

- N.B. :** (1) Question No. 1 is **compulsory**.
 (2) Attempt any **four** questions out of remaining **six** questions.
 (3) Assume **suitable** data wherever **required**.
 (4) **Figures** to the **right** indicate **full marks**.

1. (a) Write a program to implement Doubly linked list and perform following operations 12
 on it :-
 (i) Insert an item
 (ii) Delete an item
 (iii) Search an item in the list.
 (b) Construct the Huffman code for following set of data : 8
- | | | | | | | | | | |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Keys | rte | hja | pro | lpi | pru | phu | klo | try | qwa |
| Frequency | 5 | 28 | 10 | 20 | 6 | 8 | 13 | 2 | 30 |
2. (a) Explain Quicksort algorithm. Sort following numbers using quicksort. Show output 10
 of each pass :-
 65, 70, 75, 80, 85, 60, 55, 50, 45.
 (b) Explain Hashing and its various methods. 5
 (c) A binary tree has 10 nodes. The inorder and preorder traversal of the tree are shown 5
 below. Draw the tree :
Preorder J C B A D E F I G H
Inorder A B C E D F J G I H
3. (a) Given three items and a knapsack of 50 Kg to hold it with following constraints :- 5
- | | | | |
|---------------|--------|---------|---------|
| Item | 1 | 2 | 3 |
| Weight | 10 kg | 20 kg | 30 kg |
| Value | Rs. 60 | Rs. 100 | Rs. 120 |
- Find the optimal solution to fill the knapsack.
 (b) List the sequence of steps for the development of the dynamic programming. Explain 5
 how many steps would you need if only the value of an optimal solution is required.
 (c) Write an algorithm for breadth first traversal of graph. Explain with suitable example. 5
 (d) Write short notes on Circular and Priority Queues 5
4. (a) Write a program to create 'QUEUE' Abstract Data Type using linked list implementation. 10
 QUEUE ADT should support the following operations :
 (i) Create queue (ii) Insert into queue
 (iii) Delete from queue (iv) Destroy queue.
 (b) Given a set of 'n' numbers, with a program to sort them into non-descending order 10
 using 'Shell Sort' method. Explain the logic clearly taking an example.
5. (a) Write a program to create 'STACK' Abstract Data Type using linked list implementation. 10
 ADT should support the following operations :
 (i) Create stack (ii) Push stack
 (iii) Pop stack (iv) Destroy stack.
 (b) Explain Index sequential searching method. Give its complexity and applications. 10
6. (a) Define Heap. Write a 'C' program to implement Heap Sort. 10
 (b) Write an program to delete a node from the given binary search tree consider all cases. 10
7. Write short notes on (any **four**) :- 20
- | | |
|-------------------------|---------------------------------|
| (a) Asymptotic notation | (b) B-trees |
| (c) Backtracking | (d) Collision landing mechanism |
| (e) Towers of Hanoi | (f) Macros in 'C'. |