**MA 8352 Linear Algebra and Partial Differential Equations**

**Important 13mark questions**

## Unit I

1. Determine the basis and dimension of the solution space of the linear homogeneous system $x + y - z = 0$; $-2x - y + 2z = 0$; $-x + z = 0$.
2. Determine whether the set of all 2 × 2 matrix of the form $\begin{bmatrix} a & a+b \\ a+b & b \end{bmatrix}$, $a, b \in R$, with respect to standard matrix addition and scalar multiplication is a vector space or not? If nor, list all the axioms that fail to hold.

## Unit II

1. Let L be a linear transformation from $R^3$ to $R^3$ whose matrix representation A with respect to the standard basis is given below. Find the Eigen values of L and a basis of Eigen vectors $\mathbf{A} = \begin{vmatrix} 1 & 3 & -3 \\ 3 & 1 & -3 \\ -3 & -3 & 1 \end{vmatrix}$.
2. If A is an $m \times n$ matrix, then prove that $N(A)$ is a sub space of $R^n$.

## Unit III

1. State and prove Gram- Schmidh orthogonalization process.
2. Find the orthogonal basis containing the vector (1, 3, 4) for $V_3(R)$ with the standard inner product.

## Unit IV

1. Solve $p^2 + q^2 = x^2 + y^2$.
2. From the partial differential equation by eliminating the arbitrary functions f and ∅from $Z = x\, f(y/x) + y\emptyset(x)$.

## Unit V

1. Express $f(x) = (\pi - x)^2$ as a Fourier series of period $2\pi$ in the interval $0 < x < 2\pi$.
2. Show that in $0 \le x \le \pi$, $x(\pi - x) = \frac{\pi^2}{6} - (\frac{\cos 2x}{1^2} + \frac{cos4x}{2^2} + \frac{cox6x}{3^2} + \cdots)$.