Roll No.											

PRESIDENCY UNIVERSITY

BENGALURU

Make Up Examinations –December 2025

Date: 06- 01-2026 **Time:**09:30am – 12:30pm

School: SOE	**Program:** B. Tech	
Course Code :MAT1002	**Course Name :** Transform Techniques, Partial Differential Equations and Their Applications	
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	**If $f(x) = x^2$ and $g(x) = \cos x$, then verify whether the product $f(x) \cdot g(x)$ is even or odd?.**	2 Marks	L1	CO1
2	**Find b_n for $f(x)=x^3$ in the interval $(0,2\pi)$.**	2 Marks	L2	CO1
3	**Find the Laplace transform of$(2025t^2 + 2024t)$.**	2 Marks	L2	CO2
4	**Find the inverse Laplace transform of $\frac{1}{(s-2)^2}$.**	2 Marks	L1	CO2
5	**Define Fourier transforms.**	2 Marks	L1	CO2
6	**Find $Z[a^n \cosh n\theta]$.**	2 Marks	L1	CO3
7	**Find the z-transform of $\cos\left(\frac{n\pi}{2}\right)$.**	2 Marks	L2	CO3
8	**Write formula for $Z[u_{n+3}]$.**	2 Marks	L1	CO3
9	**Find the order and degree of the partial differential equation $\left(\frac{\partial^2 z}{\partial x^2}\right)^3 + \frac{\partial z}{\partial y} = \cos x$.**	2 Marks	L1	CO4

10	Write the Lagrange's auxiliary equation of $x^2p + y^2q = z^2$.	2 Marks	L1	CO4

Part B

Answer the Questions. **Total Marks 80M**

11.	a.	Obtain the Fourier expansion of $f(x) = \begin{cases} x, & 0 < x < \pi \\ 2\pi - x, & \pi < x < 2\pi \end{cases}$ over the interval $[0, 2\pi]$.	10 Marks	L3	CO1

Or

12.	a.	Find the Fourier series of the function $f(x) = (l - x)^2$ in $0 \leq x \leq 2l$.	10 Marks	L3	CO1

13.	a.	Find the half range (a) cosine series and (b) sine series for $f(x) = \begin{cases} x, \\ 2 - x, \end{cases}$ in $(0, \pi)$.	10 Marks	L3	CO1

Or

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

x	0	1	2	3	4	5
$f(x)$	4	8	15	7	6	6

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

Or

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

17.	a.	Find Z-transform of $\sin\left(\frac{n\pi}{2}\right)$, $(n+1)^2$ and ne^{an}.	10 Marks	L3	CO3

Or

18.	a.	Use Z-transform method to solve $u_{n+2} + 4u_{n+1} + 3u_n = 3^n$, $u_0 = 0$ and $u_1 = 1$.	10 Marks	L3	CO3

19.	**a.**	**Form the PDE by eliminating the arbitrary constants a, b and c from $z = ax + by + cxy$.**	**10 Marks**	**L3**	**CO4**

Or

20.	**a.**	**Solve $\frac{\partial^2 z}{\partial x^2} + 4z = 0$, given that when $x = 0, z = e^{2y}$ and $\frac{\partial z}{\partial x} = 2$.**	**10 Marks**	**L3**	**CO4**

21.	**a.**	**Express the function $f(t) = \begin{cases} \cos t, & 0 < t < \pi \\ \cos 2t, & \pi < t < 2\pi \\ \cos 3t, & t > 2\pi \end{cases}$ in terms of unit step function and hence find their Laplace transform.**	**15 Marks**	**L3**	**CO2**

Or

22.	**a.**	**Using Laplace transform method solve $\frac{d^2 y}{dt^2} + \frac{dy}{dt} + 3y = e^{-t}$ with $y(0) = y'(0) = 0$.**	**15 Marks**	**L3**	**CO2**

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

Or

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**

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