Subject Code: KCS301

PAPER ID-311107

Roll No: | | | | | | | | | | | | | |

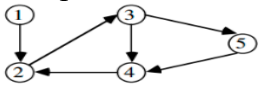
B. TECH
(SEM III) THEORY EXAMINATION 2020-21
DATA STRUCTURES

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

Q no.	Question	Marks	CO
a.	Define Time-Space trade-off.	2	1
b.	Differentiate Array and Linked list.	2	1
c.	Explain Tail Recursion with suitable example.	2	2
d.	Write the full and empty condition for a circular queue data structure.	2	2
e.	Examine the minimum number of interchanges needed to convert the array 90, 20, 41,18, 13, 11, 3, 6, 8,12, 7, 71, 99 into a maximum heap.	2	3
f.	Differentiate sequential search and binary search.	2	3
g.	Compute the Transitive closure of following graph. 	2	4
h.	Write short notes on adjacency multi list representation a Graph.	2	4
i.	What is the importance of threaded binary tree?	2	5
j.	Write short notes on min heap.	2	5

SECTION B

2. Attempt any *three* of the following:

Q no.	Question	Marks	CO
a.	Consider a multi-dimensional Array *A*[90] [30] [40] with base address starts at 1000. Calculate the address of A[10] [20] [30] in row major order and column major order. Assume the first element is stored at *A*[2][2][2] and each element take 2 byte.	10	1
b.	Evaluate the following postfix expression using stack. **2 3 9 * + 2 3 ^ - 6 2 / +** , show the contents of each and every steps. also find the equivalent prefix form of above expression. Where ^ is an exponent operator.	10	2
c.	Explain any three commonly used hash function with the suitable example? A hash function H defined as H(key) =key%7, with linear probing, is used to insert the key 37,38,72,48,98,11,66 into a table indexed from 0 to 6. what will be the location of key 11? Justify your answer, also count the total number of collisions in this probing.	10	3
d.	Write an algorithm for Breadth First search (BFS) and explain with the help of suitable example.	10	4
e.	If the in order of a binary tree is B,I,D,A,C,G,E,H,F and its post order is I,D,B,G,C H,F,E,A then draw a corresponding binary tree with neat and clear steps from above assumption.	10	5

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SECTION C

3. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	Consider the two dimensional lower triangular matrix (LTM) of order N ,Obtain the formula for address calculation in the address of row major and column major order for location LTM[j][k], if base address is BA and space occupied by each element is w byte.	10	1
b.	Write a C program to insert a node at k^{th} position in single linked list.	10	1

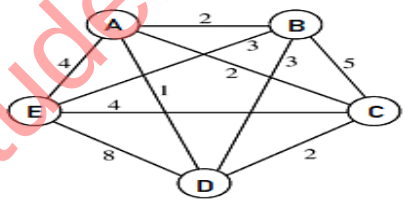
4. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	Convert the following infix expression to reverse polish notation expression using stack. $$x = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$	10	2
b.	Write a C program to implement stack using single linked list.	10	2

5. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	Write an algorithm for merge sort and apply on following elements 45,32,65,76,23,12,54,67,22,87.	10	3
b.	Write a C program for Index Sequential Search.	10	3

6. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	Describe Prim`s algorithm and find the cost of minimum spanning tree using Prim`s Algorithm. 	10	4
b.	Apply the Floyd warshall's algorithm in above mentioned graph (i.e. in Q.no 6a)	10	4

7. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	Write Short notes of following (a) Extended Binary Trees (b) Complete Binary Tree (c) Threaded Binary Tree.	10	5
b.	Insert the following sequence of elements into an AVL tree, starting with empty tree 71,41,91,56,60,30,40,80,50,55 also find the minimum array size to represent this tree.	10	5