BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION MO/SP20)**

CLASS: BTECH — **SEMESTER: III**
BRANCH: CS/IT — **SESSION: MO/2022**

SUBJECT: CS231 DATA STRUCTURES

TIME: 03 Hours — **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

Q.1(a)	If there are three loops in a nested form. "The outer loop will take more time compared to the innermost loop". Agree/ Disagree Justify.	[2]	CO1,BL1
Q.1(b)	Why does storing of sparse matrices need extra consideration? How are sparse matrices stored efficiently in the computer's memory?	[3]	CO1,BL2

Q.1(c)	Consider the following segment of C code:
	int j=1,n;
	while(j<=n)
	  j=j*2 ;
	Find the number of comparisons made in the execution of the loop for any n>0?
		[5]
		CO1
		BL3	

Q.2(a)	Is there any Overflow and underflow conditions in a CQ? Justify.	[2]	CO2,BL1
Q.2(b)	Is it a right choice to implement one stack using two queues? Justify.	[3]	CO2,BL2
Q.2(c)	Write an algorithm/pseudocode/ procedure to replace every element with the nearest greater element on the right of that element in an array of elements.	**[5]** CO2 BL3	
Q.3(a)	If the head of a linked list is pointing to kth element, then how will you get the elements before the kth element?	[2]	CO3,BL1
Q.3(b)	Write a procedure/algorithm to check a linked list is palindrome or not.	[3]	CO3,BL2
Q.3(c)	Write a procedure/algorithm to count the number of non-zero values in a circular link list.	[5]	CO3,BL3
Q.4(a)	Consider the following array of elements <89,19,50,17,12,15,2,5,7,11,6,9,100> The minimum number of interchanges needed to convert it into a max heap is?	[2]	CO4,BL1
Q.4(b)	Write the procedure for DFS. Explain with an example.	[3]	CO4,BL2
Q.4(c)	Write an algorithm/procure to find the element in BST which is closet to the given key. Explain with an example.	[5]	CO4,BL3
Q.5(a)	Given an array of 1,00,000-pixel color values, each of which is an integer in the range of [0,255]. Which sorting algorithm is preferable for sorting them. Explain.	[2]	CO5,BL1
Q.5(b)	Compare and contrast between Heap sort and Insertion sort.	[3]	CO5,BL2
Q.5(c)	Create a 3-way search tree for the data <45,29,32,49,63,18,27,30,31,36,39,46,47,54,59,61,67,72> Insert 23,45,67 and delete 9,36.	[5] CO5 BL3	

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