(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1246 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. III) ODD SEMESTER THEORY EXAMINATION 2013-14

DATA STRUCTURES

Time : 3 Hours *Total Marks : 100*

Note :–Attempt all questions.

SECTION–A

1. Attempt all parts : **(10×2=20)**

   (a) How a pointer to a function is declared in 'C' ?

   (b) What is a Data Structure ? What are the factors that influence the choice of a particular data structure ?

   (c) If there are 27 nodes in a complete binary tree, what will be its height and how many nodes will be in the last level ?

   (d) Convert the following infix expression to prefix expression : ((2 + 3) * 4 + (5* (6 + 7)* 8) + 9).

   (e) Give a recursive solution to the Towers of Hanoi problem.

   (f) What do you understand by activity network ? Explain.

   (g) What are the advantages of B^+ tree over B- Tree ?

   (h) Define complete graph and connected graph. How a graph is different from a tree ?

   (i) Obtain addressing formula for an element in three dimensional array represented in column major order.

   (j) What is a dequeue ? Explain.

SECTION–B

2. Attempt any **three** parts : (10×3=30)

(a) Discuss the representation of polynomial of single variable using linked list. Write 'C' functions to add two such polynomials represented by linked list.

(b) Write an algorithm to evaluate postfix expressions using stacks.

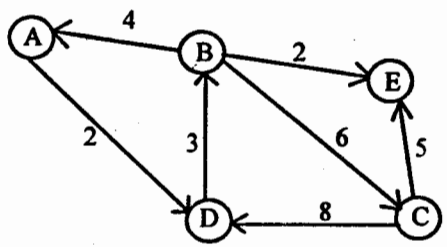
(c) Differentiate between fixed length and variable length encoding. Draw a Huffman tree for the following symbols whose frequency of occurrence in a msg is stated alongwith the symbol below :

A : 15, B : 6, C : 7, D : 12, E : 25, F : 4, G : 6, H : 1, I : 15
Decode the message 1110100010111011.

(d) Write an algorithm for Merge Sort. Show step by step sorting procedure for the following list of elements :

30, 12, 38, 8, 5, 15, 1, 40.

(e) Write Warshall's algorithm for all pair shortest path and find the all pair shortest paths for the graph given :



SECTION–C

Note:–Attempt all questions. (5×10=50)

3. Attempt any **two** parts :

(a) A m × n matrix is said to have a saddle point if some entry a [i] [j] is the smallest value in row i and largest value in column J. Write C prog. that determines the saddle point if one exists.

(b) Write a 'C' function that creates a new linear linked list by selecting alternate elements of a given linear linked list.

(c) Write an algorithm for insertion of an element in a doubly circular linked list.

4. Attempt any **two** parts :

(a) Write a C function to delete element from a circular queue implemented using array.

(b) Give a data structure to implement two stacks in same array. Write C function to implement push operation on both the stacks.

(c) Illurtrate the use of stack to convert the following infix expression to postfix : A* (B + C ^ D) – E ^F *(G/H).

5. Attempt any **two** parts :

(a) The order of nodes of a binary tree in inorder and post-order traversal are as follows :

In-order : B, I, D, A, C, G, E, H, F.

Post-order : I, D, B, G, C, H, F, E, A.

Draw the corresponding binary tree.

(b) Write a C function to insert elements in a BST.

(c) Construct an expression tree for the following algebraic expression :

(3a – b) ^ 2 (4 c + 2d) ^ 3.

6. Attempt any **two** parts :

(a) Use Prims algorithm to determine MST for the graph given in fig. 1.

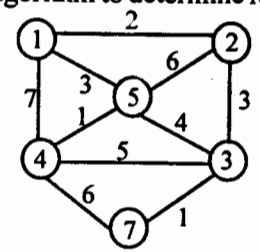


Fig. 1

(b) Consider the graph given in fig. 2.

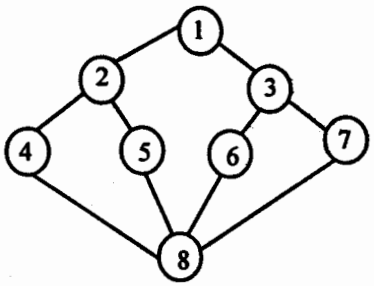


Fig. 2

Perform BFS beginning at vertex 1. List the vertices in which they are visited.

(c) Write Dijkastra algorithm for finding the shortest path from a source vertex.

7. Attempt any two parts :

(a) Show step by step creation of a heap for the following elements in the order shown :

25, 57, 48, 37, 12, 92, 86, 33.

(b) Show the trace of the Quick sort algorithm for the following data :

22, 55, 6, 7, 3, 66, 89, 56, 49, 65, 34, 67.

(c) Write short note on any one of the following :

(i) AVL trees

(ii) Big-oh Notation.