Roll No. | | | | | | | |

TMA–201

B. Tech. (Second Semester)
Mid Semester EXAMINATION, 2017
(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) In Homogenous equation the degree of each term 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 $\frac{d^2y}{dx^2} - y = \cos x$ is :

(i) $-\frac{1}{2}\cos x$

(ii) $\frac{1}{2}\cos x$

(iii) $-\frac{1}{2}\sin x$

(iv) None of these

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

(e) Indicate true or false.

The P I of $\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + 2y = e^{3x}$ is $\frac{1}{21}e^{3x}$.

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

(a) Solve :

$$(D^2 - 4D + 4)y = x^3e^{2x}$$

(b) Find CF $(x^3D^3 + x^2D^2 - 2)y = 0$

(c) Define ordinary differential equation, order and degree with examples.

(d) Express $f(x) = |x| \; -\pi < x < \pi$ as Fourier series.

(e) Find the inverse Laplace transform of

$$\frac{s-1}{s^2 - 6s + 25}$$

(f) Find integrating factor of the equation :

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

Section—B

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

(a) Solve :

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

(b) Obtain the general solution of the differential equation $(D^2 - 2D + 2)y = x + e^x \cos x$.

(c) Solve :

$$x^3\frac{d^3y}{dx^3} + 3x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = x + \log x$$

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 :

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

(b) Find :

$$L(t\,e^{-3t}\sin 2t)$$

(c) Solve the equation $y'' - 3y' + 2y = 4t + e^{3t}$ by Laplace transform.

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

(a) Define periodic function. Find the Fourier series $f(x) = x,\ 0 < x < 2\pi$

(b) Find :

$$L\left(\frac{1-\cos t}{t^2}\right)$$

(c) Solve by variation of parameters $\frac{d^2y}{dx^2} + y = \tan x$.