GANPAT UNIVERSITY

B. Tech SEMESTER: IV Computer Engineering / Information Technology
Regular Examination April - June 2015
2CE403 / 2IT403: Data Structure

Time: 3 Hours]

[Total Marks: 70

Instructions:
1. Figures to the right indicate full marks
2. Each section should be written in a separate answer book
3. Be precise and to the point in your answer

SECTION-I

Q-1 **[A]** Differentiate following term: [6]
1) Linear Data Structure and Non-linear Data Structure
2) Strictly Binary Tree and Full Binary Tree
3) Directed Graph and Undirected Graph

[B] What is Priority Queue? Write a user defined function to insert and delete an element in priority queue. [6]

OR

Q-1 **[A]** Explain the algorithm for Quick sort with a suitable example. [6]

[B] What is queue structure? List out various types of queues. Explain any **two** types of Queues in detail with example. [6]

Q-2 **[A]** Write an algorithm for BFS to traverse the graph. Also find the traversal sequence for given fig. Consider node E as root. [6]
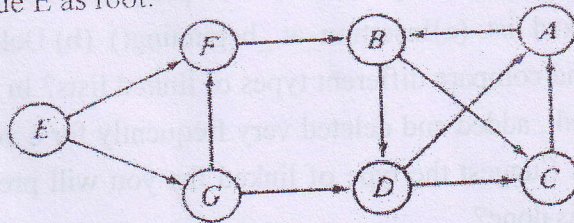
[B] Trace Heap Sort Algorithm for following data: [5]
30 50 22 60 55 77 55 66 33 85 90

OR

Q-2 **[A]** Explain the algorithm for Selection sort with a suitable example. [6]

[B] Discuss linear search and binary search. Which technique is better and justify by comparing time complexities? Write an algorithm for Binary Search. [5]

Q-3 **[A]** Draw Binary tree from given general tree. [5]
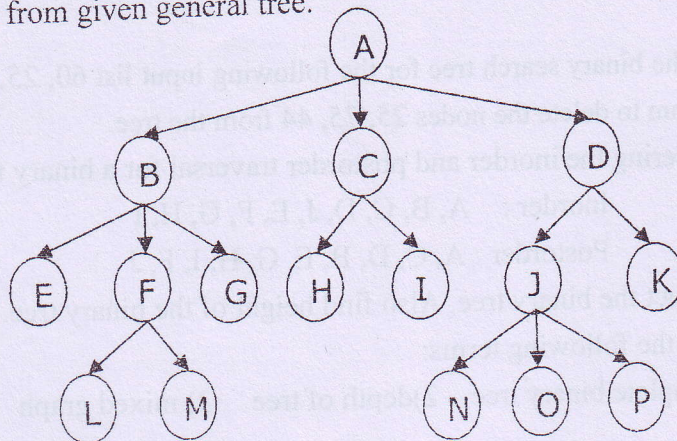
[B] Construct binary tree for the given prefix expression: [5]

$- * A + B C / D ^ E * F G$

[C] Write the time complexity for the following sorting algorithms in best case & worst case: [2]
a) Bubble sort   b)Quick sort   c)Selection sort   d)Merge sort

Q-4 **[A]** Write an algorithm or pseudo code to implement Tower of Hanoi problem. Show the [6] moves for 3 discs (disc3>disc2>disc1) from source to destination peg using one auxiliary peg.

[B] How postfix expression can be useful in evaluating values of mathematical expression [6] instead of infix expression? Using Stack, convert the following infix expression into postfix expression & then evaluate the value using postfix expression. Show the status of stack after each step. (a) 3*2+1-6/2+3

OR

Q-4 **[A]** Write algorithm or pseudo code or program to implement following stack functions [6] using array:
  a) Push() to insert an element.
  b) Pop() to remove an element.
  c) Peep() to read n^{th} element from top of stack

[B] Using Stack, convert the following infix expression into postfix expression. Show the [6] status of stack after each step.
  (a) ((A-B)*(C+D)*E)/F

Q-5 **[A]** Write an algorithm or pseudo code or program to implement following functions for [6] **Singly** linked list: (a)Insertion_at_beginning() (b) Deletion_at_end()

[B] List out and compare different types of linked lists? In an application nodes are need to [5] be accessed, added and deleted very frequently for a very large number of nodes in the linked list. Suggest the type of linked list you will prefer so that minimum number of traversals is done?

OR

Q-5 **[A]** Write an algorithm or pseudo code or program to implement following functions for [6] **doubly** linked list: (a)Insertion_at_end() (b) Deletion_at_beginning()

[B] Differentiate arrays with linked lists? Write a function to display values of nodes in [5] reverse order in Doubly linked list. Assume suitable structure.

Q-6 **[A]** Draw the binary search tree for the following input list 60, 25,75,15,50,66,33,44. Trace an [4] algorithm to delete the nodes 25, 75, 44 from the tree.

[B] Considering the inorder and postorder traversal for a binary tree: [4]
  Inorder :   A, B, C, D, J, E, F, G, H, I
  Postorder : A, C, D, B, E, G, H, I, F, J
Construct the binary tree. Also find height of the binary tree.

[C] Define the following terms: [4]
  1) Complete binary tree   2)depth of tree   3) mixed graph   4) acyclic graph