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Total No. of Pages : 01

Total No. of Questions : 08

M.Tech. (ECE) (Sem.-1)
ADVANCED MATHEMATICS FOR ENGINEERS
Subject Code : EC-501
Paper ID : [E0561]

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTION TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

1. Find the Fourier cosine transform of $f(x) = \frac{1}{1+x^2}$. Hence derive Fourier sine transform of

$$\phi(x) = \frac{x}{1+x^2}$$

2. a) Find Z-transform of i) $C(n+p, p)$ ii) $n \sin n\theta$

b) Find inverse Z-transform of $\frac{2z^2 + 3z}{(z+2)(z-4)}$.

3. Find largest eigen values and the corresponding eigen vector of the matrices

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

4. Solve the equation using Gauss-seidal iteration method

$$20x + y - 2z = 17$$

$$3x + 20y - z = -18$$

$$2x - 3y + 20z = 25$$

5. Use Rayleigh-Ritz method to solve $y'' + y + x = 0$ ($0 \leq x \leq 1$), $y(0) = y(1) = 0$.

6. Under the transformation of $w = \frac{1}{z}$ find image of $|z - 2i| = 2$.

7. State and prove brachistochrone problem.

8. a) State and Prove Convolution theorem for Fourier transforms.

- b) Find relationship between Fourier and Laplace transforms.