Seat No.: _____

Enrolment No.____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-I & II EXAMINATION - WINTER 2015

Subject Code: 110009 Date:21/12/2015

Subject Name: Maths-II

Time: 10:30am to 01:30pm Total Marks: 70

Instructions:

- 1. Attempt any five questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- **Q.1** (a) 1.Let u = (2, -2, 3), v = (1, -3, 4) then

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- a. Find the norm of u + v.
- b. Find the distance between u and v.
- c. Find u v
- 2. Define basis of R^3 and Check the following set S is a basis of R^3 or not.
- $S = \{(1, 2, 1), (2, 1, 0), (-3, 2, 1)\}.$
- (b) Define Vector Space. Let V be the set of all order pair (x, y) of real numbers with operations $(x_1, y_1) + (x_2, y_2) = (x_1 + x_2, y_1 + y_2)$ and

 $K(x_1, y_1) = (K^2 x_1, K^2 y_1)$. Check whether V is a Vector Space over R or not.

Q.2 (a) Find the inverse of A (if possible) using row operations, Where

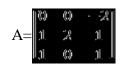
 $\mathbf{A} = \begin{bmatrix} 11 & 22 & 33 \\ 24 & 25 & 33 \\ 44 & 24 & 49 \end{bmatrix}$

- (b) Determine which of the following are subspace of V.
 - a. All vectors of the form (x, 0, 0), where $V = R^3$.
- Q.3 (a) Find bases for the row and column space of

(b) Solve the linear system

$$x + y + 2z = 2,3x - y + z = 6,$$
 $x + 3y + 4z = 4.$

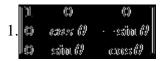
Q.4 (a) Find the bases for the Eigen space of



- (b) Determine whether the following functions are Linear Transformation. Justify your answer.
 - a. Let T: M33 \longrightarrow M₃₃, Defined by T (A) = A^T.
 - b. Let T: $R^3 > R^3$, Defined by T (x, y, z) = (x^2 , y^2 , z^2).
- Q.5 (a) Consider the basis $S = \{(-2,1),(1,3)\}$ for R^2 and $T:R^2 \longrightarrow R^3$ be the Linear Transformation such that T(-2,1) = (-1, 2, 0) and T(1, 3) = (0, -3, 5)Find a formula for T(x, y) and find T(2, -3).
 - (b) Define Real inner product Space. Let Vector Space P₂ have the inner product 07

- a. Find the norm of p for w = 1 and $w : x^2$
- b. Find the distance between w:: 1 and q:: x
- **Q.6** (a) Let $S = \{(1, 2, 1), (2, 9, 0), (3, 3, 4)\}$ be the basis for \mathbb{R}^3 .
 - a. Find the co-ordinate vector of v = (5, -1, 9) with respect to S.
 - b. Find the vector v in R^3 whose co-ordinate vector with respect to S is $(v)_s = (1, 3, 2)$.
 - (b) Define: Symmetric Matrix and Orthogonal Matrix. 07

Are the following matrices symmetric or orthogonal?







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- - (b) Let R^3 have the Euclidean inner product. Use the Gram-Schmidt process to transform the basis $S=\{(1,0,0),(3,7,-2),(0,4,1)\}$ into an orthonormal basis.
