ALCCS - NEW SCHEME

Code: CT11 **Subject: DATA STRUCTURES THROUGH C**
Time: 3 Hours **Max. Marks: 100**

SEPTEMBER 2010

NOTE:

- **Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.**
- **Parts of a question should be answered at the same place.**

Q.1 **(7×4)**

a. State two important differences between a pointer and an array.

b. Assume A = 1, B = 2, C = 3. Evaluate the following postfix expression:

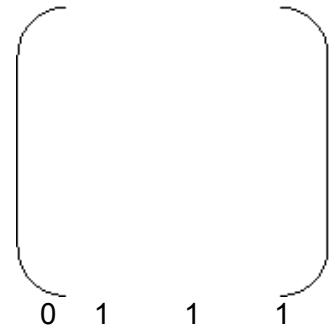
ABC + * C B A - + *

c. Write a function, length, in C that will return the number of nodes in a given singly linked list.

d. Represent the polynomial $3x^{14} + 2x^{8} - 1$ using linked list.

e. Do the preorder and inorder sequences of a binary tree uniquely define the binary tree? Justify your answer.

f. Let the adjacency matrix of a graph G be given as



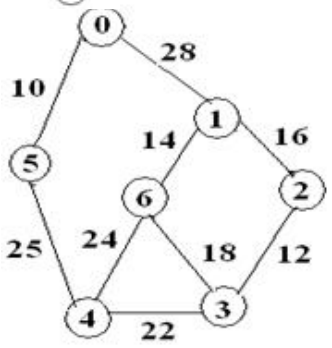
0	1	1	1
1	0	1	1
1	1	0	1
1	1	1	0

find the graph G?

g. Determine whether the following binary search tree is an AVL tree? Give reasons for your claim.

Q.2 a. Write a C program to ode at the end of a singly linked list.

b. Let G be an undirected given by



Using Kruskal's algorithm generate a minimum cost spanning tree. **(9+9)**

Q.3 a. Write an algorithm to determine the number of nodes in a given binary tree?

b. For the following input list of numbers
14, 15, 4, 9, 7, 18, 3, 5, 16, 4, 20, 17, 9, 14, 5
Find the binary search tree? **(9+9)**

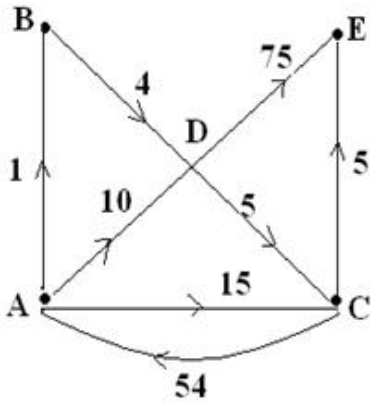
Q.4 a. Write a function in C program that traverses a threaded binary tree in preorder.

b. Show that the maximum number of nodes in a binary tree of depth K is
$2^k - 1, k \geq 0$ **(9+9)**

Q.5 a. With an example, explain the working of heap sort algorithm.

b. Find the shortest path using Dijkstra's algorithm in the given weighted directed graph from A to E. Explain the steps.

(9+9)



Q.6 a. Discuss boundary tag method and write a C program for freeing memory blocks.

b. If a binary search tree with n nodes is well balanced, what is the approximate number of comparisons of keys needed to find a target? What is the number if the tree degenerates to a chain? **(9+9)**

Q.7 Write short note on any **THREE** of the following:-

(i) Circular queue and priority queue
(ii) Huffman trees
(iii) Shell sort
(iv) Game trees

. **(3×6)**