

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: $\frac{xdx}{z^2 - 2yz - y^2} = \frac{dy}{y+z} = \frac{dz}{y-z}$
OR

[5]

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 $z = \frac{x}{2}$

