NY—206—2023

FACULTY OF SCIENCE

M.Sc. (Second Semester) EXAMINATION

NOVEMBER/DECEMBER, 2023

(New/CBCS Pattern)

PHYSICS

Paper–PH-203

(Numerical Techniques in Physics)

(Monday, 11-12-2023)   **Time : 10.00 a.m. to 1.00 p.m.**

Time—Three Hours   *Maximum Marks—75*

N.B. :— (*i*)   Attempt all questions.

    (*ii*)   Each question carries equal marks.

    (*iii*)   Figures to the right indicate full marks.

1.   (*a*)   Describe Gauss-Jordan elimination method for the solution of simultaneous equations.   7

    (*b*)   Give the classification of partial differential equation and discuss any *one* method.   8

Or

    (*c*)   Discuss Taylor's series method for the solution of ordinary differential equations.   7

P.T.O.

(d) Use Eular's method to solve the differential equation $\dfrac{dy}{dx} = \dfrac{y-x}{y+x}, y(0) = 1$ to find the value of y at $x = 0.1$. 8

2. (a) Describe built in functions and user defined functions in C Programming with *one* example each. 7

(b) Find the inverse of matrix $A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$ by Gauss-Jordan method. 8

Or

(c) Solve by Gauss-elimination method : 7

$x + y + 4z = 12, \; 8x - 3y + 2z = 20, \; 4x + 11y - z = 33$

(d) Find the highest Eigen value and corresponding Eigen vectors of the following matrix : 8

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 3 \\ 0 & 0 & 2 \end{bmatrix}$$

3. (a) Discuss power method to obtain Eigen values and Eigen vectors of a symmetric matrix. 7

(b) Calculate the value of the integral $\int_{4}^{5.2} \log x\,dx$ using Trapezoidal rule.

8

Or

(c) Discuss in brief input and output statements used in C Programming. 7

(d) Discuss Adams-Bashforth predictor corrector method. 8

4. (a) What are random numbers ? How are random numbers generated in C Programming ? 7

(b) Write a C Programming for addition of two 5 × 5 matrix. 8

Or

(c) Discuss inverse power method. 7

(d) Solve the system of equations using Gauss-Seidel iteration method : 8

$$2x_1 - x_2 = 7$$

$$-x_1 + 2x_2 - x_3 = 1$$

$$1x_2 + 2x_3 = 1$$

5. Write short notes on (any *three*) : 15

(i) Difference schemes

(ii) Linear interpolation

(iii) Compilers and interpreters useful in C-Programming

(iv) Newton-Cotes formula for numerical integration.