Total No. of Questions : 4]

SEAT No. :

PF211

[Total No. of Pages : 2

Apr-26/SE/Insem-260

S.E. (Computer) (Computer Science & Design Engineering)/(Information Technology)/(Artificial Intelligence & Machine Learning) (Insem)

ENGINEERING MATHEMATICS -III

(2019 Pattern) (Semester - IV) (207003)

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

Instructions to the candidates:

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

Q1) a) Solve any two: **[10]**

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

ii) $\frac{d^2y}{dx^2} + y = \sec(x)$ by method of variation of parameters.

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

b) Solve: $\frac{xdx}{z^2 - 2yz - y^2} = \frac{dy}{y+z} = \frac{dz}{y-z}$ **[5]**

OR

Q2) a) Solve any two: **[10]**

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

ii) $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} = e^x \sin x$ by method of variation of parameters.

iii) $(1+x)^2\frac{d^2y}{dx^2} + (1+x)\frac{dy}{dx} + y = 4\cos[\log(1+x)]$

b) Solve: $\frac{dx}{dt} + y = e^t$ **[5]**

$x - \frac{dy}{dt} = e^{-t}$

P.T.O.

Q3) a) Find the fourier integral representation of the function **[5]**

$$f(x)=\begin{cases}1 & |x|<1\\ 0 & |x|>1\end{cases}$$

and hence evaluate $\int_0^\infty \frac{\sin\lambda\cos\lambda x}{\lambda}d\lambda$

b) Solve any one **[5]**

i) Find the z-transform and its ROC of 2^k, $k \geq 0$

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

c) Obtain $f(k)$, given that $12f(k+2) - 7f(k+1) + f(k) = 0$; $k \geq 0$, $f(0) = 0, f(1) = 3$. **[5]**

OR

Q4) a) Solve any one **[5]**

i) Find $z\{f(k)\}$ if $f(k) = 4^k \sin(2k + 3)$, $k \geq 0$

ii) Obtain $\{f(k)\}$ by use of the inversion integral method when F (z) is given by

$$F(z) = \frac{10z}{(z-1)(z-2)}$$

b) Find the fourier cosine integral representation for the function **[5]**

$$f(x)=\begin{cases}x^2 & 0<x<a\\ 0 & x>a\end{cases}$$

c) Solve the integral eqn **[5]**

$$\int_0^\infty f(x)\cos\lambda x dx=\begin{cases}1-\lambda & 0\leq\lambda\leq 1\\ 0 & \lambda>1\end{cases}$$

and hence show that $\int_0^\infty \frac{\sin^2 z}{z^2}dz=\frac{\Pi}{2}$ where $z=\frac{u}{2}$

● ● ●