SEAT No. :

P-5384

[6186]-510

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, Q.3 or Q.4.*
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) $(D^2 - 1) y = 2x^4 - 3x + 1$

    ii) $\dfrac{d^2y}{dx^2} + y = \cos ec\ x$ (By method of variation of parameters)

    iii) $x^2 \dfrac{d^2y}{dx^2} - 4x \dfrac{dy}{dx} + 6y = x^5$

   b)   Solve $\dfrac{dx}{3z - 4y} = \dfrac{dy}{4x - 2z} = \dfrac{dz}{2y - 3x}$ **[5]**

OR

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

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

    ii) $(D^2 - 4D + 3)y = e^x \cos 2x$

    iii)   Solve the following simultaneous equations

$$\frac{dx}{dt} = y + 1$$

$$\frac{dy}{dt} = x + 1$$

P.T.O.

b) A circuit consists of an inductance of 0.05 henrys, a resistance of 5 ohms and a condensor of capacitance 4×10^{-4} Farad. If $q = i = 0$ when $t = 0$, find $q(t)$ and $i(t)$ when there is a constant emf of 110 volts. **[5]**

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

i) Find Laplace transform of $\int_0^t te^{-t} \sin 4t \ dt$

ii) Find inverse Laplace transform of $\dfrac{1}{s(s+2)}$

iii) Find Laplace transform of $\dfrac{\left(1-e^{2t}\right)}{t}$

b) Solve differential equation by Laplace transform $(D^2 - 2D - 8)y = 0$ subject to conditions $y(0) = 3$, $y'(0) = 6$. **[5]**

OR

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

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

ii) Find Laplace transform of $e^{-t}[1 - U(t - 3)]$

iii) Find inverse Laplace transform of $\dfrac{3s-14}{s^2-4s+8}$

b) Evaluate $\int_0^\infty t^2 e^{-3t} \sin t \ dt$ by Laplace transform. **[5]**

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