Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – October 2025

Date: 10-10-2025 **Time:** 02.00pm to 03.30pm

School: SOE/SOCSE	**Program:** B. Tech.	
Course Code: MAT2501	**Course Name:** INTEGRAL TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	
Semester: III	**Max Marks**: 50	**Weightage**: 25%

CO - Levels	CO1	CO2	CO3	CO4	CO5
Marks	26	24			

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **5Q x 2M=10M**

1	Find the Laplace transform of (i) $\sin 2t$ (ii) $\cosh 3t$.	2 Marks	L1	CO1
2	Express the function $f(t)=\begin{cases} f_1(t), 0<t<a \\ f_2(t), t \geq a \end{cases}$ in terms of unit step function.	2 Marks	L1	CO1
3	Find the inverse Laplace transform of i) $\frac{2}{s+3}$ ii) $\frac{s}{s^2+9}$.	2 Marks	L1	CO1
4	Verify whether the function $f(x)=\frac{\pi-x}{2}$ defined in the interval $[0,2\pi]$ is even or odd.	2 Marks	L1	CO2
5	Write the formula of Fourier sine series over the interval $[0,\pi]$.	2 Marks	L1	CO2

Part B

Answer the Questions. **Total Marks 40M**

6	a	Find the Laplace transform of $\sin 3t \cos 4t$.	5 Marks	L2	CO1
	b	Find the Laplace transform of $t^2 \sin at$.	5 Marks	L2	CO1
		Or			
7		Find the Laplace transform of below function by expressing it in terms of unit step function $f(t)=\begin{cases}1, 0<t\le 1\\ t, 1<t\le 2\\ t^2, t>2\end{cases}$.	10 Marks	L2	CO1

8	a	Find the inverse Laplace transform of $\tan^{-1}\left(\frac{1}{s}\right)$.	4 Marks	L3	CO1
	b	Find the inverse Laplace transform of $\frac{1}{(s^2+1)(s^2+9)}$ by using the concept of convolution theorem.	6 Marks	L3	CO1
		Or			
9		Apply the concept of Laplace transform to solve the equation $\frac{d^2y}{dt^2}+4\frac{dy}{dt}+3y=e^{-t}$ with $y(0)=y'(0)=0$.	10 Marks	L3	CO1

10	Obtain the Fourier series for the function $f(x)=x+x^2$ in $[-\pi,\pi]$.	10 Marks	L3	CO2
	Or			
11	Find the Fourier series for $f(x)=\pi x$ in $-1\le x\le 1$ and hence deduce that $\frac{\pi}{4}=1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\ldots$.	10 Marks	L3	CO2

12	Obtain half range Fourier sine series of $f(x)=x$ in $(0,\pi)$ and hence deduce that $\frac{\pi}{4}=1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\ldots$.	10 Marks	L3	CO2
	Or			
13	Find Fourier series of y in $(0,6)$ up to second harmonic for the following data x: 0, 1, 2, 3, 4, 5 y: 4, 8, 15, 7, 6, 2	10 Marks	L3	CO2