

**2nd Semester MCA End Term Examination 2021-2022**

**DATA STRUCTURES(MCCS-T-PC-004)**

Duration: 03:00

Full Marks: 60

**1 Answer All**

- a Differentiate between static and dynamic data structure. 1
- b A [5] [7] is an integer matrix with indices starting from 0. Each element of the array requires two units of storage. The location of A [2][4] is at 540. If its elements are arranged in row-major order, then what is the location of A [4][5]? 1
- c In a circular queue, the initial values of front and rear are initialized as \_\_\_\_\_ and \_\_\_\_\_ respectively. 1
- d The following sequence of operations are performed on a stack:  
push(1), push(2), pop(), push(1), push(2), pop(), pop(), pop(), push(2), pop()  
Mention the sequence of popped out elements. 1
- e Write a recursive function to traverse a binary tree in in-order. 1
- f Differentiate between complete binary tree and strictly binary tree. 1
- g Which technique is used by Merge Sort to arrange a list of non-negative integers? 1
- h What is the best-case time complexity of Merge Sort algorithm? 1
- i What is its role in accessing a file from a large database? 1
- j What are the functions used in Hashing ? 1

**2 Answer All**

- a Write a function to insert a new node as the first node of a circular linked list. 3
- b Stepwise evaluate the postfix expression  $6\ 2\ 3\ +\ -\ 3\ 8\ 2\ /\ +\ * \ 2^3\ +$  using stack. 3
- c Write a function to search a node in a binary search tree. 3
- d Step-wise sort the integers 92, 99, 90, 91, 89, 95, 94, 93, 98 in ascending order by using Bubble sort algorithm. 3
- e What is hashing? Describe one hashing technique with an example. 3

**3 Answer any One**

- a Write a program using function to display the largest element and reverse an array. 7
- b Write a program in C to insert a new node after a given node of a double linked list. 7

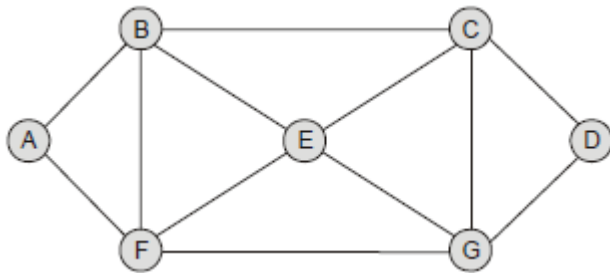
**4 Answer any One**

- a Write a menu driven program in C to implement push, pop and display operations on a stack. 7
- b Convert the following infix expression into equivalent postfix expression using stack.  
 $A^B * (C/D) - (E+F)/(G^H)$  7

**5 Answer any One**

- a Show the steps of the DFS traversal for the following graph assuming node A as the starting vertex.

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- b Create 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

7

**6 Answer any One**

- a Explain the divide and conquer process for sorting the following elements using Merge Sort-

7

14, 7, 3, 12, 9, 11, 6, 12, 45, 26

- b Write a program in C to arrange a given list of integers in non-decreasing order using Quick Sort algorithm. Also mention the time complexity of this algorithm.

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**7 Answer any One**

- a Consider a hash table of size 10. The hash function uses the division method with remainder modulo 7, namely,  $H(k) = (k \% 7) + 1$ . Construct the hash table ( initially which is empty ) with the following set of key values: 10, 6, 20, 11, 4, 3, 7. Consider that Linear Probing method is to be used if collision occurs during the insertion of any key into the hash table. Find out the total number of collisions occurred.

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- b What do you mean by Hashing ?Describe various hashing techniques with example.

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