THE AMERICAN COLLEGE, MADURAI

(An Autonomous Institution Affiliated to Madurai Kamaraj University)

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

Backlog Arrear Examination, March 2021

MAT 238   **Max.Marks:75**

Numerical Analysis   **Duration:3 hrs**

Answer any FIVE Questions: **5×15=75**

1. a) Find the positive root of $x^2 - log_{10}x - 12 = 0$ by the method of false position corrected to three decimals.

   (b) Find the root between 0 and 1 of the equation $3x - cosx - 1 = 0$ correct to four places of decimals by Newton- Raphson Method.

2. A function $y = f(x)$ is given by the following table. Find $f(0.2)$ and $f(5.4)$.

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

3. Evaluate $f(9)$ for the following table using (i) Lagrange's formula (ii)Newton's divided differences formula.

x	5	7	11	13	17
y	150	392	1452	2366	5202

4. Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x = 51$ from the following table.

x	50	60	70	80	90
y	19.96	36.65	58.81	77.21	94.61

5. Evaluate $\int_0^{10} \frac{dx}{1+x^2}$ by using (i) Trapezoidal rule (ii)Simpson one-third rule.

6. Using Taylor's method solve $\frac{dy}{dx} = 1 + xy$ with $y_0 = 2$. Find (i)$y(0.1)$ (ii)y(0.2) and (iii)y(0.3).

7. Using Runge-Kutta method of fourth order find $y(0.1)$, $y(0.2)$ and $y(0.3)$, given that $\frac{dy}{dx} = xy + y^2, y(0) = 1$.