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[5252]-563

**S.E. (Computer Engineering) (I Semester) EXAMINATION, 2017**  
**DATA STRUCTURES AND ALGORITHMS**  
**(2015 PATTERN)**

**Time : Two Hours**

**Maximum Marks : 50**

**N.B. :—** (i) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.

(ii) Neat diagrams must be drawn wherever necessary.

(iii) Assume suitable data, if necessary.

1. (a) Define and explain the following terms : [3]

(a) Data structure

(b) ADT

(c) Algorithm

(b) Give pseudo C/ C++ code to concatenate two strings. [3]

(c) Explain the Greedy strategy with suitable example. Comment on its time complexity. [6]

*Or*

2. (a) Define and explain the following terms : [4]

(a) Linear data structure

(b) Non-linear data structure

(c) Time complexity

(d) Space complexity

(b) What is sparse matrix ? Explain with suitable example. [2]

(c) Explain the Asymptotic notation Big O, Omega and Theta with suitable example. [6]

P.T.O.

3. (a) Write a pseudo C/C++ code to delete intermediate node from singly linked list. [3]  
(b) Explain Generalized linked list with example. [3]  
(c) What is stack ? Write an ADT for stack. [6]

*Or*

4. (a) What is recursion ? Explain use of stack for recursion. [4]  
(b) Explain the stepwise conversion using stack for the given infix expression to the postfix expression : [2]  
 $A * (B + C) * D$   
(c) Write pseudo C/ C++ code to represent Singly linked list as an ADT. [6]
5. (a) Define the following terms with example : [6]  
(a) Dequeue  
(b) Priority queue  
(c) Linear queue  
(b) Write a pseudo C/C++ code to implement circular queue using arrays. [7]

*Or*

6. (a) Explain linear queue and circular queue with suitable example. Give the advantages of circular queue over linear queue. [6]  
(b) Explain priority queue. Give pseudo C/C++ code for array implementation of priority queue. [7]
7. (a) Sort the following numbers using Merge sort. [6]  
55, 85, 45, 11, 34, 05, 89, 99, 67  
Discuss its time complexity and space complexity.

- (b) Explain sequential search and binary search with appropriate example and compare their time complexity and space complexity. [7]

*Or*

8. (a) Explain the algorithm of Quick sort with suitable example. Discuss its time complexity and space complexity. [6]
- (b) Explain heap sort and sort the given list using heap sort :[7]  
18, 13, 12, 22, 15, 24, 10, 16, 19, 14, 30.