

Cutting, Overwriting, Erasing, Fluid painting and use of Lead Pencil will earn no marks. Write answer of the Question No.1 and 2 on this sheet and handover it to the supervisory staff of examination within first 35 minutes.

Time Allowed: 35 Minutes

(OBJECTIVE PART)

Max. Marks: 32

*Sign of
Supdt.*

1- a) Encircle the correct answer:

 1×4

- i) The Bisection method to solve the equations is
 - a) Always False
 - b) Always Divergent
 - c) Always True
 - d) May or may not true
- ii) The Trapezoidal rule give 100% accurate result for
 - a) Cubic Equation
 - b) Quadratic Equation
 - c) Transcendental Equation
 - d) Linear Equation
- iii) In Weddle's rule the amount of error in $[x_0, x_6]$ will be
 - a) $\frac{h^7}{210} y^{(v)}$
 - b) $-\frac{h^7}{140} y^{(vi)}$
 - c) $\frac{h^7}{90} y^{(iv)}$
 - d) None of them
- iv) Hen's method is another form of
 - a) Simpson's Method
 - b) Trapezoidal Rule
 - c) Euler's Method
 - d) Bisection method.

b) Encircle True or False:

 $1x8$

- | | | |
|-------|---|---------------------|
| i) | In Euler's method the error can be reduced by decreasing step length. | True / False |
| ii) | Gauss-Seidal method the convergence is guaranteed if the system is not in diagonally dominated. | True / False |
| iii) | The equation involving the logarithmic function is called trigonometric function. | True / False |
| iv) | Two roots of equation $e^x - 3x^2 = 0$ lies between -1 and 4. | True / False |
| v) | $\Delta = E - 1$ | True / False |
| vi) | Stirling's Formula is the mean of Newton's backward and forward Interpolation formula. | True / False |
| vii) | The second divided difference of a polynomial of degree 2 is not constant. | True / False |
| viii) | $\ x + y\ \leq \ x\ + \ y\ $. | True / False |

c) Fill in the blanks meaningfully:

1x4

- i) The Convergence of Newton-Raphson method is _____.
- ii) Order of a differential equation is its _____.
- iii) In case of relative error $R_{pq} =$ _____.
- iv) Polynomial interpolation consists of determining the nth-order polynomial that fits _____ points.

(Continued Overleaf)

2- Give short answers of the following questions:

2x8

- i) Derive $E = e^{hD}$ where E is shift operator and D called differential operator.

- ii) Prove that Similar Matrices have same Eigenvalues.

- iii) If $f(x) = x^2$ then find $f(x_0, x_1, x_2)$ _____

- iv) Write two disadvantages of N-R method. _____

- v) Write the Stirling's Formula.

- vi) Define Fix-Point.

- vii) Prove that $E = 1 + \mu \delta + \frac{\delta^2}{2}$

- viii) Define Interpolation.



(M.A/M.Sc Part-II)

Roll No: _____

(Mathematics) Numerical AnalysisTime Allowed : 2:25 hrs
Max. Marks : 68Attempt **FOUR** Questions in all. Select **TWO** Questions from **Section A** and **TWO** Questions from **Section B**. All Questions carry equal marks.**SUBJECTIVE PART****SECTION-A**

- 3- a) Prove that N-R method is quadratically convergent method. 9
b) Use Regula Falsi Method to find a root to 4 dp of $e^x - 2 = 0$ $x_0 = 0, x_1 = 1$ 8

- 4- a) Find A^{-1} by Crout's Scheme for system.

$$\begin{aligned} 2x_1 + 3x_2 + x_3 &= 9 \\ x_1 + 2x_2 + 3x_3 &= 6 \\ 3x_1 + x_2 + 2x_3 &= 8 \end{aligned}$$
then solve the system by using A^{-1} . 9

- b) Find Dominant Eigen value by using power method of matrix. $\begin{bmatrix} 4 & 1 & -1 \\ 2 & 3 & -1 \\ -2 & 1 & 5 \end{bmatrix}$ 8

- 5- a) Solve $\begin{aligned} x_1 + x_2 + 10x_3 &= 33 \\ x_1 + 10x_2 + x_3 &= 24 \\ 10x_1 + x_2 + x_3 &= 7 \end{aligned}$ Using Gauss Seidal's Method. 9
b) Prove that condition number of a matrix is always greater than "1" 8

SECTION-B

- 6- a) Use Aitken's method find $\log_{10}(301)$ using data given in the form
 $(x, \log_{10} x)$ (300, 2.4771), (304, 2.4829), (305, 2.4843) and (307, 2.4871). 9

- b) If a, b, c and d are the arguments of $f(x) = \frac{1}{x}$. Show that $f(a, b, c, d) = \frac{-1}{abcd}$ 8

- 7- a) Solve $\begin{aligned} u_{n+1} - u_n + v_n &= 7 \\ 3v_{n+1} - 2v_n + u_n &= 2 \end{aligned}$ 9

- b) Evaluate by Taylor's Series at $x = 0.1, 0.2$ upto 4dp $y'' - x(y')^2 + y^2 = 0$ $y(0) = 1, y'(0) = 0$ 8

- 8- a) Derive R-K Method of order "2". 9
b) Solve the differential equation

$\frac{dy}{dx} = x + y$ subject to initial condition $y(0) = 1$ on interval $[0, 0.5]$ using Euler's method take $h = 0.1$ 8