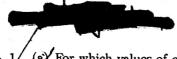
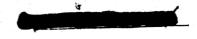
The LNM Institute of Information Technology, Jaipur Mathematics-II Mid Term

Mid Jerm February 21, 2018

Duration: 90 mins.

Max.Marks: 30





For which values of g, h and k the following system of linear equations is consistent?

$$x-4y+7z = g$$
$$3y-5z = h$$
$$-2x+5y-9z = k$$

[3]

(b) Prove that any square matrix A can be written as the sum of a symmetric matrix and a skew-symmetric matrix. [2]

Let V = C[0,1]. Prove or disprove: $S = \{f \in V : f(\frac{1}{2}) = 0\}$ is a subspace of V.

[2]

(6) Let V be a vector space over a field F. Let U and W be two subspaces of V. Prove that $U \cap W$ is also a subspace of V. [3]

What is the span of {1} in the vector space C over the field C? What is the span of {1} in the vector space C over the field R. [2]

Write the span of $\{(1,0,0),(0,-1,0)\}$ in \mathbb{R}^3 . Explain geometrically.

[2]

Show that $B = \{(1,2,0), (1,3,2), (0,1,3)\}$ forms a basis for \mathbb{R}^3 .

[3]

Determine the coordinate vector of v = (2, 7, -4) with respect to the ordered basis B given in Part (a).

5 (a) Suppose $\{u_1, u_2\}$ is an orthogonal set in an inner product space V. Show that $||u_1 + u_2||^2 = ||u_1||^2 + ||u_2||^2$. [2]

Use Gram-Schmidt process to transform the basis $\{(1,0,1),(1,0,-1),(0,3,4)\}$ for \mathbb{R}^3 into an orthogonal basis with the standard inner product.

Find all value/s of $k \in \mathbb{R}$ for which $A = \begin{pmatrix} 1 & k & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ is diagonalizable. [3]

Let A be a square matrix. Prove that A and A^T have same set of eigen values. [2]