INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech IV Semester End Examinations (Regular/Supplementary) - July, 2021

Regulation: R18

DATA STRUCTURES

Time: 3 Hours   (AE|EEE)   **Max Marks: 70**

Answer FIVE Questions choosing ONE question from each module
(NOTE: Provision is given to answer TWO questions from any ONE module)
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. (a) Define data structures. Explain the classification of data structures with a neat diagram. **[7M]**

   (b) What is an algorithm? How do you find the complexity of an algorithm? **[7M]**

2. (a) Write a binary search algorithm that finds an item in a sorted array. Explain with an example. **[7M]**

   (b) Trace the insertion sort algorithm with the given set of 8 numbers 9, 7, 6, 15, 16, 5, 10, 11 by showing the passes and position moved. Mention the worst case and best case running time of insertion sort. **[7M]**

MODULE – II

3. (a) Compare between linear queue and circular queue. Write down algorithms for insert and delete operations in a circular queue. **[7M]**

   (b) Write an algorithm to evaluate a postfix expression. Execute your algorithm using the following postfix expression as your input: a b + c d + * f - . **[7M]**

4. (a) Define a double ended queue (DEQUE). Explain input restricted and output restricted DEQUE. **[7M]**

   (b) Convert the following infix expression to postfix expression using a stack using the usual precedence rule: x + y * z + (p * q + r) * s. **[7M]**

MODULE – III

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

   (b) Write a function to reverse the links in a linked list such that the last node becomes the first and the first becomes the last by traversing the linked list only once. **[7M]**

6. (a) Define a node in a linked list. Explain the difference between creation of single linked list node and double linked list node. **[7M]**

   (b) Write a program to modify the linked list such that all even numbers appear before all the odd numbers in the modified linked list. **[7M]**

MODULE – IV

7. (a) Explain BFS and DFS graph traversal schemes and write their merits and demerits in brief. **[7M]**

   (b) Construct a binary search tree for the following data and do in-order, preorder and post-order traversal of the tree. 50, 60, 25, 40, 30, 70, 35, 10, 55, 65, 5. **[7M]**

8. (a) What are the advantages of priority queue? Write the time complexity to insert a node based on position in a priority queue. **[7M]**

   (b) Write the in-order, pre-order and post-order traversals for the given binary tree in Figure 1. **[7M]**
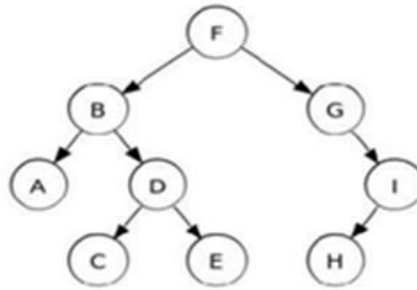

Figure 1

MODULE – V

9. (a) Write the purpose of a hash table .Explain hash tables, hash function and hashing techniques. **[7M]**

   (b) Draw a hash table with open addressing and a size of 9. Use the hash function "k%9". Insert the keys: 5, 29, 20, 0, 27 and 18 into your table (in that order). **[7M]**

10. (a) Explain the collision resolution technique, separate chaining and open addressing with suitable example. **[7M]**

    (b) Insert the following sequence of elements into an AVL tree, starting with an empty tree: 10, 20, 15, 25, 30, 16, 18, 19 and delete 30 in the AVL tree that you got. **[7M]**

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