MCA PROGRAMME
(Master of Computer Application)

COURSE STRUCTURE

1st Year 1st Semester:

A. THEORY							
SERIAL NO	**CODE**	**THEORY**	**CONTACTS (PERIODS/WEEK)**				**CREDITS**
			L	**T**	**P**	**TOTAL**	
1	MCAP1101	Digital Logic Design	3	1	-	4	4
2	MCAP1102	Introduction to Programming	3	1	-	4	4
3	MCAP1103	Numerical and Statistical Techniques	3	1	-	4	4
4	MCAP1104	Discrete Mathematics	3	1	-	4	4
5	MCAP1105	Management Information System	3	1	-	4	4
6	HMTS1102	Business English	3	-	-	3	3
Total of Theory						**23**	**23**
B. PRACTICAL							
6	MCAP1111	Digital Logic Lab	-	-	4	4	3
7	MCAP1112	Programming Lab	-	-	4	4	3
8	HMTS1112	Language Practice Lab	-	-	4	4	3
Total of Practical						**12**	**9**
Total of Semester						**35**	**32**

1st Year 2ndSemester:

A. THEORY							
SERIAL NO	**CODE**	**THEORY**	**CONTACTS (PERIODS/WEEK)**				**CREDITS**
			L	**T**	**P**	**TOTAL**	
1	MCAP1201	Object Oriented Programming with Java	3	1	-	4	4
2	MCAP1202	Data Structures	3	1	-	4	4
3	MCAP1203	Database Management Systems I	3	1	-	4	4
4	MCAP1204	Optimization Techniques	3	1	-	4	4
5	MCAP1205	Computer Organization and Architecture	3	1	-	4	4
5	HMTS1201	Principles of Management and Accounting	3	-	-	3	3
Total of Theory						**23**	**23**
B. PRACTICAL							
6	MCAP1211	Object Oriented Programming Lab	-	-	4	4	3
7	MCAP1212	Data Structure Lab	-	-	4	4	3
8	MCAP1213	DBMSI Lab	-	-	4	4	3
Total of Practical						**12**	**9**
Total of Semester						**35**	**32**

2nd Year 1st Semester:

A. THEORY							
SERIAL NO	**CODE**	**THEORY**	**CONTACTS (PERIODS/WEEK)**				**CREDITS**
			L	**T**	**P**	**TOTAL**	
1	MCAP2101	Design and Analysis of Algorithm	3	1	-	4	4
2	MCAP2102	Data Communication &ComputerNetworks	3	1	-	4	4
3	MCAP2103	Data Base Management System II	3	1	-	4	4
4	MCAP2104	Operating Systems	3	1	-	4	4
5	CHEM2101	Enviromentand Ecology	3	-	-	3	3
Total of Theory						**19**	**19**
B. PRACTICAL							
6	MCAP2111	Algorithm Lab	-	-	4	4	3
7	MCAP2112	UNIX and Network Programming Lab	-	-	4	4	3
8	MCAP2113	DBMS II Lab	-	-	4	4	3
Total of Practical						**12**	**9**
Total of Semester						**31**	**28**

2nd Year 2nd Semester:

A. THEORY							
SERIAL NO	**CODE**	**THEORY**	**CONTACTS (PERIODS/WEEK)**				**CREDITS**
			L	**T**	**P**	**TOTAL**	
1	MCAP2201	Software Engineering	3	1	-	4	4
2	MCAP2202	Web Technology	3	1		4	4
3	MCAP2203	Computer Graphics	3	1	-	4	4
4	MCAP2204	Intelligent Systems	3	1	-	4	4
5	HMTS2201	Human Values and Professional Ethics	2	-	-	2	3
Total of Theory						**18**	**19**
B. PRACTICAL							
6	MCAP2211	Software Engineering Lab	-	-	4	4	3
7	MCAP2212	Web Technology Lab	-	-	4	4	3
8	MCAP2213	Graphics Lab	-	-	4	4	3
Total of Practical						**12**	**9**
Total of Semester						**30**	**28**

3rd Year 1st Semester:

A. THEORY							
SERIAL NO	**CODE**	**THEORY**	**CONTACTS (PERIODS/WEEK)**				**CREDITS**
			L	**T**	**P**	**TOTAL**	
1	MCAP3150 to 3152	Elective I	3	1	-	4	4
2	MCAP3160 to 3162	Elective II	3	1	-	4	4
3	MCAP3170 to 3172	Elective III	3	1	-	4	4
4	MCAP3180 to 3183	Elective IV	3	1	-	4	4
5	HMTS3121	Personality Development and Group Discussion	3	1	-	4	3
Total of Theory						**20**	**19**
B. PRACTICAL							
6	MCAP3155 to 3157	Elective I Lab	-	-	4	4	3
7	MCAP3195	Minor Project and Seminar	-	-	12	12	6
Total of Practical						**16**	**9**
Total of Semester						**36**	**28**

Electives for Semester 5

ELECTIVE NO	COURSE CODE	TOPIC
Elective I	MCAP3150	System Administration using Linux
	MCAP3151	Advanced Java
	MCAP3152	Image Processing
Elective II	MCAP3160	Cryptography and Network Security
	MCAP3161	Theory of Computing
	MCAP3162	Big Data Analysis
Elective III	MCAP3170	Mobile Computing
	MCAP3171	Soft Computing
	MCAP3172	Data Mining and Data Warehousing
Elective IV	MCAP3180	Next Generation Networking
	MCAP3181	Parallel and Distributed Computing
	MCAP3182	Compiler Design
	MCAP3183	Ecommerce and ERP
Elective I Lab	MCAP3155	System Administration Lab
	MCAP3156	Advanced Java Lab
	MCAP3157	Image Processing Lab

3rd Year 2nd Semester:

PRACTICAL							
1	MCAP3295	Major Project and Seminar	-	-	-	-	20
2	MCAP3296	Grand Viva	-	-	-	-	8
Total of Practical						**0**	**28**
Total of Semester						**0**	**28**

Summary

Semester No.	Contact hr/wk	Credit
1	35	32
2	35	32
3	31	28
4	30	28
5	36	28
6	0	28
	Total	176

MCA PROGRAMME

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COURSE CONTENT

1st year 1st Semester

Subject Name: DIGITAL LOGIC DESIGN					
Paper Code: MCAP 1101					
Contact hrs per week:	L	T	P	Total	Credit Point
	3	1	0	4	4

Module I – [10L]

Number System

Data and number systems; Binary, Octal and Hexadecimal representation and their conversions; BCD, ASCII, EBDIC, Gray codes and their conversions; Fixed point representation of fractional number. Signed binary number representation with 1's and 2's complement methods, Binary arithmetic.

Module II – [10L]

Logic gates- truth tables and circuits; Representation in SOP and POS forms; Minimization of logic expressions by algebraic method, Kmap method, Quine Mc Clusky's Method.

Module III – [10L]

Combinational Circuits and Memory

Combinational circuits- Adder and Subtractor circuits; Applications and circuits of Encoder, Decoder, Multiplexer, De-Multiplexer and Parity Generator. Overview of Memory Systems. Design of combinational circuits-using ROM. Overview of Programming logic devices and gate arrays (PLAs and PLDs).

Module IV – [10L]

Sequential Circuits

Sequential Circuits - Basic memory element - S-R, J-K, D and T flip flops; Registers and counters and their design, Irregular counter, State table and state transition diagram; Sequential circuits design methodology.

Text Book:

1. Digital Logic And Computer Design - M. Morris Mano, Pearson.
2. Digital Logic Design, Mansaf Alam - Bashir Alam, PHI.

Reference Books:

1. Digital Design: Basic Concepts and Principles - Mohammad A. Karim, CRC Press.
2. Digital Logic Design Principle - Bradley Carlson, Norman Balabanian, Wiley India.

Subject Name: DIGITAL LOGIC LAB					
Paper Code: MCAP1111					
Contact hrs per week:	**L**	**T**	**P**	**Total**	**Credit Point**
	0	**0**	**4**	**4**	**3**

Problems related to

- Basic skills lab in using Personal Computer and common software tools
- Realization of Logic Gates
- Realization of Flip- Flop using logic gates
- Realization of Multiplexer
- Realization of Coder & Decoder
- Realization of Adder and Subtractor using logic gates

Subject Name: INTRODUCTION TO PROGRAMMING					
Paper Code: MCAP1102					
Contact hrs per week:	L	T	P	Total	Credit Point
	3	1	0	4	4

Module I -[10L]

Introduction
History of Computing, Evolution of Programming Languages, Compilers, Familiarization with UNIX.

Problem Solving Method
Algorithm, Flowchart, Problem-Solving Methodology- Tools, Pseudocode.

Overview of C language
C Standards, Structure of a C Program, C Libraries, Steps of Compilation of a C Program.

Expressions
Basic Data Types, Variables, Type Qualifiers, Storage Class Specifiers, Variable Scopes, Constants, Operators, Operator Precedence, Expression Evaluation, Type Conversion in Expressions, Type Casting.

Console I/O
Reading and Writing Characters, Reading and Writing Strings, Formatted Console I/O.

Module II - [10L]

Control Statements
Selection Statements (if, switch-case), Iteration Statements (for loop, while loop, dowhileloop), Jumping Statements (return, goto, break, exit, continue).

Function:
Functions and Modular Programming, General Form, Function Prototypes, Library Functions, Parameter Passing Mechanisms, Storage Classes, Recursive function.

Module III - [10L]

Arrays and Strings
Single Dimension Arrays, Two Dimension Arrays, Multidimensional Arrays, Strings, Arrays of Strings, String Library Functions.

Pointer
Pointers and Memory Addressing. Pointer Variables, Pointer Arithmetic, Pointer Expressions, Pointers and Arrays, Functions and Pointers, Dynamic Memory Allocation, Command Line Arguments.

Module IV - [10L]

Structures, Unions, Enumerations
Structures, Arrays of Structures, Structure and Pointers, Unions, Bit Fields, Enumerations, Typedef Keyword**.**

File I/O
Concept of Files, File operations, Text Files and Binary Files.

The Preprocessor
Preprocessor Directives, Macros, File Inclusion.

Text Books:
1. Programming with C - Gottfried, TMH.
2. Programming in C - Balagurusamy, Tata McGraw Hill.

Reference Books:
1. C Programming Made Easy - Raja Ram, SCITECH.
2. The C Programming Language - Kerninghan Ritchie, PHI.

Subject Name: PROGRAMMING LAB					
Paper Code: MCAP1112					
Contact hrs per week:	**L**	**T**	**P**	**Total**	**Credit Point**
	0	**0**	**4**	**4**	**3**

Programs related to

- Control Structures
- Array (1-d, 2-d)
- Functions
- Dynamic Memory Allocation
- String Handling
- Structures, Union
- File Handling

Subject Name: NUMERICAL AND STATISTICAL TECHNIQUES					
Paper Code: MCAP1103					
Contact hrs per week:	L	T	P	Total	Credit points
	3	1	0	4	4

Module I – [10L]

Probability
Random Experiment, Sample Space, Random Events, Probability of Events, Probability of Non-disjoint Events (Theorems), Counting Techniques Applied to Probability Problems, Conditional Probability, Independent Events, Bayes' Theorem and Related Problems.

Random Variable and Probability Distribution
Probability Mass Function, Probability Density Function and Distribution Function, Distributions: Binomial, Poisson and Normal Expectation and Variance, Moment Generating Function, Reproductive Property of Binomial, Poisson and Normal Distribution (proof not required), Chebychev's Inequality (statement) and Problems.

Module II – [10L]

Sampling and Estimation
Population, Sample; Statistic, Estimation of Parameters (consistent and unbiased), Sampling Distribution of Sample Mean and Sample Variance (proof not required), Point Estimation.
Overview of Testing of Hypothesis, Type I and Type II errors.

Module III – [10L]

Numerical Analysis and Errors
Introduction, Sources of Errors, Significant Figures: Absolute, Relative and Percentage Errors.

Interpolation
Introduction, Lagrange's Interpolation Formula, Divided Differences and Properties, Newton's Forward & Backward Interpolation Formula. Newton's Divided Difference Formula, Error in Difference Table, Problems and Solutions.

Numerical Differentiation and Integration
Differentiation based on Newton's Forward and Backward Interpolation Formula. Trapezoidal Rule and Simpson's $1/3^{rd}$ Rule, Errors in Numerical Integration Formulae, Problems and Solutions.

Module IV – [10L]

Solution of System of Linear Equations
Introduction, Gauss Elimination Method and Gauss-Seidel Method, Problems and Solutions.

Solution of Algebraic and Transcendental Equation
Introduction, Bisection Method, Regula-Falsi Method, Newton-Raphson Method, Problems and Solutions.

Solution of Ordinary Differential Equations

Introduction, Euler's Method, Runge - Kutta Method (2nd and 4th order), Modified Euler's Method, Problems and Solutions.

Text Books:

1. Statistical Methods (Volume 1 and 2) – N. G. Das, TMH.
2. Introductory Numerical Analysis – Dutta and Jana, Shreedhar Prakashani.

Reference Books:

1. Mathematical Statistics – S.C. Gupta and V. K. Kapoor, S. Chand.
2. Engineering Mathematics: Volume IIIA – B. K. Pal & K. Das, U. N. Dhur & Sons Pvt. Ltd.
3. Numerical Analysis - S. Ali Mollah.
4. Numerical Analysis - James B. Scarborough.

Subject Name: DISCRETE MATHEMATICS					
Paper Code: MCAP1104					
Contact hrs per week:	L	T	P	Total	Credit Points
	3	1	0	4	4

Module–I –[10L]

Abstract Algebra
Overview of Discrete Mathematics, Set, Relations, Mappings, Poset, lattice, Hasse diagram, Vector Space.

Boolean algebra
Definition of Boolean algebra, Boolean function Simplification.

Mathematical Logic
Propositions, Connectives, Conditionals and Biconditionals, Well Formed Formulas (WFF), Tautologies, Equivalence formulas, duality law, Normal Forms, Predicate Calculus, free and bound variables.

Module-II-[10L]

Permutation and Combination
Concepts of Permutations and Combinations, Pigeon-hole principle, Euclidean algorithm for Linear Diophantine Equation, Basic Counting Concepts, problems, solutions.

Generating- function and Recurrence- relation
Generating Function, Recurrence relations, Linear recurrence relations with constant Coefficients, Solution by Generating Function.

Module –III-[10L]

Graph Theory
Basic Concepts of Graphs, Trees, Forest, Adjacency and Incidence Matrices, Minimum Spanning Tree (Prim's and Kruskals Algm), Shortest Path (Dijkstra's Algm), Planar Graph. Various applications of Graph Theory in Computer Science.

Module IV-[10L]

Mathematical Computing
Finite Automata, Finite Automata-Construction, DFA, NFA, State minimization, Mealy M/C, Moore M/C, problem and solution.

Definition Of Grammars – Unrestricted grammar, Context-sensitive grammar, Context-free grammar, Regular grammar.

Text Books:

1. Discrete Mathematics and Its Applications, K.H. Rosen, TMH.
2. Elements of Discrete Mathematics, C.L. Liu, McGraw-Hill.
3. Discrete Mathematical Structures. Kolman, Busby and Ross, PHI.

Reference Books:

1. Discrete Mathematics Theory, Problems and Solutions - Dipendra Nath Ghosh, Academic Publishers.
2. Graph Theory with Applications to Engineering and Computer Science - N. Deo, PHI.
3. Theory of Computer Science by K.L.P Mishra and N. Chandrasekaran, PHI.

Subject Name: MANAGEMENT INFORMATION SYSTEM					
Paper Code: MCAP1105					
Contact hrs per week:	L	T	P	Total	Credit Points
	3	1	0	4	4

Module I – [10L]

Introduction to systems and Basic systems concepts, Types of systems, The systems Approach, Information systems-Definition and characteristics, types of Information, role of Information in Decision Making.

Introduction to Information Analysis and Design Tools-Decision Tree, Decision Table, Structured Analysis, Dataflow Analysis, Data dictionary, Structured Flow Chart, HIPO, Warnier/ ORR diagram

Module II – [10L]

An overview of Management Information System: Definition and Characteristics, Components of MIS, Hierarchy of Management Activity. Information requirements and Levels of Management, Model of decision making, structured Vs un-structured decisions, Formal vs Information systems

Module III – [10L]

Storage and retrieval of data -transaction processing, office automation and information processing, Virtual office system, control functions, Decision making process, phases in the decision making process, Intelligence and design phases, concepts of decision making, Behavioral models of the decision maker/decision making

Module IV- [10L]

Planning & implementation of Information Systems, Executive information Systems, Decision Support Systems, Expert Systems, Knowledge Based System. Introduction to Computer crime, Security & ethical challenges.

Text Books:

1. Management Information System - W.S.Jawadekar, TMH.
2. Management Information Systems - Loudon and Loudon, Pearsons Educations.
3. Analysis & Design of Information System - James A. Senn.

Reference Books:

1. Management Information Systems – Conceptual foundations, Structure and Development - Gordon B. Davis, Margrethe H. Olson.
2. Management Information System – Oz, Thomson Learning.
3. Management Information System - James O‘Brien, TMH.
4. Information Systems the foundation of E-Business - Steven Alter, Person education.

Subject Name: BUSINESS ENGLISH					
Paper Code: HMTS1102					
Contact hrs per week:	L	T	P	Total	Credit Point
	3	0	0	3	3

Module I – [10L]

Communication Skill
Definition, nature & attributes of Communication
Process of Communication
Models or Theories of Communication
Types of Communication
Levels or Channels of Communication
Barriers to Communication

Module II – [10L]

Business Communication- Scope & Importance
Writing Formal Business Letters
Writing Reports
Organizational Communication: Agenda & minutes of a meeting, notice, memo, circular
Project Proposal
Technical Report Writing
Organizing e-mail messages
E-mail etiquette
Tips for e-mail effectiveness

Module III – [10L]

Language through Literature
Modes of literary & non-literary expression
Introduction to Fiction, (An Astrologer's Day by R.K. Narayan and Monkey's Paw by W.W. Jacobs), Drama (The Two Executioners by Fernando Arrabal) or (Lithuania by Rupert Brooke) & Poetry (Night of the Scorpion by Nissim Ezekiel and Palanquin Bearers by Sarojini Naidu)

Module IV – [10L]

Grammar in usage (nouns, verbs, adjectives, adverbs, tense, prepositions, voice change) -to be dealt with the help of the given texts.

Text Books:

1. Theories of Communication: A Short Introduction - Armand Matterlart and Michele Matterlart, Sage Publications Ltd.
2. Professional Writing Skills, Chan, Janis Fisher and Diane Lutovich. San Anselmo, CA: Advanced Communication Designs.
3. Business English - Hauppauge, Geffner, Andrew P., New York: Barron's Educational Series.

Reference Books:

1. Writing and Speaking at Work: A Practical Guide for Business Communication - Edward P.Bailey, Prentice-Hall.
2. Business and Administrative Communication - Kitty O. Locker, McGraw-Hill/ Irwin.
3. Intercultural Business Communication - Lillian Chaney and Jeanette Martin, Prentice Hall.

Subject Name: LANGUAGE PRACTICE LAB					
Paper Code: HMTS1112					
Contact hrs per week:	L	T	P	Total	Credit Point
	0	0	4	4	3

Module I

Introduction to Linguistics
Phonetics-Vowel and Consonant Sounds (Identification &articulation)
Word- stress, Intonation (Falling and rising tone), Voice Modulation, Accent training
Conversational Skills

Module II

Writing Skill
Writing Dialogue- (formal and informal)
Descriptive, narrative and expository writing
Writing with a purpose---Convincing skill, argumentative skill/negotiating Skill (These skills will be repeated in oral skills).
Writing reports/essays/articles—logical organization of thoughts
Job Application Letter
CV& Resume
Book review

Module III

Major Areas of Formal, Verbal Communication
Interpersonal Speaking & Public Speaking
Group Discussion
Oral Presentation, both technical and general
Interview Techniques

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COURSE CONTENT

1st year 2nd Semester

Subject Name: OBJECT ORIENTED PROGRAMMING WITH JAVA					
Paper Code: MCAP1201					
Contact hrs per week:	L	T	P	Total	Credit Point
	3	1	0	4	4

Module I - [10L]

Introduction to Object Oriented Programming

Genesis of Object Oriented Programming. Problems with Procedural Programming, Object Oriented Concepts – Objects & Classes, Abstraction, Encapsulation, Message Passing, Access Specifier, Relationships, Aggregation, Links & Associations, Generalization & Specialization, Inheritance, Abstract Classes, Meta-Class, Grouping Constructs. Comparison of Procedural & OOP.

Introduction to Java

Introduction and Overview, Virtual machines - concept and hierarchy of virtual machines.Basic Language Constructs,Arrays.String Class, String Methods, String Arrays, Command Line Arguments, StringBuffer Class, StringBuffer Methods.

Module II - [10L]

Classes and Objects

Defining a Class, Creating Objects, Assigning Object Reference Variables, Introducing Methods, Array of Objects, Constructors, Method Overloading, Passing and Returning Objects, “this” Keyword, Static Members, Introducing Access Control, Inner and Nested Classes.

Module III - [10L]

Inheritance

Inheritance and Code Reusability, Types of Inheritance, Dealing with “super”, Multilevel Inheritance, Method Overriding, “final” Keyword, Object Class, Abstract Classes.

Interface

Defining Interfaces, Implementing Interfaces, Extending Interfaces, Interfaces and Multiple Inheritance.

Package

Using Packages, Java API, User Defined Packages, Classpath, Access Control.

Module IV - [10L]

Exception Handling

Exception and Exception Handling, Exception Types, Built-in Exceptions, “throw”, “throws”, “finally”, Creating User Defined Exceptions, Chained and Unchained Exceptions.

Multithreading

Multitasking & Multithreading, Java and Multithreading, Creating Threads, Life Cycle of a Thread, Thread Methods, Thread Priorities, Synchronization and Deadlock.

Excerpts from java.util and java.lang
Garbage Collection, String Tokenizer, Collections API.

Text Books :

1. JAVA: The Complete Reference – Herbert Schildt, TMH.
2. Core Java I and II – Horstmann and Cornell, Oracle Corporation.

Reference Books:

1. Object Oriented Modeling & Design, James R. RumBaugh, PHI.
2. The Java Programming Language – James Gosling, Addison Wesley.
3. Java – How to Program – Deitel and Deitel, PHI.
4. A Programmer's Guide to Java SCJP Certification - Khalid A. Mughal and Rolf W. Rasmussen, Addison Wesley.

Subject Name: OBJECT ORIENTED PROGRAMMING LAB					
Paper Code: MCAP1211					
Contact hrs per week:	L	T	P	Total	Credit Point
	0	0	4	4	3

Programs related to

- Language Features
- Arrays in Java and String Handling
- Classes and Objects
- Inheritance
- Interface and Package
- Exception Handling
- Multithreading
- java.util and java.lang
- Applet

Subject: DATA STRUCTURES					
Paper Code: MCAP1202					
Contact hrs. per week	L	T	P	Total	Credit Point
	3	1	0	4	4

Module - I [8L]

Introduction
Concepts: Datatype and data structure, Abstract Data Type. Classification.
Algorithms concepts. Analysis: space and time analysis of algorithms – Big O, Θ, Ω notations.

Array
Different representations – row major, column major. Sparse matrix – itsimplementation and applications. Array representation of polynomials.

Linked List
Singly linked list, circular linked list, doubly linked list, linked list representation ofpolynomial and applications.

Module - II [8L]

Stack and Queue
Stack - implementation using array and linked list. Applications.
Queue, circular queue, deque - implementation using array and linked list. Applications.

Recursion
Principles of recursion – use of stack, differences between recursion anditeration, tail recursion.
Applications - The Tower of Hanoi.

Module - III [12L]

Graphs
Graph representations / storage – using adjacency matrix, adjacency list.

Trees
Basic Terminologies, tree representation – using array and linked list. Binary trees: traversal (pre-, in-, post-, level- order). Threaded binary trees. Huffman trees. Heaps – implementation of priority queue. Binary Search trees, AVL tree (insertion, deletion with examples only), B-tree (insertion, deletion with examples only), Trie (insertion, deletion with examples only).

Module - IV [12L]

Searching
Sequential, Binary. Complexity analysis and comparison.

Sorting
Introduction – idea about internal and external sorting, in-place sorting, stability, adaptivity. Sorting algorithms - Bubble, Insertion, Selection, Shell, Quick, Merge, Heap, Radix. Complexity analysis (Average case analysis not required), and comparison.

Hashing
Hash Functions. Collision resolution – open and closed hashing.

Text Books:

1. Classic Data Structures, Debasis Samanta, PHI Learning.
2. Data Structures and Program Design in C, Robert L Kruse, Bruce P. Leung, Pearson Education.
3. Data Structures using C, Aaron M Tenenbaum, Moshe J Augustein, Pearson Education.

Reference Books:

1. Data Structures, Seymour Lipshutz, McGraw Hill.
2. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Universities Press.

Subject: DATA STRUCTURES LAB					
Paper Code: MCAP1212					
Contact hrs. per week	L	T	P	Total	Credit Point
	0	0	4	4	3

Programs related to

- 1-D and 2-D array
- Linked List (Singly linked list, Circular Linked List,Doubly Linked List)
- Stack and Queue implementation using array and linked list
- Implementation of different recursive algorithms
- Implementation of Binary Search Tree (insertion, deletion, searching, traversals)
- Different searching and sorting algorithms

Subject Name : DATABASE MANAGEMENT SYSTEMS I					
Paper Code: MCAP1203					
Contact hrs per week:	L	T	P	Total	Credit Point
	3	1	0	4	4

Module I – [10L]

Introduction to DBMS

Basic Concepts ofOperational Data, Data vs Information, Introduction to Database and DBMS, Importance of Database Design, Files and File Systems, Problems with File System Data Management, Database Systems, Views of Data, Three-LevelArchitecture, Instances and Schemas,Database Administrator, Database Users, Advantages and Disadvantages of DBMS.

Data Model

Data Modeling and Data Models, Importance of Data Models, Data Model Basic Building Blocks, The Evolution of Data Models, Degree of Data Abstraction.

Entity-Relationship Modeling

Entity and Entity Instances, Attributes,Entity Relationships, Cardinality of Relationships, Strong and Weak Entity, Generalization, Specialization, Aggregation, Developing an ER Diagram, Entity Integrity andPrimary Key, Translating ER Model into Relational Model

Module II – [10L]

Relational Model

A Logical View of Data, Keys, Integrity Rules, Relational Set Operators, Data Dictionary and the System Catalog, Relationships within the Relational Database, Data Redundancy Revisited, Indexes, Codd's Relational Database Rules.

Relational Database Design

Functional Dependency (FD) –Definition, Trivial and Non-Trivial FD,Closure of Set of FD, Closure Of Attribute Sets, Irreducible Set of FD, Canonical Cover, Normalization – 1NF, 2NF, 3NF,BCNF, Decomposition using FD, Lossless Decomposition, Dependency Preservation.

Module III – [10L]

Relational Algebra

Select Operation, Project Operation, Join Operation, Division Operation, CrossProduct Operation, Set operations.

Relational Calculus

Introduction, Tuple Relational Calculus, Operators used in TRC, Example queriesusing TRC, Domain Relational Calculus, Operators used in DRC, Example queries using DRC, Comparison of TRC, DRC, RA

Structured Query Language (SQL)
Introduction to SQL, DDL, DML, DCL, Basic Structure, Basic Queries,Set operations, Aggregate Functions, Null Values, Domain Constraints, Referential Integrity Constraints, Assertions, Views, Joining Database Tables, Commit, Rollback.

Module IV – [10L]

Advanced SQL
Subqueries and Correlated Queries, SQL Built in Functions - Numeric, Date, String Functions, Updatable Views.

Storage structure
Sequential and indexed file organization, B+ tree - creation, insertion &deletion,

Indexing
Primary, Secondary& Multi Level.

Text Books:
1. Database System Concepts, Korth, Silberschatz, S. Sudarshan, TMH.
2. Fundamentals of Database Systmes, Elmsari and Navathe, Addison-Wesley.

Reference Books:
1. An Introduction to Database Systems, Date C. J., Addison-Wesley.
2. SQL-PL/SQL - Ivan Bayross, BPB.

Subject Name : DATABASE MANAGEMENT SYSTEMS I LAB					
Paper Code: MCAP 1213					
Contact hrs per week:	**L**	**T**	**P**	**Total**	**Credit Point**
	0	**0**	**4**	**4**	**3**

Problems related to

1. Database Creation
   - Creating a Database
   - Creating a Table
   - Specifying Relational Data Types
   - Specifying Constraints
   - Creating Indexes

2. Table and Record Handling
   - INSERT statement
   - Using SELECT and INSERT together
   - DELETE, UPDATE, TRUNCATE statements
   - DROP, ALTER statements

3. Retrieving Data from a Database
   - The SELECT statement
   - Using the WHERE clause
   - Using Logical Operators in the WHERE clause
   - Using IN, BETWEEN, LIKE , ORDER BY, GROUP BY and HAVING

4. Clause
   - Using Aggregate Functions
   - Combining Tables Using JOINS
   - Subqueries

5. Database Management
   - Creating Views
   - Creating Column Aliases
   - Creating Database Users
   - Using GRANT and REVOKE

Subject Name: OPTIMIZATION TECHNIQUES					
Paper Code: MCAP1204					
Contact hrs per week:	L	T	P	Total	Credit Point
	3	1	0	4	4

Module I - [10L]

Introduction
The nature of Optimization Techniques, History, Meaning, Models, Principles Problem solving with mathematical models, optimization process.

Linear Programming
Basic LPP and applications, various components of LP problem formulation, Graphical Method, Simplex Method, Big-M method, Duality in linear programming.

Integer programming
Concepts, Formulation, Solution and Applications (Branch & Bound method).

Module II - [10L]

Transportation Problem
Formulation, Initial solution - North-West corner method, Least cost method, Vogel's approximation method (VAM). Optimal solution –Economic interpretation of u_i's and v_j's, MODI method, Properties of closed-loop. Unbalanced transportation problems, Degeneracy and its resolution, Alternate optimal solution, Prohibited transportation route. Maximization transportation problems.

Assignment Problem
Formulation, Optimal solution - Hungarian method. Multiple optimal solution, Maximization problem, Unbalanced assignment problem, Restriction on assignment problem. Travelling salesman problem.

Module III - [10L]

Game theory
Introduction, Decision making under risk, Decision making under uncertainty. Two person Zero Sum game (Pure Strategy and Mixed Strategy), Properties of a game, Maximin and Minimax principles, Method of solving game - Saddle point, Principle of dominance, Algebraic method, Graphical method, Linear Programming method.

Network Optimizations
PERT/ CPM – Introduction, Significance of use, Network components and precedence relationship (AOA and AON diagram), Critical path analysis- Forward pass, Backward pass, Float(slack) of Activity and Event.

Module IV- [10L]

Queuing Theory

Introduction, Basic definitions and notations, Structure of a Queuing system, Axiomatic derivation of the arrival & departure distributions for Poisson Queue, M/M/1 Queuing Model.

Sequencing Model

Introduction, Notation, Terminology and Assumption. Processing of n jobs through two machines, Processing of n jobs through three machines, Processing of n jobs through m machines, Processing of two jobs through m machines.

Text Books:

1. Operations Research: Theory and Applications, J K Sharma, MacMillan
2. Operation Research, KantiSwarup, Gupta Pk, Man Mohan, Sultan Chand & Sons

Reference Books:

1. Operations Research: An Introduction, H. Taha, Prentice'Hall
2. Operations Research, Hillier & Lieberman, TMH

Subject Name: COMPUTER ORGANIZATION AND ARCHITECTURE					
Paper Code: MCAP1205					
Contact hrs per week:	L	T	P	Total	Credit Point
	3	1	0	4	4

Module I - [12L]

Introduction to basic structures and operational concepts, Instruction formats, Instruction execution, sequencing, Addressing modes Control unit – Concepts, Fetching and storing word from/in main memory, Register transfers, Operations, execution of a complete instruction, Hardwired control, Microprogrammed control.

Module II - [8L]

Fixed point Arithmetic - Arithmetic and logical operations of signed numbers and their implementation,
Hardware Multiplier, Booths' multiplier, Booth pair multiplier, Binary Division restoring and non-restoring. IEEE-754 representation of floating point numbers, overflow and underflow.

Module III - [10L]

Memory – Basic concepts, RAM, ROM – different types, Characteristics, Memory design (Linear addressing, interleaved memory) Cache memories, Performance (memory interleaving, hit rate etc.), Memory hierarchy - virtual memory – address translation, Secondary memories Data transfer through programmed I/O, interrupt and DMA, I/O processors.

Module IV - [10L]

Input/output organization: memory mapped, standard (isolated) and linear selection techniques of I/O addressing.

Pipelining - arithmetic & instruction, speedup, vector processing, array processor, Introduction to RISC processor and parallel processing, Bit-Slice processors.

Text Books:

1. Computer Organization – C. Hamacher, Z. Vranesik, S. Zaky, McGraw Hill.
2. Computer Architecture and Organization – John P. Hayes, McGraw Hill.

Reference Books:

1. Computer System Architecture - Morris Mano, PHI.
2. Computer Organization and Architecture - Williams Stallings.

Subject Name: PRINCIPLES OF MANAGEMENT AND ACCOUNTING					
Paper Code: HMTS1201					
Contact hrs per week:	L	T	P	Total	Credit Point
	3	0	0	3	3

Module I - [4L]

Introduction to Business Management

Basic concepts, Management Functions, Planning and decision making, scheduling, organizing, staffing, directing, controlling. Manager as Leader. Human Resource Planning, Human resource development and Organizational Development, Organizational Communication.

Module II - [4L]

Management for Organization

Management control systems: goals, strategies, Managerial economics and financial management, productivity management**.** Strategic planning. Strategy: firm and its environment, strategies and resources, industry structure and analysis, corporate strategies and its evaluation, strategies for growth and diversification.

Module III - [17L]

Accounting Principles & Financial Accounting

Meaning and Scope of accounting, Accounting Concepts, Principles and Conventions, Accounting Standards – concepts, objectives, benefits, Accounting Policies, basic accounting equation, Accounting as a measurement discipline – valuation principles, accounting estimates. Financial accounting, rules of debit and credit, financial statements and analysis, seven basic steps of the accounting cycle for a sole proprietorship and a merchandising business using subsidiary ledgers and special journals. Books of Accounts leading to the preparation of Trial Balance, Journalize entries for uncollectible receivables including the direct write-off method and the allowance method.

Module IV - [15L]

Overview of Management and Cost Accounting

Conceptual framework of Management Accounting, Meaning, Scope, Objectives and limitation. Cost–Volume profit analysis: Concept of break-even point, Profit volume relation, Margin of safety, Angle of incidence, Break-even point chart, Break even analysis. Introduction to cost accounting**,** meaning, objectives and advantages of cost accounting.

Text Books:

1. Management: A Systems Approach - Koontz and O'Donnel, TMH.
2. Management: A Global Perspectiv - Weihrich and Koontz, TMH.
3. Financial Accounting - PC Tulsian, Pearson Education.
4. Management Accounting - I.M. Pande, VIKAS.

Reference Books:

1. Management Techniques: A Practical Guide - John Argenti.
2. Management Accounting - Khan & Jain, TMH.