Total No. of Questions : 4]

SEAT No. :

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S.E.(Computer/I.T/C.S. & D.E/A.I& M.L) (Insem)

ENGINEERING MATHEMATICS - III (2019 Pattern) (Semester - II) (207003)

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

Instructions to the candidates :

1) *Attempt Q.1 or Q.2, Q.3 or Q.4.*
2) *Assume suitable data, if necessary.*
3) *Neat diagrams must be drawn wherever necessary.*
4) *Use of electronic pocket calculator is allowed.*
5) *Figures to the right indicate full marks.*

Q1) a) Solve any Two **[10]**

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

ii) $(D^2 - 2D + 2)\, y = e^x \tan x$ (Use method of variation of parameters)

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

b) Solve $\dfrac{dx}{3z-4y} = \dfrac{dy}{4x-2z} = \dfrac{dz}{2y-3x}$ **[5]**

OR

Q2) a) Solve any TWO **[10]**

i) $(D^2 - 4D + 4)\, y = e^x \cos^2 x$

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

iii) $(x+2)^2 \dfrac{d^2y}{dx^2} + 3(x+2)\dfrac{dy}{dx} + y = 4\cos[\ln(x+2)]$

b) Solve **[5]**

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

$$\frac{dy}{dt} + x - 4y = 0$$

P.T.O.

Q3) a) Find the Fourier cosine integral representation for the function

$$f(x)=\begin{cases}x^2, 0<x<a\\ 0,\ x>a\end{cases}.$$ **[5]**

b) Solve the integral equation $\int_0^\infty f(x)\sin\lambda x dx=\begin{cases}1-\lambda, 0\le\lambda\le 1\\ 0,\lambda\ge 1\end{cases}.$ **[5]**

c) Attempt the following (Any One) : **[5]**

i) Find Z-transform of $f(k)=\left(\frac{1}{4}\right)^{|k|}$ for all k.

ii) Find $Z^{-1}\left[\frac{1}{(z-3)\,(z-2)}\right], 2<|z|<3.$

OR

Q4) a) Attempt the following (Any One) : **[5]**

i) Find Z-transform of $f(k)=4^k\sin(2k+3), k\ge 0.$

ii) Find $Z^{-1}\left[\frac{3z^2+2z}{z^2-3z+2}\right], 1<|z|<2.$

b) Solve the difference equation $f(k+2)+3f(k+1)+2f(k)=0, f(0)=0,$ $f(1)=1$, using z-transform. **[5]**

c) By Considering Fourier cosine integrals of e^{-mx}, $(m>0)$, prove that

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

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