MANIPAL UNIVERSITY

FIRST SEMESTER ME (MEDICAL SOFTWARE / EMBEDDED SYSTEMS / EMBEDDED SYSTEMS & INSTRUMENTATION (ESIGELEC, FRANCE) / EMBEDDED & WIRELESS TECHNOLOGY / COMPUTING TECHNOLOGIES & VIRTUALIZATION) THIRD SEMESTER MSc. TECH (VLSI DESIGN / EMBEDDED SYSTEMS / EMBEDDED & INSTRUMENTATION (ESIGELEC, FRANCE) / EMBEDDED & WIRELESS TECHNOLOGY) DEGREE EXAMINATION – NOVEMBER 2015

SUBJECT: MMS 601/ESD 601/ESI 601/EWT 601/VIR 601/EDA 601/ESD 601/ESI 601/EWT 601

DATA STRUCTURES AND ALGORITHMS

Monday, November 23, 2015

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

✍ **Answer ALL the questions.**

1. Write the data structures required to implement single linked list. Write functions to add an element at the tail position and count the number of elements in the list.

(4+4+2 = 10 marks)

2. With required data structures, write functions to create stack, push and peek element from linked list based stack.

(3+2+3+2 = 10 marks)

3. Give the data structures required for array based queue. Write functions to add element, count number of elements in the queue and check whether queue is full.

(3+3+2+2 = 10 marks)

4. Write an algorithm for deleting an item from binary search tree. Give example for different cases.

(10 marks)

5. Implement quick-sort. Illustrate the working with an example. Discuss its time complexity.

(6+2+2 = 10 marks)

6. Write the following algorithms:
6A. All pairs shortest path
6B. Knapsack problem

(5 marks × 2 = 10 marks)

7. With required data structure, write function for BFS traversal of a graph. Illustrate this with an example.

(3+5+2 = 10 marks)

8. Let $w = \{5,7,10,12,15,18\}$ and m = 30. Find all possible subsets of w that sum to m using back tracking. Draw the portion of the state space tree is generated.

(10 marks)

9. Write divide and conquer algorithms for finding minimum and maximum elements from list. Trace this with suitable example.

(6+4 = 10 marks)

10. Write a function to delete all duplicate elements from double linked list. What is the time complexity?

(8+2 = 10 marks)