USN | | | | | | | | | | 　　　　　　　　　　　　　　　　　　　**10CS35**

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Data Structures with C

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　　　　　　　　　Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
atleast TWO questions from each part.

PART – A

1　a.　What are the various memory allocation techniques? Explain them with example. **(06 Marks)**
　　b.　What is recursion? What are the various types of recursion explain with example. **(06 Marks)**
　　c.　What is a magic square? What is the procedure given by coxeter to generate the magic square? **(08 Marks)**

2　a.　Point out the differences between malloc( ) and calloc( ). **(04 Marks)**
　　b.　Write an algorithm to add two polynomials using abstract data type polynomial. **(08 Marks)**
　　c.　Write an algorithm to search for an element in the sparse matrix represented as a triple. **(08 Marks)**

3　a.　Define stack, write an ADT of it. **(04 Marks)**
　　b.　Convert the following infix to postfix notations.
　　　　i)　$((A + (B - C)*D)^E + F)$
　　　　ii)　$X^Y^Z - M + N + P/Q$. **(06 Marks)**
　　c.　Write an algorithm to implement queue full and queue empty functions for the non – circular queue. **(10 Marks)**

4　a.　What are linked lists? Point out its types and how a linked list is represented in 'C'? **(04 Marks)**
　　b.　Write a 'C' functions to insert an item at the front end of the list. **(04 Marks)**
　　c.　What are double – linked lists. Explain the procedure or a 'C' function how to insert a node at the front end and at the rear end. **(10 Marks)**
　　d.　Point out any two differences between single and double link lists. **(02 Marks)**

PART – B

5　a.　Define the following :　i) Strictly binary tree　　ii) Skewed tree
　　　　　　　　　　　　　　　iii) Complete binary tree　　iv) Binary search tree. **(04 Marks)**
　　b.　Consider a binary tree, given in Fig.Q5(b).
　　　Write the preorder, postorder and inorder traversals of the binary tree of Fig.Q5(b) **(06 Marks)**
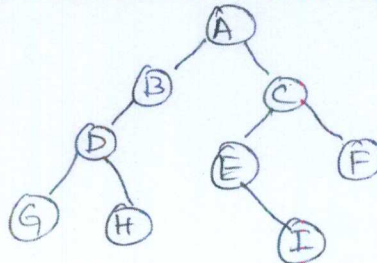

Fig.Q5(b)

　　c.　Write a 'C' functions to traverse the tree in inorder, preorder, and postorder level. **(06 Marks)**
　　d.　What are threaded binary trees? What are its types? How they are different from normal binary trees. **(04 Marks)**

6   a.   What is a binary search tree? Explain how to insert an element in it.   **(05 Marks)**

     b.   Consider the following forest given in Fig. 6(b) and convert the forest into a binary tree.
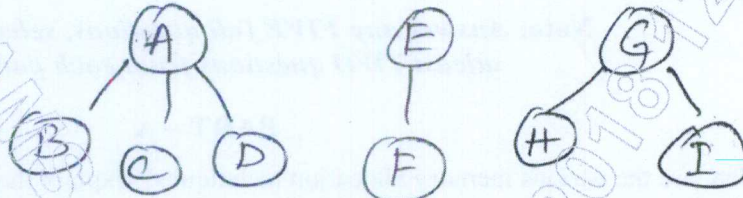   **(05 Marks)**

Fig. Q6(b)

     c.   What is a selection tree? What are its types and explain them briefly.   **(04 Marks)**

     d.   What is an adjacency matrix and adjacency list explain both with an example.   **(06 Marks)**

7   a.   What is single ended and double ended priority queues?   **(03 Marks)**

     b.   What is a binomial heap? What are the types of binomial heaps?   **(06 Marks)**

     c.   What is a Fibonacci heap? What are the types of Fibonacci heaps?   **(06 Marks)**

     d.   What is a paring heap? What are its types?   **(05 Marks)**

8   a.   What is an AVL tree? Write an algorithm to create an AVL tree.   **(10 Marks)**

     b.   What is a Red Black tree? What is the rank of a node in a red-black tree? How a red–black tree can be represented?   **(10 Marks)**

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