

- N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required, and state it clearly.

Attempt any FOUR

- 1 a Explain linear and nonlinear data structures. [20]
b Evaluate the given postfix expression using stack
$$2\ 3\ 4\ +\ * \ 5\ *$$

c What are the advantages of a linked list over arrays?
d Explain different graph traversal techniques.
e Given an array $\text{int } a[] = \{69, 78, 63, 98, 67, 70, 52, 55, 96\}$. Calculate the address of $a[6]$ if the base address of an array is 2100.
- 2 a Write a C program to implement queue using Arrays. [10]
b Given the postorder and inorder traversal of a binary tree, construct the original tree. [10]
Postorder: D E F B G L J K H C A
Inorder: D B F E A G C L J H, K
- 3 a What is hashing? What properties should a hash function demonstrate? [10]
b Write a program to implement a stack using linked list. [10]
- 4 a Consider the following sorted array DATA with 13 elements: 11, 22, 30, 33, 40, 44, 55, 60, 66, 77, 80, 88, 99 Illustrate the working of binary search technique while searching an element (i) 40 (ii) 85. [10]
b What is a Binary search tree? Construct a Binary search tree for the following elements. 13, 3, 4, 12, 14, 10, 5, 1, 8, 2, 7, 9, 11, 6, 18 [10]
- 5 a Explain insertion sort using an example. Write an algorithm for it and comment on its complexity [10]
b Write short notes on BFS and DFS algorithms. [10]

- 6 a Write a C program to implement a singly linked list. The program should be able to perform the following operations: [10]
1. insert a node in the end
 2. delete the last node
 3. display the nodes.
- b Given the frequency for the following symbols, compute the Huffman code for each symbol. [10]

Symbol	A	B	C	D	E	F
Frequency	9	12	5	45	16	13