

Total No. of Questions : 4]

SEAT No. :

PC390

[6359]-510

[Total No. of Pages :2

**S.E. (Electrical Engineering) (Insem)  
ENGINEERING MATHEMATICS - III  
(2019 Pattern) (Semester-III) (207006)**

Time : 1 Hour]

[Max. Marks : 30

Instructions to the candidates:

- 1) Attempt Q.1 or Q.2 and Q3 or Q4.
- 2) Figures to the right indicate full marks.
- 3) Use of electronic pocket calculator is allowed.
- 4) Assume suitable data, if necessary.

Q1) a) Solve the following differential equations (Any two): [10]

i)  $\frac{d^2 y}{dx^2} + y = \sin 2x \cos 2x$

ii)  $\frac{d^2 y}{dx^2} + 9y = \frac{1}{\sin 3x}$  (By method of variation of parameters)

iii)  $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} - 4y = 4x^2$

b) Solve the following simultaneous differential equation: [5]

$$\frac{dx}{dt} + y = \sin t, \quad \frac{dy}{dt} + x = \cos t$$

OR

Q2) a) Solve the following differential equations (Any two): [10]

i)  $(D^2 - 2D + 1)y = xe^x \sin x$

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

iii)  $\frac{dx}{x} = \frac{dy}{y} = \frac{dz}{y-z}$

b) An inductor of 0.5 henry is connected in series with a capacitor of 0.02 farad, a resistor of 8 ohms and a generator having e.m.f.  $80 \cos(10t)$ ,  $t \geq 0$ , in series. Find the instantaneous charge  $q$  and current  $i$ , if  $i = 0$ ,  $q = 0$  at  $t = 0$ . [5]

P.T.O.

**Q3) a)** Solve any two of the following. **[10]**

i) Find Laplace Transform of  $\frac{\cos 2t - \cos t}{t}$

ii) Find Laplace Transform of  $t^2 \cup (t-3)$

iii) Find  $L^{-1} \left\{ \frac{1}{s(5^2 + 2^2)} \right\}$

b) Solve  $\frac{d^2 y}{dt^2} + 4y = 9(t)$  given that  $y(0)=0, y'(0)=7$  by using Laplace transform. **[5]**

OR

**Q4) a)** Solve any two of the following. **[10]**

i) Find Laplace Transform of  $e^t(t+2)^2$

ii) Find Laplace Transform of  $\frac{\sin^2 t}{t}$

iii) Find  $L^{-1} \left\{ \frac{3s + 7}{s^2 - 2s - 3} \right\}$

b) Solve the differential equation by Laplace transform. **[5]**

$\frac{d^2 y}{dt^2} + 2\frac{dy}{dt} + y = te^{-t}$  Subject to  $y(0) = 1, y'(0) = 2$

