

[6268]-217

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]**

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

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

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

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

[5]**OR****Q2) a) Solve any two****[10]**

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

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

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

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

- 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]
