

**ANNA UNIVERSITY: COIMBATORE**  
**CURRICULUM 2007 – FULL TIME**  
**M.C.A (MASTER OF COMPUTER APPLICATIONS)**

**SEMESTER - I**

| Subject Code      | Subject Name                                   | Hours / Week |   |   |     |
|-------------------|--|--------------|---|---|-----|
|                   |  | L            | T | P | M   |
| <b>THEORY</b>     |  |              |   |   |     |
| MCA 101           | Digital Fundamentals and Computer Organization | 3            | 1 | 0 | 100 |
| MCA 102           | Problem Solving Techniques                     | 3            | 0 | 0 | 100 |
| MCA 103           | Business Processes                             | 3            | 0 | 0 | 100 |
| MCA 104           | Data Structures                                | 3            | 1 | 0 | 100 |
| MCA 105           | Programming in 'C'                             | 3            | 0 | 0 | 100 |
| <b>PRACTICALS</b> |  |              |   |   |     |
| MCA 106           | Office Automation Lab                          | 0            | 0 | 3 | 100 |
| MCA 107           | Data Structures Lab                            | 0            | 0 | 3 | 100 |
| MCA 108           | Programming in 'C' Lab                         | 0            | 0 | 3 | 100 |

**SEMESTER - II**

| Subject Code      | Subject Name                         | Hours / Week |   |   |     |
|-------------------|--------------------------------------|--------------|---|---|-----|
|                   |                                      | L            | T | P | M   |
| <b>THEORY</b>     |                                      |              |   |   |     |
| MCA 201           | Foundations of Computer Applications | 3            | 1 | 0 | 100 |
| MCA 202           | System Software                      | 3            | 0 | 0 | 100 |
| MCA 203           | Design and Analysis of Algorithms    | 3            | 0 | 0 | 100 |
| MCA 204           | Object Oriented Programming          | 3            | 1 | 0 | 100 |
| MCA 205           | Data Base Management Systems         | 3            | 0 | 0 | 100 |
| <b>PRACTICALS</b> |                                      |              |   |   |     |
| MCA 206           | Algorithms Lab                       | 0            | 0 | 3 | 100 |
| MCA 207           | Object Oriented Programming Lab      | 0            | 0 | 3 | 100 |
| MCA 208           | Data Base Management Systems Lab     | 0            | 0 | 3 | 100 |

## SEMESTER - I

### MCA 101 DIGITAL FUNDAMENTALS AND COMPUTER ORGANIZATION

|   |   |   |     |
|---|---|---|-----|
| L | T | P | M   |
| 3 | 1 | 0 | 100 |

#### **UNIT - I INTRODUCTION TO DIGITAL DESIGN** (12)

Data Representation – Data Types – Complements – Arithmetic Operations – Representations – Fixed Point, Floating Point , Error detection codes – Binary Codes- Logic Gates, Boolean Algebra, Map Simplification – Combinational Circuits: Half-Adder, Full Adder- Flip Flops - Sequential Circuits

#### **UNIT - II DIGITAL COMPONENTS - REGISTER TRANSFER & MICRO OPERATIONS** (12)

ICs – Decoders – Multiplexers – Registers – Shift Registers – Binary Counters – Memory Unit – Register Transfer Language – Register Transfer – Bus And Memory Transfers – Arithmetic , Logic And Shift Micro Operations , Arithmetic Logic Shift Unit.

#### **UNIT - III COMPUTER ORGANIZATION AND PROGRAMMING** (12)

Instruction Codes – Computer Registers – Computer Instructions – Timing And Control – Instruction Cycle – Memory Reference Instructions – I/O And Interrupt – Machine Language – Assembly Language – Assembler - Program Loops – Programming Arithmetic And Logic Operations – Subroutines – I/O Programming.

#### **UNIT - IV INPUT – OUTPUT ORGANIZATION** (12)

Peripheral Devices – Input-Output Interface – Asynchronous Data Transfer – Modes Of Transfer – Priority Interrupt – DMA – IOP – Serial Communication.

#### **UNIT - V MEMORY ORGANIZATION AND CPU** (12)

Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory – Memory Management Hardware – CPU: General Register Organization – Control Word – Stack Organization – Instruction Format – Addressing Modes – Data Transfer And Manipulation – Program Control.

**Lecture 45 Tutorial 15 Total 60**

#### **Reference Books**

- 1 M..Morris Mano,"Computer System Architecture", Prentice Hall of India, 3<sup>rd</sup> edition,2003.
- 2 M.Morris Mano , "Digital Logic & Computer Design" PHI 2006.
- 3 Alan B.Marcovitz, "Introduction to Logic design", Tata McgrawHill ,Second edition,2005.

**UNIT - I    INTRODUCTION TO COMPUTER PROBLEM-SOLVING** (9)

Introduction – The Problem-solving Aspect - Top-down Design-implementation of Algorithms-Program Verification - The Efficiency of Algorithms. Fundamental Algorithms - Exchanging the values of Two Variables – Counting - Summation of a set of Numbers - Factorial Computation-Sine function computation - Generation of the Fibonacci sequence - Reversing the Digits of an Integer - Base Conversion-Character to Number Conversion.

**UNIT - II    FACTORING METHODS** (9)

Finding the square Root of a number - The Smallest Divisor of an Integer - The Greatest Common Divisor of Two Integers - Generating Prime Numbers - Computing the Prime Factors of an Integer - Generation of Pseudo - random Numbers - Raising a Number to a Large Power - Computing the *n*th Fibonacci Number.

**UNIT - III    ARRAY TECHNIQUES** (9)

Array Order Reversal-Array Counting or Histogramming - Finding the Maximum Number in a Set - Removal of Duplicates from an Ordered Array - Partitioning an Array - Finding the *k*th Smallest Element - Longest Monotone Subsequence.

**UNIT - IV    SORTING AND SEARCHING** (9)

The Two-way Merge - Sorting by Selection - Sorting by Exchange-Sorting by Insertion - Sorting by Diminishing Increment - Sorting by Partitioning - Binary Search - Hash Searching.

**UNIT - V    TEXT PROCESSING AND PATTERN SEARCHING** (9)

Text Line Length Adjustment - Left and Right Justification of Text - Keyword Searching in Text - Text Line editing - Linear Pattern Search - Sub linear Pattern Search.

**Total 45**

**Reference Books**

- 1 R.G.Dromey “ How to Solve it by Computer ”, Pearson Education,India,2007.
- 2 Seymour Lipschutz, “Essentials computer Mathematics”, Schaums’ outlines series, Tata McGrawHill Edition, 2004.

**UNIT - I INTRODUCTION (9)**

Organizational behaviour- Foundations of Individual behavior-Perception and Individual decision making-values, attitude and job satisfaction.

**UNIT - II GROUPS IN ORGANISATION (9)**

Foundations of group behaviour- Understanding work teams- Communication – Leadership.

**UNIT - III ORGANISATION SYSTEM (9)**

Foundations of organization structure – Technology – Work design and stress – Human resource policies and practices – Organisational Culture.

**UNIT - IV BUSINESS PROCESS RE-ENGINEERING AND IT (9)**

Basic concepts and the need for BPR-Principles of BPR and the role of IT- BPR and restructuring the organization.

**UNIT - V NETWORK ORGANIZATIONS (9)**

Networked organization- virtual corporations.

**Total 45****Reference Books**

- 1 Stephen P.Robbins “Organizational behavior”, PHI, 12<sup>th</sup> edition, 2006.
- 2 Turban,Mclean,wetherbe,“Information Technology for management” John Wiely and Sons, 2001.
- 3 Ravi Kalakota and Marcia Robinson, “E-Business; Roadmap for Success; Pearson Education, 2000.
- 4 Vikram Sethi & William R King, “ Organizational transformation through business process reengineering”, Pearson education, 2006.

**UNIT - I LISTS, STACKS AND QUEUES (12)**

Abstract data types- List ADT-Stack ADT-recursion-Queue ADT

**UNIT - II TREES (12)**

Trees – General, Binary trees– Search tree ADT- Binary Search Trees- AVL trees, Threaded trees- Splay Trees- B-Trees.

**UNIT - III SORTING AND SEARCHING (12)**

Sorting – Internal Sorting – Quick Sort, Heap Sort, Radix Sort – External Sorting – Merge Sort, Multi-way Merge Sort, Polyphase Sorting– Basic Search Techniques – Tree Searching – General Search Trees – Hashing.

**UNIT - IV GRAPHS AND THEIR APPLICATIONS (12)**

Graphs – Definitions – Topological sort- Shortest Path Algorithms – Network flow problems- Minimum Spanning Tree – Applications of Depth First search – Introduction to NP-completeness.

**UNIT - V STORAGE MANAGEMENT (12)**

Automatic list Management- Garbage Collection - Algorithms for Garbage collection-collection and compaction- Dynamic memory management- Buddy Systems.

**Lecture 45 Tutorial 15 Total 60**

**Reference Books**

- 1 Weiss “Data Structures and Algorithm Analysis in C ”, Addison Wesley , Second Edition, 2007
- 2 Aaron M.Tanaenbaum, Yedidyah Langsam, Moshe J. Augenstein “ Data Structures using C” , Printice hall of India, 2007
- 3 Seymour Lipschutz, “ Data Structures” Schaums’ outline series, Tata Mcgraw Hill, NewDelhi, 2007.

**UNIT - I INTRODUCTION TO C LANGUAGE (9)**

Overview of 'C'language – Constants, Variables and Data Types – Operators, Expressions and Assignment statements – Managing Input/Output Operations – Formatted I/O – Decision Making - Branching – IF, Nested IF – Switch – goto - Looping- While, do, for statements.

**UNIT - II ARRAYS AND FUNCTIONS (9)**

Arrays – dynamic and multi-dimensional arrays - Character arrays and Strings – String handling Functions - User defined Functions – Categories of Functions – Recursion.

**UNIT - III STRUCTURES AND UNIONS (9)**

Basics of Structures-Declaring a Structure – Array of Structures –Passing Structures elements to Functions- Passing entire Structure to Function – Structures within Structures - Union – Union of Structures – Enumerated Data Types – typedef Statement.

**UNIT - IV POINTERS (9)**

Pointers – Declaration, Accessing a variable, dynamic memory allocation, Pointers versus Arrays, Array of pointers, Pointers to functions and structure Pointers.

**UNIT - V FILE MANAGEMENT (9)**

File Management in C – Data hierarchy- Files and Streams – Sequential access file- Random access file - Preprocessors

**Total 45****Reference Books**

- 1 E.Balagurusamy “ Programming in ANSI C ” , Tata McGraw Hill, 2004
- 2 Yashavant P. Kanetkar “Understanding Pointers In C” , BPB Publications, NewDelhi, 2002
- 3 Byron C Gotfried, Programming with C, Schuams' outline series, 2<sup>nd</sup> edition, Tata McGraw Hill,2006.

## PRACTICALS

MCA 106 OFFICE AUTOMATION LAB

|   |   |   |     |
|---|---|---|-----|
| L | T | P | M   |
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### LIST OF EXPERIMENTS

#### WORD

- 1 Creating and Formatting a simple document (using bulleted and Numbered list, adding Headers, Footers and Page numbers)
- 2 Navigating Long document with the Document Map
- 3 Working with Tables ( create tables, editing tables, formatting tables, converting tables, sorting table contents, etc.,)
- 4 Mail Merge
- 5 Creating a Birthday Card

#### EXCEL

- 6 Formatting the worksheets( Formatting the cell, rows and columns)
- 7 Working with functions and formulae.
- 8 Presenting Data with Charts
- 9 Performing What-If analysis with data table.
- 10 Summarize the data using pivot table

#### POWER POINT

- 11 Presentation using Text with animation
- 12 Presentation using images, media file
- 13 Creating a graph in a PowerPoint slides
- 14 Creating self running presentations
- 15 Hiding and showing the slides

#### ACCESS

- 16 Creating a database ( create a table, setting field properties and setting the key)
- 17 Entering and editing data using forms
- 18 Retrieving data from more than one related table using queries (using Query Wizard)
- 19 Generating Report using Report Wizards.

#### TALLY

- 20 Creation of company, Accounts Configuration, Classification of Accounts using Tally.
- 21 Accounts Masters, Accounts Voucher – Voucher Entry, conversion, Interest Calculation, Printing of voucher using Tally.
- 22 Create a Contra Voucher, Payment and Receipt Voucher using Tally.
- 23 Create Sales and Purchase Voucher, Credit notes and Debit notes using Tally.
- 24 Create Trading Account, Profit / Loss Account, Balance Sheet using Tally.

**Total 45**

## PRACTICALS

|                |                                   |          |          |          |            |
|----------------|-----------------------------------|----------|----------|----------|------------|
| <b>MCA 107</b> | <b>DATA STRUCTURES LABORATORY</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>M</b>   |
|                |                                   | <b>0</b> | <b>0</b> | <b>3</b> | <b>100</b> |

### LIST OF EXPERIMENTS

- 1 Create a Stack and do the following operations using arrays and linked lists  
(i)Push (ii) Pop (iii) Peep
- 2 Create a Queue and do the following operations using arrays and linked lists  
(i)Add (ii) Remove
- 3 Implement the operations on singly linked list, doubly linked list and circular linked list.
- 4 Create a binary search tree and do the following traversals  
(i)In-order (ii) Pre order (iii) Post order
- 5 Implement the following operations on a binary search tree.  
(i) Insert a node (ii) Delete a node
- 6 Sort the given list of numbers using heap and quick sort.
- 7 Perform the following operations in a given graph  
(i) Depth first search (ii) Breadth first search
- 8 Find the shortest path in a given graph using Dijkstra algorithm

**Total 45**

## PRACTICALS

MCA 108 PROGRAMMING IN 'C' LAB

|   |   |   |     |
|---|---|---|-----|
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### LIST OF EXPERIMENTS

- 1 Display the following:  
(i) Floyd's triangle (ii) Pascal Triangle
- 2 Generate the following series of numbers:  
(i) Armstrong numbers between 1 to 100  
(ii) Prime numbers between 1 to 50  
(iii) Fibonacci series up to N numbers
- 3 Manipulate the strings with following operations.  
(i) Concatenating two strings (ii) Reversing the string (iii) Finding the substring  
(iv) Replacing a string (v) Finding length of the string
- 4 Find the summation of the following series:  
(i) Sine (ii) Cosine (iii) Exponential
- 5 Create the sales report for M sales persons and N products using two dimensional array.
- 6 Simulate following Banking operations using functions.  
(i) Deposit (ii) Withdrawal (iii) Balance Enquiry
- 7 Implement using recursion  
(i) Find the solution of Towers of Hanoi problem using recursion.  
(ii) Fibonacci number generation.  
(iii) Factorial
- 8 Generate Student mark sheets using structures.
- 9 Create a collection of books using arrays of structures and do the following:  
Search a book with title and author name (ii) Sorts the books on title.
- 10 Perform string operations using pointers.
- 11 Program to implement dynamic memory allocation.
- 12 Create, Reading and displaying a sequential and random access file.

**Total 45**

## SEMESTER - II

|                |   |          |          |          |            |
|----------------|---|----------|----------|----------|------------|
| <b>MCA 201</b> | <b>FOUNDATIONS OF COMPUTER APPLICATIONS</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>M</b>   |
|                |   | <b>3</b> | <b>1</b> | <b>0</b> | <b>100</b> |

### **UNIT - I PROBABILITY** (12)

Probability models-Sample space-Events-Algebra of Events-Graphical Methods of representing events-Probability Axioms-Combinational Problems-Conditional Probability-Independence of Events-Bayes's Rule-Bernoulli Trials

### **UNIT - II SOLUTION OF NON-LINEAR AND SIMULTANEOUS LINEAR EQUATION** (12)

Method of Bisection-Method of false position-Fixed point iteration method-Newton's method. Gauss method-Gauss Jordan method-Triangularization method-Jecobi method-Gauss Seidal method.

### **UNIT - III SCHEDULING BY PERT AND CPM** (12)

Network construction-Critical path method-project evaluation and review technique-resource analysis in network scheduling

### **UNIT - IV QUEUING MODELS** (12)

Characterization of Queuing models - Poisson Queues - (M/M/1): (FIFO/ $\infty/\infty$ ), (M/M/1): (FIFO/N/ $\infty$ ), (M/M/C): (FIFO/ $\infty/\infty$ ), (M/M/C): (FIFO/N/ $\infty$ ) models.

### **UNIT - V FORMAL LANGUAGES & FINITE AUTOMATA** (12)

Formal Languages: Four classes of grammars (Phrase Structure, context sensitive, context free, regular)-Finite State Automata- Non-Deterministic Finite State Automata (NFSA), conversion of NDFSA to DFSA- acceptance of regular set by an FSA- construction of a right linear grammar from a finite automata.

**Lecture 45 Tutorial 15 Total 60**

#### **Reference Books**

- 1 Kishore.S, Trivedi, "Probability and statistics with reliability , queuing and computer Science applications, PHI Edition,2000 (UNIT-1)
- 2 Kandasamy.P, Thilagavathy.K and Gunavathi.K, "Numerical methods(revised edition) S.Chand company, New Delhi 2003 (UNIT 2)
- 3 Taha H.A., "Operations Research : An Introduction " 7<sup>th</sup> Edition, Pearson Education, 2004. (UNIT-3,4)
- 4 Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002. ( Unit 5)

**UNIT - I INTRODUCTION (9)**

Basic concepts - Machine structure – Simplified Instructional Computer.

**UNIT - II ASSEMBLERS (9)**

Functions - Machine dependent and Machine independent assembler Features - Design options - Implementation – Example – MASM Assembler

**UNIT - III LOADERS AND LINKERS (9)**

Functions - Machine dependent and Machine independent loader features – Design options- Implementation – Example - MSDOS Linker.

**UNIT - IV MACRO PROCESSORS (9)**

Functions – M/C independent macro processor features - Macro processor design options - Implementation – Example – MASM Macro processor

**UNIT - V COMPILERS AND UTILITIES (9)**

Introduction to compilers - Different phases of compiler - System software tools - Text editors - Interactive debugging systems.

**Total 45**

**Reference Books**

- 1 Leland L.Beck, System Software - An Introduction to Systems Programming, 3rd Edition, Addison Wesley, 1999.
- 2 D.M.Dhamdhere, System Programming and Operating Systems, Tata Mc Graw Hill Company, 1993.
- 3 A.U.Aho,Ravi Sethi and J.D.Ullman, Compilers Principles Techniques and Tools, Addison Wesley, 1988.
- 4 John J.Donovan, systems Programming, Tata Mc Graw Hill Edition, 1991.

**UNIT - I INTRODUCTION (9)**

Introduction – Notion of Algorithm - Fundamentals of algorithmic problem solving – Important problem types – Fundamentals of the analysis of algorithm efficiency – analysis frame work – Asymptotic notations – Mathematical analysis for recursive and non-recursive algorithms.

**UNIT - II DIVIDE AND CONQUER METHOD AND GREEDY METHOD (9)**

Divide and conquer methodology – Merge sort – Quick sort – Binary search – Binary tree traversal – Multiplication of large integers – Strassen's matrix multiplication – Greedy method – Prim's algorithm – Kruskal's algorithm – Dijkstra's algorithm.

**UNIT - III DYNAMIC PROGRAMMING (9)**

Computing a binomial coefficient – Warshall's and Floyd' algorithm – Optimal binary search tree – Knapsack problem – Memory functions.

**UNIT - IV BACKTRACKING AND BRANCH AND BOUND (9)**

Backtracking – N-Queens problem – Hamiltonian circuit problem – Subset sum problem – Branch and bound – Assignment problem – Knapsack problem – Traveling salesman problem.

**UNIT - V NP-HARD AND NP-COMPLETE PROBLEMS (9)**

P & NP problems – NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem – Knapsack problem.

**Total 45****Reference Books**

- 1 Anany Levitin "Introduction to the Design and Analysis of Algorithms" Pearson Education 2003.
- 2 Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, "Introduction to algorithms" Prentice Hall 1990.
- 3 SaraBaase and Allen Van Gelder, "Computer Algorithms – Introduction to Design and Analysis" Pearson education, 2003.
- 4 A.V.Aho, J.E Hopenfit and J.D.Ullman, "The Design and Analysis of Computer algorithms" Pearson education Asia, 2003.

**UNIT - I OOP PARADIGAM** (12)

Programming Paradigms-Procedural Programming-Modularity-Exception Handling-Data Abstraction-User Defined Types-Concrete Types-Abstract Types-Virtual Functions-Object Oriented Programming-Generic Programming-Containers-Algorithms.

**UNIT - II INTRODUCTION TO C++** (12)

Overview of C++-Classes and Objects- constructor and destructor - Friend Functions-Friend Classes-Inline Function-Static Members-Arrays-Pointers-References-Dynamic Allocation.

**UNIT - III OVERLOADING** (12)

Function Overloading-Overloading Constructor Functions-Copy Constructors-Default Argument-Operator Overloading-Member Operator Overloading-Overloading new and delete.

**UNIT - IV INHERITANCE AND TEMPLATES** (12)

Inheritance-Base Class-Access Control-Virtual Functions-Pure Virtual Functions-Templates-Generic Functions-Appling Generic Functions-Generic Classes

**UNIT - V ERROR HANDLING AND FILES** (12)

Exception Handling-C++ I/O Streams-File I/O-STL-Overview-Container Classes-Lists-Maps-Algorithms Using Functions and Objects-String Class.

**Lecture 45 Tutorial 15 Total 60**

**Reference Books**

- 1 Herbert Schildt,"C++ The Complete Reference", Tata McGrawHill Edition, 2003 (unit 2, 3, 4)
- 2 Bjanne Stroustrup,"The C++ Programming Language",3<sup>rd</sup> Edition, Addison Wesley, 2000 (Unit 1 & 5)
- 3 Robert Lafore."Waite Groups OOP in Turbo C++",Galgotia Publications, 2001
- 4 Stanley, B.Lippman,Jove Lagrie,"C++Primer",3<sup>rd</sup> Edition, Addison Wesley,1998

**UNIT - I INTRODUCTION (9)**

Database Systems vs. File Systems-View of Data- Data Models-Database Languages-Transaction Management-Database Systems Structure-History of Database Systems-Database Systems Applications-Entity Relationship Model

**UNIT - II RELATIONAL DATABASES (9)**

SQL-Basic Structure-Set Operations-Complex Queries-Joined Queries-DDL-Embedded SQL-Dynamic SQL-Other SQL Functions-Query by Example-Integrity and Security of searching-Relational Database Design – Normalization – 1NF,2NF,BCNF,3NF

**UNIT - III DATA STORAGE AND INDEXING (9)**

Storage & File Structure-Disks-RAID-File Organization-Indexing &Hashing-B+ TREE-B Tree-Static Hashing-Dynamic Hashing-Multiple Key Access

**UNIT - IV QUERY EVALUATION & OPTIMIZATION (9)**

Query Processing-Selection Operation-Sorting-Join Operation-Evaluation of Expressions-Query Optimization

**UNIT - V TRANSACTION MANAGEMENT & RECENT TRENDS (9)**

Transaction Concept-Static Implementation-Concurrency Control-Protocols-Deadlock Handling-Recovery Systems-Recovery with Concurrent Transactions-Shadow Paging-Buffer Management – Basic concepts: Distributed Databases, Parallel Databases.

**Total 45**

**Reference Books**

- 1 Abraham Silberschatz, Henry F.Korth and S.Sudharssan,"Database System Concepts", 4<sup>th</sup> Edition, Tata McGraw Hill, 2002
- 2 Raghu Ramakrishnan & Johannesgerhrke, "Data Base Management Systems", Mc Graw Hill International Edition, 2000
- 3 Ramez Elmasri and Shamkant B.Navathe, "Fundamental Database Systems", Third Edition, Pearson Education, 2003.

## PRACTICALS

MCA 206

ALGORITHMS LAB

|   |   |   |     |
|---|---|---|-----|
| L | T | P | M   |
| 0 | 0 | 3 | 100 |

### LIST OF EXPERIMENTS

- 1 Apply the divide and Conquer technique to arrange a set of numbers using merge sort method.
- 2 Perform Strassen's matrix multiplication using divide and conquer method.
- 3 Solve the knapsack problem using greedy method.
- 4 Construct a minimum spanning tree using greedy method.
- 5 Construct optimal binary search trees using dynamic programming method of problem solving.
- 6 Find the solution for traveling salesperson problem using dynamic programming approach.
- 7 Perform graph traversals.
- 8 Implement the 8-Queens Problem using backtracking.
- 9 Implement knapsack problem using backtracking.
- 10 Find the solution of traveling salesperson problem using branch and bound technique.

**Total 45**

## PRACTICALS

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|----------------|--|----------|----------|----------|------------|
| <b>MCA 207</b> | <b>OBJECT ORIENTED PROGRAMMING LAB</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>M</b>   |
|                |  | <b>0</b> | <b>0</b> | <b>3</b> | <b>100</b> |

### LIST OF EXPERIMENTS

- 1 Programs using Constructor and Destructor.
- 2 Creation of classes and use of different types of functions.
- 3 Count the number of objects created for a class using static member function.
- 4 Write programs using function overloading and operator overloading.
- 5 Programs using inheritance.
- 6 Program using friend functions.
- 7 Program using virtual function.
- 8 Write a program using exception handling mechanism.
- 9 Programs using files.
- 10 Programs using function templates.

**Total 45**

## PRACTICALS

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|--|----------|----------|----------|------------|
| <b>MCA 208 DATABASE MANAGEMENT SYSTEMS LAB</b> | <b>L</b> | <b>T</b> | <b>P</b> | <b>M</b>   |
|  | <b>0</b> | <b>0</b> | <b>3</b> | <b>100</b> |

### LIST OF EXPERIMENTS

- 1 Execute a single line and group functions for a table.
- 2 Execute DCL and TCL Commands.
- 3 Create and manipulate various DB objects for a table.
- 4 Create views, partitions and locks for a particular DB.
- 5 Write PL/SQL procedure for an application using exception handling.
- 6 Write PL/SQL procedure for an application using cursors.
- 7 Write a DBMS program to prepare reports for an application using functions.
- 8 Write a PL/SQL block for transaction operations of a typical application using triggers.
- 9 Write a PL/SQL block for transaction operations of a typical application using package.
- 10 Design and develop an application using any front end and back end tool (make use of ER diagram and DFD).

(Typical Applications – Banking, Electricity Billing, Library Operation, Pay roll, Insurance, Inventory, etc.)

**Total 45**