

				Sub	ject	Coc	de: I	KCS	301
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.

 $2 \times 10 = 20$

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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	2	3
	array 90, 20, 41,18, 13, 11, 3, 6, 8,12, 7, 71, 99 into a maximum heap.		
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	10	1
	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.		
b.	Evaluate the following postfix expression using stack.	10	2
	$239 * + 23 ^ - 62 / +$, show the contents of each and every steps. also		
	find the equivalent prefix form of above expression. Where ^ is an		
	exponent operator.		
c.	Explain any three commonly used hash function with the suitable	10	3
	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.		
d.	Write an algorithm for Breadth First search (BFS) and explain with the	10	4
	help of suitable example.		
e.	If the in order of a binary tree is B,I,D,A,C,G,E,H,F and its post order is	10	5
	I,D,B,G,C H,F,E,A then draw a corresponding binary tree with neat and		
	clear steps from above assumption.		

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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	10	1
	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.		
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.	10	2
	$x = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$		
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	10	3.
	45,32,65,76,23,12,54,67,22,87.		
b.	Write a C program for Index Sequential Search.	10	3

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

Q no.	Question	Marks	СО
a.	Describe Prim's algorithm and find the cost of minimum spanning tree using Prim's Algorithm.	10	4
	E 4 1 2 3 3 5 C		
b.	Apply the Floyd warshall's algorithm in above mentioned graph	10	4
	(i.e. in Q.no 6a)		

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

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