SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech. II Year I Semester Regular Examinations February-2025
NUMERICAL METHODS & TRANSFORM TECHNIQUES
(Mechanical Engineering)

Time: 3 Hours   **Max. Marks: 70**

PART-A
(Answer all the Questions **10 x 2 = 20** Marks)

1	**a**	Write the formula to find the root of an equation by Regula Falsi method.	CO1	L2	2M
	b	Compare Jacoby and Gauss Seidel methods.	CO1	L5	2M
	c	Write Newton's forward interpolation formulae.	CO2	L1	2M
	d	Write Lagrange's interpolation formulae.	CO2	L1	2M
	e	Write Taylor's formula for $y(x_1)$ to solve $y' = f(x,y)$ with $y(x_0) = y_0$.	CO3	L1	2M
	f	Write the formula for Runge – Kutta method of fourth order.	CO4	L1	2M
	g	State Change of Scale Property.	CO5	L1	2M
	h	State Convolution Theorem.	CO5	L1	2M
	i	Write the conditions for Fourier Series Expansion.	CO6	L1	2M
	j	State the shifting property of Fourier Transform.	CO6	L1	2M

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	**a**	Find a positive root of the equation $x^3 - x - 1 = 0$ by Bisection method.	CO1	L1	5M
	b	Find out the square root of 25 given $x_0 = 2.0$, $x_1 = 7.0$ using Bisection method.	CO1	L1	5M

OR

3	Find a real root of the equation $e^x \sin x = 1$ using Newton – Raphson method.	CO1	L1	10M

UNIT-II

4 **a** Using Newton's forward interpolation formula and the given table of values   CO2 L3 5M

x	1	1.4	1.8	2.2
f(x)	3.49	4.82	5.96	6.5

Obtain the value of *f(x)* when *x=1.6*.

b Applying Newton's forward interpolation formula, compute the value of $\sqrt{5.5}$ given that $\sqrt{5} = 2.236$; $\sqrt{6} = 2.449$; $\sqrt{7} = 2.646$; $\sqrt{8} = 2.828$.   CO2 L3 5M

OR

5 By method of least squares fit a straight line to the following data ;   CO2 L3 10M

X	1	2	3	4	5
y	14	27	40	55	68

UNIT-III

6 Tabulate $y(0.1), y(0.2)$ and $y(0.3)$ using Taylor's series method given that $y^1 = y^2 + x$ and $y(0) = 1$.   CO3 L3 10M

OR

7	Using Runge – Kutta method of fourth order, solve $\frac{dy}{dx} = x^2 - y$, $y(0) = 1$. Find (0.1) *and* $y(0.2)$	CO4	L3	10M

8	a Find the Laplace transform of $f(t) = \left(\sqrt{t} + \frac{1}{\sqrt{t}}\right)^3$.	CO5	L3	5M
	b Find the Laplace transform of $e^{4t} sin2t \, cost$.	CO5	L3	5M

OR

9	a Find $L^{-1}\left\{\frac{1}{(s^2+5^2)^2}\right\}$, using Convolution theorem.	CO5	L3	5M
	b Find $L^{-1}\left\{\frac{s^2}{(s^2+4)\,(s^2+25)}\right\}$, using Convolution theorem.	CO5	L3	5M

10	Obtain the Fourier series expansion of $f(x) = x^2$ in $0 < x < 2\pi$.	CO6	L3	10M

OR

11	Find the Finite Fourier sine transform of f(x)=$2x$, where $0 < x < 2\pi$.	CO6	L1	10M

*** END ***