Reg. No. | | | | | | | | | | | |

MANIPAL UNIVERSITY

THIRD SEMESTER B.S. (ENGG.) DEGREE EXAMINATION – MAY/JUNE 2013

SUBJECT: DATA STRUCTURES (CS 231)
(NEW SCHEME)
Thursday, May 30, 2013

Time: 10:00 – 13:00 Hrs.   Max. Marks: 100

✍ **Answer any FIVE full questions.**
✍ **All functions and programs should be well documented.**

1A.   Write a C++ recursive program to convert the given decimal number into binary.
1B.   Find the time complexity of a program which multiples two matrices.
1C.   Write a C++ template function to add two numbers. Show how can you add two numbers which are floating point, integer using the template function.

(5+5+10 = 20 marks)

2A.   Write a complete C++ code to check if a string is a palindrome or not using stack.
2B.   Convert the following expression to postfix and prefix:
      8 - 6 * (1 + 4 * 9 – (3 -7 / 2 * 5 + 6))
2C.   Implement queues for string of characters. Implement qfull(), qempty(), addtoq(), deletefromq(), dispalyq().

(5+5+10 = 20 marks)

3A.   Write a C++ code to find the number of nodes present in a singly linked list.
3B.   Write a C++ code to create a binary tree.
3C.   Write C++ functions to:
      i)   create a doubly linked list
      ii)   delete a node with a given value in the list
      iii) display the doubly linked list
      Write main function to implement this.

(5+5+10 = 20 marks)

4A.   Write a C++ program to valuate the expression tree given the postfix expression.
4B.   Get the postorder, preorder and inorder traversal for a binary tree, generated on inserting the following values:
      10, 5, 30, 18, 12, 9, 8
4C.   Generate the AVL tree for each value accepted from the user. Specify the type of rotation carried out.
      3, 10, 5, 9, 1, 7, 15, 2, 4, 8, 12

(5+5+10 = 20 marks)

5A.   Write C++ code to sort the elements in an array using quick sort.
5B.   Write a C++ code to search for an element using linear search. Analyze the time complexity for the best, worst and average cases.
5C.   Show the steps required to sort the following set of numbers using merge sort:
      3, 10, 5, 9, 1, 7, 15, 2, 4, 8, 12

(7+8+5 = 20 marks)

6A. For the graph given below (fig 6A) find the DFS and BFS from all the nodes assuming the neighbors in the linked list are added in increasing order of their vertex number.
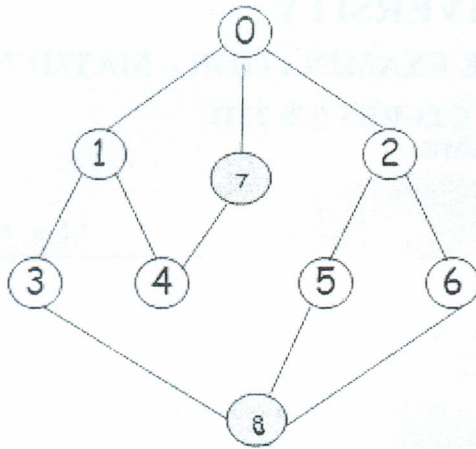

Fig. 6A

6B. Using all pair shortest path algorithm, find the distance matrix to find shortest path between all the vertices for the following graph (fig 6B):
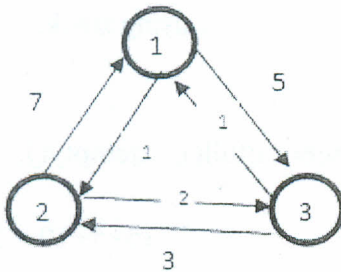

Fig 6B

6C. Explain the properties associated with graphs.

(7+8+5 = 20 marks)

7A. Explain the concept of digit analysis during hashing.

7B. Explain the concept of linear probing during hashing. Why is it essential? Explain with an example.

7C. Give a C++ code to implement transitive closure.

(4+6+10 = 20 marks)

8. **Write short notes on:**

8A. Chaining during hashing

8B. Tree properties

8C. Recursion and iteration

8D. Stack applications

8E. Time complexity of sorting algorithms

(4×5 = 20 marks)

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