P. S. SCIENCE & H. D. PATEL ARTS COLLEGE, KADI

Internal Examination

B. Sc. Semester - IV

11-3-2017] **Mathematics - 402** **[1-30 to 3-30**

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1. **(a)** Explain matrix associated with a Linear Transformation.

(b) **Attempt any one.**

(i) Let $T : IR^4 \to IR^3$ be a L.T. Then find matrix $[T : B_1, B_2]$.
Where B_1 & B_2 are standart basis of IR^4 & IR^4 resp. and $T(a, b, c, d) = (a + c, b-d, 2a + 5b + 3c + d)$

(ii) Find Linear Transformation associated with a matrix

$$\begin{bmatrix} 5 & -1 \\ 5 & 2 \end{bmatrix}$$ where $B_1 = \{1, t\}$ & $B_2 = \{1, 1+t\}$ are ordered basis of P_2 & P_2 resp.

2. **(a)** Define inner product space for $x, y \in U$ and Scallars α, β. Prove that $4\langle x, y\rangle = \|x + y\|^2 - \|x - y\|^2$.

(b) **Attempt any one.**

(i) For $x, y \in U$ Prove that
$\|x + y\|^2 + \|x - y\|^2 = 2\|x\|^2 + 2\|y\|^2$

(ii) Let $B = \{(1, 2), (5, -1)\}$ be a basis of IR^2. Then find it's orthonormal basis.

3. **(a)** Defines : Eigen value, Eigen vectors, characteristic polynomial.

(b) **Attempt any one.**

(i) Solve the system of Linear equations
$2x - 3y = 5$
$x + 4y = 9$

(ii) Using Cayley - Hamilton theorem find inverse of matrix $\begin{bmatrix} 3 & 5 \\ 2 & 1 \end{bmatrix}$
