Hall Ticket No | | | | | | | | | | | Question Paper Code: ACS002

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech II Semester End Examinations (Regular/Supplementary) - May, 2018

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

1. (a) Trace the insertion sort algorithm with the given set of 8 numbers 15, 20, 10, 30, 50, 18, 5, 45 by showing the passes and position moved. Mention the Worst case and Best case running time of Insertion sort. **[7M]**

   (b) What is the result of mystery (2, 6)? Given positive integers a and b, discuss what mystery(a, b) does. **[7M]**

```
int mystery(int a, int b)
{
    if (b == 0)
        return 0;
    else if (b % 2 == 0)
        return mystery(a + a, b / 2);
    else
        return mystery(a + a, b / 2) + a;
}
```

2. (a) Consider an array of elements 2, 6, 7, 34, 76, 123, 234, 567, 677 and 986 and read a number X. Write a function which will return i, such that (a_i == x), if x is not in the array then return -1 (which means "Not Found"). Then the function should return 6 (because 123 is at position 6)(Use binary search algorithm). **[7M]**

   (b) Write a function using recursion for multiplication operation using positive integers a and b as parameters, by using + or – operators. **[7M]**

UNIT – II

3. (a) Write an algorithm to insert an element into double ended queue at rear and front end. **[7M]**

   (b) Convert the given INFIX expression (A * B - (C - D)) / (E + F) to POSTFIX expression using stacks. **[7M]**

4. (a) Given the following numbers 1,2,3,4,5,6,7 into a circular queue. Consider the size as 5. Perform the following operations <enqueue, enqueue, enqueue, enqueue, enqueue, dequeue, dequeue, enqueue, enqueue, >. What is the final Front and Rear element? **[7M]**

   (b) Write a function to dequeue() an element and enqueue() an element into a queue using array. **[7M]**

UNIT – III

5. (a) Write an algorithm to reverse the elements in a singly linked list? **[7M]**

   Input : Consider the following linked list

   1->2->3->4->NULL

   Output : Linked list should be changed to,

   4->3->2->1->NULL

   (b) Write an algorithm to insert the element at any position in a doubly linked list? **[7M]**

6. (a) Write an algorithm to delete the element from middle for a circular linked list? **[7M]**

   (b) Write a function to enqueue an element and dequeue an element into a queue using single linked list. **[7M]**

UNIT – IV

7. (a) Show the result of inserting <3, 1, 4, 6, 9, 2, 5, 7> into an initially empty binary search tree. Show the result of deleting the root. **[7M]**

   (b) Explain how queue is useful to traverse a graph using breadth first search using the graph shown in Figure 1. **[7M]**

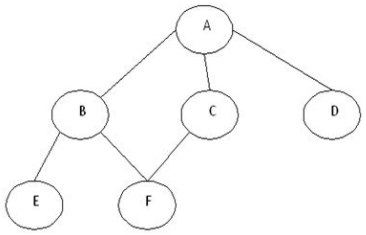

Figure 1

8. (a) Which data structure is useful to traverse a graph using depth first search. Examine the possible order of visiting the nodes of the following graph in Figure 2. **[7M]**

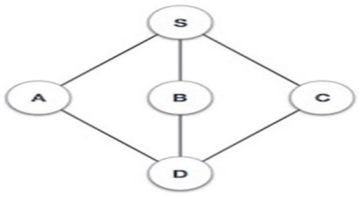

Figure 2

(b) Write the binary tree traversals for the diagram shown in Figure 3. Write the function to perform inorder traversal. **[7M]**

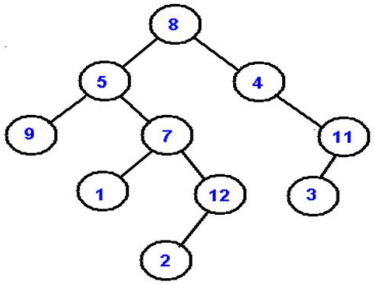

Figure 3

UNIT – V

9. (a) Show the result of inserting these keys into an initially empty AVL tree: 34, 56, 74, 23, 19, 83, 23, 12, 96. **[7M]**

   (b) Show the B-tree that results when deleting A, then deleting V and then deleting P from the B-tree shown in Figure 4 with a minimum branching factor of t=2. **[7M]**

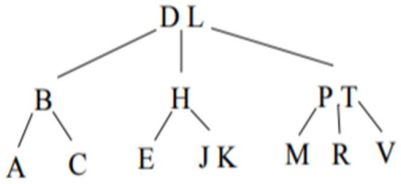

Figure 4

10. (a) Given the input 76,93,40,47,10,55 a fixed table size of 7 and a hash function H(X) = X mod 7, show the result after performing linear probing. **[7M]**

    (b) Load the keys 23, 13, 21, 14, 7, 8, and 15 in this order, in a hash table of size 7 using quadratic probing with c(i) = i^2 and the hash function: h(key) = key % 7. **[7M]**

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