

AQ -814

- (Q) By using Taylor's series method, find $y(0.1)$ upto four decimal places for the differential equation

$$\frac{dy}{dx} = x - y^2 \text{ given } y(0) = 1. \quad 8$$

EITHER

4. (A) Explain compiler. 4
- (B) Explain Branched flow chart with an example of finding the largest number among the given three integer numbers. 6
- (C) Describe the character set of C language. 6

OR

- (P) State the rules for scanf statement and printf statement. 6
- (Q) Explain the hierarchy of arithmetic operators. 6
- (R) Design a program to find the area of the circle taking radius equal to 4 and write the output. 4

AQ -814

4

First Semester M. Sc. I (Physics) Examination

Paper : 1 PHY- 4

COMPUTATIONAL METHODS AND PROGRAMMING

P. Pages : 5

Time : Three Hours]

[Max. Marks : 80

Credit : 4

EITHER

1. (A) Explain Gauss Elimination Method. 4
- (B) Find a root of the equation $x^2 - 4x - 10 = 0$ using bisection method. 6
- (C) Find the value of $\sqrt{5}$ correct upto 1 decimal place using Newton Raphson method. 6

OR

- (P) Explain Regula Falsi method (False position method). 6
- (Q) Find the real root lying between 1 and 2 of the equation $x^3 - 3x - 1 = 0$ upto 3 places of decimals by using Regula Falsi method. 6

AQ -814

P.T.O.

- (R) Find the real root of $x^3 + 3x + 1 = 0$ lying between 0 and 1 upto 3 decimal places by Newton-Raphson method (only first approximation). 4

EITHER

2. (A) Determine the largest Eigen value and the corresponding eigen vector of the matrix

$$\begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix} \quad 6$$

- (B) Use the method of least squares to fit the straight line $y = a + bx$ to the data

x	1	2	4	5	6	8	9
y	2	5	7	10	12	15	19

- (C) If $y(75) = 246$, $y(80) = 202$, $y(85) = 118$, $y(90) = 40$. Find $y(79)$ by Interpolation. 4

OR

- (P) Use Lagrange's Interpolation formula to fit a polynomial to the data and find the value of y when $x = 2$

x	0	1	3	4
y	-12	0	6	12

- (Q) Calculate the value of the Integral using Simpson's $1/3$ rule.

$$\int_2^{10} \frac{dx}{1+x} \quad 4$$

- (R) Evaluate :-

$$\int_0^1 \frac{dx}{1+x^2} \text{ by Newton Cote's formula.} \quad 6$$

EITHER

3. (A) Using Euler's method solve $\frac{dy}{dx} = 1 + xy$

with $y(0) = 2$ find $y(0.1)$, $y(0.2)$ and $y(0.3)$. 8

- (B) Using fourth order Runge-Kutta method, evaluate the value of y when $x = 1.1$, given that $y(1.1) = 1$,

$$\frac{dy}{dx} + \frac{y}{x} = \frac{1}{x^2} \quad 8$$

OR

- (P) Given $\frac{dy}{dx} = \frac{1}{x+y}$;

$y(0) = 2$. If $y(0.2) = 2.09$, $y(0.4) = 2.17$ and $y(0.6) = 2.24$ find $y(0.8)$ using Predictor corrector method. 8

EITHER

5. (A) Explain If Else structure with an example. 6
- (B) Describe Break statement and state its advantages. 5
- (C) Explain Functions and its need in C language. 5

OR

- (P) Explain do-While loop with an example. 6
- (Q) Describe passing an array to a function. 5
- (R) Describe the recursive function ie : Recursion. 5



