AU–225

M.Sc. Semester—I (C.B.C.S. Scheme) Examination

PHYSICS

1-Phy-4 : Computational Methods and Programming

Time : Three Hours] [Maximum Marks : 80

EITHER

1. (a) What is bisection method ? Find one root of each of following equations correct to four decimal places :

$x^2 + 3x - 20 = 0$

$x^3 - 31 = 0.$ 6

(b) What is False Position method ? Obtain a root of equation $x^4 - 3x^2 + 5x - 100 = 0$ correct to four decimal places. 6

(c) Explain matrix inversion method. 4

OR

(p) Solve following equations by Gauss elimination method.

$10x + 11y - 12z = 23$

$9x - 13y + 8z = 36$

$-7x + 8y + 7z = 54$ 6

(q) Giving proper example, explain the principle of Pivoting. 4

(r) Explain Newton-Raphson method. Obtain one root of each of the following equations correct to four decimal places.

$x^2 - 50 = 0$

$x^3 + 30 = 0$ 6

EITHER

2. (a) Fit a curve of the type ae^{-bx} for the data given in table

x	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.00	2.25	2.5
y	3.1	1.7	1.0	0.68	0.42	0.26	1.4	0.09	0.04	0.03

6

(b) Observe the data given in table :

x (Angle Radians)	0.25	0.26	0.27	0.28	0.29
Sine	0.2474	0.2571	0.2667	0.2764	0.2860

Integrate the function using Trapezoidal method. 6

(c) Find an Eigen Value of the matrix :

$$\begin{bmatrix} 12 & -20 \\ -8 & 16 \end{bmatrix}$$

4

OR

(p) Fit a curve of the type $1/(a + bx)$ to the points given in table.

x	0	1	2	3	4	5	6	7	8	9
y	11.0	3.33	2.2	1.52	1.00	0.91	0.82	0.66	0.56	0.49

5

(q) Integrate the function tabulated below using Simpson's rule.

x	–0.6	–0.5	–0.4	–0.3	–0.2	–0.1	0	0.1	0.2	0.3
f(x)	4	2	3	8	4	–2	2	3	5	8

6

(r) Using data in the table obtain vapour pressure of the oil at 404 °C using forward interpolation method :

T(°C)	360	380	400	420	440
P(mmHg)	9.1	10.8	13.2	15.4	17.6

5

EITHER

3. (a) Explain Euler's method of obtaining numerical solution of differential equation. 8

(b) Solve the equation by Euler's method :

$$\frac{dy}{dx} + xy = 0 \quad , \quad y(0) = 1$$

from x = 0 to x = 0.60, h = 0.05. 8

OR

(p) Give an account of fourth order Runge-Kutta method of solving differential equation. 8

(q) Solve the equation by second order Runge-Kutta method.

$$\frac{dy}{dx} = 2xy \quad , \quad y(0) = 0.5$$

Range of x $0 \leq x \leq 1$, h = 0.05. 8

EITHER

4. (a) What is flowchart ? Discuss various symbols used to draw flowcharts. 4

(b) Discuss different data types. Describe various declaration in C language. 6

(c) Write a program to obtain and display areas of :

(1) Right angled triangle,

(2) Circle and rectangle using proper Input Output statements. 6

OR

(p) Describe Compilers, Interpreters and Operating Systems. 6

(q) What are Identifiers and Keywords ? Explain with illustrative examples. 4

(r) Develop a program to obtain and display volume of a sphere, cylinder and cone using proper Input Output statements. 6

EITHER

5. (a) What is library function ? Explain the role of various Library functions. 4

(b) Give the format of writing 'While' Statement. Discuss the working of 'While' Statement. 6

(c) Develop a program to arrange twenty numbers in ascending order. 6

OR

(p) What is array ? With illustrative examples discuss types of arrays used in language. 4

(q) Give the format of writing IF-ELSE statement. 6

(r) Develop a program to obtain 3 × 3 matrix B from 3 × 3 matrix A by adding 10% of each element to itself. 6