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Total No. of Pages : 02

Total No. of Questions : 08

M.Tech. (ECE) (Sem.-1)

ADVANCED MATHEMATICS FOR ENGINEERS

Subject Code : EC-501

M.Code : 36202

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTION TO CANDIDATES :

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

 Q1. a) Find the fourier sine and cosine transforms of $f(x) = e^{-ax}$ ($a > 0$). (10)

 b) If $F(f(x)) = F(s)$ then show that $F(x^n f(x)) = (-i)^n \frac{d^n}{ds^n} F(s)$. (10)

 Q2. a) Find the Z-transform of $\sin\left(\frac{k\pi}{2} + \alpha\right)$. (10)

 b) If $Z(f(k)) = F(z)$ then show that $Z\left(\sum_{n=-\infty}^{\infty} f(n)\right) = \frac{F(z)}{1-z^{-1}}$ (10)

Q3. Apply Gauss-Seidel's iteration method to solve the equations

$$20x + y - 2z = 17; 3x + 20y - z = -18; 2x - 3y + 20z = 25 \quad (20)$$

 Q4. Show that the transformation $w = i \frac{1-z}{1+z}$ transform the circle $|z| = 1$ onto the real axis of the w -plane and the interior of the circle into the upper half of the w -plane. (20)

Q5. Define Euler's equation and find the shape of the curve of the given perimeter enclosing maximum area. (20)

Q6. Discuss Hamilton's principle and derive Lagrange's equation. (20)

Q7. State Parseval's identity for fourier transforms. Prove that

$$\int_0^{\infty} \frac{dt}{(a^2+t^2)(b^2+t^2)} = \frac{\pi}{2ab(a+b)} \quad (20)$$

Q8 .Determine the largest eigen value and the corresponding eigen vector of the matrix

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix} \quad (20)$$

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.