Roll No. .....

# TMA–201

## B. TECH. (SECOND SEMESTER)
## MID SEMESTER EXAMINATION, 2019
### (ALL BRANCHES)
### ENGINEERING MATHEMATICS–II

**Time : 1 : 30 Hours**

**Maximum Marks : 50**

**Note :** (i) This question paper contains two Sections.

(ii) Both Sections are compulsory.

**Section—A**

1. Fill in the blanks/True-False : (1×5=5 Marks)

(a) The order and degree of the differential equation $y = x\frac{dy}{dx} + \frac{x}{dy / dx}$ are 2, 1.

(True/False)

(b) The complementary function of the differential equation $(D^2 + 1)\, y = 0$, where $D \equiv \frac{d}{dx}$ is ..... .



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(c) The particular integral of $(D^2 + 4D + 4)$ $y = e^{2x}$ is ..... .

(d) The Laplace transform of $(\cos at)$ is $\frac{s}{s^2 + a^2}$. (True/False)

(e) The inverse Laplace transform of $\frac{1}{s^2 + a^2}$ is ..... .

2. Attempt any *five* parts : (3×5=15 Marks)

(a) Find the complete solution of $y'' + 9y = \sin 3x$.

(b) Find the particular integral of :

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

(c) What is the role of the integrating factor in the solution of a differential equation ? Write the integrating factor of $(xy^3 + y)\,dx + 2(x^2y^2 + x + y^4)\,dy = 0$.

(d) Find the inverse Laplace transform of $\frac{s^2 - 3s + 4}{s^3}$.





(e) Solve $\frac{d^2y}{dx^2} - 4y = \sinh x$.

(f) Define unit step function and write down its Laplace transform.

## Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Solve $(D^2 + a^2)\,y = \sec ax$.

(b) Solve $x^2 \frac{d^2y}{dx^2} - 4x\frac{dy}{dx} + 6y = x^2$.

(c) Evaluate $\int_0^\infty t\,e^{-3t} \sin t\,dt$ by using Laplace transform.

4. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Apply Convolution theorem to evaluate $L^{-1} \frac{1}{(s^2 + 1)(s^2 + 9)}$.

(b) Solve by the method of variation of parameters $y'' - 2y' + y = e^x \log x$.

(c) Find the Laplace transform of $t \cos at$.

5. Attempt any *two* parts of choice from (a), (b) and (c). (5×2=10 Marks)

(a) Find the Laplace transform of the function :

$$f(t) = \sin \omega t, \quad 0 < t < \pi/\omega$$
$$= 0 \quad , \quad \pi/\omega < t < 2\pi/\omega$$

(b) Solve $(D^2 - 3D + 2)y = xe^{3x}$.

(c) Solve the equation $y'' + 4y' + 3y = e^{-t}$, $y(0) = y'(0) = 1$ by Laplace transform.



F. No. : a-7