

LTS

Data Structure Using C

2K5-CS-3

E-6

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Time : 3 Hrs.

Note :

1. Part 'A' may be attempted in first 5 pages of Answer Sheet.
भाग 'क' के सभी उत्तर, उत्तर-पुस्तिका के प्रथम पांच पृष्ठों में ही करने हैं।
2. Part 'B' in rest of the Sheets of Answer Sheet.
भाग 'ख' के उत्तर, उत्तर-पुस्तिका के आगे शेष पृष्ठों में लिखिये।
3. Answers may be given in English or Hindi.
प्रश्नों के उत्तर अंग्रेजी अथवा हिन्दी में दीजिये।

Part 'A'

1. Attempt any ten questions:

10x2= 20

- (i) What are the features of sparse matrix?
- (ii) Convert the following expression into postfix :
 $A-B*C+D-E+F/G-H$.
- (iii) What is user defined data structure?
- (iv) What are the features of a threaded binary tree?
- (v) Define transitive closure.
- (vi) State application of Stack?
- (vii) What are the limitations of doubly linked lists?
- (viii) Define polynomial ADT.
- (ix) List the application of stacks.
- (x) P: $12/7+3-4*2*1+5$. Transform P into infix expression.
- (xi) Define path in a tree.
- (xii) What are the characteristics of C language?
- (xiii) What is Queues.
- (xiv) Define Complexity.

2. Attempt any 5 of the following questions:

5 x 4 = 20

- (i) Discuss infix to prefix conversion algorithm using stack with an example.
- (ii) Explain the procedure to evaluate postfix expression $623+-382/+*243+$.
- (iii) Discuss about implementation of queues using linked list in detail.

- (iv) Write an algorithm to insert new node at the beginning, at middle position and at the end of a Singly Linked List.
- (v) A binary tree has seven nodes. The Preorder and Postorder traversal of the tree are given below. Can you draw the tree? Justify.
 Preorder : GFDABEC
 Postorder : ABDCEFG
- (vi) Create binary search tree for the following elements (23, 12, 45, 36, 5, 15, 39, 2, 19)
 Discuss about the height of the above binary search tree.
- (vii) Explain about the Prim's algorithm with example.
- (viii) Write algorithm to insert and delete an element from binary search tree using suitable example using C.

PART-B

Attempt any 3 of the following questions:

3 x 20 = 60

3. (a) Discuss the algorithms for push and pop operations on a stack in detail.
 (b) Explain creation, insertion, deletion, traversal of doubly linked list.
4. (a) Explain merge sort algorithm with a suitable example in C.
 (b) "Selecting the pivot element plays vital role in Quick sort" support this statement with proper explanation. Explain various choices available for selecting the pivot using suitable example in C.
5. (a) Give the best case, average case, worst case time complexity of recursive merge sort. Explain in detail.
 (b) What is the difference between a queue and a stack? Write a separate program of each using C language.
6. (a) Explain Heap sort algorithm. Create Heap for the following elements and then sort them. (13, 102, 405, 136, 15, 105, 390, 432, 28, 144)
 (b) Explain the recursive merge sort algorithm to sort the following elements :
 12, 25, 5, 9, 1, 84, 63, 7, 15, 4, 3
7. (a) Sketch the binary search tree resulting after inserting the following integer keys
 49, 27, 12, 11, 33, 77, 26, 56, 23, 6.
 i) Check whether the tree is almost complete or not?
 ii) Determine the height of the tree.
 iii) Write post order and preorder traversals.
- (b) Show how to reverse a single linked list using a suitable example.