		Reg. 110.											
प्रज्ञानं ब्रह्म	MANIPAL INSTITUTE OF TECHNOLOGY, MANIPAL 576104 (Constituent College of Manipal University)												WER
INSPIRED BY LIFE FOURTH SEMESTER B.TECH. DEGREE END SEMESTER EXAMINATIONS, MAY – 2016 SUBJECT: OPEN ELECTIVE - I:DATA STRUCTURES (ICT 340) (REVISED CREDIT SYSTEM)													
	TIME: 3 HOURS	17/05	/2016	6			MAX	K. M/	ARK	S: 50			
Instructions to candidates													
• Answer any FIVE FULL questions.													
• N	fissing data if any may be suitably ass	sumed											

Rog No.

- 1A. Write functions for the following operations on a double ended queue.
 - a) Delete rear
 - b) Insert front
 - c) Check for underflow
 - d) Check for overflow
- Convert A+(((B-C)*(D-E)+F)/G)\$(H-J) to postfix and prefix. 1B.
- List and explain different methods of measuring the performance of an algorithm. Which is the 1C. most accepted method and why?

[5+3+2]

- 2A. What is a circular queue? Write functions to add and delete operations on it. Write the state of the circular queue with maximum size 8 after performing each of the following operations: add(10), add(20), add(30), delete(), delete(), add(40), add(50), delete(), add(60), delete(), delete(), add(70)
- Write a function to exchange the smallest and largest elements in a singly linked list. 2B.
- What is a heap? Explain different types of heaps with an example for each. 2C. [5+3+2]
- 3A. Write a function to delete an element from a Binary Search Tree considering all the cases.
- 3B. Construct the binary tree given the following postorder, preorder and inorder traversals. Postorder: EDBKGHFCA Preorder: ABDECFGKH Inorder: DEBACKGFH
- 3C. Let G = (V, E) be a directed graph. Let |V| = n; |E| = e. Prove the following:
- $0 \le e \le n(n-1)$ i.
- $\sum_{i=1}^{n} d_{i}^{\text{in}} = \sum_{i=1}^{n} d_{i}^{\text{out}} = e.$ ii. [5+3+2]
- 4A. List different representations of graphs? Give examples. Traverse the graph shown in Figure.Q.4A using Depth First Search. Also write the function to perform the same.



Figure Q.4A

- 4B. Write a function to search an element in an array using binary search technique.
- 4C. Construct the Binary Search Tree given the following elements:
- 10, 5, 15, 16, 90, 34, 67, 89, 17, 2, 24, 45, 23, 11

[5+3+2]

- 5A. Write the necessary functions to sort a set of numbers using quick sort. Trace your algorithm to sort the following numbers using the function.
 12, 1, 34, 23, 67, 45, 34, 78, 14, 6, 33, 66
- 5B. Write a function to evaluate a postfix expression.
- 5C. Write a function to count the number of leaf nodes in a binary tree.

[5+3+2]

- 6A. What is a sparse matrix? Write a function to find the transpose of a sparse matrix.
- 6B. Write a function to perform binary search operation and write the difference between linear search and binary search.
- 6C. Differentiate between malloc() and calloc() function with an example for each. [5+3+2]