Paper Code: IC2217

M.Sc (Informatics) II Sem.-2017
Paper-IT-22, Data Structure Design Of Algorithms

Time: 3hrs *Maximum Marks:75*

(Write your Roll No. on the top immediately on receipt of this question paper)

(Answer any 5 Questions)

Q.1)

a) Write a 'C' function to find out the maximum, second maximum and third maximum number from an array of integers.

b) Assume a singly circular linked list containing integers. Write a function move() which would move a node forward by n positions in the linked list.

c) Suggest a suitable data structure for representation of imaginary numbers (a + ib)? Write functions for addition, subtraction and multiplication of two imaginary numbers

[3 * 5]

Q.2)

a) Convert the following infix expression using stack. Show in tabular form the changing status of stack (^ - exponent)

$A + (B * C - (D / E \wedge F) * G) * H$

b) Consider the following list of alphabetic characters.

DATASTRUCTURES

Assuming D to be the pivot, Use Quicksort algorithm to find final position of character D.

[9 + 6]

Q.3)

a) Write a 'C' function/algorithm to traverse a binary tree level by level. In each level the tree is traversed from left to right

b) Given the following data:

Dec, Nov, Oct, Sep, Aug, Jul, Jun, May, Apr, Mar, Feb, Jan

Create AVL tree. Show the steps and rotations

OR

Create a B Tree of order 5 with the following list of elements

1, 7, 6, 2, 4, 13, 8, 10, 5, 19, 9, 18, 24, 3, 12, 14, 20, 21, 16 **[6 + 9]**

(P.T.O)

Q.4)

a) Assume a list of names. We need to remove duplicates from the list. Which data structure will be most efficient for doing the same. Write functions for the following:

i. Search an item

ii. Add an item to data structure

iii. Delete an item from data structure

b) Use binary search to search for the name "rakesh" in the array of names. Show the action step by step.

ajay bhuvan brajesh charlie david navin prakash puneet rakesh sumit

[10 + 5]

Q.5)

a) Given adjacency matrix A of graph G (R, S, T, U, V)

	R	S	T	U	V
R	0	1	0	1	1
S	1	0	1	1	0
T	0	0	0	1	0
U	0	0	1	0	1
V	1	0	0	0	0

Use Warshall's algorithm for finding the path matrix. Draw transitive closure of the same.

b) How do we represent a graph in memory using linked representation? Use the graph of adjacency matrix in Q 5 a) to explain the same. Make provision to store INDEG, OUTDEG of vertex and WEIGHT of an edge.

[9 + 6]

Q.6)

a) Show the steps used in sorting the following numbers using radix sort

107 234 654 456 693 879 243 385 912 023 768

b) What are the measures for resolving collisions in hashing?

c) How to implement a priority queue using an array? Write algorithm to insert and delete elements from such a queue.

[3 * 5]