

17330

11920

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Illustrate your answers with neat sketches wherever necessary.
 - (3) Figures to the right indicate full marks.
 - (4) Assume suitable data, if necessary.
 - (5) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. (A) Attempt any SIX of the following :

12

- (a) Define data structure and give its classification.
- (b) List operations on data structure.
- (c) Define searching. Give its type.
- (d) State the applications of stack.
- (e) Define following with respect to tree :
 - (i) Degree of node
 - (ii) Path
 - (iii) Leaf node
 - (iv) Depth
- (f) Define a complete binary tree.
- (g) State any four sorting technique.
- (h) Define connected Graph.

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P.T.O.

- (B) Attempt any TWO of the following :** **8**
- (a) What is complexity of an algorithm ? Describe time complexity & Space complexity.
 - (b) Describe linear search with an example.
 - (c) Describe Priority queue with its advantages.
- 2. Attempt any FOUR of the following :** **16**
- (a) Describe working of selection sort with example.
 - (b) Find out prefix equivalent of the following expression :
 - (i) $[(A + B) + C] * D$
 - (ii) $A [(B * C) + D]$
 - (c) Write an algorithm to insert a new node in the middle of a singly linked list. Give example.
 - (d) What is binary tree ? Explain types of Binary tree.
 - (e) Write a program to delete element in queue.
 - (f) Write a program to search an element in an array using binary search methods.
- 3. Attempt any FOUR of the following :** **16**
- (a) Explain Push () & POP () Operation by diagram.
 - (b) Describe circular queue with example.
 - (c) Describe doubly linked list with example.
 - (d) Describe Binary search tree with example.
 - (e) Draw tree structure for following expression :
 $[3A + 7B] - [(6D - 4E) ^ 6C]$
 - (f) Describe representations of graph with example.

4. Attempt any FOUR of the following :**16**

- (a) Explain different approaches to designing an algorithm.
- (b) Write a program to print Fibonacci series using recursion.
- (c) Describe Queue as an abstract datatype.
- (d) Define following term :
 - (i) Node
 - (ii) Null pointer
 - (iii) Empty list
 - (iv) Information
- (e) Write an algorithm to traverse a singly linked list.
- (f) Describe the Pre-order binary tree traversal algorithm.

5. Attempt any TWO of the following :**16**

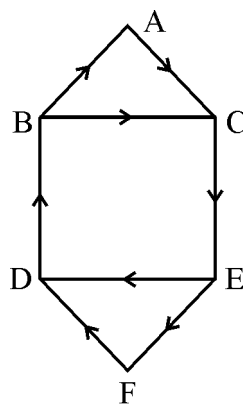
- (a) Sort following elements by Radix sort algorithm :
1050, 844, 324, 56, 01, 7, 1000, 14
- (b) Convert the given infix expression to postfix expression using stack. Write the details of stack at each step of conversion.
 $(A + B) * C/D$.
- (c) Describe the collision resolution techniques in hashing with an example.

P.T.O.

6. Attempt any TWO :

16

- (a) Write a program to read an integer number. Print the reverse of this number using recursion.
- (b) Draw expression tree for the following :
- (i) $(6a^3 - 4b^2)^3 * (4c^2 + 7b^3 + 9c)^4$
- (ii) $(a^2 + 2ab + b^2)^3 + (c^2 - 2cd + d^2)^3$
- (c) Consider graph 'G' in figure.



- (i) Find simple path between A to F.
- (ii) Find Indegree of each node.
- (iii) Find outdegree of each node.
- (iv) Find Adjacency matrix 'A' for graph.
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