

This question paper contains 3 printed pages]

**NEPWT—194—2024**

**FACULTY OF SCIENCE**

**M.Sc. (First Year) (First Semester) EXAMINATION**

**NOVEMBER/DECEMBER, 2024**

**PHYSICS**

**SPHYC-403**

(Numerical Techniques and C-Programming)

**(Tuesday, 17-12-2024)**

**Time : 10.00 a.m. to 1.00 p.m.**

*Time—3 Hours*

*Maximum Marks—80*

- N.B. :—*
- (i) Question No. 1 is compulsory.
  - (ii) Attempt any *three* questions from Q. No. 2 to Q. No. 6.
  - (iii) Each question carries equal marks.
  - (iv) Use of scientific calculator is allowed.
  - (v) Figures to the right indicate full marks.

1. Solve the following questions. (Each question carries 5 marks) : 20

(a) Discuss synthetic division method to obtain roots of a polynomial equation

(b) Using Simpson's rule find  $\int_0^4 e^x dx$ ,

(Given :  $e^0 = 1$ ,  $e^1 = 2.72$ ,  $e^2 = 7.39$ ,  $e^3 = 20.09$  and  $e^4 = 54.6$ )

(c) Find the inverse of  $A = \begin{pmatrix} 1 & 3 \\ 2 & 7 \end{pmatrix}$  by Gauss-Jordan method.

P.T.O.

- (d) What are random numbers ? How are random numbers generated in C-programming ?
2. (a) Find a root of the equation  $x^3 - 4x - 9 = 0$ , using the bisection method correct to three decimal places. 10
- (b) Describe principle of least square fit method to fit the data into a straight line. 10
3. (a) Obtain an expression for Newton Core's formula for the numerical integration. 10
- (b) Use Euler's method to solve the differential equation  $\frac{dy}{dx} = x + y$ ,  $y(0) = 0$  to find the value of  $y$  at  $x = 1.0$  taking  $h = 0.2$ . 10
4. (a) On the basis of classification of Partial differential equation, discuss the solution for the elliptic equation. 10
- (b) Solve the following equations using Gauss-Seidel iteration method starting from (1, 1, 1) : 10

$$x_1 + x_2 + 2x_3 = 8$$

$$2x_1 + 3x_2 + x_3 = 12$$

$$5x_1 + x_2 + x_3 = 15$$

5. (a) Discuss about compilers and interpreters in C-programming. 10
- (b) Write a C-program for the addition of two  $5 \times 5$  matrix. 10
6. Write short notes (each question carries 5 marks) : 20
- (a) Linear interpolation
- (b) Taylor series method
- (c) Power method
- (d) Executable and non-executable functions in C-programming.