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SEAT No. :

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S.E. (Comp/IT/AI&ML/CS&DE) (Insem)

ENGINEERING MATHEMATICS - III

(2019 Pattern) (Semester - IV) (207003)

Time : 1 Hours]

[Max. Marks : 30

Instructions to the candidates:

- 1) Attempt Q1 or Q2 and Q3 or Q4.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
- 5) Assume Suitable data if necessary.

Q1) a) Solve any two

[10]

$$\text{i) } \frac{d^2y}{dx^2} + 4y = x \sin x$$

$$\text{ii) } (D^2 - 6D + 9)y = \frac{e^{3x}}{x^2} \text{ (Use method of variation of parameters)}$$

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

$$\text{b) Solve : } \frac{dx}{y + xz} = \frac{dy}{-x - yz} = \frac{dz}{x^2 - y^2}.$$

[5]

OR

Q2) a) Solve any two

[10]

$$\text{i) } (D^2 + 2D + 1)y = 4 \sin 2x$$

$$\text{ii) } (D^2 + 4)y = \sec 2x \text{ (Use method of variation of parameters)}$$

$$\text{iii) } (x + a)^2 \frac{d^2y}{dx^2} - 4(x + a) \frac{dy}{dx} + 6y = x$$

P.T.O.

- b) Solve the following simultaneous equations : [5]

$$\frac{dx}{dt} + 5x - 2y = 0$$

$$\frac{dy}{dt} + 2x + y = 0$$

- Q3)** a) By using Fourier integral representation show that

$$\int_0^\infty \frac{\cos \lambda x}{1+\lambda^2} d\lambda = \frac{\pi}{2} e^{-x}, x > 0. \quad [5]$$

- b) Attempt any one : [5]

i) Find inverse z-transform of $F(z) = \frac{6z}{(z+2)(z-4)}$, $|z| > 4, k \geq 0$

ii) Find z-transform of $f(k)$ if $f(k) = e^k$, $k \geq 0$

- c) Solve difference equation $f(k+1) + 4f(k) = 4^k$, $k \geq 0$ given $f(0) = 0$. [5]

OR

- Q4)** a) Solve any one : [5]

i) Find z-transform of $f(k) = 3^k \sin(2k+3)$, $k \geq 0$

ii) Find inverse z-transform of $F(z) = \frac{1}{(z-4)(z-5)}$ by inversion integral method

- b) Find Fourier sine transform of $f(x) = \begin{cases} \sin x & , 0 < x < a \\ 0 & , x \geq a \end{cases}$ [5]

- c) Solve integral equation $\int_0^\infty f(x) \sin \lambda x dx = \begin{cases} 1 - \lambda & , 0 \leq \lambda \leq 1 \\ 0 & , \lambda > 1 \end{cases}$ [5]
