B.Sc. EXAMINATION - October-2015
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 Schwartz's inequality. [7]
B Apply gram- Schmidt process to obtain an orthonormal basis for {(1,0,1) ,(1,1,0) (0,1,1)}. [7]

OR

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

Q.2 A If T is symmetric linear transformation if $R_T$ is range of T, and $N_T$ is nullity of T then $R_T=(N_T)^{\perp}$ [7]
B If W is subspace of an inner product space V then prove that , Dim $W^{\perp}$ = Dim V —Dim W [7]

OR

Q.2 A Define symmetric linear transformation and verify the following function is linear symmetric or not ? T: $R^2 \to R^2$ ; $T(x,y) = \left(\frac{x+\sqrt{3}y}{2}, \frac{y-\sqrt{3}x}{2}\right)$ [7]
B State and prove riesz representation theoerem. [7]

Q.3 A Prove that $\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ yz & zx & xy \end{vmatrix} = \begin{vmatrix} 1 & 1 & 1 \\ x^2 & y^2 & z^2 \\ x^3 & y^3 & z^3 \end{vmatrix}$ [7]
B Verify the matrix $\begin{bmatrix} 1 & -2 & -2 \\ 2 & -1 & 2 \\ 2 & 2 & -1 \end{bmatrix}$ is orthogonal or not? [7]

OR

Q.3 A 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]
B Verify T: $R^3 \to R^3$ ,T(a ,b ,c) = (a + b , a+2b+c, b+c ) is symmetric linear or not? [7]

Q.4 A Define the properties of vector product and prove that $|u \times v| = |u|^2 |v|^2 - |u.v|^2$ [7]
B V be a vector space f , g be linear functional on V, h:V→F is defined as h(x y) = f(x).g(y) then show that h is bilinear form. [7]

OR

Q.4 A Define bilinear form and if $\phi_1$ and $\phi_2$ are bilinear form on vector space V then prove that $\phi_1 + \phi_2$ is also bilinear form. [7]
B Classify the quadratic curve represented by the equation, $2x_1^2 - 72x_1x_2 + 23x_2^2 + 14x_1 - 20x_2 + 50 = 0$ [7]

Q.5 A Verify cayley theorem for the function If T: $R^2 \to R^2$ , T (x,y) = ( x +2y , 3x +2y ). [7]
B If Φ is bilinear form then prove that ∝Φ is bilinear form [7]

OR

Q.5 A Define the curve represented by the equation [7]
$x^2 + z^2 + 6yz - 2xz + 4xy$.
B B: $R^n \times R^n \to R$ is symmetric linear form if Q(x) = B(x, x)then show that [7]
Q( X + Y ) + Q( X + Y) = 2 [Q (X) + Q (Y) ].