PRESIDENCY UNIVERSITY

BENGALURU

Make- Up Examinations – December 2025

Date: 30 – 12- 2025   **Time:** 09:30am – 12:30pm

School: SOE	**Program:** B. Tech
Course Code : MAT2001	**Course Name :** Transform Techniques, Partial Differential Equations
Semester: MK	**Max Marks**:100 **Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4
Marks	24	31	16	29

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.   **10Q x2M=20M**

1	Verify whether the function $f(x) = sinx$ is even or odd?	2 Marks	L1	CO1
2	Find a_n for f(x)=x^2 in the interval (-π, π).	2 Marks	L2	CO1
3	Find the Laplace transform of 4t-5.	2 Marks	L1	CO2
4	Find the inverse Laplace transform of $\frac{1}{(s+6)^2}$.	2 Marks	L2	CO2
5	Define Fourier transforms.	2 Marks	L1	CO2
6	Find the z-transform of 4n-7a.	2 Marks	L1	CO3
7	Find the z-transform of $\sin\left(\frac{n\pi}{2}\right)$.	2 Marks	L1	CO3
8	Write formula for Z[u_{n+3}].	2 Marks	L1	CO3
9	Define linear partial differential equations.	2 Marks	L1	CO4
10	Define non-homogenous partial differential equations.	2 Marks	L1	CO4

Part B

11.	a.	Find the Fourier series of the function $f(x) = x^2 - 2$ when $-2 \leq x \leq 2$.	10 Marks	L3	CO1

Or

12.	a.	Obtain the Fourier expansion of $f(x) = x^2$ over the interval $[-\pi, \pi]$.	10 Marks	L3	CO1

13.	a.	Find the half range (a) cosine series and (b) sine series for $f(x) = x$ in $(0, \pi)$.	10 Marks	L3	CO1

Or

14.	a.	Expand the function $f(x)$ in terms of Fourier series by means of the table of values given below. Find the series up to the second harmonics.	10 Marks	L3	CO1

x	0	$\dfrac{\pi}{3}$	$\dfrac{2\pi}{3}$	π	$\dfrac{4\pi}{3}$	$\dfrac{5\pi}{3}$	2π
$f(x)$	1.98	1.3	1.05	1.3	−0.88	−0.25	1.98

15.	a.	Find inverse Laplace transform of $\dfrac{s}{(s+2)(s+3)}$.	10 Marks	L3	CO2

Or

16.	a.	Apply convolution theorem to find inverse Laplace transform of $\dfrac{1}{(s+1)(s^2+4)}$.	10 Marks	L3	CO2

17.	a.	Find Z-transform of $(n+3)^3$ and $\cos(3n+2)$.	10 Marks	L3	CO3

Or

18.	a.	Use Z-transform method to solve $u_{n+1} - 3u_n = 4$, $u_0 = 1$.	10 Marks	L3	CO3

19.	a.	Form the PDE by eliminating the arbitrary function	10	L3	CO4

		from $xyz = f(x+y+z)$.	Marks		

<div align="center">Or</div>

20.	a.	Solve $\frac{\partial^2 z}{\partial x^2} + z = 0$.	10 Marks	L3	CO4

21.	a.	Express the function $f(t) = \begin{cases} t^2 & for\ 0 < t \le 1 \\ 4t & for\ t > 1 \end{cases}$ in terms of unit step function and hence find their Laplace transform.	15 Marks	L3	CO2

<div align="center">Or</div>

22.	a.	Using Laplace transform method solve $\frac{dy}{dt} + y = te^{-t}$ with $y(0) = 2$.	15 Marks	L3	CO2

23.	a.	Solve $(z-y)p + (x-z)q = y-x$.	15 Marks	L3	CO4

<div align="center">Or</div>

24.	a.	Solve $\frac{\partial^2 z}{\partial x^2} = xy$ subject to conditions $\frac{\partial z}{\partial x} = log(1+y)$ when $x = 1$ and $z = 0$ when $x = 0$.	15 Marks	L3	CO4

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***** BEST WISHES *****

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