

M.Sc. (Semester—I) (C.B.C.S. Scheme) Examination
1-PHY-4 : PHYSICS
(Computational Methods and Programming)

Time : Three Hours]

[Maximum Marks : 80

EITHER

1. (a) What is Newton-Raphson Method ? Obtain roots of equation $7x^3 + 2x^2 - 107 = 0$ using Newton-Raphson Method correct to four decimal places. 6
- (b) Explain the method of simple iteration. Find the roots of equation $x^4 + 3x^3 - 251 = 0$ using the method of simple iteration correct to four decimal places. 6
- (c) Explain matrix inversion method giving suitable example. 4

OR

- (p) Find a root of equation $x^2 + 7x - 31 = 0$ using bisection method correct to four decimal places. 4
- (q) What is false position method ? Find a root of equation $2x^3 - 51 = 0$ correct to four decimal places. 6
- (r) Obtain values of x, y and z using Gauss elimination method :

$$2x + 5y - 3z = 27$$

$$5x - 7y + 9z = 60$$

$$7x + 3y + 5z = 118.$$
6

EITHER

2. (a) The table gives the data for linear regression of x on y :

x :	1	2	3	4	5	6	7	8
y :	2	5	6	7	10	12	13	15

Fit a straight line to the data. 5
- (b) Using data in the table obtain vapour pressure of oil at 30°C using Forward Interpolation Formula :

T°(0)	:	20	24	28	32	36	40
P (mm Hg)	:	8.42	11.22	14.14	16.5	20.8	27.2

5
- (c) A rocket is launched from the ground. Its acceleration measured every five seconds is tabulated below. Find the velocity of the rocket after 40 sec using Trapezoidal rule :

t :	0	5	10	15	20	25	30	35	40
a :	40.0	45.2	48.5	51.2	54.3	59.5	61.5	64.3	68.7

6

OR

- (p) Explain how trigonometric function is fitted to experimental data. 5
- (q) Give details about the method obtaining Eigen Values and Eigen Vectors of matrices. 5
- (r) A train travels with velocities given in the table at different instants of time :

Time (min)	:	0	2	4	6	8	10	12
Vel (km/hr)	:	10	34	42	45	47	48	50

Find the distance traveled by the train within 12 minutes. 6

EITHER

3. (a) Describe the Predictor-Corrector method of solving differential equation. 8
- (b) Obtain ten values of y using equation $\frac{dy}{dx} = x^2 + y^2$, $h = 0.1$, $y = 1$ for $x = 0$ (use Predictor-Corrector method). 8

OR

- (p) Discuss second order Runge-Kutta method of solving differential equation. 8
- (q) Obtain about ten values of y using equation $\frac{dy}{dx} = x + y$ for $x = 0$, $y = 1$. Take $h = 0.1$ (Second order Runge-Kutta method). 8

EITHER

4. (a) Describe character set used to develop a program. Discuss the constants used in C language. 4
- (b) Illustrate the formats of writing Input, Output statements. 6
- (c) Develop a computer program to obtain and display the area of regular hexagon, parrallelogram and rectangle. 6

OR

- (p) Describe storage types used in C language. Write static variables used in C language. 6
- (q) What are expressions ? Write the rules of writing expressions. 4
- (r) Develop a computer program to obtain and display surface of sphere cylinder and cone. 6

EITHER

5. (a) Discuss Arithmetic and Logical operators in C language. 4
- (b) Write and explain format of writing DO-WHILE statement. 6
- (c) Develop a program to arrange twenty elements in descending order. 6

OR

- (p) What is subscripted variable ? Discuss various subscripted variables in C language. 4
- (q) Give and explain the format of writing IF statement. 6
- (r) Develop a program to obtain product of two 3×3 matrices. 6