

BCA 2nd Semester

Mathematical foundation for computer science

Paper Code-BCA-1203

1. Express $f(x)=x^5+5x^3+3x$ as a polynomial in $(x-1)$. Also find $f(x+1)$
2. Solve the equation $4x^4-4x^3-13x^2+9x+9=0$ given that the sum of two roots is zero.
3. Solve
$$\begin{vmatrix} x^3-a^3 & x^2 & x \\ b^3-a^3 & b^2 & b \\ c^3-a^3 & x^2 & c \end{vmatrix} = 0$$
4. Solve by Cramer's rule : $x+2y+3z=6$, $2x+4y+z=7$, $3x+2y+9z=14$
5. Compute the adjoint and inverse of the matrix
$$\begin{bmatrix} 3 & 2 & 1 \\ 1 & 1 & 1 \\ 5 & 1 & -1 \end{bmatrix}$$
6. If $y=\sin^{-1} \sqrt{1-x^2}$, $|x|<1$, show that
 - i) $(1-x^2)y_2-3xy_1-y=0$
 - ii) $(1-x^2)y_{n+2}-(2n+3)xy_{n+1}-(n+1)^2y_n=0$
7. Write down Lagrange's Mean Value Theorem. Prove that from Rolle's Theorem.
8. If $u=r^3$, $x^2+y^2+z^2=r^2$, prove that
$$(\delta^2 u / \delta^2 x + \delta^2 u / \delta^2 y + \delta^2 u / \delta^2 z) = 12r$$

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