M.Sc. PHYSICS
SECOND SEMESTER
COMPUTATIONAL PHYSICS
MSP - 202

(Use Separate Answer Scripts for Objective & Descriptive)

Duration:1:30 hrs. **Full Marks: 35**

(PART-A: Objective)

Time: 10 min. **Marks: 10**

Choose the correct answer from the following: ***1X10=10***

1. Which loop will run atleast once
   a. For
   b. While
   c. Do-while
   d. None of the options

2. Will the following provide an error?

$$\begin{bmatrix} 2 & 3 \\ 8 & 9 \end{bmatrix} * \begin{bmatrix} 5 & 6 \\ 10 & 11 \end{bmatrix}$$

   a. Yes
   b. No
   c. Maybe
   d. Depends upon computer

3. For an 8-bit signed number, what is the maximum value that can be stored?
   a. 127
   b. 64
   c. 356
   d. 255

4. Which dimensional graph is best suited to plot 2 independent and 1 dependent variable together?
   a. 2D
   b. Double 2D
   c. Overlapped 3D
   d. 3D

5. Which part of a computer actually performs the mathematical calculations
   a. RAM
   b. DMA
   c. ALU
   d. HDD

6. Which loop is better suited for operation with logical conditions
   a. For
   b. While
   c. Do-while
   d. None of the options

7. What is the FPU representation of $^1/_2$
   a. 0.5×10^{-1}
   b. 0.5×10^{1}
   c. 0.5×10^{4}
   d. 0.5×10^{0}

8. Which function in MATLAB is used to plot several figures in one plot
   a. plot();
   b. subplot();
   c. function();
   d. surface();

9. What is the pointer value of 3 in the following: [5 6 8 9 7 4 1 2 3 5 8 7]
   a. 2 b. 6
   c. 10 d. 9

10. Which of the following pertains to integration in a compter?
   a. Newtons Forward Method b. Simpson's 3/8 Rule
   c. Lagranges' Method d. None of the options

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PART-B : Descriptive

Time : 1 hr. 20 min. Marks : 25

[Answer question no.1 & any two (2) from the rest]

1. a. Write an algorithm to multiply 322 and 15 using a for loop and requiring minimum time for execution. **5+5**

   b. Write an algorithm to find the solution for the following simultaneous equations: $6x + 9y = 12$ and $8x + 5y = 2$

2. a. Write an algorithm to perform a differentiation on the following array and what are the unique properties of the outcome array? **4+3.5**
   [3 5 8 9 6 4 5 1 8 7 5 2 9 6 8 1]

   b. Write an Algorithm to swap two numbers without the use of a third variable

3. a. Define and differentiate between Interpolation and Extrapolation. **3.5+4**

   b. What are the differences between if-else and Switch-case, and what are their use cases?

4. a. Explain the different types of loops and their use cases. **3.5+4**

   b. Write an algorithm to compute the following function:

$$y = x + \frac{x(x-1)}{2!} + \frac{x(x-2)}{3!} + \cdots + \frac{x(x-9)}{10!}$$

5. a. Explain the role of the Operating system in the use of a computer. **3.5+4**

   b. How is the use of a Floating Point Unit advantageous over conventional digital bit allotment.

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