Sub Code: RCS305/RCS305A

Paper Id: 110303 Roll No: | | | | | | | | | | | | | |

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**B. TECH**
**(SEM-III) THEORY EXAMINATION 2019-20**
**DATA STRUCTURES**

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

**Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

## SECTION A

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

| | |
|---|---|
| a. | Define the term Array. What are various ways of representing two-dimensional array in memory? |
| b. | What is the condition of circular queue to check if circular queue is full. |
| c. | What is basic difference between a binary tree and a threaded binary tree? |
| d. | Define multigraph and pendant vertex |
| e. | Differentiate between linear and non-linear data structure. |
| f. | What is a Multi-way search tree? |
| g. | What are the number of edges in a complete undirected graph with n vertices. |

## SECTION B

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

| | |
|---|---|
| a. | memory? Also explain the upper triangular and lower triangular sparse matrices. |
| b. | What are the advantages of linked list over array? Write an algorithm/C code to insert a node at the end of a singly linked list. |
| c. | Convert the given infix expression into postfix expression and evaluate it using stack: 5*(6+2)-12/4 |
| d. | Why is Huffman coding technique used? Create Huffman's coding for the following string "duke blue devils" |
| e. | Construct the binary tree from the following traversal:<br>Post Order: 9,1,2,12,7,5,3,11,4,8<br>In order: 9,5,1,7,2,12,8,4,3,11 |

## SECTION C

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

| | |
|---|---|
| (a) | What is a AVL Tree? Construct the following elements in the given order. 63,9,19,27,18,108,99 |
| (b) | What do you mean by queue? Write a C program for array implementation of queue using linked list. |

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

| | |
|---|---|
| (a) | What do you mean by stack? What do you mean by overflow and underflow condition? Write an algorithm/C function for push and pop operations. |
| (b) | What is Linear probing? Describe the pros and cons of linear probing. Also suggest to avoid primary clustering, what are the other techniques to be used |

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

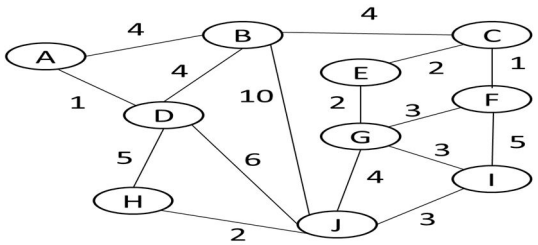
| | |
|---|---|
| (a) | What is Quick sorting technique? Sort the following array using quick sort: 24,56, 47, 35, 10, 90, 82 ,31 |
| (b) | Write an algorithm/C program that reverses the order of all the elements in a singly linked list. |



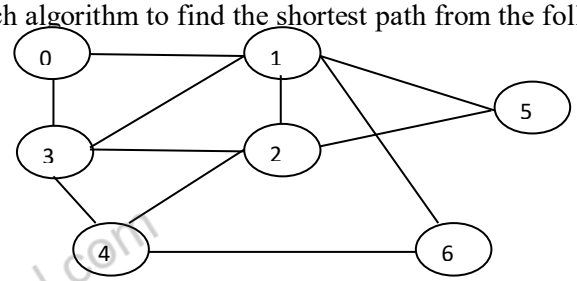
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**6. Attempt any *one* part of the following: 7 x 1 = 7**

| | |
|---|---|
| (a) | What is spanning tree? Find a minimum cost spanning tree by kruskal's algorithm of the following graph. Also explain the complexity.   |
| (b) | Differentiate between linear search and binary search techniques? Write a C program to search an element in an array using binary search. Also write its time complexity. |

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

| | |
|---|---|
| (a) | Implement Breadth First Search algorithm to find the shortest path from the following graph:   |
| (b) | Explain various types of Queues? Why circular queue is more desirable than linear queue? Explain applications of queues. |

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