B. Tech Odd Semester Examination, February, 2023

Computer Science & Engineering

(3rd Semester)

Course No.: CSE-302

(Data Stucture)

Full Marks: 50

Pass Marks: 25

Time: 2 hours

Note:
1. Attempt any five questions.
2. Begin each answer in a new page.
3. Answer parts of a question at a place.
4. Assume reasonable data wherever required.
5. The figures in the right margin indicate full marks for the question.
6. All the mathematical symbols and abbreviations have their usual meanings.

1. (a) What is Data Structures? Explain the criteria that one must keep in mind, while choosing a data structure and an algorithm to solve a particular problem at hand. 2+3

   (b) Define ADT (abstract data type) 2

   (c) State the difference between linked list and arrays. 3

2. (a) Design an algorithm that takes two arrays, and returns true if the arrays are Disjoint, i.e. have no elements in common. 5

   (b) Write an algorithm to insert a number into a sorted list. 5

3. (a) Write short notes on the following:

(i) Multidimensional Array

(ii) Recursion 2+2

(b) Give the solution for tower of Hanoi with 4 disks. Also comment on theNumber of moves required to solve the problem of tower of Hanoi with nDisks. 4+2

4. (a) What does it mean when.we say that an algorithm X is asymptoticallymore efficient than. Y? Also calculate the algorithmic complexity of the following

```
inti, j, k = 0;
for (i = n / 2; i<= 11; i++) {
for (i = 2; j <= n; j =j * 2) {
k = k+n/%
}
}
```
2+3

(b) Convert the expression ((A + B)* C — (D — E) ^ (F + G)) to equivalent Prefix and Postfix notations showing all the intermediate stack states. 2+3

5. What is a Binary Search Tree (BST)? Make a BST for the following sequence of 2+4; numbers.

45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48. Also show the Pre-order and Post-orderTraversal of the resultant tree. 2+4+4

6. (a) Write the algorithm for merge and merge. Sort the following string using merge sort:

77,44,33,11,88,22,66,55 3+2+2

(b) Considering the above string as mentioned in question 6.a), if insertion sortis used, how man passes would be required to sort the array . Explain. 3

7. (a) How binary search is different from linear search? Explain 3

(b) Apply binary search algorithm on the following array:

ll, 22, 30, 33, 40, 44, 55, 60, 66, 77, 80, 88, 99 to search the item 40. Discuss thetime complexity of the algorithm you applied. 4+3

8. (a) Write an algorithm to search an 'ITEM' in an unsorted linked list. 5

(b) Consider a circular queue initially having 3 elements A, B, C inserted in 1+4same sequence. The circular queue is having an capacity of 5 elements.Show the current value of FRONT & REAR. Delete 2 elements from thequeue and insert 4 more elements (D,E,F,G) in queue and show the FRONT& REAR positions. 1+4

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