



# THE AMERICAN COLLEGE, MADURAI

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

Re-accredited (2<sup>nd</sup> Cycle) by NAAC with Grade "A", CGPA – 3.46 on a 4-point scale

## Backlog Arrear Examination, March 2021

**MAT MAS 3445**  
**NUMERICAL ANALYSIS**

**TIME: 3hrs**  
**MARKS: 75**

**ANSWER ANY FIVE QUESTIONS:**

**5x15=75**

1. Find a real root of the equation  $x^3 - 3x + 1 = 0$  lying between 1 and 2 correct to three places of decimal by using bisection method.
2. Find the real root of  $xe^x - 2 = 0$  correct to three places of decimals using Newton-Raphson method.

3. Find the inverse of the matrix  $A = \begin{bmatrix} 2 & 1 & 1 \\ 3 & 2 & 3 \\ 1 & 4 & 9 \end{bmatrix}$  using Gaussian method.

4. Determine the largest eigen value and the corresponding eigen vector of the matrix  $\begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$

5. A function  $y = f(x)$  is given by the following table. Find  $f(0,2)$  by using Newton's forward interpolation formula.

$x$	0	1	2	3	4	5	6
$y = f(x)$	176	185	194	203	212	220	229

6. Using Runge-Kutta method of fourth order find  $y(0,1)$ ,  $y(0,2)$  and  $y(0,3)$  given that  $\frac{dy}{dx} = 1 + xy$ ;  $y(0) = 2$ .
7. Evaluate  $\int_0^{10} \frac{dx}{1+x^2}$  by using (i) Trapezoidal rule (ii) Simpson one third rule.

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