This question paper contains **3** printed pages]

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.

FA017F073DB104FA8D46A5C89E8ED6A0

(*d*) Use Eular's method to solve the differential equation $\frac{dy}{dx} = \frac{y - x}{y + x}, y(0) = 1$ 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.

FA017F073DB104FA8D46A5C89E8ED6A0

FA017F073DB104FA8D46A5C89E8ED6A0

FA017F073DB104FA8D46A5C89E8ED6A0