Total No. of Questions: 4]
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SEAT No.: [Total No. of Pages :2

[6359],511

PC391

S.E. (Electronics/E & TC/Electronics & Computer/

Electronics Eng. (VLSI Design & Tech.)/

Electronics & Comm.-Adv. Comm. Tech.) (Insem)

ENGINEERING MATHEMATICS-III

(2019 Pattern) (Semester- III) (207005)

Time: 1 Hour]

[Max. Marks: 30

Instructions to the candidates:

- Answer Q.1 or Q.2 and Q.3 or Q.4.
- Figures to the right indicate full marks. *2*)
- Neat diagrams must be drawn wherever necessary. 3)
- Use of non-programmable scientific calculator is allowed
- 5)

Q1) a) Solve any Two.

[10]

i)
$$(D^2 - 1)y = \frac{1}{2}(1 - \cos x)$$

- i) $(D^2 1)y = \frac{1}{2}(1 \cos x)$ ii) $(D^2 + 4)y = \csc(2x)$ ii) $(D^2 + 4)y = \csc(2x)$ [By Method of variation of Parameters]

iii)
$$x^{2} \frac{d^{2}y}{dx^{2}} - 3x \frac{dy}{dx} + 5y = \sin(\log x)$$

b) Solve: $\frac{dx}{3z - 4y} = \frac{dy}{4x - 2z} = \frac{dz}{2y - 3x}$

OR

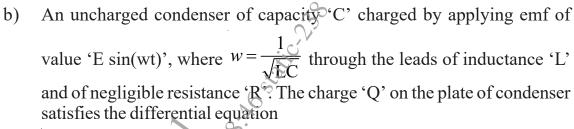
02) a) Solve any Two.

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

ii) $(D^2 + 3D + 2)y = e^{e^x}$ [By Method of Variation of Parameters]

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

P.T.O.



$$\frac{d^2Q}{dt^2} + \frac{Q}{LC} = \frac{E}{L} \sin\left(\frac{t}{\sqrt{LC}}\right), \text{ then find the charge 'Q' at any time 't' [5]}$$

Using Fourier integral representation show *Q3*) a)

that
$$\int_{0}^{1-\cos\lambda\pi} \sin\lambda x \, d\lambda = \begin{cases} \frac{\pi}{2} & ; \ 0 < x < \pi \\ 0 & ; \ x > \pi \end{cases}$$
 [5]

[5]

[5]

- Solve any one. b)
 - i) Find $z\{f(k)\}$ where $f(k) = \frac{2^k}{k}$; $k \ge 1$ ii) Find inverse z-transform of $F(z) = \frac{3z^2 + 2z}{z^2 3z + 2}, \ 1 < |z| < 2$

$$F(z) = \frac{3z^2 + 2z}{z^2 - 3z + 2}, \ 1 < |z| < 2$$

Solve the following difference equation: c)

$$f(k+1) + \frac{1}{2}f(k) = \left(\frac{1}{2}\right)^k, k \ge 0, f(0) = 0$$

- **Q4**) a)
- The any one. Find $z\{f(k)\}$ if $f(k) = 2^k \cos(3k + 2)$; if $k \ge 0$
- $J(k) = 2^{k} \cos(3k + 2); \text{ if } k \ge 0$ ii) Find $z^{-1} \left[\frac{2^{2}}{(z^{2} + 1)} \right]$ by inversion integral method

 Find the Fourier sine transform of $\frac{e^{-ax}}{x}$, x > 0Solve integral equation: $\int_{0}^{\infty} f(x) \sin \lambda x \, dx = \begin{cases} 1 \lambda & ; & 0 \le \lambda \le 1 \\ 0 & ; & \lambda \ge 1 \end{cases}$ 1

 2 b)
 - c)

$$\int_{0}^{\infty} f(x) \sin \lambda x \, dx = \begin{cases} 1 - \lambda & ; & 0 \le \lambda \le 1 \\ 0 & ; & \lambda \ge 1 \end{cases}$$

