

# SPPU-SE-COMP-CONTENT – KSKA Git

Total No. of Questions : 4]

SEAT No. :

PA-4975

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[6008]-227

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

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

OR

Q2) a) Solve any TWO [10]

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

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

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

b) Solve [5]

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

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

P.T.O.

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

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

b) Solve the integral equation  $\int_0^\infty f(x) \sin \lambda x dx = \begin{cases} 1 - \lambda, & 0 \leq \lambda \leq 1 \\ 0, & \lambda \geq 1 \end{cases}$ . [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  $f(k) = 4^k \sin(2k+3), k \geq 0$ .

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

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

