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Academic Year 2025/2026
1st Year ST – Science and Technology
Session: Regular
Duration: 01 hour 30 minutes

Final Exam – Introduction to Programming

Course Questions: [4 points]

1. How do you access an element of an array? ***(0.75pt)***
2. What is an array in programming? ***(0.75pt)***
3. What is the difference between a vector and a matrix? ***(0.5pt)***
4. What are the differences between a simple variable and an indexed variable, mention two types of the latter. ***(1pt)***
5. What are the necessary conditions to perform the product of two matrices and the product of a matrix by a vector. ***(1pt)***

Exercise 01: [10 points]

Given the following algorithm:

```
Algorithm GravitationalForce ;
Variables
        m1, m2, r, F : real;
Constants
        G = 6.674 × 10⁻¹¹;
Begin
     //Inputs
     Write("Enter m1, m2, r");
     Read(m1, m2, r);

    //Processing
    if r = 0 then
       Write("Error: division by zero");
    else
       F ← G * (m1 * m2) / (r * r);
    end if;

     //Outputs
   Write("Gravitational force F = ", F);
End.
```

Questions:

1. List all the variables used and give their type in C language; ***(2pt)***
2. Write the C instructions to read the variables (m1, m2, and r) using two methods: ***(2pt)***
   a) one instruction per variable
   b) a single instruction for all three variables
3. Give the C language instruction that displays the gravitational force F. ***(1.75pt)***
4. Modify the output so that the results are displayed with two decimal places. ***(1.5pt)***
5. Propose a C program for the above algorithm. ***(2.75pt)***

Exercise 02: [6 points]

Let **M** be a square matrix of size **N × N**. Write a C program that allows you to:

1. Enter the size N and the elements of matrix M as integers.
2. Compute and display the sum S of the elements of the main diagonal of M.
3. Compute and display the number of zero, negative, and positive elements in matrix M.

Good luck