Total No. of Questions : 4]

SEAT No. : ____

PB71

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S.E. (Automobile and Mechanical Engineering)/ (Mechanical Sandwich)/ (Automation and Robotics Engg.) (Insem)

ENGINEERING MATHEMATICS-III

(2019 Pattern) (Semester-IV) (207002)

Time : 1 Hour] ***[Max. Marks : 30***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Assume suitable data, if necessary.***

Q1) a) Solve any two of the following: **[10]**

i) $(D^2+1)\,y = e^{3x} + \cos(2x)$

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

iii) $x^2\frac{d^2y}{dx^2} - 4x\frac{dy}{dx} + 6y = x^3$

b) Solve $\frac{dx}{y+zx} = \frac{dy}{-x-yz} = \frac{dz}{x^2-y^2}$ **[5]**

OR

Q2) a) Solve any two of the following **[10]**

i) $(D^2-D+1)\,y = 3x^2 + 1$

ii) $(D^2+1)\,y = \sec x$ (use Method of variation of Parameters)

iii) $(x+1)^2\frac{d^2y}{dx^2} - 4(x+1)\frac{dy}{dx} + 6y = x$

P.T.O.

b) A body of Weight W=3N stretches a spring to 15cm. If the weight is pulled down 10 cm below the equilibrium position and then given a downward velocity 60 cm/sec, determine the amplitude, period and frequency of motion. **[5]**

Q3) a) Find the Laplace transform of the $f^n f(t)=e^{-3t}$ (3 Cosh 3t–2 Sin h 4 t) **[5]**

b) Find the inverse Laplace transform of $F(s)=\dfrac{3s+7}{(s-2)(s+1)}$ **[5]**

c) Find the fourier cosine transform of $f(x)=\begin{cases} x^2, & 0<x<a \\ 0, & x>a \end{cases}$ **[5]**

OR

Q4) a) Find the fourier sine transform of the f^n $f(x)=e^{-x}+e^{-2x}, x\geq 0$ **[5]**

b) Solve the integral equation **[5]**

$$\int_0^{\infty} f(x)\sin\lambda x\,dx=\begin{cases} 1 & ,0\leq\lambda<1 \\ 2 & 1\leq\lambda<2 \\ 0 & \lambda\geq 2 \end{cases}$$

c) Find the inverse Laplace transform of $F(s)=\dfrac{3s+1}{(s-1)(s^2+1)}$ **[5]**

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