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

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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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