| Total | No. | of | Questions | : | <b>4</b> ] |
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P-5385

| SEAT No.: |
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[Total No. of Pages: 2

## [6186]-511

## S.E. (Electronics)/(E&Tc)/(Electronics & Computer Engg.) (Insem.) **ENGINEERING MATHEMATICS - III** (2019 Pattern) (207005) (Semester-III)

Time: 1 Hour] [Max. Marks: 30

Instructions to the candidates

- Answer Q1 or Q2 and Q3 or Q4.
- 2) Figures to the right indicate full marks.
- 3) Near diagrams must be drawn wherever necessary.
- 4) Use of non-programmable scientific calculator is allowed
- 5) Assume suitable data, if necessary.

[10]

i) 
$$\frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 4y = 2\sin x - 3e^{-2x}$$

Solve by method of variation of parameters.

$$\frac{d^2y}{dx^2} + y = \sec x$$

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

$$\frac{d^2y}{dx^2} + y = \sec x$$
iii) 
$$x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + 6y = x$$
b) 
$$\frac{dx}{x^2 + y^2} = \frac{dy}{2xy} = \frac{dz}{(x + y)^3 z}$$

**Q2**) a)

i) 
$$(D^2-20+1)y = xe^x \sin x$$

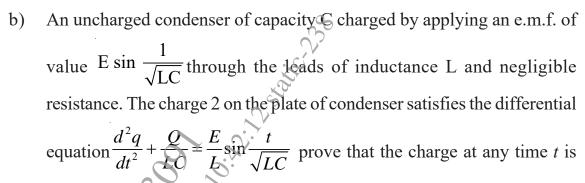
$$\frac{d^2y}{dx^2} - y = \frac{2}{1 + e^x}$$

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

$$\frac{dx}{x^{2} + y^{2}} = \frac{dy}{2xy} = \frac{dz}{(x + y)^{3}z}$$
OR

Solve any two.
i)  $(D^{2}-20+1)y = xe^{x}\sin x$ 
ii) Solve by method of variation of parameters.
$$\frac{d^{2}y}{dx^{2}} - y = \frac{2}{1+e^{x}}$$
iii)  $(2x+3)^{2} \frac{d^{2}y}{dx^{2}} - 2(2x+3)\frac{dy}{dx} - 12y = 6x$ 

P.T.O.



given by 
$$Q = \frac{Ec}{2} \left[ \sin \frac{t}{LC} - \frac{t}{\sqrt{LC}} \cos \frac{t}{\sqrt{LC}} \right].$$
 [5]

Q3) a) Find Fourier cosine transform of 
$$f(x) = e^{-2x}, x > 0$$
 [5]

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

  ii) Find inverse z transform of [5]

$$F(z) = \frac{1}{z - a}, |z| > |a|$$

c) Solve the following difference equation 
$$f(k+2) - 4f(k) = 0, f(0)=0, f(1)=2$$
 [5]

## Attempt any ONE **Q4**) a)

- Find Z transform of  $f(k) = k5^k, k \ge 0$ .
- Find inverse z transform of  $F(z) = \frac{z^2}{z^2 + 1}$ , |z| > 1 by inversion integral ii)

method.
b) Find Fourier transform of
$$f(x) = \begin{cases} 1 & , |x| < a \\ 0 & , |x| > a \end{cases}$$
c) Solve 
$$\int_{0}^{\infty} f(x) \sin \lambda x dx = \begin{cases} 1 - \lambda, \ 0 \le \lambda \le 1 \\ 0 & , \lambda \ge 1 \end{cases}$$

$$(5)$$

$$(5)$$

$$(6)$$

$$(7)$$

$$(7)$$

$$(86)$$

$$(7)$$

$$(86)$$

$$(86)$$

$$(86)$$

c) Solve 
$$\int_{0}^{\infty} f(x) \sin \lambda x dx = \begin{cases} 1 - \lambda, & 0 \le \lambda \le 1 \\ 0, & \lambda \ge 1 \end{cases}$$
 [5]