KONERU LAKSHMAIAH EDUCATION FOUNDATION
(Deemed to be University, Estd. u/s. 3 of UGC Act 1956)

B.Tech - Even Sem : Semester in Exam-I
Academic Year:2021-2022
21SC1202 - DATA STRUCTURES
Set No: 3

Time: **Max.Marks: 50**

S.NO	Answer All Questions	Choice	Options	Marks	CO	CO BTL	COI BTL
1.	Algorithm A requires 2^{n+1} secs and Algorithm B requires 2^{2n} secs to solve a problem. Which algorithm would you prefer for a problem instance with $n=10^6$ and justify your answer?	choice Q-2		4.5Marks	CO1	4	4
2.	Show that the worst-case running time complexity of quick sort sort is $O(N^2)$ and justify your answer?			4.5Marks	CO1	4	4
3.	A group of 9 friends are playing a game, rules of the game are as follows: Each member will be assigned with a number and the sequence goes like 107, 654, 10, 55, 99, 242, 135, 165, 47. Now they will be sorted in ascending order in such a way that tallest one will be sorted first. Now your task is to find the order of indices based on initial position of the given sequence and print the order of indices at the end of the iteration. Trace the above using insertion sort?	choice Q-4		8Marks	CO1	4	4

4.	Find time complexities of the following algorithms and give their asymptotic relations. Justify your answer?
	Algorithm A(int N):
	for(i=1; i<=N; i=i*2)
	{
	for(j=i; j>=0 ; j=j-1)
	{
	Printf("ABC");
	}
	}
	
	Algorithm B(int N):
	for(i=N; i>=1; i=i/2)
	{
	for(j=1; j<=i ; j=j+1)
	{
	Printf("DEF");
	}
	}
	
	Algorithm C(int N, int x): // x>0
	for(i=1; i<=N; i=i+x)
	{
	for(j=i; j>=0 ; j--)
	{
	Printf("GHI");
				8Marks	CO1	4	4

	} } }					
5.	John is a great problem solver. He found that most of his problems could be solved by following sorted order. Given an array A, you can decrement any element of the array by 1. This operation can be repeated any number of times. A number is said to be missing if it is the smallest positive number which is a multiple of 2 that is not present in the array A. You must find the maximum missing number after all possible decrements of the elements by implementing shell sort using C program?	choice Q-6	12.5Marks	CO1	4	4
6.	Write a C program to implement merge sort technique to arrange the values in descending order. Derive its time complexity for average case input?		12.5Marks	CO1	4	4
7.	Display the top two elements of the stack after the first * is evaluated if the postfix expression 212 118 57 / % 25 24 ^ * 12 25 * + is evaluated using stack. Note that ^ is exponential operator?	choice Q-8	4.5Marks	CO2	4	4
8.	Write a function to reverse the singly linked list?		4.5Marks	CO2	4	4
9.	Show the detailed contents of stack at every step in order to check whether the given expression (K-(A+M)*((S/N)^(G+C)) *(R-J) is balanced or not .	choice Q-10	8Marks	CO2	4	4
10.	Mr. John want to create an audio play list in his mobile. Initially list contains zero songs with an advance feature where the first song from the list will be played automatically after the last song gets completed. Now, he wishes to add N songs into the list with song numbers from 1 to N in sequential order. But he is very lazy to add the songs to the list. Help john to add all the songs into the playlist. Write a C program to implement the following operations of circular linked list on above scenario. a. Give the node structure for song b. Insert first N songs into list c. Display all songs		8Marks	CO2	4	4
11.	Write a C program to implement the following operations on stack using singly linked list? a. Push the given element into stack b. Pop the top of the stack c. Find minimum of the stack d. Display all the stack elements.	choice Q-12	12.5Marks	CO2	4	4
12.	Write a C program to implement the following operations on doubly linked list? a. Create list with N elements b. Sort the list in ascending order c. Search the given element in list		12.5Marks	CO2	4	4

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