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MANIPAL INSTITUTE OF TECHNOLOGY, MANIPAL 576104
(Constituent College of Manipal University)



THIRD SEMESTER B.TECH. (IT/CCE) DEGREE MAKEUP EXAMINATION, JAN - 2016
SUBJECT: DATA STRUCTURES (ICT-205 / ICT-251)
(REVISED CREDIT SYSTEM)

TIME: 3 HOURS

03/01/2016

MAX. MARKS: 50

Instructions to candidates

- Answer any **FIVE FULL** questions
- Missing data, if any, may be suitably assumed

- 1A. Explain multiple queue concept. Write a complete C++ program to implement multiple queues.
- 1B. Explain different types of constructor with suitable example.
- 1C. Write a recursive user defined function to find the GCD of two numbers. Write a main function to read the two numbers and pass it to the GCD function.
(5+3+2)
- 2A. Write a class definition for implementing a stack data structure. Use this stack class to convert a given infix expression to a prefix expression. Show the contents of the stack at each step.
Infix expression: $A + (B * C - (D / E - F) * G) * H$
- 2B. Explain with suitable example, how stacks can be used in (i) recursion (ii) finding whether the string is a palindrome or not.
- 2C. Consider a sparse matrix represented using array of objects. Write a user defined function which takes this sparse matrix as an argument and displays the corresponding 2D matrix.
(5+3+2)
- 3A. Write a menu driven program which performs the following operations on doubly linked list.
- Insert a node at the end
 - Delete a specific element given as input by the user
 - Reverse the List
 - Display the contents of the list.
- 3B. Write user defined functions to:
- Delete duplicate nodes from a singly linked list.
 - Delete the last node of the singly linked list and append it at the beginning of the list.
- 3C. What is time complexity? Explain with suitable example.
(5+3+2)
- 4A. Define max heap. Explain with an example. Write user defined functions to insert an element into a max heap and delete an element from a max heap.
- 4B. Explain the significance of threaded binary tree. Show the memory representation for an empty threaded tree. Draw the threaded representation for the tree given in Figure Q.4B.
- 4C. Given the adjacency matrices for an undirected graph and a directed graph, how to find the degree of a vertex?
(5+3+2)

5A. Write a complete C++ program to implement quick sort. For the following set of numbers show each step in the sorting process: 10, 20, 9, 19, 5, 11, 2

5B. Write a function to perform the depth first search traversal on a given graph. The parameter to the function is the index from which the traversal should start. For the adjacency matrix M given below, draw the equivalent graph. Also write the Breadth First Search and Depth First Search sequences starting from the vertex A in the graph. Consider the increasing numerical order for traversal.

$$M = \begin{matrix} & \begin{matrix} A & B & C & D & E \end{matrix} \\ \begin{matrix} A \\ B \\ C \\ D \\ E \end{matrix} & \begin{pmatrix} 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 1 & 1 \\ 1 & 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \end{pmatrix} \end{matrix}$$

5C. Construct an appropriate tree using the traversal sequence given below. Also write the level order traversal sequence for the constructed tree.

PREORDER: G B Q A C K F P D E R H

INORDER: Q B K C F A G P E D H R

(5+3+2)

6A. Write a complete C++ program to merge two singly linked list.

6B. What are the different representations of a generic tree? Explain with suitable example.

6C. What is hashing? Explain with example.

(5+3+2)

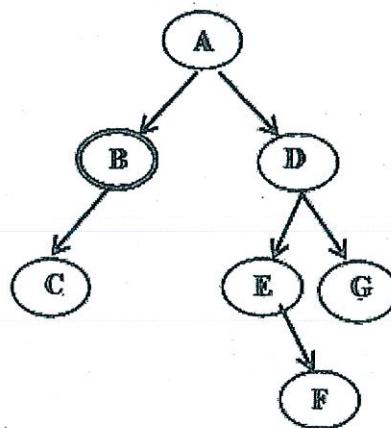


Figure Q.4B