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**[5559]-183**

**S.E. (Computer Engineering) (I Sem.) EXAMINATION, 2019**

**DATA STRUCTURES AND ALGORITHMS**

**(2015 PATTERN)**

**Time : Two Hours**

**Maximum Marks : 50**

- N.B. :-**
- (i) Attempt Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6, Q. No. 7 or Q. No. 8.
  - (ii) Draw neat diagrams wherever necessary.
  - (iii) Figures to the right indicate full marks.
  - (iv) Assume suitable data, if necessary.

1. (a) Write pseudo C/C++ code to perform simple transpose of sparse matrix. [4]
- (b) State the characteristics of an algorithm. [2]
- (c) What is complexity analysis of an algorithm ? Explain the notations used in the complexity analysis. [6]

*Or*

2. (a) What is sparse matrix ? Explain its representation with an example. [4]

P.T.O.

(b) Define : [2]

(i) ADT

(ii) Data structure.

(c) Solve the recurrence relation : [6]

$$a_r - 10a_{r-1} + 9a_{r-2} = 0$$

with initial conditions  $a_0 = 3$  and  $a_1 = 11$ .

3. (a) Explain polynomial representation using linked list with an example. [3]

(b) Define : [3]

(i) Recursion

(ii) Stack

(iii) Linked List.

(c) Explain process of conversion of an infix expression to postfix expression using stack : [6]

$$A * (B - C) / E ^ F + G.$$

Or

4. (a) Explain use of backtracking in 4-Queen's problem. [4]

(b) Explain the concept of Generalized linked list. [2]

(c) Write pseudo C/C++ code to represent circular linked list as an ADT. [6]

5. (a) Write pseudo C/C++ code to implement a simple queue using linked list. [6]
- (b) Explain Dequeue with the insert and delete operations performed on it. [7]

*Or*

6. (a) Write pseudo C/C++ code to implement a circular queue using arrays. [6]
- (b) What is Priority queue ? Describe the operations on priority queue and explain its applications. [7]
7. (a) Write pseudo C/C++ code for radix sort. [6]
- (b) Write an algorithm for searching an element using binary search. Discuss the time complexity of algorithm in best case and worst case. [7]

*Or*

8. (a) Explain insertion sort algorithm and sort the given list using insertion sort : [6]
- 7, 4, 10, 6, 3, 12, 1, 8, 2, 15, 9, 5.
- (b) Explain merge sort algorithm using divide and conquer strategy with an example. State its time complexity and space complexity. [7]