Roll No. ..... Total Printed Pages - 4

F-3954

B.C.A., (Part - II) Examination, 2022

(OLD COURSE)

PAPER FIRST

NUMERICAL ANALYSIS

(201)

Time : Three Hours] *[Maximum Marks:50*

Note : All questions are compulsory. Attempt any two parts from each question. All questions carry equal marks. Simple/Scientific calculator is allowed.

Unit - I

1. (a) Evaluate $\sqrt{12}$ to four places of decimals by using Newton-Raphson method.

   (b) Find a real root of the equation $f(x) = x^3 - 2x - 5 = 0$, Using bisection method in five stage.

   (c) Using Regula-falsi method, find the real roots of the equation $x^4 - x - 10 = 0$

Unit - II

2. (a) Use power method to find the largest Eigen value of the matrix:

$$A = \begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$$

   (b) Apply triangularisation method to obtain the inverse of the matrix.

$$A = \begin{bmatrix} 50 & 107 & 36 \\ 25 & 54 & 20 \\ 31 & 66 & 21 \end{bmatrix}$$

   (c) Find the inverse of the matrix.

$$A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$$

   By Gauss - Jordan method.

Unit - III

3. (a) Given $\sin 45^0 = 0.7071$, $\sin 50^0 = 0.7660$, $\sin 55^0 = 0.8192$, $\sin 60^0 = 0.8660$, Find $\sin 52^0$, by using any method of interpolation

(b) Using Lagrange's interpolation formula, find the value of y, for x = 9.5 from the following table :

x	7	8	9	10
$y = f(x)$	3	1	1	9

(c) Find the cubic polynomial which takes the following values.

x 0	1	2	3
y 1	0	1	10

Unit - IV

4. (a) Given : $\begin{array}{c|ccccc} x: & 0.1 & 0.2 & 0.3 & 0.4 \\ \hline y = f(x): & 1.10517 & 1.22140 & 1.34986 & 1.49182 \end{array}$

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 0.4$

(b) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's One-Third rule.

(c) Explain in general Simpson's rule gives a better result than the Trapezoidal rule.

Unit - V

5. (a) Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with the initial condition y = 1 at x = 0. Find y for x = 0.1 by Euler's method **(Five step).**

(b) Use Runge Kutta Method to solve $\frac{dy}{dx} = x.y$ for x = 1.4 initially x = 1, y = 2 (take h = 0.2).

(c) Solve $\frac{dy}{dx} = x + y^2$; $y(0) = 1$ using Taylor's series method and compute y (0.1).