dealer:

AUTHOR (author-id:int, name:string, city:string, country:string)
PUBLISHER (publisher-id:int, name:string, city:string, country:string)
CATALOG(book-id:int, title:string, author-id:int, publisher-id:int, category-id:int, year:int, price:int)
ORDER-DETAILS (order-no:int, book-id:int, quantity:int)

a) Create the above tables by properly specifying the primary keys and the foreign keys.
b) Enter atleast five tuples for each relation.
c) Give the details of the authors who have 2 or more books in the catalog and the price of the books is greater than the average price of the books in the catalog and the year of publications is after 2000.
d) Find the author of the book, which has maximum sales.
e) Demonstrate how you increase the price of books published by a specific publisher by 10%.
f) Generation of suitable reports.

10. Consider the following database for a banking enterprise:

BRANCH(branch-name:string, branch-city:string, assets:real)
ACCOUNT(accno:int, branch-name:string, balance:real)
DEPOSITOR(customer-name:string, accno:int)
COUSTOMER(customer-name:string, customer-street:string, customer-city:string)
LOAN(loan-number:int, branch-name:string, amount:real)
BORROWER(customer-name:string, loan-number:int)

a) Create the above tables by properly specifying the primary keys and the foreign keys.
b) Enter atleast five tuples for each relation
c) Find all the customers who have atleast two accounts at the Main branch.
d) Find all the customers who have an account at all the branches located in a specific city.
e) Demonstrate how you delete all account tuples at every branch located in a specific city.
f) Generation of suitable reports.

Note:

- All experiments to be conducted.
- The exercises are to be executed in Oracle, MySQL or similar RDBMS environment.

AC62 OPERATIONS RESEARCH & ENGINEERING MANAGEMENT

PART A: OPERATIONS RESEARCH

UNIT I

WHAT IS OPERATIONS RESEARCH? **02 hrs**

Operations Research Models; Solving the OR Model; Queuing and Simulation Models; Art of Modeling; More Than Just Mathematics; Phases of an OR.

I (1.1 to 1.6)

MODELING WITH LINEAR PROGRAMMING **05 hrs**

Two-Variable LP Model; Graphical LP Solution; Selected LP Applications.

I (2.1 to 2.3)

UNIT II

THE SIMPLEX METHOD AND SENSITIVITY ANALYSIS **05 hrs**

LP Model in Equation Form; The Simplex Method; Artificial Starting Solution; Special Cases in Simplex Method.

I (3.1, 3.3, 3.4, 3.5.1, 3.5.2, 3.5.3, 3.5.4)

DUALITY AND POST-OPTIMAL ANALYSIS **03 hrs**

Definition of the Dual Problem; Simplex Tableau Computations.

I (4.1, 4.2.4)

UNIT III

TRANSPORTATION MODEL AND ITS VARIANTS **07 hrs**

Definition of the Transportation Model; Nontraditional Transportation Models; The Transportation Algorithm; The Assignment Model.

I (5.1, 5.2, 5.3, 5.4)

UNIT IV

NETWORK MODELS **08hrs**

Scope and Definition of Network Models; Shortest-Route Problem; CPM and PERT.

I (6.1, 6.3, 6.5)

UNIT V

DECISION ANALYSIS AND GAMES **03 hrs**

Game Theory - Optimal Solution of Two-Person Zero-Sum Games; Solution of Mixed Strategy Games.

I (13.4.1, 13.4.2)

QUEUING SYSTEMS **05 hrs**

Why Study Queues?; Elements of a Queuing Model; Role of Exponential Distribution; Pure Birth and Death Models; Generalized Poisson Queuing Model; Specialized Poisson Queues.

I (15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.6.1, 15.6.2, 15.6.3)

PART B: ENGINEERING MANAGEMENT

UNIT VI

INTRODUCTION TO ENGINEERING MANAGEMENT **03 hrs**

What is Management; The History of Management; Types of Manager; Management Responsibilities; Management Tasks; The Engineering Manager.

II (2.1, 2.2, 2.3, 2.4, 2.5, 2.6)

THE ORGANIZATION **04 hrs**

Defining the Organization; Organization Structures; The Quality Organization; Organizational Change; Managing Change.

II (3.1, 3.2, 3.3, 3.4, 3.5)

UNIT VII

STRATEGY FORMULATION **02 hrs**

The Elements of Corporate Strategy; Strategy Formulation Process; Alliances and Acquisitions; Strategy Formulation Tools and Techniques.

II (5.1, 5.2, 5.3, 5.4)

DECISION MAKING **02 hrs**

The Nature of Management Decision; Decision Making Process; Decision Making Techniques.

II (6.1, 6.2, 6.3)

INFORMATION PRESENTATION **01 hrs**

Statistical Analysis; Presentation of Data.

II (7.1, 7.2)

FORECASTING MODELS FOR DECISION MAKING **03 hrs**

Forecasting the Future; Qualitative Methods; The Time Series; Causal Models

II (9.1, 9.2, 9.3, 9.4)

UNIT VIII

MARKETS AND MARKETING **02 hrs**

The Market; Marketing Information; Market Segmentation; Consumer and Industrial Markets.

II (15.1, 15.2, 15.3, 15.4)

PRODUCT MANAGEMENT, SALES AND DISTRIBUTION **02 hrs**

Product Management; Pricing; Marketing Communications; Sales; Physical Distribution.

II (16.1, 16.2, 16.3, 16.4, 16.5)

MANAGEMENT SKILLS **02 hrs**

The Nature of Leadership; Leadership Theories; Delegation; Defining Motivation; Motivational Theories; Defining Needs; Motivation Techniques.

II (17.1, 17.2, 17.3, 17.4, 17.5, 17.6, 17.7)

EFFECTIVE COMMUNICATIONS **01 hrs**

Communication Process; Establish Communications; Presentation.

II (19.1, 19.2, 19.3)

Text Books:

I. Operations Research, An Introduction, Hamdy A. Taha, Eight Edition, PHI, 2007
II. Engineering Management, Fraidoon Mazda, Low Price Indian Edition, Addison-Wesley.

Reference Books:

1. Introduction to Operation Research, Hiller and Liberman, Fifth Edition, McGraw Hill Publications.
2. Operations Research, S.D. Sharma, Kedarnath, Ramnath & Co
3. Managing Engineering & Technology, Babcock & Morse, Pearson Education.
4. Management – A Competency Based Approach, Helriegel / Jackson / Slocum, 9th Edition, Thomson South Western.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks, selecting **THREE** questions from Part A and **TWO** from Part B.

AC63 SOFTWARE ENGINEERING

UNIT I

SOCIO-TECHNICAL SYSTEMS **08 hrs**

Emergent System Properties, Systems Engineering, Organizations, People and Computer Systems, Legacy Systems

SOFTWARE PROCESSES

Software Process Models, Process Iteration, Process Activities, The Rational Unified Process, Computer-Aided Software Engineering

PROJECT MANAGEMENT

Management activities, Project planning, Project scheduling, Risk management

I (2, 4, 5)

UNIT II

SOFTWARE REQUIREMENTS **08 hrs**

Functional and nonfunctional Requirements, User Requirements, System Requirements, Interface Specification, The Software Requirements Document

REQUIREMENTS ENGINEERING PROCESSES

Feasibility studies, Requirement elicitation and analysis, Requirements validation, Requirements management

SYSTEM MODELS

Context models, Behavioral models, Data models, Object models, Structured Methods

I (6, 7, 8)

UNIT III

RAPID SOFTWARE DEVELOPMENT **07 hrs**

Agile Methods, Extreme Programming, Rapid Application Development, Software Prototyping

FORMAL SPECIFICATION

Formal Specification in the Software Process, Sub-system Interface Specification, Behavioral specification

I (17, 10)

UNIT IV

ARCHITECTURAL DESIGN **07 hrs**

Architectural Design Decisions, System Organization, Modular Decomposition Styles, Control Styles, Reference Architectures

DISTRIBUTED SYSTEMS ARCHITECTURES

Multiprocessor architectures, Client-Server architectures, Distributed Object architectures, Inter-Organizational Distributed Computing

I (11, 12)

UNIT V

OBJECTED-ORIENTED DESIGN **08 hrs**

Objects and Object Classes, An Object-Oriented Design Process, Design Evolution

SOFTWARE REUSE

The Reuse Landscape, Design Patterns, Generator-based Reuse, Application Frameworks, Application System Reuse

COMPONENT-BASED SOFTWARE ENGINEERING
Components and Component Models, The CBSE Process, Component Composition
I (14, 18, 19)

UNIT VI

USER INTERFACE DESIGN **07 hrs**
Design Issues, The UI Design Process, User Analysis, User Interface Prototyping, Interface Evaluation

CRITICAL SYSTEMS DEVELOPMENT
Dependable Processes, Dependable Programming, Fault Tolerance, Fault Tolerant Architectures
I (16, 20)

UNIT VII

VERIFICATION AND VALIDATION **08 hrs**
Planning Verification and Validation, Software Inspections, Automated static analysis, Verification and Formal Methods

SOFTWARE TESTING
System Testing, Component Testing, Test Case Design Test Automation

SOFTWARE COST ESTIMATION
Software Productivity, Estimation Techniques, Algorithmic Cost Modeling, Project Duration and Staffing
I (22, 23, 26)

UNIT VIII

QUALITY MANAGEMENT **08 hrs**
Process and Product Quality, Quality Assurance and Standards, Quality Planning, Quality Control, Software Measurement and Metrics

PROCESS IMPROVEMENT
Process and Product Quality, Process Classification, Process Measurement, Process Analysis and Modelling, Process Change, The CMMI Process Improvement Framework

CONFIGURATION MANAGEMENT
Configuration Management Planning, Change Management, Version and Release Management, System Building, CASE Tools for Configuration Management
I (27, 28, 29)

Text Book:

I. Software Engineering, Ian Sommerville, 7th edition, Pearson Education, 2004.

Reference Book:

1. An Integrated Approach to Software Engineering, Pankaj Jalote, Narosa Publishing House, 3rd edition, 2007

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC64 DESIGN & ANALYSIS OF ALGORITHMS

UNIT I

INTRODUCTION **07 hrs**

What is an algorithm?, Fundamentals of Algorithmic Problem Solving, Important Problem Types, Fundamental Data structures

I (1)

UNIT II

FUNDAMENTALS OF THE ANALYSIS OF ALGORITHM EFFICIENCY 07 hrs

Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical analysis of non-recursive and recursive algorithms, Example: Fibonacci numbers

I (2.1 to 2.5)

UNIT III

BRUTE FORCE **08 hrs**

Selection Sort and Bubble sort, Sequential Search and Brute Force String Matching, Exhaustive Search

DIVIDE AND CONQUER

Merge Sort, Quick Sort, Binary Search, Multiplication of Large Integers, Strassen's Matrix multiplication

I (3.1, 3.2, 3.4, 4.1, 4.2, 4.3, 4.5)

UNIT IV

DECREASE AND CONQUER **07 hrs**

Insertion Sort, Depth First Search and Breadth First search, Topological Sorting, Algorithms for Generating Combinatorial Objects, Variable Size - Decrease Algorithms

I (5.1 to 5.4, 5.6)

UNIT V

TRANSFORM AND CONQUER **08 hrs**

Gaussian elimination, Balanced search trees, Heaps and Heapsort, Horner's rule and Binary Exponentiation, Problem reduction

I (6.2 to 6.6)

UNIT VI

DYNAMIC PROGRAMMING **08 hrs**

Computing a Binomial Coefficient, Warshall's and Floyd's Algorithms, The Knapsack problem and Memory Functions

GREEDY TECHNIQUE

Prim's algorithm, Kruskal's algorithm, Dijkstra's algorithm

I (8.1, 8.2, 8.4, 9.1 to 9.3)

UNIT VII

SPACE AND TIME TRADEOFFS **08 hrs**

Sorting by counting, Input Enhancement in String matching, Hashing, B-trees

LIMITATIONS OF ALGORITHMIC POWER

Decision Trees. *P*, *NP*, *NP*-complete problems, Challenges of numerical algorithms

I (7, 11.2 to 11.4)

UNIT VIII

COPING WITH LIMITATIONS OF ALGORITHMIC POWER **07 hrs**

Backtracking, Branch and Bound, Algorithms for Solving Nonlinear Equations

I (12.1, 12.2, 12.4)

Text Book:

I. Introduction to The Design & Analysis of Algorithms, Anany Levitin, Second Edition, Pearson Education, 2007

Reference Book:

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, 2nd edition, PHI, 2006

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC65 DISCRETE STRUCTURES

UNIT I

SET THEORY **07 hrs**

Sets and subsets, Operations on Sets, Countable and Uncountable Sets, The Addition Principle, The Concept of Probability

I (1)

UNIT II

MATHEMATICAL LOGIC **07 hrs**

Propositions, Logical Equivalence

I (2.1, 2.2)

UNIT III

MATHEMATICAL LOGIC *(*CONTD.) **08 hrs**

Rules of Inference, Open Statements: Quantifiers, Methods of Proof and Disproof

I (2.3, 2.4, 2.5)

UNIT IV

MATHEMATICAL INDUCTION AND RECURSIVE DEFINITIONS **07 hrs**

Mathematical Induction, Recursive Definitions

RELATIONS

Cartesian product of Sets, Relations

I (3, 4.1, 4.2)

UNIT V

RELATIONS (CONTD.) **08 hrs**

Operations on Relations, Properties of Relations, Equivalence Relations, Partial Order - Total order, Extremal elements in posets, Lattices

I (4.3 to 4.6)

UNIT VI

FUNCTIONS **08 hrs**

Functions, Types of Functions, Composition of Functions, Invertible Functions, Permutation Function, Functions of Computer Science

I (5)

UNIT VII

GROUPS **08 hrs**

Binary Operation, Groups, Sub-groups, Cyclic groups, Coset Decomposition of a Group, Homomorphism; Isomorphism

I (6)

UNIT VIII

CODING THEORY **07 hrs**

Preliminaries, The Hamming Metric, Generator Matrix; Parity-Check Matrix, Group Codes, Hamming Matrices

RINGS

Rings, The Ring Z_n

I (7, 8)

Text Book:

I. Discrete Mathematical Structures, D. S. Chandrasekharaiah, Prism Books Pvt. Ltd., 2005

Reference Books:

1. Discrete Mathematics, Seymour Lipschutz, Marc Lipson, Second Edition, Shaum's Outlines, TMH
2. Discrete Mathematics with Graph Theory, Edgar G. Goodaire, Michael M. Parmenter, Third Edition, PHI, 2007

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC66 MICROPROCESSORS & MICROCONTROLLERS

UNIT I

INTRODUCTION TO MICROPROCESSORS 08 hrs

Evolution of Microprocessors, Fundamentals of a Computer, Number Representation – Unsigned binary integers, Signed binary integers; Fundamentals of Microprocessor – description of 8085 pins, Programmer's view of 8085, Registers A, B, C, D, E, H and L First Assembly Language Program; Instruction set of 8085 – Data transfer group, Arithmetic group, Logical group, NOP and Stack group of instructions

I (1, 2, 3.1, 3.2, 4.2, 4.3, 4.4, 4.5, 5, 6, 7, 8, 9)

UNIT II

INTRODUCTION TO MICROPROCESSORS (CONTD) 08 hrs

Instruction set of 8085 continued – Branch group, Chip select logic, Addressing of I/O ports, Architecture of 8085 – Details of 8085 architecture, Instruction cycle, Comparison of different machine cycles

I (10, 11, 12, 13.1, 13.2, 13.3)

UNIT III

ASSEMBLY LANGUAGE PROGRAMS 07 hrs

Exchange 10 bytes, Add 2 multibyte numbers, Add 2 multibyte BCD numbers, Block movement without overlap, Monitor routines, Multiply two numbers Linear search, Find the smallest number, HCF of two numbers, Convert BCD to binary, Convert binary to BCD

I (14.1 to 14.4, 14.6.1, 16.1, 16.2, 16.3, 16.7.1, 16.7.2, 16.8.1, 16.8.2)

UNIT IV

INTERRUPTS IN 8085 07 hrs

Data transfer schemes, 8085 interrupts, EI and DI instructions, INTR and INTA* pins, RST 5.5, RST 6.5, RST 7.5, and TRAP pins, SIM and RIM instructions, 8255 Programmable peripheral interface chip Description of 8255, Operational modes, Control port of 8255

I (18.1 to 18.7, 18.9, 20.1 to 20.3)

UNIT V

PROGRAMS USING INTERFACE MODULES 07 hrs

Logic controller interface, Evaluation of Boolean expression, Decimal counter, Simulation of 4-bit ALU, Interfacing of I/O devices**.** Interfacing of 7-segment display, Interfacing simple keyboard, Interfacing a matrix keyboard, Intel 8279 Keyboard and Display controller

I (21.1.1, 21.1.3, 21.1.4, 22.1, 22.3, 22.4, 22.6)

UNIT VI

INTEL 8259A- PROGRAMMABLE INTERRUPT CONTROLLER 08 hrs

Need for interrupt controller, Overview of 8259, Pins of 8259, Registers of 8259, Programming with no slaves – ICW1, ICW2, ICW3, ICW4, OCW1 Intel 8257 – Programmable DMA controller Concept of DMA, Need for DMA, Description of 8257, Programming the 8257, Pins of 8257, Working of 8257

I (23.1 to 23.4, 23.5.1 to 23.5.5, 24.1 to 24.6)

1.1 UNIT VII

INTEL 8253 – PROGRAMMABLE INTERVAL TIMER 08 hrs

Need for programmable interval timer, Description of 8253, Programming the 8253, Mode 0, Mode 1, Mode 3 operations Intel 8251A – Universal synchronous asynchronous receiver transmitter Need for USART, Asynchronous transmission, Asynchronous reception, Synchronous transmission, Synchronous reception, Pin description of 8251, Programming the 8251

I (25.1 to 25.5, 25.7, 26.1 to 26.7)

UNIT VIII

8051 MICROCONTROLLER **07 hrs**

Main features, Functional blocks, Program memory structure, Data memory structure, Programmer's view, Addressing modes, Instruction set, Programming examples

I (29)

Text Book:

I. The 8085 Microprocessor; Architecture, Programming and Interfacing, K. Udaya Kumar and B. S. Umashankar, Pearson Education, 2008

Reference Books:

1. Microprocessor Architecture, Programming and Applications with the 8085, Fourth Edition, R. S. Gaonkar, Penram International Publishing (India), 2000
2. The 8051 Microcontroller and Embedded Systems, Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D. McKinlay, Second Edition, Pearson Education, 2008

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC93 ANALYSIS & DESIGN OF ALGORITHMS LAB

List of Experiments

1. Perform recursive binary and linear search.

2. Sort a given set of elements using Heap sort technique.

3. a. Sort a given set of elements using Merge sort technique.
   b. Check whether a graph is connected using Depth first technique.

4. Sort a given set of elements using Selection sort technique.

5. a. Obtain the topological ordering of vertices in a given digraph.
   b. Sort a given set of elements using Insertion sort technique.

6. Implement 0/1 knapsack problem using memory function dynamic programming.

7. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.

8. Sort a given set of elements using Quick sort technique.

9. Find minimum cost spanning tree of a given undirected graph using Kruskal's algorithm.

10. a. Print all the nodes reachable from a given starting node in a digraph using Breadth first search technique.
    b. Implement all pair shortest paths problem using Floyd's algorithm.

11. Find a subset of a given set $S = \{s_1, s_2, \ldots, s_n\}$ of n positive integers whose sum is equal to a given positive integer d. A suitable message is to be displayed if the given problem instance does not have a solution.

12. a. Implement Horspool algorithm for string matching.
    b. Find the binomial coefficient using dynamic programming.

13. Find minimum cost spanning tree for a given undirected graph using Prim's algorithm.

14. a. Print all the nodes reachable from a given starting node in a given digraph using Depth first search technique.
    b. Compute the transitive closure of a given directed graph using Warshall's algorithm.

15. Implement *n*-Queens problem using backtracking technique.

Note:

- Minimum of 13 experiments to be conducted.
- All Programs can be written in C or C++ and executed in Turbo C++ or similar environment

AC67 DATA COMMUNICATION AND COMPUTER NETWORKS

UNIT I

DATA COMMUNICATIONS, DATA NETWORKING, AND THE INTERNET **04 hrs**

Data Communications and Networking for Today's Enterprise; A Communications Model; Data Communications; Networks; The Internet.
I (1.1, 1.2, 1.3, 1.4, 1.5)

PROTOCOL ARCHITECTURE, TCP/IP, AND INTERNET-BASED APPLICATIONS 03 hrs

The Need for a Protocol Architecture; The TCP/IP Protocol Architecture; the OSI Model; Standardization within a Protocol Architecture.
I (2.1, 2.2, 2.3, 2.4)

UNIT II

DATA TRANSMISSION **05 hrs**

Concepts and Terminology; Analog and Digital Data Transmission; Transmission Impairments; Channel Capacity.
I (3.1, 3.2, 3.3, 3.4)

TRANSMISSION MEDIA **03 hrs**

Guided Transmission Media; Wireless Transmission.
I (4.1, 4.2)

UNIT III

SIGNAL ENCODING TECHNIQUES **05 hrs**

Digital Data, Digital Signals; Digital Data, Analog Signals; Analog Data, Digital Signals; Analog Data, Analog Signals.
I (5.1, 5.2, 5.3, 5.4)

DIGITAL DATA COMMUNICATION TECHNIQUES **03 hrs**

Asynchronous and Synchronous Transmission; Types of Errors; Error Detection; Line Configurations.
I (6.1, 6.2, 6.3, 6.5)

UNIT IV

DATA LINK CONTROL PROTOCOLS **03 hrs**

Flow Control; Error Control; High-Level Data Link Control (HDLC).
I (7.1, 7.2, 7.3)

MULTIPLEXING **04 hrs**

Frequency-Division Multiplexing; Synchronous Time-Division Multiplexing; Statistical Time-Division Multiplexing.
I (8.1, 8.2, 8.3)

UNIT V

CIRCUIT SWITCHING AND PACKET SWITCHING **02 hrs**

Switched Communications Networks; Circuit Switching Networks; Packet-Switching Principles.
I (10.1, 10.2, 10.5)

ROUTING IN SWITCHED NETWORKS **03 hrs**

Routing in Packet-Switching Networks; Least-Cost Algorithms.
I (12.1, 12.3)

CONGESTION CONTROL IN DATA NETWORKS **02 hrs**

Effects of Congestion; Congestion Control; Traffic Management; Congestion Control in Packet-Switching Networks.
I (13.1, 13.2, 13.3, 13.4)

UNIT VI

LOCAL AREA NETWORK OVERVIEW **04 hrs**

Background; Topologies and Transmission Media; LAN Protocol Architecture; Bridges
I (15.1, 15.2, 15.3, 15.4)

HIGH-SPEED LANS **02 hrs**

The Emergence of High-Speed LANs; Ethernet.
I (16.1, 16.2)

WIRELESS LANS **02 hrs**

Overview; Wireless LAN Technology; IEEE 802.11 Architecture and Services.
I (17.1, 17.2, 17.3)

UNIT VII

INTERNETWORK PROTOCOLS **07 hrs**

Basic Protocol Functions; Principles of Internetworking; Internet Protocol Operation; Internet Protocol; IPv6.
I (18.1, 18.2, 18.3, 18.4, 18.5)

UNIT VIII

INTERNETWORK OPERATION **03 hrs**

Multicasting; Routing Protocols.
I (19.1, 19.2)

TRANSPORT PROTOCOLS **02 hrs**

TCP; UDP.
I (20.2, 20.4)

INTERNET APPLICATIONS **03 hrs**

Electronic Mail: SMTP and MIME; Internet Directory Service: DNS.
I (22.1, 23.1)

Text Book:

I. Data and Computer Communications, Eight Edition (2007), William Stallings, Pearson Education Low Price Edition.

Reference Book:

1. Data Communications and Networking, Fourth Edition (2006), Behrouz A. Forouzan, Tata McGraw-Hill Special Indian Edition.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC68 FINITE AUTOMATA & FORMULA LANGUAGES

UNIT I

INTRODUCTION TO AUTOMATA **07 hrs**

Why Study Automata Theory? Introduction to formal proof, Additional forms of proof, Inductive proofs, central concepts of automata theory, Finite Automata: An informal picture of Finite Automata

I (1.1 to 1.5, 2.1)

UNIT II

FINITE AUTOMATA (CONTD.) **08 hrs**

Deterministic Finite automata, Non deterministic Finite automata, an application: text search, Finite automata with Epsilon transition, minimization of DFAs, Why the minimized DFAs can't be beaten?

I (2.2 to 2.5, 4.4.3, 4.4.4)

UNIT III

REGULAR EXPRESSIONS AND LANGUAGES **08 hrs**

Regular expressions, Finite automata and Regular expressions, applications of Regular expressions, Algebraic Laws for Regular Expressions

I (3.1 to 3.4)

UNIT IV

PROPERTIES OF REGULAR LANGUAGES **07 hrs**

Proving Languages not to be regular, closure properties of Regular languages**,** Testing equivalence of states, testing equivalence of regular languages

CONTEXT-FREE GRAMMARS AND LANGUAGES

Context-free grammar, Parse trees

I (4.1, 4.2, 4.4.1, 4.4.2, 5.1, 5.2)

UNIT V

CONTEXT-FREE GRAMMARS AND LANGUAGES (CONTD.) **07 hrs**

Applications of context-free grammars, ambiguity in grammars and languages, Pushdown Automata: Definition of Push down automaton, languages of PDA, Equivalence of PDA's and CFG's, Deterministic pushdown automata

I (5.3, 5.4, 6.1 to 6.4)

UNIT VI

PROPERTIES OF CONTEXT-FREE LANGUAGES **07 hrs**

Normal forms for Context free Grammars, Pumping lemma for context-free languages, Closure properties of context-free languages.

I (7.1 to 7.3)

UNIT VII

INTRODUCTION TO TURING MACHINES **08 hrs**

Problems That Computers Cannot Solve, The Turing machine, Programming Techniques for Turing Machines, Extensions to the Basic Turing Machine, Restricted Turing Machines, Turing Machines and Computers.

I (8.1 to 8.6)

UNIT VIII

UNDECIDABILITY **08 hrs**

A Language That Is Not Recursively Enumerable, An Undecidable Problem That Is RE, Undecidable Problems About Turing Machines, Post's Correspondence Problem.

I (9.1 to 9.4)

Text Book:

I. Introduction to Automata Theory, Languages and Computation, John E Hopcroft, Rajeev Motwani, Jeffery D. Ullman, Pearson Education, Third Edition, 2006.

Reference Books:

1. Introduction to Languages and the Theory of Computation, J. C. Martin, Second Edition, McGraw-Hill, 1997
2. An Introduction to Formal Languages and Automata, Peter Linz, Narosa Publishing, Fourth Edition, 2006

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC71 UNIX SYSTEMS PROGRAMS

UNIT I

INTRODUCTION **08 hrs**

Introduction, logging in, Files and directories, Input and Output, Programs and Processes, ANSI C Features, Error Handling, User Identification, Signals, Unix Time Values, System Calls and Library Functions

FILE I/O

Introduction, File Descriptors, *open* function, *creat* function, *close* function, *lseek* function, *read* function, *write* function, I/O Efficiency, File Sharing, Atomic Operations, *dup* and *dup2* Functions, *fcntl* Function, *ioctl* Function, /dev/fd

I (1.1 to 1.11, 3.1 to 3.15)

UNIT II

FILES AND DIRECTORIES **07 hrs**

Introduction, *stat, fstat* , and *lstat* Functions, File Types, Set-User-ID and Set-Group-ID, File access Permissions, Ownership of New Files and Directories, access Function , *Umask* Function, *chmod* and *fchmod* Functions, Sticky Bit, *chown , fchown,* and *lchown* Functions, File Size, File Truncation, Fileststems, *link, unlink, remo*ve and *rename* Functions, Systolic Links, *symlink* and *readlink* Functions,File Times, *utime* Function, *mkdir* and *rmdir* Functions, Reading Directories, *chdir, fchdir* and *getcwd* Functions, Special Device Files, *sync* and *fsync* Functions, Summary of file access Permission bits

I (4.1 to 4.25)

UNIT III

STANDARD I/O LIBRARY **07 hrs**

Introduction*, Streams* and *File* Objects, Standard input, Standard Output and Standard Error, Buffering, Opening a Stream, Reading and writing a Stream, Line-at-a time I/O, Standard I/O Efficiency, Binary I/O, Positioning a Stream, Formatted I/O, Implementation Details, Temporary Files, Alternatives to Standard I/O

SYSTEM DATA FILES AND INFORMATION

Introduction, Password File, Shadow Passwords, Group Files, Supplementary Group IDs, Other Data Files, Login Accounting, System Identification, Time and date Routines

I (5.1 to 5.14, 6.1 to 6.9)

UNIT IV

PROCESS CONTROL **08 hrs**

Introduction, Process Identifiers, *fork* Function, *vfork* Function, *exit* Function, *wait* and *waitpid* Functions, *wait3* and *wait4* Functions, Race Conditions, *exec* Functions, Changing User IDs and Group IDs, Interpreter Files, *system* Function, Process Accounting, User Identification, Process Times.

I (8.1 to 8.15)

UNIT V

PROCESS RELATIONSHIPS **08 hrs**

Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp and tcsetpgrp Functions, Job Control, Shell Execution of Programs, Orphaned Process Groups

THE ENVIRONMENT OF A UNIX PROCESS

Introduction, *main* Function, Process Termination, Command-line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, *setjmp* and *longjmp* Functions, *getrlimit* and *setrlimit* Functions

I (7.1 to 7.11, 9.1 to 9.10)

UNIT VI

SIGNALS **07 hrs**

Introduction, Signal Concepts, *signal* Function, Unreliable Signals, Interrupted System Calls, Reentrant Functions, SIGCLD Semantics, Reliable Signal terminology and Semantics*, kill* and *raise* Functions, *alarm* and *pause* Functions, Signal Sets*, sigprocmask* Function, *sigpending* Function, *sigaction* Function, *sigset jmp* and *siglongjmp* Functions, *sigsuspend* Function, *abort* Function, *system* Function, *sleep* Function, Job Control signals, Additional Features

I (10.1 to 10.21)

UNIT VII

TERMINAL I/O **08 hrs**

Introduction, Overview , Special Input Characters, Getting and setting Terminal Attributes, Terminal Option Flags, *stty* command, Baud rate Functions, Line Control Functions, Terminal Identification, Canonical Mode, Noncanonical Mode, Terminal Window Size, *termcap* , *terminfo* and *curses*

DAEMON PROCESSES

Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client -Server Model

I (11.1 to 11.13, 13.1 to 13.5)

UNIT VIII

INTER PROCESS COMMUNICATION **07 hrs**

Introduction, Pipes, *popen* and *pclose* Functions, Coprocesses, FIFOs, System V IPC, Message Queues, Semaphores, Shared Memory, Client-Server Properties.

I (14.1 to 14.10)

Text Book:

I. Advanced Programming in the UNIX Environment, W. Richards Stevens, Pearson Education, 2004

Reference Book:

1. Advanced UNIX Programming, Rochkind, Pearson Education, 2nd Edition, 2004.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC72 **LINUX INTERNALS**

UNIT I

LINUX-THE OPERATING SYSTEM **07 hrs**

Main Characteristics, Linux Distributions

COMPILING THE KERNEL

Where Is Everything?, Compiling, Additional Configuration facilities

I (1.1, 1.2, 2.1, 2.2, 2.3)

UNIT II

INTRODUCTION TO THE KERNEL **08 hrs**

Important Data Structures, Main Algorithms, Implementing System Calls

I (3.1 to 3.3)

UNIT III

MEMORY MANAGEMENT **08 hrs**

The Architecture Dependent memory model, The Virtual Address space for a Process, Block Device Caching, Paging under Linux

I (4.1 to 4.4)

UNIT IV

INTER-PROCESS COMMUNICATION **08 hrs**

Synchronization in the Kernel, Communication via Files, Pipes, Debugging Using *ptrace*, System V IPC, IPC with Sockets.

I (5.1 to 5.6)

UNIT V

THE LINUX FILE SYSTEM **07 hrs**

Basic Principles, The Representation of File Systems in the Kernel, The *proc* File System, The *ext2* File System

I (6.1 to 6.4)

UNIT VI

DEVICE DRIVERS UNDER LINUX **07 hrs**

Character and Block Devices, Polling and Interrupts, The Hardware, Implementing a Driver, An Example of DMA Operation

I (7.1 to 7.5)

UNIT VII

NETWORK IMPLEMENTATION **08 hrs**

Introductory Summary, Important Structures, Network Devices under Linux, ARP – The Address Resolution Protocol, IP, UDP, TCP, The Packet Interface – an Alternative?

I (8.1 to 8.8)

UNIT VIII

MODULES AND DEBUGGING **7 hrs**

What are Modules?, Implementation in the Kernel, What can be Implemented as a Module?, Parameter Passing, The *kernel* Daemon, An Example Module, Debugging.

MULTI-PROCESSING

The Intel Multi-processor Specification, Problems with Multi-processor Systems, Changes to the Kernel, Compiling Linux SMP

I (9.1 to 9.7, 10.1 to 10.4)

Text Book:

I. Linux Kernel Internals, M. Beck, H. Bome, et al, Pearson Education, Second Edition, 2001

Reference Books:

1. The Design of the UNIX Operating Systems, Maurice. J. Bach, PHI, 1998
2. Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Peter Baer Galvin, Wiley, John & Sons, 2004

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC73 C# & .NET

UNIT I

THE PHILOSOPHY OF .NET 07 hrs

Understanding the previous state of Affairs, The .NET Solution, The Building Blocks of the .NET Platform (CLR, CTS, CLS), The Role the .NET Base Class Libraries, What C# Brings to the Table, Additional .NET-Aware Programming Languages, An Overview of .NET Binaries (*aka* Assemblies), The role of the Common Intermediate Language, The role of .NET Type Metadata, The role of the Assembly Manifest, Compiling CIL to Platform Specific Instructions, Understanding the Common Type System, Intrinsic CTS Data Types, Understanding the Common Language Specification, Understanding the Common Language Runtime, A tour of the .NET Namespaces, Increasing Your Namespace Nomenclature, Deploying the .NET Runtime

I (1)

UNIT II

BUILDING C# APPLICATIONS 08 hrs

The role of the Command Line Compiler (*csc.exe*), Building a C# Application Using *csc.exe*, Working with *csc.exe* Response Files, Generating Bug Reports, Remaining C# Compiler Options, The Command Line Debugger (*cordbg.exe*), Using The Visual Studio .NET IDE, Building a VS .NET Test Application, Debugging with the Visual Studio.NET IDE, Other Key Aspects of the VS .NET IDE, Documenting Your Source Code via *XML*, C# "Preprocessor" Directives, An Interesting Aside: The System.Environment Class, Building .NET Applications with Other IDEs.

I (2)

UNIT III

C# LANGUAGE FUNDAMENTALS 08 hrs

The Anatomy of a Basic C# Class, Creating Objects: Constructor Basics, The composition of a C# Application, Default Assignments and Variable Scope, The C# Member Variable Initialization Syntax, Basic Input and Output with the Console Class, Understanding Value Types and Reference Types, The Master Node: System.Object, The System Data Types (and C# Aliases), Converting between Value Types and Reference types: Boxing and Unboxing, Defining Program Constants, C# Iteration Constructs, C# Control Constructs, The Complete Set of C# Operators, Defining Custom Class Methods, Understanding Static Methods, Method Parameter Modifiers, Array Manipulation In C#, String Manipulation in C#, C# Enumerations, Defining Structures In C#, Defining Custom Namespaces

I (3)

UNIT IV

OBJECT ORIENT PROGRAMMING WITH C# 07 hrs

Formal Definition of the C# Class, Defining the "Default Public Interface" of a Type, Recapping the Pillars of *OOP*, The First Pillar: C#'s Encapsulation Services, Pseudo-Encapsulation: Creating Read - Only Fields, The Second Pillar: C#'s Inheritance Support, Keeping Family Secrets: The "protected" Keyword, Nested Type Definitions, The Third Pillar: C#'s Polymorphic Support, Casting Between Types, Generating Class Definitions Using Visual Studio.NET

I (4)

UNIT V

EXCEPTIONS AND OBJECT LIFE TIME 08 hrs

Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception handling, The *System.Exception* Base Class, Throwing a Generic Exception, Catching Exceptions, CLR System-Level Exceptions (*System.SystemException*), Custom Application-Level Exception (*System.ApplicationException*), Handling Multiple Exceptions, The *Finally* Block, The Last Chance Exception, Dynamically Identifying Application- and System-Level Exceptions, Debugging System Exceptions Using VS .NET, Understanding Object Lifetime, The CIL of *new*, The basics of Garbage Collection, Finalizing a Type, the Finalization Process, Building an Ad Hoc Destruction Method, Garbage Collection Optimizations, The *System.GC* Type.

I (5)

UNIT VI

INTERFACES AND COLLECTIONS **07 hrs**

Defining Interfaces Using C#, Invoking Interface Members at the Object level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces as Polymorphic Agents, Building Interface Hierarchies, Implementing Interfaces Using VS.NET, Understanding the IConvertible Interface, Building a Custom Enumerator (*IEnumerable and IEnumerator*),Building Cloneable Objects (*ICloneable*), Building Comparable Objects (*IComparable*), Exploring the *System.Collections* Namespace, Building a Custom Container(Retrofitting the *Cars* Type)

I (6)

UNIT VII

CALLBACK INTERFACES, DELEGATES AND EVENTS **07 hrs**

Understanding Callback Interfaces, Understanding the .NET Delegate Type, Members of System.MulticastDelegate,The Simplest possible Delegate Example, Building a More Elaborate Delegate Example, Understanding Asynchronous Delegates, Understanding (and Using) Events

I (7)

UNIT VIII

UNDERSTANDING .NET ASSEMBLIES **08 hrs**

Problems with Classic COM Binaries, An Overview of .NET Assemblies, Building a Single File Test Assembly, A C# Client Application, A Visual Basic .NET Client Application, Cross-Language Inheritance, Exploring The CarLibrary's Manifest, Exploring The CarLibrary's Types, Building a Multifile Assembly, Using the Multifile Assembly, Understanding Private Assemblies, Probing for Private Assemblies (the basics), Private Assemblies and XML Configuration Files, Probing for Private Assemblies (the Details), Understanding Shared Assemblies, Understanding Strong Names, Building a Shared Assembly, Understanding Delayed Signing, Installing / Removing Shared Assemblies, Using a Shared Assembly, Versioning Shared Assemblies, Building SharedAssembly Version 2.0.0.0, Specifying Custom Version Policies, GAC Internals, Assembly-Centric Odds and Ends, Regarding the VS .NET Add References Dialog Box

I (9)

Text Book:

I. C# and the .NET Platform, Andrew Troelsen, Second Edition 2003, Dreamtech Press

Reference Books:

1. Inside C#, Tom Archer, 2001, WP Publishers.
2. C# 2.0: The Complete Reference, Herbert Schildt, McGraw Hill Osborne Media, 2005
3. Perry, Core C# And .NET: The Complete And Comprehensive Developer's Guide To C# 2.0 and .NET 2.0, Pearson Education, 2007

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC74 ARTIFICIAL INTELLIGENCE & NEURAL NETWORKS

UNIT I

OVERVIEW OF ARTIFICIAL INTELLIGENCE **07 hrs**

Introduction, History of AI, Applications of AI, Objectives of AI, Artificial Intelligence Programming, Criticism of AI, Future of AI

I (1)

UNIT II

SYMBOLIC LOGIC **07 hrs**

Introduction, Logic, Propositions, Normal Forms in Propositional Logic, Logical Consequences, Resolution Principle, Predicate Calculus, Well-Formed Formulas (WFFs), Clausal Form, Rules of Inference, Unification, Resolution, Rule-Based Expert Systems, The Prolog Language

I (2)

UNIT III

KNOWLEDGE ACQUISITION AND REPRESENTATION **07 hrs**

Introduction, Machine Intelligence, Knowledge Engineering, Procedure for Knowledge Acquisition, Knowledge Representation, Logical Representation Schemes, Procedural Representation Schemes, Network Representation Schemes, Structured Representation Schemes

I (3)

UNIT IV

REASONING AND KRR SYSTEMS **08 hrs**

Introduction, Reasoning, Knowledge Representation and Reasoning (KRR) System, Knowledge Representation (KR) Languages, Domain Modeling, Semantic Nets (Associative Networks) Reasoning Systems, Frame Based Systems, Hybrid Representation Systems

UNCERTAINTY

Introduction, Non-monotonic and Monotonic Reasoning, Confidence Factor, Bayes Theorem, Dempster and Shafer's Theory of Evidences, Non-classical Logics, Default Logic, Bayesian Networks, Fuzzy Logic

I (4, 5)

UNIT V

SEARCH TECHNIQUES **08 hrs**

Introduction, Problem Representation, Definitions, Representation Schemes, Problem Solving in AI, Blind Search Techniques, Heuristic Search Techniques, Game Searches

I (6.1 to 6.8)

UNIT VI

EXPERT SYSTEMS **08 hrs**

Introduction, Skill Versus Knowledge, Basic Characteristics of an Expert System, Brief History of Expert Systems, Knowledge Engineering, Inferencing

NEURAL NETWORKS

Introduction, Difference between Human and Machine Intelligence, Features of Biological Neural Networks, How the Human Brain Learns?, From Human Neurons to Artificial Neurons, How Neural Networks Learn?, Learning Algorithms

I (8.1 to 8.6, 9.1 to 9.7)

UNIT VII

NEURAL NETWORKS (CONTD.) **08 hrs**

Different Network Architectures and their Applications, Some Simple Networks, Comparison of Neural Networks and Rule-Based Methods, Comparison of Neural Networks and Expert System, Benefits of Neural Computing, Limitations of Neural Computing

I (9.8 to 9.13)

UNIT VIII

APPLICATIONS OF ARTIFICIAL INTELLIGENCE **07 hrs**

Introduction, AI in E-commerce, AI in E-Tourism, AI in Industry, AI in Medicine

I (12)

Text Book:

I. Introduction to Artificial Intelligence, Rajendra Akerkar, PHI, 2005

Reference Books:

1. Artificial Intelligence – A Modern Approach, Stuart Russell, Peter Norvig, Second Edition, PHI, 2008
2. Artificial Neural Networks – An Introduction, Kevin L. Priddy, Paul E. Keller, PHI, 2007

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC75 INTERNET APPLICATIONS

UNIT I

HYPERTEXT MARKUP LANGUAGE **08 hrs**

Basic HTML, The Document Body, Text, Hyperlinks, Adding More Formatting, Lists, Using Colour and Images, Images

MORE HTML

Tables, Multimedia Objects, Frames, Forms – Toward Interactivity, The HTML Document Head in Detail, XHTML – An Evolutionary Markup

I (2, 3)

UNIT II

CASCADING STYLESHEETS **07 hrs**

Introduction, Using Styles: Simple Examples, Defining Your Own Styles, Properties and Values in Styles, Style Sheets – Worked Example, Formatting Blocks of Information, Layers

CASCADING STYLESHEETS 2

The Design of CSS2, Styling for Paged Media, Using Aural Representation, Counters and Numbering

I (4, 5)

UNIT III

AN INTRODUCTION TO JAVASCRIPT **08 hrs**

What is Dynamic HTML?, JavaScript, JavaScript – The Basics, Variables, String Manipulation, Mathematical Functions, Statement, Operators, Arrays, Functions

OBJECTS IN JAVASCRIPT

Data and Objects in JavaScript, Regular Expressions, Exception Handling, Built-in Objects, Cookies, Events

I (6, 7)

UNIT IV

DYNAMIC HTML WITH JAVASCRIPT **07 hrs**

Data Validation, Opening a New Window, Messages and Confirmations, The Status Bar, Writing to a Different Frame, Rollover Buttons, Moving Images, Multiple Pages in a Single Download, A Text-only Menu System, Floating Logos

I (8)

UNIT V

PROGRAMMING IN PERL 5 **07 hrs**

Why Perl, Online Documentation, The Basic Perl Program, Scalars, Arrays, Hashes, Control Structures, Processing Text, Regular Expressions, Using Files, Subroutines, Bits and Pieces

I (9)

UNIT VI

CGI SCRIPTING **08 hrs**

What is CGI?, Developing CGI Applications, Processing CGI, Introduction to CGI.pm, CGI.pm Methods, Creating HTML pages Dynamically, Using CGI.pm – An Example, Adding Robustness, Carp, Cookies

BUILDING WEB APPLICATIONS WITH PERL

Uploading Files, Tracking Users with Hidden Data, Using Relational Databases, Using lib www, Template based Sites with HTML::Mason, Creating and Manipulating Images

I (10, 11)

UNIT VII

AN INTRODUCTION TO PHP **08 hrs**

PHP, Introducing PHP, Including PHP in a Page, Data Types, Program Control, Arrays, User-defined Functions, Built-in Functions, Regular Expression, Using Files

BUILDING WEB APPLICATIONS WITH PHP

Tracking Users, Using Databases, Handling XML

I (12, 13)

UNIT VIII

XML: DEFINING DATA FOR WEB APPLICATIONS **07 hrs**

Basic XML, Document Type Definition, XML Schema, Document Object Model, Presenting XML, Handling XML with Perl, Using XML::Parser, Handling the DOM with Perl

I (14)

Text Book:

I. Web Programming – Building Internet Applications, Chris Bates, Third Edition, Wiley Student Edition, 2006.

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC76 CRYPTOGRAPHY & NETWORK SECURITY

UNIT I

INTRODUCTION **07 hrs**

Security Goals, Attacks, Services and Mechanism, Techniques

MATHEMATICS OF CRYPTOGRAPHY

Integer Arithmetic, Modular Arithmetic, Matrices, Linear Congruence, Primes, Primality testing, Factorization, Chinese Remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm

I (1, 2, 9)

UNIT II

TRADITIONAL SYMMETRIC-KEY CIPHERS **07 hrs**

Introduction, Substitution Ciphers, Transposition Ciphers, Stream and Block Ciphers

INTRODUCTION TO MODERN SYMMETRIC-KEY CIPHERS

Modern Block Ciphers, Modern Stream Ciphers

I (3, 5)

UNIT III

DATA ENCRYPTION STANDARD (DES) **08 hrs**

Introduction, DES Structure, DES Analysis, Multiple DES, Security of DES, Differential Cryptanalysis, Linear Cryptanalysis of DES

I (6, Appendix N)

UNIT IV

ENCIPHERMENT USING MODERN SYMMETRIC-KEY CIPHERS **08 hrs**

Use of Modern Block Ciphers, Use of Stream Ciphers, Other Issues

ASYMMETRIC-KEY CRYPTOGRAPHY

Introduction, RSA Cryptosystem

I (8, 10.1, 10.2)

UNIT V

MESSAGE INTEGRITY AND MESSAGE AUTHENTICATION **08 hrs**

Message Integrity, Message Authentication

CRYPTOGRAPHIC HASH FUNCTIONS

Introduction, SHA-512

I (11.1, 11.3, 12.1, 12.2)

UNIT VI

DIGITAL SIGNATURE **07 hrs**

Comparison, Attacks on Digital Signature

KEY MANAGEMENT

Symmetric-key Distribution, Kerberos, Symmetric- Key Agreement, Public- Key Distribution - Public Announcement, Trusted Center, Controlled Trusted Center, Certification Authority

I (13.1, 13.4, 15)

UNIT VII

SECURITY AT THE APPLICATION LAYER **07 hrs**

E-Mail, PGP, S/MIME

I (16)

UNIT VIII

SECURITY AT THE TRANSPORT LAYER **08 hrs**

SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security

I (17)

Text Book:

I. Behrouz A. Forouzan, Cryptography & Network Security, Special Indian Edition.

Reference Books:

1. William Stallings, Cryptography and Network Security, Third Edition, Pearson Education/PHI, 2003
2. Atul Kahate, Cryptography and Network Security, Tata Mc Graw Hill, 2003

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC77 DIGITAL SIGNAL PROCESSING

UNIT I

SAMPLING OF CONTINUOUS-TIME SIGNALS 07 hrs

Periodic Sampling; Frequency Domain Representation of Sampling; Reconstruction of a Bandlimited Signal from its Samples; Discrete-Time Processing of Continuous-Time Signals; Continuous-Time Processing of Discrete-Time Signals; Digital Processing of Analog Signals; Oversampling and Noise Shaping in A/D and D/A Conversion

I (4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.8, 4.9)

UNIT II

TRANSFORM ANALYSIS OF LINEAR TIME-INVARIANT SYSTEMS 07 hrs

The Frequency Response of LTI systems; System Functions for Systems Characterized by Linear Constant-Coefficient Difference Equations; Frequency Response for Rational System Functions; Relationship between Magnitude and Phase; All Pass Systems; Minimum Phase Systems

I (5.0, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6)

UNIT III

STRUCTURES FOR DISCRETE-TIME SYSTEMS 07 hrs

Block Diagram Representation of Linear Constant Coefficient Difference Equations; Signal Flow Graph Representation of Linear Constant Coefficient Difference Equations; Basic Structures for IIR Systems; Transposed Forms; Basic Network Structures for FIR Systems

I (6.0, 6.1, 6.2, 6.3, 6.4, 6.5)

UNIT IV

FILTER DESIGN TECHNIQUES 08 hrs

Design of Discrete-Time IIR Filters from Continuous-Time Filters; Design of FIR Filters by Windowing; FIR Filter Design by the Kaiser Window Method; Optimum Approximations of FIR Filters; FIR Equiripple Approximation; IIR and FIR Discrete-Time Filters

I (7.0, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6)

UNIT V

1.1.1 **THE DISCRETE FOURIER TRANSFORM 08 hrs**

Sampling the Fourier Transform; Fourier Representation of Finite-Duration Sequences: The Discrete Fourier Transform; Properties of the Discrete Fourier Transform; Linear Convolution using the Discrete Fourier Transform

I (8.0, 8.4, 8.5, 8.6, 8.7)

UNIT VI

COMPUTATION OF THE DISCRETE FOURIER TRANSFORM 08 hrs

Efficient Computation of the Discrete Fourier Transform; The Goertzel Algorithm; Decimation-in-Time FFT Algorithms; Decimation-in-Frequency FFT Algorithms; Practical Considerations; Implementation of the DFT using Convolution

I (9.0, 9.1, 9.2, 9.3, 9.4, 9.5, 9.6)

UNIT VII

FOURIER ANALYSIS OF SIGNALS USING THE DISCRETE FOURIER TRANSFORM 08 hrs

Fourier Analysis of Signals using the DFT; DFT Analysis of Sinusoidal Signals; The Time-Dependent Fourier Transform; Block Convolution using the Time-Dependent Fourier Transform; Fourier Analysis of Nonstationary Signals; Fourier Analysis of Stationary Random Signals: The Periodogram; Spectrum Analysis of Random Signals using Estimates of the Autocorrelation Sequence.

I (10.0, 10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.7)

UNIT VIII

DISCRETE HILBERT TRANSFORMS **07 hrs**

Real and Imaginary Part Sufficiency of the Fourier Transform for Causal Sequences; Relationships between Magnitude and Phase; Hilbert Transform Relations for Complex Sequences**.**

I (11.0, 11.1, 11.3, 11.4)

Text Book:

I. Discrete-Time Signal Processing (1999)*,* Oppenheim, A. V., and Schafer, R. W., with J. R. Buck, Second Edition, Pearson Education, Low Price Edition.

Reference Books:

1. Digital Signal Processing: Principles, Algorithms, and Applications (2007), Proakis, J. G., Manolakis, D. G., Fourth Edition, PHI Private Limited.
2. Signal Processing First (2003), McClellan, J. H., Schafer, R. W., Yoder, M. A., Prentice Hall.
3. Schaum's Outline of Digital Signal Processing, Hayes, H., Schaum's Outlines.
4. Digital Signal Processing – Theory, Analysis and Digital-filter Design, B. Somanathan Nair, PHI Pvt Ltd

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC78 ADVANCED MICROPROCESSORS

UNIT I

8086 ARCHITECTURE AND PROGRAMMING MODEL **08 hrs**

Pin description of 8086, 8086 architecture

8086 ADDRESSING MODES

Immediate addressing, Register addressing, Memory addressing modes, Memory addressing modes as derivatives of Based Indexed addressing with displacement, I/O port addressing

INSTRUCTION TEMPLATES

Template for data transfer between a Register and Register / Memory, Code generation using template

I (1, 2, 3)

UNIT II

DATA TRANSFER INSTRUCTIONS **08 hrs**

Move data to a Register / Memory from a Register / Memory / Immediate data, Data transfer between a Segment register and a Register / Memory location, PUSH and POP instructions, Exchange instructions, Data transfer with I/O ports

DATA CONVERSION INSTRUCTIONS

XLAT, LEA, LDS, LES, LAHF, SAHF instructions

ARITHMETIC INSTRUCTIONS

Add and Subtract group of instructions, Negate instructions, Compare instructions, Data size conversion instructions, Multiply and Divide instructions

LOGICAL INSTRUCTIONS

AND, OR, ExOR, TEST, NOT, Rotate and Shift instructions

PROCESS CONTROL INSTRUCTIONS

Instructions to Set / Reset flags

STRING INSTRUCTIONS

MOVS, STOS, LODS, CMPS and SCAS instructions

I (4.2 to 4.6, 5, 6, 7, 8.1, 9)

*(**Note:** No need to learn about the templates for the instructions appearing in this unit)*

UNIT III

BRANCH INSTRUCTIONS **07 hrs**

Conditional Jumps based on a single flag, Conditional jumps based on more than one flag, Unconditional jump instruction, Iteration instructions, Call and Return instructions.

INTERRUPTS AND RELATED INSTRUCTIONS

Hardware interrupts of 8086, Exceptions during instruction execution, Software interrupt instructions, Priority of 8086 interrupts

I (10, 11)

UNIT IV

8087 NUMERIC CO-PROCESSOR **07 hrs**

Need for a numeric co-processor, Overview of 8087 Numeric co-processor, Description of 8087 pins, 8087 data types, Programmer's view of 8087 co-processor

8087 INSTRUCTION SET

Arithmetic instructions, Data transfer instructions, Compare instructions, Transcendental instructions, Load special constants instructions, Processor control instructions

I (12, 13)

UNIT V

YOUR FIRST ASSEMBLY LANGUAGE PROGRAM **07 hrs**

Introduction, Problem of multi byte addition and subtraction, Approach methodology, Explanation of Assembler directives, Conventions used in writing comments in the program, Program working, Keying in the program, Assembling the program, Linking of the program, Testing of the program, Running the entire program in a single operation, Running the program in single step operation, Stepping through the program several instructions at a time, Assembly language programs without using the .MODEL directive

SIMPLE ASSEMBLY LANGUAGE PROGRAMS

Computation of LCM, GCD of four numbers, Insertion sort, Selection sort, Bubble sort

I (14, 15)

UNIT VI

BIOS AND DOS SERVICES **08 hrs**

Direct access of PC hardware, Using BIOS services, DOS operating system services, Using High level language services, Linear search program, Linear search in an array of records, Binary search program, Matrix multiplication program

ASSEMBLY LANGUAGE PROGRAMS USING RECURSION

Computation of factorial

ASSEMBLY LANGUAGE PROGRAMS USING BIOS SERVICES

Display memory size in kilobytes, Clear screen using BIOS interrupt, Print a message using printer, Move a string of characters on the CRT

ASSEMBLY LANGUAGE PROGRAMS USING DOS SERVICES

Check user entry for password, Display command line parameters, Rename a file

I (16, 17.1, 18.1, 18.2, 18.4, 18.6, 19)

UNIT VII

ASSEMBLY LANGUAGE PROGRAMS USING CO-PROCESSOR **08 hrs**

Overview of 8087 co-processor, Compute hypotenuse

C LANGUAGE PROGRAMS USING BIOS AND DOS SERVICES

Accessing BIOS and DOS services in C programs, Create a subdirectory, Get the size of a file, Get attributes if a file, Display ASCII and scancode of key pressed, Print a message, if printer is online, Control of display on CRT screen

I (20.1, 20.2, 21)

UNIT VIII

80286 - WITH MEMORY MANAGEMENT AND PROTECTION **07 hrs**

Salient features of 80286, Internal architecture of 80286, Signal descriptions of 80286, Real addressing mode, PVAM, Privilege, Protection, Additional instructions in 80286, Instructions for protection control

808386 AND 80486 – THE 32 BIT PROCESSORS

Salient features of 80386DX, Architecture and signal descriptions of 80386, Register organization of 80386, Addressing modes, Data types of 80386, Real address mode of 80386, Protected mode of 80386, Segmentation, Paging, Virtual 8086 mode, Enhanced instruction set of 80386, The CPU with a numeric co-processor – 80486DX: salient features of 80486, Architecture of 80486, General features of 80486, On chip cache and cache control unit

PENTIUM PROCESSOR

Salient features of Pentium, A few relevant concepts of computer architecture, System architecture, Branch prediction, Enhanced instruction set of Pentium

II (9.1 to 9.7, 9.17.3, 9.17.4, 10.1 to 10.11, 10.13.1, 10.13.2, 10.13.4, 10.13.5, 11.1 to 11.5)

Text Books:

I. Advanced Microprocessors & IBM-PC Assembly Language Programming, K. Udaya Kumar and B.S. Umashankar, TMH, 1996

II. Advanced Microprocessors and Peripherals, A.K. Ray and K.M. Burchandi, TMH, 2000

Reference Book:

1. The 8088 and 8086 Microprocessors, Walter A. Triebel, Avtar Singh, Fourth Edition, Pearson Education, 2007

Note: Students have to answer **FIVE** full questions out of **EIGHT** questions to be set from each unit carrying 16 marks.

AC94 µP & µC LAB

List of Experiments

1. Write an 8085 assembly language program to exchange 10 bytes of data stored from location X with 10 bytes of data stored from location Y.

2. Write an 8085 assembly language program to add 2 multi-byte numbers. The numbers are stored from locations X and Y in byte reversal form. The size in bytes of the multi-byte numbers is given in the location, SIZE. The result is to be stored from location Z in byte reversal form, using one byte more than the size of muti-byte numbers.

3. Write an 8085 assembly language program to add 2 multibyte BCD numbers. The numbers are stored from locations X and Y in byte reversal form. The size in bytes of the multi-byte BCD numbers is given in the location, SIZE. The result is to be stored from location Z in byte reversal form, using one byte more than the size of muti-byte numbers.

4. Write an 8085 assembly language program to perform Block movement. The blocks are assumed to be non-overlapping. The block starting at location X is to be moved to the block starting at Y. The block size is provided in the location SIZE.

5. Write an 8085 assembly language program to multiply two 8-bit numbers stored at locations X and Y. Store the 16-bit result in locations Z and Z+1. Also display the result in the address field of the microprocessor kit.

6. Write an 8085 assembly language program to search for a given byte in an array of bytes using Linear search algorithm. Location X contains the size of the array and location X+1 contains the element to be searched. The elements of the array are stored from location Y onwards. The program should display in the address field, the search element and the position where it was found. If the search element is not found, the position should be indicated as 00.

7. Write an 8085 assembly language program to find the smallest of N one-byte numbers. The N value is provided at location X and the numbers are present from location X+1. Display the smallest number in the data field, and its location in the address field.

8. Write an 8085 assembly language program to find the HCF of two 8-bit numbers. The numbers are stored at locations X and Y. Display the numbers in the address field and their HCF in the data field.
9. Write an 8085 assembly language program to convert a 2-digit BCD number to binary. The 2-digit BCD number is at location X. Display the BCD number and its binary (hex) equivalent in the address field.

10. Write an 8085 assembly language program to convert an 8-bit binary number to equivalent BCD number. The binary number is at location X. Display the binary (hex) number in the data field and its equivalent BCD number in the address field.

11. Write an 8085 assembly language program to implement a Decimal counter using Logic controller interface. The starting count should be input through the interface and the counting should be displayed on the interface.

12. Write an 8085 assembly language program to simulate a 4-bit ALU using Logic controller interface. The ALU should perform addition, subtraction, AND operation, or OR operation on 4-bit inputs, based on the desired operation.

13. Write an 8051 assembly language program to convert an 8-bit Binary number to its equivalent BCD value. The 8-bit binary number is at external RAM location 30H. The result is

to be stored in external RAM locations 31H and 32H, with location 31H having the MS part of the result.

14. Write an 8051 assembly language program to convert a 2-digit BCD number to its equivalent Binary value. The 2-digit BCD number is at external RAM location 200H. The result is to be stored in external RAM location 201H.

15. Write an 8051 assembly language program to convert a 4-digit hexadecimal number to its equivalent ASCII. The 4-digit hex number is at internal RAM locations 30H and 31H. The equivalent ASCII is to be stored in four internal RAM locations starting from 50H.

Note:
Minimum of 13 experiments to be conducted. All the 8085 Assembly Language Programs have to be manually assembled and executed on a 8085 Microprocessor kit.

AC69 PROJECT WORK

The Project will consist of hardware/software, design/development, experimental/ theoretical work or a critical in-depth literature survey of a contemporary topic or a combination of these. A student is expected to put in about six hours/week spread over a period of three to four months. There will be no joint project work.

The students may work for their project in any industry, in any educational institution, in R&D Labroratory or in a library depending upon the nature of the project. The student will be required to have a supervisor from one of these places who can supervise and guide the project work. In case of difficulties, the students may contact the local centre.

On completion of the project, the student will submit two bound copies of the project report to IETE Local Centre as per the dates intimated by the Centre. The project work will be assessed by an Assessment Board. The students will be intimated by the local centers of the venue, date & time for presentation of their project report & appearing before the Assessment Board. The result of the project will be finalized at IETE HQ and declared along with the main IETE examination result. Pass marks for the project will be 5 CGPA. Students not getting 5CGPA marks will be required to re-register for the project following the usual procedure. The students will have the option of taking up a new project or continue with the earlier project.

AC70 SEMINAR

1. Eligibility :
To become eligible for seminar, the student should have cleared 16 subjects including the labs of Sec A & Sec B with GPA of 5 or more. In addition, the student should have completed three and half years from the date of enrolment.

2. Registration :
Eligible students are required to submit their applications for the registration of seminar to the respective local Centres/Sub-Centres where the examinations are conducted with a brief write up of the topic selected for approval. Seminar topic should be selected from the emerging technologies in ET,CS,IT only. Students who have undergone industrial training may make their presentation of their training report. Applications for the seminar must be submitted at the concerned Centre/ Sub-Centre within one week after declaration of result but not later than 05 April / 05 October.

3. Scrutiny / Approval of Seminar proposals :
The members of Regional Evaluation Board will approve the topic of seminar. The students should make presentation on approved topics only.

4. Semnar Fees :
Each student is required to pay Rs 400/- as Seminar fee to the respective IETE Centre / Sub-Centre.

5. Examination / Evaluation :
The local Centre / Sub-Centre will fix up a suitable date immediately after the main examination for the conduct of Seminar.The students should make Power Point presentation on the approved topic. In addition,they have to submit a complete report on the Seminar topic presented.

AC99 COMMUNICATION SKILLS AND TECHNICAL WRITING

UNIT I

COMMUNICATION: ITS TYPES AND SIGNIFICANCE **05 hrs**

Basic Concepts of Communication; Process of Communication; Types of Formal communication; The Media of Communication; Channels of Communication; Barriers in Communication; How to Overcome Barriers to Communication.

I (1.1, 1.2, 1.3, 1.4, 1.5, 1.6)

UNIT II

GRAMMAR **06 hrs**

Synonyms; Antonyms; Words used as different parts of speech; Spotting errors; Concord; Principle of proximity between subject and verb.

I (4.1 to 4.3, 4.6, 4.7, 4.8)

UNIT III

SYNTAX **07 hrs**

Sentence Structure; Combination and Transformation of sentences; Verb Patterns in English.

I (5.1 to 5.4)

UNIT IV

READING SKILLS **05 hrs**

Purpose and Process of Reading; Reading Tactics; Reading Strategies; Reading Comprehension; Paraphrase; Preparing outlines of paragraph/text.

I (2.1 to 2.3, 2.5, 2.6, 2.10, 2.11)

UNIT V

WRITING SKILLS **07 hrs**

Elements of Effective Writing; Job Application, Bio-data, Personal Resume and Curriculum Vitae; Preparing Agenda and Minutes of a Meeting; Back office job for organizing a conference/seminar; Writing Styles; Scientific and Technical Writing; Summary Writing; Writing paragraphs; Writing Essays.

I (3.1 to 3.6, 3.8, 3.9, 3.11)

UNIT VI

LISTENING SKILLS **06 hrs**

Process of listening; Hard and Soft Skills; Feedback Skills; Essentials of Good Communications; Types of Listening; Barriers to Listening; Note taking and Note making.

I (8.1 to 8.4, 8.6 to 8.10)

SPEAKING SKILLS

Skills of Effective Speaking; Component of an Effective Talk; Tone of Voice; Body Language; Timing and Duration of Speech; Audio-Visual Aids in Speech.

I (9.1, 9.2, 9.4 to 9.7)

UNIT VII

TECHNICAL REPORT **06 hrs**

Main considerations in writing a good report; Types and Structure of Reports; Collecting Data; Technical Proposals; Visual Aids; General Tips for Writing Reports.

I (12.1 to 12.5, 12.8, 12.9)

UNIT VIII

SELF DEVELOPMENT **06 hrs**

Know yourself; Tips for giving an Interview; Body language for Interviews; Group Discussion; Skills of participating in meeting; Attending Calls; Soft Skills & Leadership.

I (10.1 to 10.4, 10.6, Chap 13)

Text Book

I. The Functional Aspects of Communication Skills, Prajapati Prasad and Rajendra K. Sharma, S. K. Kataria & Sons, New Delhi, Reprint 2007**.**

Reference Books

1. Business Communication, Sinha K. K, S. Chand, New Delhi.
2. Business Communication, Asha Kaul, Prentice Hall of India.
3. Business Correspondence and Report Writing: A Practical Approach to Business and Technical Communication, Sharma, R.C. and Krishna Mohan, Tata McGraw-Hill.
4. A New Approach to English Grammar for High Schools, Madan Sabina, Spectrum Books, New Delhi.

NOTE: Examination procedure.

Theory - consists of written examination for 70 marks.

Oral Test - consists of an Oral Test to test the Communication Skills which includes an oral presentation on any subject, of the choice of students (e.g. About IETE, General knowledge topics etc). This presentation need not be on technical subject. This test carries 30 marks.