Govt. of Karnataka, Department of Technical Education

Diploma in **Information Science** & Engineering

Third Semester

Subject: DATA STRUCTURES USING C

Contact Hrs / week: 4   **Total hrs: 64**

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Detailed Contents

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8.3	Binary trees
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10	**Searching**
10.1	Introduction
10.2	Searching
10.3	Linear (sequential) search (without creating linked list)
10.4	Binary search

General objectives:

1	Understand the concept of pointers and their operations
2	Understand the concept of dynamic memory allocation
3	Understand file handling in C
4	Know the concepts of linear data structures, their operations and applications
5	Know the concepts of non linear data structures, their operations and applications
6	Understand the various sorting and searching techniques

Specific Objectives:

Pointers
Bring out the concepts of pointers
Learn to declaring and initializing pointers
Learn to access variables using pointers
Explain the concepts of pointer arithmetic
Explain the use of Pointers in arrays, character strings, functions, structures
Files
Define File
Learn the I/O operations on files
Distinguish between sequential & random access files

Learn to handle errors in files and command line arguments
Introduction to data structures
Define Information ,data and data structures
Distinguish between the various types of data types: primitive and non primitive
Define stack with examples
Explain the Primitive Operations- Push and Pop performed on stack
Write programs to Implement Push and Pop Operations in C
Learn the applications of Stacks
Learn about Infix, Postfix and Prefix Expressions
Learn to convert expressions i.e. from Infix to postfix & prefix,
Learn to convert Postfix to infix & prefix ,Prefix to infix & postfix Expressions
Understand recursion: eg. Multiplication of natural numbers, Factorial and GCD
Learn queue with examples and their sequential representation
Learn C implementation of Queues and their operations
Learn C implementation of Circular queues and their operations
Learn the concepts of Dequeue and priority queues
Linked list
Learn the concepts of Linked linear lists, their advantages and disadvantages
Write programs for Inserting and removing nodes from a list
Write programs to implement of Stacks and Queues
Learn Array implementation of lists in C and its limitations
Implement Linked list using dynamic variables in C
Examples of list operations in C
Comparing the Dynamic and Array Implementation of Lists
Learn concepts of Circular & doubly linked lists
Trees
Define Binary trees and learn their concepts
Understand tree operations
Learn & implement binary tree traversal operations
Sorting
To understand different sorting Techniques with examples
To implement sorting techniques in C
Searching
To understand linear and binary search Techniques with examples
To learn and implement linear and binary search techniques in C

Text book:

1. For Chapter 1 to 3 -- **Programming in ANSI C, E.Balagurusamy**, 4E, Tata McGraw Hill, ISBN: 9780070648227

2. Data Structures Using C -By Niranjan A, **Sapna Publications**

3. For Chapters 5, 6, 7, 9,10 -- **DATA STRUCTURES USING C AND C++,** Langsam yedidyah, Augenstein moshe j., Aron M. Tenenbaum , Second Edition, PHI

4. For Chapters 4 and 8 -- **Introduction to Data Structures in C**, Ashok N Kamthane, Third impression 2009, Pearson Education, ISBN : 9788131713921

Reference Books:
1. C and data Structures, Dr.N.B. Venkateshwarulu and Dr.E.V Prasad, S chand Publications
2. Data structures Using C, Aron M. Tenenbaum ,langsam yedidyah, Augenstein moshe j. , PHI
3. C and Data Structures, Prof. P S Deshapande and Prof. O G Kakde

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Subject: **Data Structures using C**

Max. Marks: 100   Max. Time: 3 Hours

Model Question Paper

Note: 1. Section –I is compulsory.

2. Answer any TWO questions from each remaining Sections.

Marks

Section – I

1. a) Fill in the blanks with appropriate word/s   5x1=5

    i. …… is a variable which holds the address of another variable.

    ii. ……. is an example for non linear data structure

    iii. The process of a function calling itself is called…………

    iv. ……. is used to open a file.

    v. The total number of nodes in a complete binary tree is given by …..

    b) Write a note on Command line arguments.   5

Section – II

2. a) Define Pointer. Explain pointer arithmetic.   6

    b) Differentiate between call by value and call by reference parameter

    passing techniques with example.   9

3. a) Write a program to sort N numbers using malloc( ) .   6

    b) Define File and explain different File modes.   6

c) How to handle errors in files? 3

4. a) Distinguish between linear and non linear data structure. 5

   b) Write an algorithm to perform PUSH and POP operations in Stack. 10

Section – III

5. a) What is recursion ? Explain with an example. 7

   b) Convert the following expressions to postfix 6

   i. (A + B) * (C - D) $ E * F

   ii. ((A – (B + C) * D) $ (E + F)

   c) Define Queue. 2

6. a) Write a program to implement Circular Queues in C 10

   b) Write a note on Priority queues. 5

7. a) Write an algorithm to insert a node into a linked list. 8

   b) Compare the Dynamic and Array Implementation of Lists. 7

Section – IV

8. a) Explain Doubly linked list. 5

   b) Write the tree traversal algorithms. 10

9. a) Construct the binary tree for the following data 5

   15,4,8,9,2,13,1,6,10,11,14

   b) Write a program to implement simple insertion sort and trace

   with an example. 10

10. a) Explain tree sorting with an example. 8

    b) Write a program to perform binary search using recursion. 7