Roll No. | | | | | | | |

TMA–201

B. Tech. (Second Semester)
Mid Semester EXAMINATION, 2015
(All Branches)
ENGINEERING MATHEMATICS—II

Time : Two Hours] [*Maximum Marks : 60*

Note : (i) This question paper contains three questions with alternative choice.

(ii) All questions are compulsory.

(iii) Each question carries four parts (a), (b), (c) and (d). Attempt either parts (a) and (b) or parts (c) and (d) of each question.

(iv) Each part carries **ten** marks. Total marks assigned to each question are **twenty**.

1. (a) Solve the differential equation :

$$2\,ydx + x\left(2\log x - y\right)dy = 0$$

(b) $\left(D^2 - 2D + 2\right)y = x + e^x \sin x.$

Or

(c) Solve :

$$\left(D^2 + 2D + 1\right)y = x\cos x$$

(d) $\dfrac{d^2y}{dx^2} + 3\dfrac{dy}{dx} + 2y = e^{e^x}.$

2. (a) Solve by variation of parameters :

$$\frac{d^2y}{dx^2} + a^2y = \sec ax$$

(b) A spring for which stiffness $k = 700$ Newton/m hangs in a vertical position with its upper end fixed. A mass of 7 kg is attached to lower end. After coming to rest, the mass is pulled down 0.05 and released. Discuss the displacement of the mass neglecting air resistance if displacement. If equation of motion is :

$$m\frac{d^2x}{dt^2} = -kx$$

Or

(c) Find Laplace transform of :

$$\left(\sqrt{t} + \frac{1}{\sqrt{t}}\right)^3$$

(d) Use convolution theorem to evaluate :

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

3. (a) Find the Laplace transform of $te^{-1} \sin 2t$.

(b) Find inverse Laplace transform if :

$$f(p) = \frac{2p^2 - 6p + 5}{p^3 - 6p^2 + 11p - 6}$$

Or

(c) Solve the following equation by Laplace transform :

$$\left(D^2 + n^2\right)x = a \sin\left(nt + \alpha\right);$$

$$x = Dx = 0 \text{ at } t = 0$$

(d) Find the Laplace transform of the periodic function :

$$f(t) = \frac{kt}{T}$$

for $0 < t < T, f(t + T) = f(t)$

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