

2056
Bachelor of Arts (FYUP) Fourth Semester
Mathematics
Numerical Analysis
(Common with B.Sc. 4th Semester FYUP)

Time allowed: 3 Hours

Max. Marks: 80

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting one question from each Section. Use of Scientific Calculator is allowed in the examination.

x-x-x

1. Attempt the following:-

- (a) Using Method of False position, find a root of the equation $4e^{-x} \sin x - 1 = 0$ that lies in $(0, 0.5)$ by performing 4 iterations.
- (b) A curve is drawn to pass through the points given by the following table:

x	1	1.5	2	2.5	3	3.5	4
y	2	2.4	2.7	2.8	3	2.6	2.1

Estimate the area bounded by the curve, the x-axis and the lines $x = 1$ and $x = 4$.

(c) Evaluate $\Delta \log x$.

(d) Apply Picard's method to solve $\frac{dy}{dx} = 1 + xy$, $y(0) = 1$ upto third approximation.

(4x4)

UNIT - I

2. a) Develop a recurrence formula to find cube root of a positive integer n using Newton-Raphson's Method and hence compute $\sqrt[3]{28}$ correct upto 3 decimal places.

b) From the table below estimate the number of students who obtained marks between 75 and 80:

Marks	35-45	45-55	55-65	65-75	75-85
No. of students	18	40	64	50	28

(8x2)

3. a) Using Stirling Formula find y_{35} given that $y_{20} = 512$, $y_{30} = 439$,

$$y_{40} = 346, y_{50} = 243$$

b) Find the Lagrange's Interpolating Polynomial $F(x)$ of degree 2 which fits the given data:

x	1	2	7	8
F(x)	4	5	5	4

(8x2)

P.T.O.

(2)

UNIT - II

4. Compute
- $f'(x)$
- and
- $f''(x)$
- at
- $x = 16$
- given :

x	15	17	19	21	23	25
$f(x) = \sqrt{x}$	3.873	4.123	4.359	4.583	4.796	5.0

(16)

5. a) Evaluate
- $\int_1^2 \frac{dx}{x}$
- using Simpson's -1/3 Rule .

- b) Evaluate
- $I = \int_{-1}^1 (1-x^2)^{3/2} \cos x \, dx$
- using Gauss-Chebyshev two point quadrature formula. (8x2)

UNIT - III

6. Using Cholesky Decomposition Method, solve the following system of equations

$$x + y + z = 3$$

$$x + 2y + 3z = 6$$

$$x + 3y + 6z = 10$$

(16)

7. Solve the linear system of equations by Gauss-Seidel Method

$$27x + 6y - z = 85$$

$$6x + 15y + 2z = 72$$

$$x + y + 54z = 110$$

(16)

UNIT - IV

8. a) If
- $\frac{dy}{dx} - \sqrt{xy} = 2$
- ,
- $y(0) = 1$
- , find the value of
- $y(0.6)$
- using Euler's Method taking
- $h=0.1$

- b) Given
- $\frac{dy}{dx} = 1 + y^2$
- and
- $y(0) = 0$
- . Find
- $y(0.4)$
- using Runge-Kutta's fourth order method with step-size of 0.2 (8x2)

9. a) Use Given's method to reduce the matrix A to tridiagonal form where

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

- b) Find the dominant eigen value of the matrix A and the corresponding eigen value by Power Method

$$A = \begin{bmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{bmatrix}$$

(8x2)

x-x-x