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S.E. (Information Technology) (Sem-III) (Revised Course 2016-2017)  
EXAMINATION Nov/Dec 2019  
Data Structures

[Duration : Three Hours]

[Total Marks : 100]

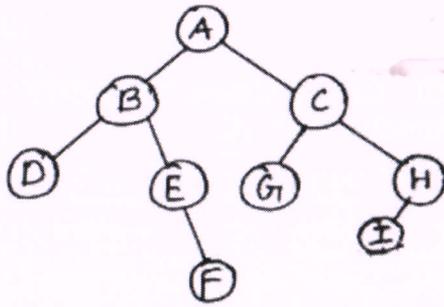
Instructions:

- 1) Answer any **five** questions by selecting **two** questions from **Part A** and **two** from **Part B** and **one** question from **Part C**
- 2) Make suitable assumptions if required.

**Part A**

Instruction: Answer any two questions from the following.

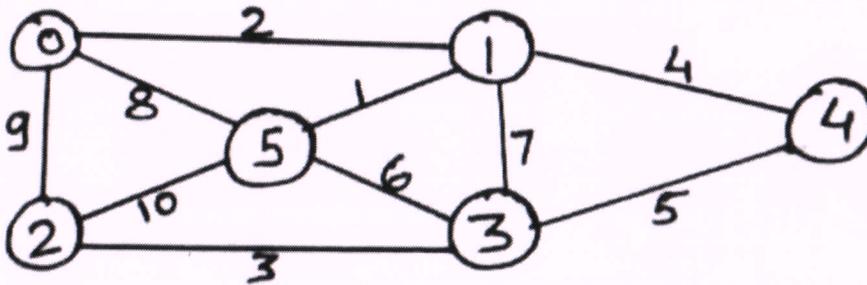
- Q.1**
- a) What is data structures? Give examples of linear and non-linear data structures and their applications. [5]
  - b) Differentiate between iterative function and recursive function. Write recursive function to find factorial of a number. [7]
  - c) Write a function to count the number of occurrence of element in a double linked list [6]
  - d) Give two important applications of priority queue data structures. [2]
- Q.2**
- a) Implement queue using single linked list [8]
  - b) Convert following expression from infix to prefix and evaluate  $(10+2)/2*3-8/1+3-2$  [6]
  - c) What is circular queue? Explain in details its working. [4]
  - d) Give some application where tree data structure can be used. [2]
- Q.3**
- a) Construct binary tree from inorder and preorder traversal  
Inorder: 35 26 93 21 68 Preorder: 68 21 93 26 35 [6]
  - b) Write a "C" function to count the number of leaf nodes in a binary tree. [3]
  - c) Construct binary search tree whose postorder traversal is  
10 11 40 48 44 32 65 73 88 77 72 56 [5]
  - d) Perform following traversals on the given tree. [6]
    - i) Inorder
    - ii) Preorder
    - iii) Postorder



Part-B

Instruction: Answer any two questions from the following.

- Q.4 a) Construct the minimal spanning tree for the graph shown below [6]



- b) With suitable example explain depth first traversal algorithm [6]
- c) Write C program to perform radix sort on the given data. [6]  
 89 63 75 60 70 49 23 45 78 36 21 98 51
- d) List important characteristics of good hash function. [2]

- Q.5 a) Write C program to implement bubble sort. Also trace with an example [6]

- b) Show how this input is sorted using Heap sort [8]  
 12 45 21 76 83 97 84 15

- c) Write C program to create adjacency matrix for any inputted graph. [6]

- Q.6 a) Mention different types of collision resolving techniques. [6]

- b) Write C function to traverse graph using breadth first traversal method. [8]

- c) Construct binary search tree for the following data and perform tree sort. [6]  
 67 45 23 12 78 32 55 90 56

Part C

Instruction: Answer any one questions from the following

- Q.7
- a) Devise a representation for a list where insertions and deletions can be made at either end. Write functions for inserting and deleting at either end. [8]
  - b) Discuss following with reference to trees. [6]
    - i) Height of the tree
    - ii) Complete Binary Tree
    - iii) Expression tree
    - iv) Sibling
    - v) Full Binary Tree
    - vi) Strictly binary tree
  - c) Write a program to sort data using selection sort. [6]
- Q.8
- a) Construct AVL tree for the following data. Show step by step construction. [6]  
40 58 87 98 23 14 78 12
  - b) Explain how merge sort works with the help of suitable example. Write function to merge two sorted files. [8]
  - c) Explain Dijkstra's algorithm to find shortest path with suitable example. [6]