B.Sc. EXAMINATION:MARCH / APRIL- 2016

SEMESTER-IV

LINEAR ALGEBRA II

PAPER NO.:M-402 CODE NO:3837

TIME:2 :30HOURS TOTAL MARKS:70

INSTRUCTIONS(1)ALL QUESTIONS ARE COMPULSORY.

(2)EACH QUESTION CARRY EQUAL MARKS.

Q.1 A State and prove gram Schmidt orthogonalization process. [7]

B Apply gram Schmidt process to obtain an orthonormal basis from $\{(0, 0, 2), (2, 1, 0), (-1, 2, 1)\}$. [7]

OR

Q.1 A If $B=\{x_1, x_2, x_3, \ldots, x_n\}$ be orthonormal basis and for $y \in V$ prove that $\|Y\|^2 = \sum |<y, x_i>|^2$ [7]

B State and prove Schwartz's inequality. [7]

Q.2 A State and prove riesz representation theoerem. [7]

B Define symmetric linear transformation and verify the following function is linear symmetric or not ? [7]

$T: R^3 \to R^3$; $T(x,y,z) = (2x + 3y + z, 3x + 4y + z, x + y + 5z)$

OR

Q.2 A $T: V \to V$ be a linear function then T is orthogonal iff $\|T(X)\| = \|X\|$ [7]

B If $W = sp\{(1, 0, 1), (0, 1, 1)\}$ then obtain $W^{\perp}$ [7]

Q.3 A Prove that $\begin{vmatrix} a+b & b+c & c+a \\ p+q & q+r & r+p \\ x+y & y+z & z+x \end{vmatrix} = 2\begin{vmatrix} a & b & c \\ p & q & r \\ x & y & z \end{vmatrix}$ [7]

B Solve the following linear equation by Cramer's rule. [7]

$3x + 4y + 7z = 2$; $4y - 7z = 2$; $7x + 9y + 63z = 2$.

OR

Q.3 A Solve the following linear equation by Cramer's rule. [7]

$X + 8y = 3$; $3x + 4y - 9z = 3$; $x + 8y + 7z = 3$.

B Find the value of $A = \begin{vmatrix} 1 & 1 & 1 & 1 \\ \alpha & \beta & y & \delta \\ y+\beta & y+\delta & \delta+\alpha & \alpha+\beta \\ \delta & \alpha & \beta & y \end{vmatrix}$. [7]

Q.4 A If $T: R^2 \to R^2$, $T(x,y) = (x + y, 3x - 2y)$ then find Eigen values and Eigen vectors of T. [7]

B Find the direction of principal axis of the conic $2x^2 + 3xy - 2y^2 = 10$ by diagonalization method. [7]

OR

Q.4 A Verify cayley theorem for the function If $T: R^3 \to R^3$, $T(x,y,z) = (x + z, y - x, x + y + z)$ [7]

B Find the direction of principal axis of the conic $x^2 + xy + y^2 = 1$ by diagonalization method. [7]

Q.5 A Define the curve represented by the equation $2x^2 - 72xy + 23y^2 + 140x - 20y + 50 = 0$. [7]

B Verify the distributive law for vectors $u = 2i - 3j + k$ and $v = i + j + k$ and $w = i + 3j + k$ for $u, v, w \in V$ [7]

OR

Q.5 A If $\emptyset(x,y) = x_1y_1 - x_2y_1 + x_2y_2$ then $\emptyset$ is bilinear or not ? [7]

B Define the curve represented by the equation [7]

$11x^2 + 6xy + 19y^2 = 80$.