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				Su	bjec	t Co	de:	KCS	S301	Ĺ
Roll No:										1

BTECH (SEM III) THEORY EXAMINATION 2021-22 DATA STRUCTURE

Time: 3 Hours Total Marks: 100

Note: Attempt all Sections. If you require any missing data, then choose suitably. SECTION A

Attempt all questions in brief. 1.

2X10	= 20

Attemp	of all questions in brief.	= 20
Q No	Questions	CO
(a)	Convert the infix expression (A+B) *(C-D) \$E*F to postfix. Give the answer without any spaces.	1
(b)	Rank the following typical bounds in increasing order of growth rate: $O(\log n), O(n^4), O(1), O(n^2 \log n)$	2
(c)	Draw the binary search tree that results from inserting the following numbers in sequence starting with 11: 11, 47, 81, 9, 61, 10, 12,	3
(d)	What does the following recursive function do for a given Linked List with first node as head? void fun1(struct node* head) { if(head == NULL) return; fun1(head->next); printf("%d ", head->data); }	4
(e)	Define a sparse matrix. Suggest a space efficient representation for space matrices.	5
(f)	List the advantages of doubly linked list over single linked list.	1
(g)	Give example of one each stable and unstable sorting techniques.	2
(h)	Write advantages of AVL tree over Binary Search Tree (BST)	3
(i)	What is tail recursion? Explain with a suitable example.	4
(j)	Write different representations of graphs in the memory.	5
	CECTION D	

SECTION B

2. Attempt any three of the following:

10X3 =	30
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Q No	Questions	CO
(a)	Write advantages and disadvantages of linked list over arrays. Write a 'C' function creating new linear linked list by selecting alternate elements of a linear linked list.	1
(b)	Write algorithms of insertion sort. Implement the same on the following numbers; also calculate its time complexity. 13, 16, 10, 11, 4, 12, 6, 7	2
(c)	Differentiate between DFS and BFS. Draw the breadth First Tree for the above graph.	3
(d)	Differentiate between liner and binary search algorithm. Write a recursive function to implement binary search,	4
(e)	What is the significance of maintaining threads in Binary Search Tree? Write an algorithm to insert a node in thread binary tree.	5

SECTION C

3.

1	0X1	= 1	10

Attempt	any one part of the following:	1 – 10
Q No	Questions	CO
(a)	Suppose a three dimensional array A is declared using A[1:10, -5:5, -10:5) (i) Find the length of each dimension and the number of elements in A (ii) Explain Row major order and Column Major Order in detail with explanation formula expression.	1



Printed Page: 2 of 2
Subject Code: KCS301
Roll No:

BTECH (SEM III) THEORY EXAMINATION 2021-22 DATA STRUCTURE

Attempt any one part of the following: ONO (a) (i) Use the merge sort algorithm to sort the following elements in ascending order. 13, 16, 10, 11, 4, 12, 6, 7. What is the time and space complexity of merge sort? (ii) Use quick sort algorithm to sort 15,22,30,10,15,64,1,3,9.2. Is it a stable sorting algorithm? Usity (ii) Using the graph as table of length 15 using open addressing with hash function h(k) = k mod 10 and linear probing. What is the resultant hash table? (iii) Differentiac between linear and quadratic probing techniques. Attempt any one part of the following: ONO (a) Use Dijkstra's algorithm to find the shortest paths from source to all other vertices in the following graph as shown below. Attempt any one part of the following: ONO Apply Prim's algorithm to find the shortest paths from source to all other vertices in the following graph. Attempt any one part of the following: ONO Ouestions (b) Apply Prim's algorithm to find alminimum spanning tree in the following weighted graph as shown below. Attempt any one part of the following: ONO Ouestions ONO Ouestions ONO Ouestions ONO (a) (i) Write an iterative function to search a key in Binary Search Tree (BST). (ii) Discuss disadvantages of recursion with some suitable example. (b) (ii) What is Recursion? (iii) Write a C program to calculate factorial of number using recursive and non-recursive functions. Attempt any one part of the following: ONO Ouestions ONO Ouestions	(b)	Discuss the representation of polynomial of single variable using linked list. Write	1
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		(11) Write a C program to reverse a string using stack.	