

**MATS School of Engineering &
Technology**

**MAT'S University
Raipur**



**Syllabus Scheme
(4th Semester)
For
Bachelor of Engineering
In
Computer Science & Engineering**

Subject Code For MATS School of Engineering & Tech. Deptt.

4th Semester (Computer Science)

S.No.	Subject Code	Subject Name
1	BE420	Discrete Mathematical Structures
2	BE421	Data Structures
3	BE422	Microprocessor
4	BE423	Object Oriented Programming with C++
5	BE424	Finite Automata & Formal Languages
6	BE425	Principles of Management
7	BE426	Data Structure Lab
8	BE427	Object Oriented Prog. Using C++Lab
9	BE428	Computer Hardware Simulation Lab
10	BE429	Microprocessor Lab



MATS School of Engineering & Technology
MATS University, Raipur
Scheme of Teaching & Examination
IVth Semester
Computer Science & Engineering



S. No.	Course code	SUBJECT	Periods per week		Evaluation Scheme		Total Marks
			L	P	IM	ESE	
THEORY							
1	BE420	Discrete Mathematical Structures	5	0	30	70	100
2	BE421	Data Structures	5	0	30	70	100
3	BE422	Microprocessor	5	0	30	70	100
4	BE423	Object Oriented Programming with C++	5	0	30	70	100
5	BE424	Finite Automata & Formal Languages	5	0	30	70	100
6	BE425	Principles of Management	5	0	30	70	100
PRACTICAL							
7	BE426	Data Structure Lab	0	3	20	30	50
8	BE427	Objects Oriental programming Using C++ Lab	0	3	20	30	50
9	BE428	Computer Hardware Simulation Lab	0	3	20	30	50
10	BE429	Microprocessor Lab	0	3	20	30	50

L-Lecturer, P-Practical, ESE- End Semester Examination, IM-Internal Marks

DISCRETE MATHEMATICAL STRUCTURES

BE420

UNIT I

Introduction to set theory, Combination of sets, Finite and Infinite sets, Uncountable infinite sets, Mathematical induction, Principles of inclusion and exclusion, multi-sets. Introduction to Relations and Functions, Properties of Binary Relation, Equivalence relation and partitions, Partial ordering and total ordering, lattices, Chains and anti-chains, Functions and pigeonhole Principle.

UNIT II

Introduction to discrete numeric functions and generating functions, Manipulation of Numeric functions, Asymptotic behavior of numeric function, Combinatorial problems.

UNIT III

Introduction to recurrence relation and recursive algorithm, Linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solution, Solution by method of generating functions, Sorting algorithm, Matrix multiplication algorithm.

UNIT IV

Introduction to groups and rings, Subgroups, Generators and Evaluation of powers, Cosets and Lagrange's theorem, Permutation Groups and Burnside's theorem, Codes and Group codes, Isomorphism and Automorphism, Homomorphism and Normal subgroups, Rings, Internal Domains and fields, Ring homomorphism, Polynomial Rings and Cyclic codes.

UNIT V

Introduction to Boolean algebra, Lattices and Algebraic systems, Principles of Duality, Relation between Algebraic system and Lattices, Distributive and Complemented lattices, Boolean lattices and Boolean algebra, Uniqueness of finite Boolean algebra's.

GRAPH THEORY: Introduction to graph theory, Walks, Paths & Circuits, Types of graphs, Eulerian and Hamiltonian graphs, Basic concept of tree: spanning tree, Cut sets, Network flow, Matrix representation of graphs.

References:

1. Element of Discrete Mathematics By C. L. Liu
2. Discrete Mathematics and its Application By Rosen., TMH

DATA STRUCTURES

BE421

UNIT I

Introduction: Basic Terminology, Elementary Data Organization.

Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, Address calculation, Application of Arrays.

Stacks: Array Representation and Implementation of Stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.

Recursion: Recursive definition and processes, Recursion in C, Example of Recursion, Simulating Recursion, Recursive algorithms, Principles of Recursion, Tail recursion, Removal of recursion.

UNIT II

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues.

Linked list: Representation and Implementation of Singly Linked Lists, Two-way Header List, Insertion and deletion to/from Linked Lists, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list.

UNIT III

Trees: Basic terminology, Binary Trees, Binary tree representation, Algebraic Expressions, Complete Binary Tree, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Traversing Threaded Binary trees.

Searching and Hashing: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

UNIT IV

Sorting: Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting.

Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST.

UNIT V

Graphs: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees.

File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, Indexing and Hashing Comparisons.

Reference Books:

- 1 Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd., New Delhi.
- 2 R. Kruse et al, "Data Structures and Program Design in C", Pearson Education Asia, Delhi-2002
- 3 A. M. Tenenbaum, "Data Structures using C ", Prentice-Hall of India Pvt. Ltd., New Delhi.
- 4 Mark Allen Weiss, "Data structure & Algorithm Analysis using C", Pearson Education.

MICROPROCESSOR

BE422

UNIT I

INTRODUCTION TO MICROPROCESSOR: Features of Intel 8085, Pin diagram of 8085, 8085 CPU architecture.

INSTRUCTION SET OF 8085: Classification of instruction: Data transfer instruction, Arithmetic operation instruction, Logical operation instruction, Branching operation instruction, Addressing modes, Stack & Subroutine, Looping & counting.

UNIT II

INSTRUCTION TIMING & STATE DIAGRAM OF 8085: Introduction to memory cycles: Opcode fetch cycle, Memory read cycle, Memory write cycle, Timing diagram of 8085 instructions.

PROGRAMMING WITH 8085: BCD-TO-BINARY conversion, BINARY-TO-BCD conversion, BCD-TO-SEVEN-SEGMENT-LED code conversion, BINARY-TO-ASCII & ASCII-TO-BINARY conversion, BCD Addition & Subtraction, Multiplication.

UNIT III

MEMORY INTERFACING: Memory structure & its requirements, Basic concepts in memory interfacing, Address decoding & memory addresses, Decoder using combinational circuit, Decoder logic using decoder IC, Interfacing multiple memory components, Shadow of memory or Folded memory.

I/O INTERFACING: Basic interfacing concepts, Interfacing output displays, Interfacing input devices, Memory-mapped I/O.

UNIT IV

INTERRUPTS: Restart instruction, Hardware implementation, Interrupt processing, Multiple Interrupts & priority concepts, Interrupt structure of 8085, instruction related to interrupts, Pending interrupts, Use of interrupt & handshaking signals in interfacing.

UNIT V

INTRODUCTION TO PERIPHERAL INTERFACING DEVICES: Architecture of 8255, Pin diagram of 8255, Architecture of 8253/8254, Pin diagram of 8253/8254, Architecture of 8251, Pin diagram of 8251, Architecture of 8086, Pin diagram of 8086.

Reference Books:

1. Microprocessor Architecture, Programming and Application by R.S.Gaonkar, Wiley Eastern.
2. Digital System from Gates to Microprocessor by Sanjay K.Bose, New Age International Publishers

OBJECT ORIENTED PROGRAMMING WITH C++

BE423

UNIT I

Basic Concepts, Introduction to OOP & C++

C++ Compiler, character set, Keywords, Identifiers, Constants, Basic structure of C++ Program, Fundamentals of object oriented programming: Procedure oriented programming Vs. Object oriented programming (OOP), Object oriented programming concepts: Classes, Reusability, Encapsulation, Inheritance, Polymorphism, Dynamic binding, Message passing, Benefits of OOP, Difference between New and Delete operator, Functions in C++.

UNIT II

Classes & Object: Specifying a class, Define member function, Scope of class and its member, Nested Class, Data hiding & encapsulation, Friend function, Array within a class, Array of object as function argument, Function returning object, Static member.

UNIT III

Constructors and Destructors: Constructor function, Parameterized multiple constructor, Default constructor, Copy constructor, Const and Class, Data conversion between objects of different Classes, Destructor function, Polymorphism, Function overloading, Operator overloading.

UNIT IV

Inheritance, Pointer & Virtual function: Define derived classes, Single Inheritance, Multilevel Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Pointers to objects, this pointer, Pointers to derived Class, Virtual function, Pure Virtual function, Abstract Classes.

UNIT V

File I/O & Templates: Files Streams, Opening & Closing a file, read() & write() functions, Detecting end-of-file, Seekp(), Seekg(), Tellg(), Tellp() function, Introduction to Templates & Exception, Creating and Handling Templates and Exception in OOPS.

Reference Books:

1. Budd, "Object Oriented Programming", Addison Wesley.
2. Mastering C++ K.R Venugopal Rajkumar, TMH.
3. C++ Primer, "Lip man and Lajole", Addison Wesley.
4. Balaguruswami, "Object oriented with C++", TMH.
5. Maria litvin, Gary litvin, "Programming in C++".
6. D Samantha, "Object oriented Programming in C++ and Java", PHI.

AUTOMATA THEORY & FORMAL LANGUAGES

BE424

UNIT I

Introduction to alphabets, Strings and languages, Finite automata and Finite state machines, DFA (deterministic finite automata), NFA (non -deterministic finite automata), NFA with ϵ Moves, Equivalence among DFA, NFA and NFA with ϵ moves.

UNIT II

Regular Expressions, Union, Concatenation and Kleen closure operations on regular expressions, Correspondence between finite automata and regular expressions, Finite Automata and Regular Expressions, Finite automata with output like Moore and Mealy machines, Pumping lemma for Regular sets, Myhill-nerode theorem and minimization of finite automata.

UNIT III

Context free grammar and languages, Derivation trees, Simplification of context free grammars, Chomsky normal form (CNF), Greibach normal form, Ambiguity in grammars, Push down automata, Deterministic and Non- deterministic push down automata, Equivalence between push down Automata and context free grammars.

UNIT IV

Turing machines, Church's hypothesis, Ram machines, Recursive and Recursively Enumerable languages, Undecidability and Rice's theorem.

UNIT V

P, NP, NP-complete and NP-hard problems, Examples of these problems like satisfy ability Problem, Vertex cover problem, Hamiltonian path problem, Chromatic number problem, Traveling salesman problem, partition problem etc.

Reference Books:

- 1 Introduction to automata theory, language and computation by John E Hopcroft and Jeffrey D. Ullman, Narosa publishing house 1997.
- 2 Introduction to language and the theory of computation by John C. Martin McGraw Hill, International Editions 1991.

PRINCIPLES OF MANAGEMENT

BE425

UNIT I

Definition of Management, Nature and Basic Concepts of Management, Management and Administration, Functions of Manager & Information age, Science theory and practice of Management. Managerial objectives and Role, Evolution of management Thoughts, Business Environment, Social attitudes beliefs and Values, Social Responsibilities of Business.

UNIT II

Functions of Management: Planning, Nature and importance, Steps in Planning, Organizing and process of organizing, Staffing, Systems approach to staffing, Directing, Controlling and process of controlling, Decision Making.

UNIT III

Motivation-Meaning, Need for motivation, Theories of Motivation, Leadership: Meaning and styles, Group and team working, HRM.

UNIT IV

Marketing function: Market and Marketing environment, Consumer / Buyer behavior, Marketing Mix, Advertisement and sales Promotion, Financial Management: Introduction to Book keeping and financial statements, Break Even Analysis.

UNIT V

Production and Productivity, Production Planning and Control, TQM Emerging Trends in Management- Globalization and WTO, Business process reengineering, IT in Management, Outsourcing.

Text Books:-

1. Govindrajan M, & Natrajan, S, Principles of Management, Prentice Hall of India, N. Delhi,2005.
2. Luthans Fred Organizational Behavior, TMH, New Delhi

Reference Books:-

1. Koontz and O'Donnell, Principles of Management and administration, Prentice Hall of India (PHI).
2. Peter F Drucker, The Practice of Management, Allied Publicatons.
3. Robbins, S. P. 3rd edition, Fundamental of Management, PHI, N. Delhi,2005
4. Chandan J. S, Management Concepts and Strategies, Vikas Publication, N. Delhi,2006
5. S.N. Maheshwari, An Introduction to accountancy Vikas Publication, N Delhi.

DATA STRUCTURES LAB

BE426

1. Write a program to perform following in one dimensional array., Insertion, Deletion and Searching (Linear & Binary).
2. Write a program to implement stack and perform push pop operation.
3. Write a program to convert infix to postfix expression using stack.
4. Write a program to perform following operation in linear queue - addition, deletion, traversing.
5. Write a program to perform following operation in circular queue - addition, deletion, traversing.
6. Write a program to perform following operation of double ended queue - addition, deletion, traversing.
7. Write a program to perform following operation in single link list.-creation, inversion, deletion.
8. Write a program to perform following operation in double link list – creation, insertion, deletion.
9. Write a program to implement polynomial in link list and perform a. Polynomial arithmetic b. Evaluation of polynomial.
10. Write programs to implement linked stack and linked queue.
11. Write programs to perform Insertion, selection and bubble sort.
12. Write a program to perform quick sort.
13. Write a program to perform merge sort.
14. Write a program to perform heap sort.
15. Write a program to create a Binary search tree and perform –insertion, deletion & traversal.
16. Write a program to traversal of graph (B.F.S, D.F.S)

Recommended Books:

1. “Data structure using C ”by Samir kumar Bandyopadhyay, Kashi nath Dey.
2. “ C and Data structures ” Ashok K Kamthane Pearson Education.
3. An Introduction to Data Structures with Application by Tremblay & Sorenson (Tata Mc)
4. Fundamentals of Data Structure by Horowitz & Sahni (Galgotia).
5. Data Structures using C by ISRD Group (Tata Mc).
6. Data Structures using C/C++ by langsam, Augenstein & Tananbaum (PHI)
7. Data Stuctures & Program Design by Robert L Kruse (PHI)

OBJECT ORIENTAL PROGRAMMING USING C++ LAB BE427

- 1 Write a Program to check whether number is prime or not.
- 2 Write a Program to read number and to display the largest value between:
 - (1) Two number
 - (2) Three Numbers
 - (3) Four number by using switch-case statements.
- 3 Write a Program to find sum of first natural numbers : sum= 1+2+3+4+..... 100 by using
 - a. for loop b. while loop c. do-while loop
- 4 Write a Program to find sum of the following series using function declaration.
Sum= $x - (x)^3/3! + (x)^5/5! - \dots \dots \dots (x)^n/n!$
- 5 Write a Program to read the element of the given two matrix & to perform the matrix multiplication.
- 6 Write a Program to exchange the contents of two variable by using
 - (a) call by value (b) Call by reference.
- 7 Write a Program to perform the following arithmetic operations of a complex number using a structure
 - (a). Addition of the two complex number
 - (b). Subtraction of the two complex number
 - (c). Multiplication of the two complex number
 - (d). Division of the two complex number.
- 8 Write a Program to generate a series of Fibonacci Nos. using the constructor where the constructor member function had been defines
 - (a). is the scope of class definition itself
 - (b). out of the class definitions using the scope resolutions operator. Also make this program with the help of the copy constructor.
- 9 Write a Program to demonstrate how ambiguity is avoided using scope resolution operator in the following inheritance
 - (a). Single inheritance (b). Multiple inheritance
- 10 Write a Program to perform the swapping of two data items of integer, floating point number and character type with the help of function overloading.
- 11 Write a Program to generate a Fibonacci series by overloading
 - a. Prefix Operator
 - b. Postfix Operator.
- 12 Write a Program to access the private data of a class by non-member function through friend function where the friend function is declared :
 - (1). is the location of public category
 - (2). is the location of private category
 - (3). With in the scope of a class definition itself
 - (4). Defined with inline code subtraction.
- 13 Write a Program to demonstrate how a pure virtual function defined declared and invoked from the object of derived class through the pointed of the base class.
- 14 Write a Program to Bubble Sort Using template function.
- 15 Write a Program for invoking for that Generate & Handle exception.

List of Equipment/Machine Required

Pentium IV machine, Turbo C++ compiler

Text Books:

1. Programming with C++ : D Ravichandran
2. OOP's with C++ : E. Balaguruswamy .

Reference Books:

1. Programming with C++ : Venugopal .
2. Object Oriented Programming in C++ : StroutStrups.
3. OOP with C++ : Robert Lafore
4. Let us C++ : Yaswant Kanetkar.

COMPUTER HARDWARE SIMULATION LAB

BE428

Experiments to be performed (minimum 10 experiments)

- 1 Simulation of AND gate and OR gate
- 2 Simulation of XOR gate and XNOR gate
- 3 Simulation of universal gates.
- 4 Design and simulation of the Binary to gray code converter
- 5 Design and simulation of the Hex to 8-4-2-1 (BCD) converter
- 6 Design and simulation of the half adder
- 7 Design and simulation of the Full adder
- 8 Design and simulation of the Parity check converter
- 9 Design and simulation of 3 to 8 decoder
- 10 Design and simulate 8 to 1 multiplexer
- 11 Design and simulation of J-K flip flop
- 12 Design and simulation of D-flip flop
- 13 Design and simulation of 8 bit SISO register
- 14 Design and simulate $Y = AB + CD$ using implementation of PLA.
- 15 Design and simulate $Y = AB + CD$ using implementation of PLA.

Recommended Books:

1. Computer simulation laboratory manual
2. Digital circuit design by: R.P Jain
3. Digital logic & computer design by Morris mano.

MICROPROCESSOR LAB BE429

Programs to be executed

1. **REVERSING AN ARRAY:** A Block of 16 bytes are residing at locations starting from BLOCK 1 WAP to transfer the block in reverse order at locations starting from BLOCK 2.
2. **SORTING IN ASCENDING ORDER:** A block (16 bytes are residing at locations starting from DATA: Write a program to arrange the word in the same location in ascending order
3. **BINARY ADDITION:** 16 bytes are residing at location starting from DATA WAP: to add all bytes and store the result location SUM and SUM + 1
4. **BCD ADDITION:** 16 BCD NUMBER are residing at location starting from DATA WAP to add all bytes and store the result location SUM and SUM + 1
5. **MULTIPLICATION:** Two bytes are residing at location DATA 1 and DATA 2 Write a program to multiply the two bytes and store the result at location PROD 1 and PROD 2 .
6. **BINARY TO BCD:** A binary number is residing at location BIN > WAP to convert the binary number in to its equivalent BCD and store the result at BCD and BCD + 1
7. **BCD TO BINARY:** A BCD number is residing at location BCD ; Write a program to convert the BCD number into its equivalent binary and store the result at BIN
8. **MULTIBYTE ADDITION:** Two 10 bytes are residing at location starting from DATA 1 and DATA 2 respectively, Write a program two add them up and store the result at location starting from RESULT (result space 11 bytes)
9. **MULTIBYTE BCD ADDITION:** Two 6 digits BCD numbers are residing at location starting from DATA 1 and DATA 2 respectively. Write a program to add them up and store the result at locations starting from RESULT (Result space 7 bytes)
10. **RST 6.5:** A block of 16 bytes is residing at location starting from ; DATA Reverse the block and store the bytes at REVERSE whenever the RST 6.5 key is pressed.
11. **EDITING OF ASCII STRING:** A string of ASCII characters is residing at locations starting from READ which contain “ I \$ WILL \$ BE \$ AN \$ ENGINEER ”. Edit string in such a way that it should contain “ I \$ will \$ be \$ Engineer ”. Keep the edited string in the same locations. Product the string from further editing. (\$ stands for a blank)
12. **SIGNED BINARY ADDITION:** A block of 16-signed binary numbers is residing at locations NUMBERS. Add them up and store the result (in signed binary) at locations from RESULT.
13. **ASCII CODE CONVERSION:** A string of 16 ASCII characters are residing at locations starting from DATA. The string consists of codes for capital letters, small letters and BCD digits (0-9). Convert the ASCII characters. In such a way that the codes for capital letters be converted into corresponding codes for small letters, codes for small letters into that of capital letters and codes for BCD digits into that of BCD numbers and store them at the same locations.
14. **PARITY CHECK:** A block of 32 bytes is residing at DATA count the number (BCD) of times even and odd PARITY bytes are appearing consecutive memory locations. Keep the count at MATCH.
15. **SERIES GENERATION:** Two BCD numbers a and b are residing at locations DATA 1 and DATA 2 respectively. Write a program to form a series in BCD with the elements of a. $a + 2b$, $a + 4b$, $a + 6b$, Stop the generation of the series whenever any element of the series in BCD with the elements of the series exceeds (99). Store the result at locations starting from RESULT. Count the number (BCD) of elements in the series and store it at NUMBER.

List of Equipments/Machine Required:

8085 based microprocessor kit, MASM assembler, 8085 simulator, PCs.

Recommended Books:

8085 Microprocessor Programming & Interfacing – N.K. Srinath, PHI