



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 154505

Roll No.

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B. Tech.

(SEM. V) (ODD SEM.) THEORY
EXAMINATION, 2014-15

DATA STRUCTURE AND ALGORITHMS

Time : 3 Hours]

[Total Marks : 100

Note : Attempt **all** questions. All questions carry **equal** marks.

1 Attempt any **four** parts of the following : **5×4=20**

- (a) Define an algorithm. Write down the parameters to judge the efficiency of any algorithm.
- (b) What is a general tree? How can we represent a general tree in computer memory?
- (c) Write an algorithm for PUSH and POP operation in stack.
- (d) Distinguish between internal sorting and external sorting?
- (e) Explain B+ tree in detail?
- (f) Write an algorithm for topological sort.

2 Attempt any **two** parts of the following : **10×2=20**

- (a) Write an algorithm to insert an element in a Queue. Define deque. Discuss input and output restricted deque with suitable diagram.
- (b) What is graph? How can we represent a graph in memory? Explain various applications of graph.
- (c) Write an algorithm for insertion sort. Trace your algorithm on the following data to sort the list :
77, 33, 44, 11, 88, 22, 66, 55

3 Attempt any **two** parts of the following : **10×2=20**

- (a) Write an algorithm for converting infix expression into postfix expression. Consider the following arithmetic infix expression :
 $Q : A + (B * C - (D / E \uparrow F) * G) * H$ into its equivalent postfix expression P.
- (b) What is linked list? Write down the different applications of linked list? Write an algorithm to insert a node after a given node.
- (c) Draw a B-tree of order 3 for the following sequence of key :
1, 5, 6, 2, 8, 11, 13, 18, 20, 7, 9.

4 Attempt any **two** parts of the following : **10×2=20**

- (a) What is heap? Differentiate between max-heap and min-heap. To build a heap H of the following using Min-heap :
60, 33, 50, 22, 55, 40, 11, 22, 65, 30

- (b) What is Minimum Spanning tree? Explain Prim's algorithm of minimum spanning tree with the help of example.

- (c) Write an algorithm for inserting a node in Binary Search Tree. Suppose the following 10 members are inserted in order into an empty binary search tree T:
50, 48, 35, 44, 80, 70, 10, 55, 11, 85
Draw the tree.

5 Attempt any **two** parts of the following : **10×2=20**

- (a) What is recurrence? Explain master theorem with all cases. Solve the following recurrence using master theorem :
 $T(n) = 4T(n/2) + n$
- (b) What is tree? How can we represent a tree in memory? Construct a binary tree for the following algebraic expression :
 $[a + (b - c)] * [(d - e) / (f + g - h)]$
- (c) Write and explain an algorithm for finding shortest path between any two nodes of a given graph with the help of suitable example.