Printed Pages: 02 **Sub Code: RCS-406**

Paper Id: 131286 **Roll No.** | | | | | | | | | | |

B.TECH
(SEM IV) THEORY EXAMINATION 2018-19
DATA STRUCTURE AND ALGORITHM

Time: 3 Hours ***Total Marks: 70***

Note: **1.** Attempt all Sections. If require any missing data; then choose suitably.
2. Any special paper specific instruction.

SECTION A

1. Attempt *all* questions in brief. **2 x 7 = 14**

a. Calculate total number of moves for Tower of Hanoi for n=15 disks.
b. Explain AVL. List general cases to maintain the height factor.
c. Explain priority queue. What is the condition if queue is full?
d. What do you mean by breadth first search (BFS)?
e. State the rules to be followed during infix to postfix conversions.
f. Define data type and what are the types of data type?
g. What is the difference between complete binary tree and full binary tree?

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a. 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
b. Define an algorithm. Write down the parameters to judge the efficiency of any algorithm.
c. Write an algorithm to insert an element in a Queue. Define deque. Discuss input and output restricted deque with suitable diagram.
d. How to find Minimum Spanning Tree? Explain the Krushkal's Algorithm with example.
e. Convert given infix expression to postfix expression.
A^B-C^D*E$F+G/H-I+J

SECTION C

3. Attempt any *one* part of the following: **7 x 1 = 7**

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 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.

4. Attempt any *one* part of the following: **7 x 1 = 7**

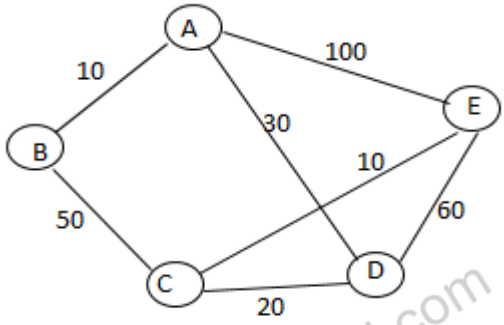
a. What is Tower of Hanoi problem. Explain solutions of Tower of Hanoi problem using proper problem using proper tree representation where number of disks n= 3 and towers are A B C.
b. Consider the any AVL tree and insert 12, 22, 17 and 20 as new node. Show proper rotation to maintain the tree as AVL.

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5. **Attempt any *one* part of the following:** **7 x 1 = 7**
   - **a.** What is a Circular Queue? Write an Algorithm to insert an item and delete an item from the circular queue.
   - **b.** How can we represent a Double Linked list? explain with example.

6. **Attempt any *one* part of the following:** **7 x 1 = 7**
   - **a.** Describe Dijkstra's algorithm for finding shortest path. Describe its working for the graph given below.



   - **b.** Write down the algorithm for DFS and BFS explain it with example.

7. **Attempt any *one* part of the following:** **7 x 1 = 7**
   - **a.** Each element of an array A[20][50] requires 4 bytes of storage. Base is 2000. Determine the location of A[10][10] when the array is stored as :
     (i) Row Major
     (ii) Column Major
   - **b.** Consider the following keys are to be placed in the hash table.
     11, 31, 32, 49, 55, 27, 60, 50, 77, 25, here size of tables is 15. Solve with the help of open addressing and chaining method.

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Correction in RCS406 16-5-19 Morning Shift Question

Kindly add following parts in Q.no.1 and do following changes.

Attempt any seven parts only in Q.No.1

1(h) What do you mean by abstract data type? Explain.

1(i) Differentiate between Structure and Union in C.

Kindly add following parts in Q.no.2 and do following changes.

Attempt any three parts only in Q.No.2

2 (f) What is hashing? Define hash function. Discuss open hashing and close hashing with suitable example.

Kindly add following parts in Q.no.4 and do following changes.

Attempt any one parts only in Q.No.4

4(c) What is recursion? Write an algorithm and a program in C to generate first 10 Fibonacci numbers using recursion.

4(d) What is shell sort? Write an algorithm to sort the numbers using shell sort. Also illustrate the same with example.