Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY
Winter Examination-2018

Subject Name : Data and File Structure

Subject Code : 4TE03DFS1 **Branch: B.Tech (CE)**

Semester : 3 **Date : 06/12/2018** **Time : 02:30 To 05:30** **Marks : 70**

Instructions:
(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

a) Define threaded binary tree.
b) Define various data types.
c) The number of different directed trees with 3 nodes are
i. 2 ii. 4 iii. 3 iv. 5
d) Give best case, worst case and average case complexity of bubble sort.
e) What do you mean by BFS and DFS?
f) Define directed graph.
g) Obtain expression tree from following postfix representation:
ab+cde+**
h) Define in degree and out degree of a vertex.
i) Define 2-3 tree.
j) When in order traversing a tree resulted E A C K F H D B G; the preorder traversal would return:
i. FAEKCDBHG ii. FAEKCDHGB
iii. EAFKHDCBG iv. FEAKDCHBG
k) The depth of a complete binary tree is given by
i. $D_n = n \log_2^n$ ii. $D_n = n \log_2^n+1$ iii. $D_n = \log_2^n$ iv. $D_n = \log_2^n+1$
l) Let the following circular queue can accommodate maximum six elements with the following data
front = 2 rear = 4 queue = _____; L, M, N, ___, ___
What will happen after ADD O operation takes place?
i. front = 2 rear = 5 queue = _____; L, M, N, O, ___
ii. front = 3 rear = 5 queue = L, M, N, O, ___
iii. front = 3 rear = 4 queue = _____; L, M, N, O, ___
iv. front = 2 rear = 4 queue = L, M, N, O, ___
m) The number of leaf nodes in a complete binary tree of depth d is
i. 2^d ii. [2^(d-1)]+1 iii. [2^(d+1)]+1 iv. (2^d)+1
n) Define almost complete binary tree.

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

a) What is doubly linked list? Give algorithms for insertion and deletion operations on doubly linked list.

b) What is Stack? List out different operation of stack. Write algorithm for any three operations of stack.

Q-3 **Attempt all questions** **(14)**

a) What is queue? Write a program for insertion and deletion operations on circular queue.

b) Give algorithms for linear search and binary search. Also discuss time complexity of both algorithms.

Q-4 **Attempt all questions** **(14)**

a) What is hash clash? Explain Primary Clustering, secondary clustering, rehashing and double hashing.

b) Define an AVL tree. Obtain an AVL tree by inserting one integer at a time in the following sequence.
150, 155, 160, 115, 110, 140, 120, 145, 130, 147, 170, 180
Also delete 140 and 170.

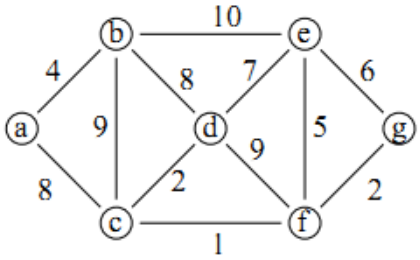
Q-5 **Attempt all questions** **(14)**

a) Insert the following letters into what is originally an empty B-tree of order 5:
C N G A H E K Q M F W L T Z D P R X
Then delete H, T, R, E from given tree.

b) Convert (A + B) * C – D ^ E ^ (F * G) infix expression into reverse polish format showing stack status after every step in tabular form.

Q-6 **Attempt all questions** **(14)**

a) Define spanning tree. Find minimum spanning tree using Prim's and Kruskal's algorithm for given graph:



b) Construct binary search tree for sequence 13, 3, 4, 12, 14, 10, 5, 1, 8, 2, 7, 9, 11, 6, 18 and give in-order, pre-order and post-order traversal. Also delete 7 and 12 and after deletion insert 15 in BST.

Q-7 **Attempt all questions** **(14)**

a) Explain quick sort with an example. Also give an algorithm for quick sort.

b) Explain sequential file structure and index sequential file structure in detail.

Q-8 **Attempt all questions** **(14)**

a) What do you mean by convex hull? Write a short note on Graham's scan algorithm.

b) What is hash function? Explain various hashing functions in detail.