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Mahindra University Hyderabad
École Centrale School of Engineering
Minor–II

Program: B. Tech. Branch: CSE+AI+ECM+CM Year: I Semester: II
Subject: Data Structures (CS1203)

Date: 18/04/2024 **Start Time: 02:00 pm**
Time Duration: 1.5 Hours **Max. Marks: 50**

Instructions:
1) All questions are compulsory.

Q.1 [Marks: 5+5].

(a) (2+3) Let a and b denote positive integers, suppose a function Q is defined recursively as follows:

$Q(a,b) = 0$ if $a<b$

$Q(a,b) = Q(a-b, b)+1$ if $b<=a$

(a) Find the value of Q(50,7)
(b) Find (5861,7)

(b) Consider a 2-dimensional array x with 10 rows and 4 columns, with each element storing a value equivalent to the product of row number and column number. The array row major format. If the first element x[0][0] occupies the memory location with address 1000 and each element occupies only one memory location, which all locations (in decimal) will be holding a value of 10 ?

Q.2 [Marks: 5+5]
(a) Consider a doubly linked list of size n. Where each node is defined as follows:

```
struct node
{
struct node *pre;
int data;
struct node *next;
};
```

The structure pointer *temp is pointing to a node (not first node and not last node). Write pseudo code to delete this node. [No need to write pseudocode code to create linked list]

(b) Assume you have a singly linked list of size n, its first node address is stored in *start. Write pseudo code to delete a node having data value X.

Q.3 [Marks: 5+5] Find time complexity of following code (ignore compilation error):

(a) count = 0

```
for (int i = n; i > 0; i /= 2)
for (int j = 0; j < i; j++)
count++;
```

(b) void fun(int n)

```
{
    for (int i = 0; i <= n / 3; i++)
        for (int j = 1; j <= n; j = j + 4)
            printf("Hello");
}
```

Q.4 [Marks: 5+5]

(a) An unordered list contains n distinct elements. The number of comparisons to find an element in this list that is neither maximum nor minimum is.

(b) What are the number of swaps required to sort n elements using selection sort in the worst case?

Q.5 [Marks: 5+5]

(a) Convert the following infix expression to a prefix expression.

A+B/C*(D+E)-F

(b) Solve the following postfix expression.

2, 3, -, 4, +, 5, 6, 7, *, +, *