PG Even Semester Examination, May 2025

PHYSICS

(2nd Semester)

Course No.: PHY-204

(Numerical Analysis and Computer Programming)

Full Marks: 70

Pass Marks: 28

Time: 3 hours

The figures in the right margin indicate full marks for the question.
Answer any five questions selecting one from each unit.

UNIT-I

1. (a) What is numerical computing? Describe the process of numerical computing with the help of block diagram. 3+7=10

   (b) Discuss the four characteristics of numerical computing. 4

2. (a) Describe three basic control structures used in executing the solution steps. 6

   (b) How do mathematical model contribute to errors in numerical computing? 4

   (c) What are the internet errors? How do they arise? 2+2=4

UNIT-II

3. (a) Write a program to read a set of N number. count them and print the largest and smallest number. 8

(b) Write a program to find the value of cos(x) with 0.0001% accuracy. 6

4. (a) Write a program to find the largest element of a given matrix and print the value with indicating row and column position. 7

(b) Write a program to find the mean, variance and standard deviation of a set of N numbers. 7

UNIT-III

5. (a) Solve the equation $x^2 - 25 = 0$ by bisection method. 7

(b) Write a program to find the solution of the above equation. 7

6. (a) Use Newton-Raphson method to calculate one root of the equation $x^4 - 5x + 4 = 0$. 7

(b) Write a program to find the solution of the above problem. 7

UNIT-IV

7. (a) Use Gauss eliminations method to find the solution of simultaneous equations :

$2x+y+4z=12$

$8x-3y+2z=10$

$4x+11y-7=30$ 7

(b) Write a program to get the solution of the above problem. 7

8. (a) Using Lagrange interpolation formula, find the value of f(2.1) using the data given below : 7

X	0	1	2	3.7	5
f(x)	0.1	0.57	0.79	0.22	–0.18

(b) Write a program to find the solution of the above problem. 7

UNIT-V

9. (a) Using Simpson's 1/3 rule, find the value of the integral: 7

$$\int_0^3 \cos^2 x\,dx;\ \text{taking } N=6$$

(b) Write a program to find the solution of the above problem. 7

10. (a) Find the value of y(1) for the following differential equation using 4th order Rk method. 7

$$\frac{dy}{dx} = -xy;\ y(0)=1$$

Take step size h= 0.25.

(b) Write a program to find the solution of the above equation. 7

*****