

MANIPAL UNIVERSITY**THIRD SEMESTER B.S. (ENGG.) DEGREE EXAMINATION – DECEMBER 2012****SUBJECT: DATA STRUCTURES (CS 231)**
(NEW SCHEME)

Friday, December 14, 2012

Time: 10:00 – 13:00 Hrs.

Max. Marks: 100

- ✍ **Answer any FIVE full questions.**
✍ **Properly document all algorithms and programs.**

- 1A. Explain with an example, how to analyse the performance of an algorithm.
1B. Explain with an algorithm, evaluation of a postfix expression using stack.
1C. In a circular queue, explain the conditions that differentiate between empty queue and full queue. Explain the advantages of circular queue over linear queue.

(6+8+6 = 20 marks)

- 2A. How does doubly linked list differ from singly linked list? Explain.
2B. Convert the following infix expression into postfix expression:
i) $(A + B) * C / (A + D)$
ii) $(a + b + (d + e) / m)$
2C. Write an algorithm for PUSH and POP operations of a stack implemented using linked list.

(6+6+8 = 20 marks)

- 3A. Write an algorithm to insert a node:
i) At the rear end
ii) At the front end of a doubly linked list
3B. Write a recursive algorithm and C++ code for the pre-order traversal of a binary tree.

(10+10 = 20 marks)

- 4A. Give the recursive functions for inorder and preorder traversal of a binary tree.
4B. Write an algorithm to find the mirror image of binary tree.

(10+10 = 20 marks)

- 5A. From the following list of numbers construct the binary search tree.
14, 15, 4, 9, 7, 18, 3, 5, 16, 4, 20, 17, 9, 14, 5
5B. What is an AVL tree? Why height balancing is required?
For the given sequence, create AVL tree (show each step with all rotations)
H, I, J, B, A, E, C, F, D

(10+10 = 20 marks)

- 6A. What is the requirement of a Binary Search Algorithm? Write Binary search algorithm and give its average time complexity.
6B. Explain Heap sort algorithm with an appropriate example.

(10+10 = 20 marks)

7A. What is meant by a Hashing function? With examples, explain any two hashing functions.

7B. Write a C++ program for sorting a list of numbers using quick sort.

(10+10 = 20 marks)

8A. With an example, explain in detail, depth first graph traversal algorithm.

8B. Write short notes on any two of the following:

i) Adjacency Matrix

ii) Big Oh Notation

iii) Adjacency List

(10+10 = 20 marks)

