

Roll No																			
---------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--



**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

MAKE UP EXAMINATION – JAN 2023

Course Code: MAT1002

Date: 20-Jan-2023

Course Name: Transform Techniques, Partial Differential
Equations and Their Applications

Time: 01:00PM to 04:00PM

Max Marks: 100

Program : B. Tech – All Programs

Weightage:50%

Instructions:

- (i) Read the all questions carefully and answer accordingly.
- (ii) Question Paper consists of 3 parts.
- (iii) Scientific and non-programmable calculators are permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(10Qx 2M = 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?
(C.O.No.1) [Knowledge]
2. Find the value of $\sin n\pi$.
(C.O.No.1) [Knowledge]
3. Find $L[6e^{-6t}]$.
(C.O.No.2) [Knowledge]
4. Find $L^{-1}\left[\frac{1}{s^6}\right]$.
(C.O.No.2) [Knowledge]
5. Find $Z[a^n \cosh n\theta]$.
(C.O.No.3) [Knowledge]
6. Find $Z[-3^n]$.
(C.O.No.3) [Knowledge]
7. Find $Z^{-1}\left[\frac{3z}{(z-3)^2}\right]$.
(C.O.No.3) [Knowledge]
8. Find $Z[u_{n+1}]$.
(C.O.No.3) [Knowledge]
9. Find the order and degree of the partial differential equation $\left(\frac{\partial^2 z}{\partial x^2}\right)^3 + \frac{\partial z}{\partial y} = \cos x$.
(C.O.No.4) [Knowledge]
10. An equation of the form $Pp + Qq = R$ is termed as _____ partial differential equation.
(C.O.No.4) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries TEN marks.

(5Q x 10M = 50M)

11. Obtain the Fourier series of $f(x)$ defined in the interval $(0, 2\pi)$ by means of the table of values given below. Find the series up to the second harmonics. (C.O.No.1) [Comprehension]

x	0	$\frac{\pi}{3}$	$\frac{2\pi}{3}$	π	$\frac{4\pi}{3}$	$\frac{5\pi}{3}$	2π
$f(x)$	1.0	1.4	1.9	1.7	1.5	1.2	1.0

12. Apply Laplace transform method to solve $\frac{d^2y}{dt^2} - y = t$ with $y(0) = 0$ and $y'(0) = 0$.

(C.O.No.2) [Comprehension]

13. Find the Fourier cosine transform for the function e^{-ax} .

(C.O.No.2) [Comprehension]

14. Find the Z-transform of: (i) $(n + 1)^2$ (ii) $n^2 e^{an}$.

(C.O.No.3) [Comprehension]

15. Solve: $\frac{y^2z}{x}p + xzq = y^2$.

(C.O.No.4) [Comprehension]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries FIFTEEN marks.

(2Q x 15M = 30M)

16. Solve $y_{n+2} + 2y_{n+1} + y_n = 0$ with $y_0 = 0, y_1 = 1$, using Z-transform method.

(C.O.No.3) [Comprehension]

17. Solve $x^2 \frac{\partial u}{\partial x} + y^2 \frac{\partial u}{\partial y} = 0$ by the method of separation of variables.

(C.O.No.4) [Comprehension]