

**VIT**Vellore Institute of Technology
(Chartered by the University under section 12(B) UGC Act, 1956)**Final Assessment Test – November/December 2023**

Course: SWE2001 - Data Structures and Algorithms

Class NBR(s): 7711

Slot: X11+X12+X21

Time: Three Hours

Max. Marks: 100

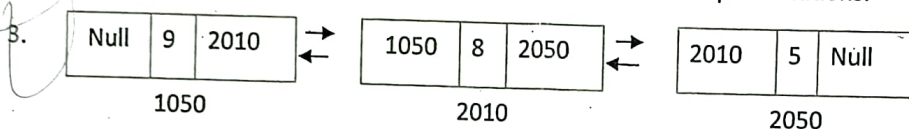
KEEPING MOBILE PHONE/SMART WATCH, EVEN IN 'OFF' POSITION, IS TREATED AS EXAM MALPRACTICE**Answer ALL Questions****(10 X 10 = 100 Marks)**

1. a) Convert the given infix expression into postfix expression using stack [5]

 $((A-(B+C))*D)^(E+F)$

- b) Explain the procedure for evaluation of an expression and evaluate an expression using stack $(8+5)*3-4/5+2$ [5]

2. Explain various operations of circular queue with schematic representations.



Design pseudocode to delete the first node of the doubly Linked List and to insert a new node at the last position of a list. Explain with schematic representations.

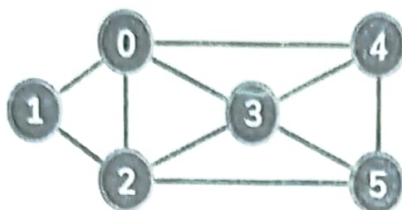
4. a) Discuss the framework for analysing the best algorithm for implementation and explain the parameters you will consider in order to choose best algorithm? [7]

- b) Compute the time complexity for the below iterative program. [3]

```
Function () {
    int i, j, k, n;
    for(i=1; i<=n; i++){
        for(j=1; j<=i^2; j++){
            for(k=1; k<=n/2; k++){
                printf("Hello");
            }
        }
    }
}
```

5. Write an algorithm for quick sort and illustrate with following example.
44, 33, 11, 55, 77, 90, 40, 60, 99, 22, 88

6. Assume 10 Students of a Programming class submitted their assignments and their marks are stored in 1D Array. The marks of the students are 10, 20, 30, 40, 50, 55, 60, 70, 80 and 90. Apply the binary search algorithm to find out the no. of comparisons are required to identify highest mark and analyse time complexity.
7. For the graph given below, find a path from vertex '0' using BFS and DFS. Explain your inference clearly using an algorithm.



8. Construct an AVL Tree for the following sequence of numbers with appropriate rotations: 50, 20, 39, 42, 60, 10, 8, 15, 32, 46, 11, 48.
9. Insert the following key elements with the help of double hashing techniques by using division method.
- Key elements = 3, 2, 9, 6, 11, 13, 7, 12.
- Hash table size, $m=10$
- Use the following hash function.
- $h_1(k)=2k+3$
- $h_2(k)=3k+1$
10. List and explain the four recent applications of stack and queue that have used the real-time data structure.



$$\begin{aligned} \text{low} &= \text{mid} + 1 \\ &= 8 + 1 \\ &= 9 \end{aligned}$$

$$\text{High} = 10$$

$$\begin{aligned} \text{mid} &= \frac{9+10}{2} \\ &= 9 \end{aligned}$$

$$\text{Goal} > \text{mid}$$

$$\text{low} = \text{mid} + 1$$

$$= 9 + 1$$

$$= 10$$

$$\text{High} = 10$$

$$\text{mid} = \frac{10+10}{2} = 10$$

$$\text{low} = 1$$

$$\text{High} = 10$$

$$\text{Mid} = \frac{\text{low} + \text{High}}{2}$$

$$= \frac{1+10}{2}$$

$$= \frac{11}{2}$$

$$= 5$$

$$\text{Goal} > \text{mid}$$

$$\text{low} = \text{mid} + 1$$

$$= 5 + 1 = 6$$

$$\text{low} = 6$$

$$\text{High} = 10$$

$$\text{Mid} = \frac{6+10}{2}$$

$$= 8$$

$$\text{Page 2 of 2}$$

$$\text{Goal} > \text{mid Value}$$

$$\text{Goal} = \text{mid}$$