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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Supplementary) - May, 2019

Regulation: IARE – R16

**DATA STRUCTURES**

**Time: 3 Hours**

(Common to CSE | IT | ECE | EEE)

**Max Marks: 70**

**Answer ONE Question from each Unit**

**All Questions Carry Equal Marks**

**All parts of the question must be answered in one place only**

## UNIT – I

- (a) What is selection sort? State the process and sort the following set of elements using this technique:  
20,35,40,100,3,10,15. [7M]

(b) Write an algorithm to Sort an array of shown in Figure 2 and 2's. You are given an array of 0s 1s and 2s in random order. Sort the array so the 0's,1's and 2's are segregated. [7M]
- (a) Write a binary search algorithm that finds an item in a sorted array. Explain with an example. [7M]

(b) Write an algorithm to find sum of natural numbers using recursion. (This program will read an integer number and print sum using recursion, for example: input value is 3, and then sum is: 6(1+2+3).) [7M]

## UNIT – II

- (a) What is difference between circular queue and linear queue. Write a function to insert an element into a circular queue. [7M]

(b) Evaluate the following postfix notation of expression (Show status of stack after execution of each operation ): 5 6 2 + \* 12 4 / - [7M]
- (a) Write a function to pop an element and push an element into a stack using array. [7M]

(b) Translate infix expression into its equivalent postfix expression: [7M]

$$A * (B + D) / E - F * (G + H / K)$$

## UNIT – III

- (a) What is sparse matrix? Represent a sparse matrix using single linked list. [7M]

(b) Write an algorithm to sort and print out the elements in a singly linked list? [7M]

6. (a) Explain double linked list with an application. [7M]  
 (b) Write a function to pop an element and push an element into a stack using single linked list. [7M]

**UNIT – IV**

7. (a) Explain with an example how queue is useful to traverse a graph using BFS. [7M]  
 (b) Write the preorder, post order and inorder traversal for the tree shown in Figure 1. [7M]

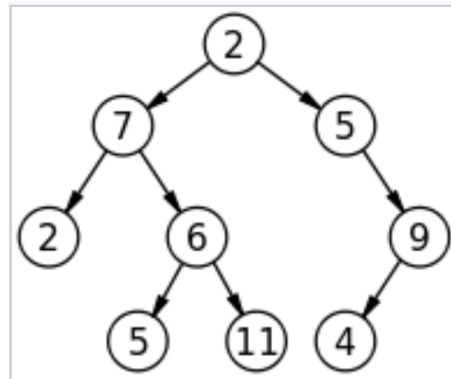


Figure 1

8. (a) Write an algorithm to delete a node from a binary search tree. [7M]  
 (b) List out different types of graph representations. Convert the given adjacency list representation of a graph shown in Figure 2 into linked representation. [7M]

	A	B	C	D	E
A	0	1	1	1	0
B	1	0	1	1	1
C	1	1	0	0	0
D	1	1	0	0	1
E	0	1	0	1	0

Figure 2

**UNIT – V**

9. (a) Explain the RL and LR rotations in an AVL tree with an example [7M]  
 (b) Show the result of inserting these keys into an initially empty AVL tree: 42, 20, 44, 57, 97, 78, 83, 62, 37, 14. [7M]
10. (a) Explain different types of collision resolving techniques. [7M]  
 (b) The keys 15,17,8,35,25,75,and are inserted into an initially empty hash table of length 10 using open addressing with hash function  $h(k) = k \text{ mod } 10$  and linear probing. Develop and explain resultant hash table. [7M]