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TERM END EXAMINATIONS (TEE) – May 2023

Programme	: B.Tech.	Semester	: Summer Semester 2022-23
Course Title/ Course Code	: Applied Numerical Methods / MAT2003	Slot	: D21+D22+D23+D24+D25
Time	: 1½ hours	Max. Marks	: 50

Answer ALL the Questions

Q. No.	Question Description	Marks

PART - A (30 Marks)

1 **(a)** Solve the following system by Gaussian elimination method   10

$$x_1 - x_2 + x_3 = 1$$
$$-3x_1 + 2x_2 - 3x_3 = -6$$
$$2x_1 - 5x_2 + 4x_3 = 5$$

OR

(b) Find the smallest positive root of the equation $x^3 - 2x + 0.5 = 0$ using Newton's-Raphson method.   10

2 **(a)** Using Lagrange's formula find the value of x when $f(x) = 15$ form the given data :   10

x	5	6	9	11
y	12	13	14	16

OR

(b) The following table gives the census population of a town for the years 1931 to 1971. Estimate the population for the year 1965 by using an approximate interpolation formula.   10

Year	1931	1941	1951	1961	1971
Population (in thousands)	46	66	81	93	101

3 **(a)** The velocity of a train which starts from rest is given by the following table, the time being reckoned in minutes from the start and speed in kilometres per hour.   10

t min	2	4	6	8	10	12	14	16	18	20
V km/ hour	16	28.8	40	46.4	51.2	32.0	17.6	8	3.2	0

Estimate approximately by Simpson's rule the total distance run in 20 minutes.

OR

(b) Find the solution of the heat equation $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ subject to the conditions $u(x,0) = 0$, $u(0,t) = 0$ and $u(1,t) = t$. Compute u for $t = \frac{1}{8}$ in one step using Crank-Nicolson method.   10

PART - B (20 Marks)

4   Verify the diagonal dominance of the following system of equation. If not rearrange   10
the equation into diagonal dominance and find the solution using Gauss-Seidel
method.

$$3x + 4y + 15z = 54.8$$
$$x + 12y + 3z = 39.66$$
$$10x + y2z = 7.74$$

5   Using Euler's method solve for y at $x = 1$ from $\frac{dy}{dx} = 2e^x + y^2$, $y(0) = \frac{1}{2}$ taking $h =$ 10
0.25.

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