NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI-15
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
II YEAR B.TECH , CYCLE TEST 1
CSPC32 DATA STRUCTURES

DATE: 08-09-2023   ANSWER ALL QUESTIONS   Max Marks: 20

1. The diagonal elements of the 5 X 5 sparse matrix are 10,20,30,40 and 50. How do you represent this matrix using XOR linked list? Also, write an algorithm for traversing this list from right to left.   (4)

2. Convert the following infix expression to its equivalent prefix expression. From the resultant prefix expression, get the postfix expression. Clearly, write all the intermediate steps for these conversions.
   Infix expression: $A/B*C+D-E\wedge F\wedge(G-H)$ (2+2)

3. The following postfix expression with single digit operands is evaluated using a stack: $8\ 2\ 3\ \wedge\ /\ 2\ 3\ *\ +\ 5\ 1\ *\ -$. What are the top two elements of the stack after the first * is evaluated?   (2)

4. The pseudo-code of the following function that takes a Queue as an argument and uses a stack S to do the processing. What will do this function?   (2)

```
void fun(Queue *Q)
{
  Stack S;
  while (!isEmpty(Q))
  {
    push(&S, deQueue(Q));
  }
  while (!isEmpty(&S))
  {
   enQueue(Q, pop(&S));
  }
}
```

5. The circular Queue of capacity (n - 1) is used in an array of n elements. Assume that insert and deletion functions are performed using REAR and FRONT as the variable index of Array, respectively. Initially, REAR = FRONT= 0. What are the conditions for finding the full and emptiness of the queue?   (2)

6. The circular skip linked list needs to be filled with the characters from the string **DATA STRUCTURES** (ignore white space). Assume that the list has 4 levels, starting from level 0. Draw a neat diagram to represent this list.   (3)

(P.T.O)

7. The following C function rearranges the members of a single-linked list of integers that is passed as a parameter. The list of numbers **1, 2, 3, 4, 5, 6,** and **7** in the specified order is passed to the function when it is called. How many elements will move about in the list once the function is finished running? Also, list out these elements. (3)

```
1.   struct node✓
2.   {
3.        int value;
4.        struct node *next;
5.   };
6.   void rearrange(struct node *list)
7.   {
8.        struct node *p, *q;
9.        int temp;
10.       if((! list) || ! list → next )
11.            return;
12.       p = list;
13.       q = list → next;
14.       while(q)
15.       {
16.            temp = p → value;
17.            p → value = q → value;
18.            q → value = temp;
19.            p = q → next;
20.            q = p ? p → next : 0;
21.       }
22.  }
```