H-2-40-22　　　　　Roll No. ....

II Semester Examination, 2022

M.Sc.

PHYSICS

Paper II

(Computational Methods and Programming)

Time : 3 Hours]　　　　　[Max. Marks : 80

Note : *All Questions are Compulsory. Question Paper comprises of 3 sections. **Section 'A'** is Objective type/Multiple Choice questions with no internal Choice. **Section 'B'** is Short answer type with internal Choice. **Section 'C'** is Long answer type with internal Choice.*

Section 'A'　　　1 × 8 = 8

(Objective Type Questions)

Choose the correct answer :

1. C-Language is developed by :

(a) K. Thomson　　　(b) Dennis Ritchie

(c) R. Martin　　　(d) N. Peter

2. Which cannot be variable name in C ?

(a) True　　　(b) Friend

(c) Volatile　　　(d) Expert

3. Which is not a type of loops in C ?

(a) For　　　(b) While

(c) Do while　　　(d) Continue

4. An array is a collection of similar types of :

(a) Elements　　　(b) Constants

(c) Points　　　(d) Variables

5. The order of convergence in the Newton-raphson's method is :

(a) 0　　　(b) 1

(c) 2　　　(d) 3

6. The elimination process in Gauss Elimination method is also known as :

(a) Forward elimination

(b) Backward elimination

(c) Side ways elimination

(d) Cross ways elimination

7. The order of error in simpson's 3/8 rule is :

(a) First　　　(b) Second

(c) Third　　　(d) Fourth

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8. The Runge-Kutta Method of the third order is called :

(a) Runge's method

(b) Taylor's method

(c) Euler's method

(d) Boole's method

Section 'B'   **6 × 4 = 24**

(Short Answer Type Questions)

1. Write the main characteristics of C-language.

Or

Explain different types of operator.

2. Explain break statement and continue statement.

Or

Explain the memory representation of array.

3. Find a root of the equation $x^3 - 4x - 9 = 0$ using the bisection method.

Or

Using iteration method, evaluate the root of the equation $\cos x = 3x - 1$ correct to three decimal places.

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4. Evaluate $\int_0^c \dfrac{dx}{1+x^2}$ using trapezoidal rule.

Or

Using Euler's method, find an approximate value of y corresponding to $x = 1$ given that

$\dfrac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$.

Section 'C'   **12 × 4 = 48**

(Long Answer Type Questions)

1. Describe the various types of C-constants and illustrate the formation rules of integer and character constants.

Or

Explain the following :

(a) Key words

(b) Variables

2. Describe the control structure with suitable examples.

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Or

Write notes on the following :

(a) Library function.

(b) Go to statement.

3. Solve the following equations

$$x + 4y - z = -5$$

$$x + y - 6z = -12$$

and $3x - y - z = 4$

by Gauss elimination method.

Or

Find the eigen values and eigen vectors of the matrix :

$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$

4. Evaluate $\int_0^4 \frac{dx}{1+x^2}$, using Boole's rule taking

(i) $h = 1$ (ii) $h = 0.5$, compare the results with the actual value and indicate the error in both.

Or

Applying Runge-Kutta (R-K) method of fourth order; solve

$$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$$

with $y(0) = 1$, at $x = 0.2$, and $x = 0.4$.

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