G.R. No.	

DECEMBER 2021 - ENDSEM EXAM
S. Y. B. TECH. (INFORMATION TECHNOLOGY) (SEMESTER - I)
COURSE NAME: FUNDAMENTALS OF DATA STRUCTURES
COURSE CODE: ITUA21204
(PATTERN 2020)

Time: [1Hr]   [Max. Marks: 30]

Instructions to candidates:
1) Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6.
2) Figures to the right indicate full marks.
3) Use of scientific calculator is allowed
4) Use suitable data where ever required

Q.1 a   Let A be a two dimensional array declared as int A[5][5]. Assume   [4]
        that each integer takes four memory locations. The first element of
        the array is stored at location 1250. Find the address of the
        element A[2][4] for row major and column major representation.

Q.1 b   Write pseudo code for simple transpose of sparse matrix. Analyze   [6]
        its time complexity. Find the transpose of the given sparse matrix
        using simple transpose algorithm.
        4 5 6
        0 2 9
        1 0 8
        1 4 2
        2 1 3
        2 3 6
        3 2 7

                                    OR

Q.2 a   Represent following polynomials using array :   [4]
        1) $10 y^6 + 2 y^2 + 3 y - 6$
        2) $15 x^4 + 10 x - 2$

Q.2 b   Write an algorithm for finding the transpose of a sparse matrix   [6]
        using a fast transpose method. Write its time complexity. Show
        how fast transpose method is applied for the given sparse matrix.
        4 3 5
        0 0 5
        0 2 8
        1 1 5
        1 2 6
        3 1 9

Q.3 a	Assume a singly linked list where each node contains student details like name, roll number and percentage of marks. Write a 'C' function COUNT( ) to traverse the linked list and count how many students have obtained more than 60% marks.	[4]

Q.3 b Compare sequential organization with linked organization by [6]
considering
- Access any element
- Insertion and deletion of element
- Utilization of memory
- pictorial representation

OR

Q.4 a Represent the following lists using GLL. [4]
3. (p,(q, r,s,(t,u),v,w),x,y,z)
4. (a,b,(c,d,(e),f), ((a,b),c,f))

Q.4 b Compare doubly linked list over singly linked list. Write 'display [6]
reverse' operation for doubly linked list and singly linked list.

Q.5 a Show the pictorial representations of any three types of queue . [4]
Also describe any three applications of the queue.

Q.5 b Convert the infix expression ((c+d)-e+g/f+a) to a postfix [6]
expression. Evaluate the above postfix expression using data c=7,
d=2, e=6, g=8, f=4, a=5 . Show the stack content in conversion
and evaluation.

OR

Q.6 a Describe Stack as ADT and write applications of stack in [4]
computer science.

Q.6 b Consider the Circular Queue (CQ) of size 6, '--' indicates an empty [6]
location in the CQ. Show the content of the Queue after each of
the following operations :
Initial state of the CQ is :
    Index: 1   2   3   4   5   6
- **Q :   --, --, P, Q, R, --**
- **front= 3, rear=5**
1. Two letters deleted.
2. K, L, M are added.
3. Two letters are deleted.
4. S added.
5. Two letters are deleted.
6. T is added.