Total No. of printed pages = 3

CS 131305 NR

Roll No. of candidate

5/3/22   2021

B.Tech. 3rd Semester End-Term Examination

Computer Science Engineering

DATA STRUCTURE AND ALGORITHMS

(New Regulation)

Full Marks – 100   Time – Three hours

The figures in the margin indicate full marks
for the questions.

Answer question No. 1 and six questions from the rest.

1. Answer the following multiple choice questions : $(10 \times 1 = 10)$

    (i)   Which of the following data structure is more appropriate to represent a heap?

        (a) Two-dimensional array

        (b) Doubly linked list

        (c) Linear Array

        (d) Linked list

    (ii) A graph in which all vertices have equal degree is known as ————.

        (a) Complete graph

        (b) Regular graph

        (c) Multi graph

        (d) Simple graph

    (iii) A graph is a tree if and only if graph is

        (a) Directed graph

        (b) Contains no cycles

        (c) Planar

        (d) Completely connected

[Turn over

(iv) The elements of a linked list are stored

    (a) In a structure

    (b) In an array

    (c) Anywhere the computer has space for them

    (d) In contiguous memory locations

(v) —————— sorting is good to use when alphabetizing a large list of names.

    (a) Merge

    (b) Heap

    (c) Radix

    (d) Bubble

(vi) New nodes are added to the —————— of the queue.

    (a) Front

    (b) Back

    (c) Middle

    (d) Both (a) and (b)

(vii) Which of the following is an application of stack?

    (a) finding factorial

    (b) tower of Hanoi

    (c) infix to postfix

    (d) all of the above

(viii) The situation when in a linked list START=NULL is ——————

    (a) Underflow

    (b) Overflow

    (c) Houseful

    (d) Saturated

(ix) Which of the following data structure can't store the non-homogeneous data elements?

    (a) Arrays

    (b) Records

    (c) Pointers

    (d) Stacks

(x) Which of the following is non-liner data structure?

    (a) Stacks

    (b) List

    (c) Strings

    (d) Trees

2. (a) Define algorithm. What are the good characteristics of an algorithm? (1+4)

    (b) What is the time complexity of the following code in the worst case (5)

```
int a = 0;
for(i=0;i<N;i++)
{
    for(j=N;j>I;j--)
    {
        a=a+i+j;
    }
}
```

    (c) What are the advantages and disadvantages of an array? (5)

3. Write a function to add, delete a node from the end of a singly linked list. Write a function to display the content of the list. (5+5+5)

4. (a) Convert the following infix to its equivalent postfix expression. (10)

    $K + L - M*N + (O\char94 P) * W/U/V * T + Q$

    (b) Evaluate the following postfix expression. (5)

    $53 + 62/*35*+$

5. (a) Build a max heap from the given set of numbers. (5)

    45, 36, 54, 27, 63, 72, 61 and 18

    (b) Sort the following elements using merge sort technique. (10)

    15,28,25,35,30,45,55,70,60,50,40

6. Write a function to add and delete an element from FIFO data structure. Write a function to display the content.. (5+5+5)

7. Write the short notes on (3×5)

    (a) Prims Algorithm

    (b) AVL tree.

    (c) Sequential Search