PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
MID TERM EXAMINATION - OCT 2023

Semester : Semester III - 2022

Course Code : MAT1002

Course Name : Sem III - MAT1002 - Transform Techniques Partial Differential Equations and Their Applications
Program : B.TECH

Date : 30-OCT-2023
Time : 9:30AM -11:00AM

Max Marks : 50

Weightage : 25%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS (5 X 2 = 10M)

1. Write the half range Fourier cosine series of $f(x)$ in $(0,2)$.

(CO1) [Knowledge]

2. Write the Laplace transform of a) π and b) e^{-3t}.

(CO2) [Knowledge]

3. What is the Laplace transform of $e^t \sin 6t$.

(CO2) [Knowledge]

4. Obtain the inverse Laplace transform for a) $\dfrac{1}{s^2-1}$ and b) $\dfrac{1}{s+2}$.

(CO2) [Knowledge]

5. What is the inverse Laplace transform of $\dfrac{s+2}{4-s^2}$.

(CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS (4 X 5 = 20M)

6. Obtain the Fourier series of $f(x) = 4x$ in $-2 \leq x \leq 2$.

(CO1) [Comprehension]

7. Compute the Laplace transform for the function $t^2 \sin t$.

(CO2) [Comprehension]

8. Convert the function $f(t) = \begin{cases} t^2, & 0 < t \le 1 \\ 3t, & t \ge 1 \end{cases}$ in terms of the unit step function and then compute its Laplace transform.

(CO2) [Comprehension]

9. Estimate the inverse Laplace transform of $\dfrac{3s-4}{(s-2)(s+3)}$ using the partial fraction method.

(CO2) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION   **(1 X 20 = 20M)**

10. a) Estimate the Fourier series of y in $(0, 6)$ up to the first harmonic for the following data.

x	0	1	2	3	4	5
y	4	8	15	7	6	2

b) Compute the inverse Laplace transform of $\dfrac{1}{s(s^2+a^2)}$ using the convolution theorem.

(CO2,CO1) [Application]