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Roll No. ...2394081.....

# TMA-201

**B. TECH. (SECOND SEMESTER)**

**MID SEMESTER**

**EXAMINATION, March, 2024**

**ENGINEERING MATHEMATICS-II**

**Time : 1½ Hours**

**Maximum Marks : 50**

**Note :** (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each sub-question carries 10 marks.

1. (a) Solve :

$$\left( \frac{y}{x} \sec y - \tan y \right) dx + (\sec y \log x - x) dy = 0$$

(CO1)

OR

(b) Solve :

(CO1)

$$(D^4 + 2a^2 D^2 + a^4)y = 8 \cos ax$$

**P. T. O.**

2. (a) Solve : (CO1)

$$(D^4 + 1)y = e^x \cos x$$

OR

- (b) Solve : (CO1)

$$\frac{d^2 y}{dx^2} - 2 \frac{dy}{dx} + y = xe^x \sin x$$

3. (a) Solve : (CO1)

$$x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + y = \log x$$

OR

- (b) Solve : (CO1)

$$x^2 \frac{d^2 y}{dx^2} - 3 \frac{dy}{dx} + 2y = \frac{e^x}{1 + e^x}$$

by using variation of parameters method.

4. (a) Draw the graph of the following periodic function and find its Laplace Transform : (CO2)

$$f(t) = \begin{cases} t & \text{for } 0 < t \leq a \\ 2a - t & \text{for } a < t < 2a \end{cases}$$

(3)

OR

(b) If: (CO2)

$$f(t) = \frac{1 - \cos t}{t^2}$$

find the Laplace transform of  $f(t)$ .

5. (a) Using Laplace transform, find the solution of the initial value problem : (CO2)

$$y'' - 4y' + 4y = 64 \sin 2t$$

$$y(0) = 0$$

$$y'(0) = 1.$$

OR

(b) Using Convolution Theorem find : (CO2)

$$L^{-1} \left\{ \frac{s}{(s^2 + 1)(s^2 + 4)} \right\}$$