22317

12425

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following : **10**

(a) Define the term :

(i) Linear data structure

(ii) Non-linear data structure

(b) List any four applications of queue.

(c) State any two differences between linear search and binary search.

(d) Define Abstract Data Type.

(e) Define the term 'overflow' and 'underflow' with respect to stack.

(f) State the following terms :

(i) Leaf node of a tree

(ii) Degree of a tree

(g) List types of linked list.

2. Attempt any THREE of the following : **12**

(a) Describe working of selection sort method with suitable example.

(b) Describe queue full and queue empty condition on linear queue with suitable diagram.

(c) Explain the following terminology w.r.t. graph :

(i) Indegree

(ii) Outdegree

(iii) Successor

(iv) Predecessor

(d) Explain node structure for singly linked list. Also write any two advantages of singly list over array.

3. Attempt any THREE of the following : **12**

(a) Write 'C' program for deletion of an element from an array.

(b) With a neat sketch, explain working of priority queue.

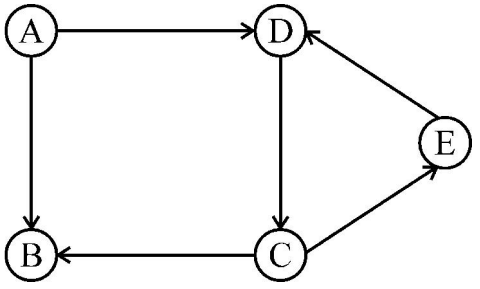
(c) Sort the following numbers in ascending order using Insertion sort :

{25, 15, 40, 3, 99, 29, 6, 55, 13, 2} and write output after each iteration.

(d) For the following graph :

(i) Give Adjacency Matrix Representation

(ii) Give Adjacency List Representation



4. Attempt any THREE of the following : **12**

(a) Find the position of element 15 using Binary search method in Array X given below :

X = {12, 15, 23, 35, 9, 14, 92, 7}

(b) Write an algorithm to count number of nodes in singly linked list.

(c) Construct a binary search tree for following elements :

22, 27, 14, 31, 40, 43, 44, 10, 20, 35

Show each step of construction of BST.

(d) Create a singly linked list using data fields 15, 20, 22, 40, 59 and show procedure step-by-step with the help of diagram from start to end.

(e) Convert following expression into postfix form. Give stepwise procedure :

$A + B \uparrow C * (D / E) - F/G$

5. Attempt any TWO of the following : **12**

(a) Draw tree for the given expression :

$(a - 2b + 5c)^2 * (4d - 6e)^5$.

(b) Write an algorithm to search an element in linked list.

(c) Show the effect of INSERT and DELETE operation onto a linear queue of size 10. The linear queue sequentially contains 10, 20, 30, 40, 50, where 10 is at front of the queue. Show diagrammatically the effect of (i) Insert (75) (ii) Insert (85) (iii) Delete (iv) Insert (60) (v) Delete (vi) Insert (90).

6. Attempt any TWO of the following : **12**

(a) Describe the working of radix sort method. Sort the following elements using radix sort method :

{361, 12, 527, 143, 9, 23, 798, 3569}

(b) Evaluate the following expression :

4 6 24 + ∗ 6 3 / –

Show diagrammatically each step of evaluation using stack.

(c) Describe circular linked list with suitable diagram. State advantages of circular linked list over linear linked list.
