Roll No. .....

TMA–201

B. TECH. (SECOND SEMESTER)
MID SEMESTER EXAMINATION, 2018
(All Branches)
ENGINEERING MATHEMATICS—II

Time : 1 : 30 Hours

Maximum Marks : 50

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

(ii) All questions are compulsory.

Section—A

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

(a) Laplace inverse of $\frac{1}{p^5}$ is .....

(b) What is the degree of the differential equation $\frac{d^2y}{dx^2} + \sqrt{1 + \left(\frac{dy}{dx}\right)} = 0$?

(i) 0
(ii) 1
(iii) 2
(iv) 4

(c) The particular integral of $\frac{d^2y}{dx^2} + y = \sin(3x + 5)$ is :

(i) $-\frac{1}{7}\sin(3x + 5)$

(ii) $-\frac{1}{8}\sin(3x + 5)$

(iii) $-\frac{1}{6}\sin(3x + 5)$

(iv) None of these

(d) If the Fourier series of $f(x)$ has only cosine terms, then $f(x)$ must be ..... function.

(e) The Laplace transformation of sinh *at* is $\frac{a}{p^2 - a^2}$. (True/False)

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

(a) Find :

P. I. of $(D^2 - 2D + 1)y = x^2e^{3x}$.

(b) Solve :

$$(D^2 + D + 1)^2 (D - 2)y = 0$$

(c) Solve :

$$(D^2 - 4D + 4)y = e^x + \sin x$$

(d) Express

$$f(z) = x, \quad -\pi < x < \pi$$

as Fourier series.

(e) Find :

$$L\left(\frac{e^{-at} - e^{-bt}}{t}\right)$$

(f) Find inverse Laplace transform of :

$$\frac{3p + 7}{p^2 - 2p - 3}$$

Section—B

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

(a) Solve :

$$(3x^2y^4 + 2xy)dx + (2x^3y^3 - x^2)dy = 0$$

(b) Obtain the general solution of the differential equation :

$$(D^2 + 5D + 4)y = x^2 + 7x + 9$$

(c) Solve :

$$x^2\frac{d^2y}{dx^2} + 5x\frac{dy}{dx} + 4y = x\log x$$

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

   (a) Define Convolution theorem. Use Convolution theorem to find :

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

   (b) Find :

$$L\left(te^{-2t}\cos t\right)$$

   (c) Solve the equation $y'' - 2y' + 2y = 0$, given $y(0) = y'(0) = 1$ by Laplace transform.

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

   (a) Solve by variation of parameters :

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

   (b) Find Inverse Laplace transform of $\frac{p^2 - a^2}{(p^2 + a^2)^2}$.

   (c) Define periodic function. Find the Fourier series for $f(x) = x^2, -\pi \le x < \pi$.