March-15

CODE:3837 B.Sc- SEM-IV EXAMINATION - MARCH

M-402: LINEAR ALGEBRA II

TIME :2:30 Hours TOTAL MARKS:70

INSTRUCTIONS: (1) All questions are compulsory.
(2) Each question carries equal marks.

Q.1	A	State and prove gram- Schmidt orthogonalization process to obtain an orthonormal basis.	[07]
	B	Apply gram- Schmidt process to obtain an orthonormal basis for vector set {(1,1,1,1) ,(0,2,0,2) ,(-1,1,3,-1)}.	[07]

OR

Q.1	A	State and prove Schwartz's inequality.	[07]
	B	Apply gram- Schmidt process to obtain an orthonormal basis for vector set {(1,-1,1,-1) ,(5,1,1,1) (2,3,4,-1)}.	[07]
Q.2	A	State and prove riesz representation theorem.	[07]
	B	Find the coordinate of the polynomial $3 + 4x + 9x^2$ relative to ordered basis $\{x^2 + 1,\ x^3\}$.	[07]

OR

Q.2	A	T: V→V be a linear function then the following are equivalent. (1)T is orthogonal. (2) $\lVert T(X) \rVert = \lVert X \rVert$. (3)If $\{e_i\}$ for $i = 1,2,\ldots n$ is an orthonormal basis then $\{T(e_i) / i = 1, 2, \ldots n\}$ is an orthonormal basis.	[07]
	B	Define symmetric linear transformation and verify the following functions are linear symmetric or not? T: $R^3 \to R^3$; $T(x) = (2a_1 + 3a_2 + a_3, 3a_1 + 4a_2 + a_3, a_1 + a_2 + 5a_3)$, $T(x) = \left(\frac{a_1 - a_2}{\sqrt{2}}, \frac{a_1 + a_2 - 2a_3}{\sqrt{6}}, \frac{a_1 + a_2 + a_3}{\sqrt{3}}\right)$.	[07]
Q.3	A	Define vector product and prove $\lvert u\ X\ v \rvert = \lvert u \rvert . \lvert v \rvert - \lvert u . v \rvert$	[10]
	B	Prove that, $\begin{vmatrix} 1+a & 1 & 1 & 1 \\ 1 & 1+b & 1 & 1 \\ 1 & 1 & 1+c & 1 \\ 1 & 1 & 1 & 1+d \end{vmatrix} = (abcd)\left(1 + \frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{d}\right)$	[04]

OR

Q.3	A	Find the value of A = $\begin{vmatrix} 1 & 1 & 1 & 1 \\ \alpha & \beta & y & \delta \\ y+\beta & y+\delta & \delta+\alpha & \alpha+\beta \\ \delta & \alpha & \beta & y \end{vmatrix}$.	[10]
	B	Solve the following linear equation by Cramer's rule. 3x +4y +7z = −1 ; 4y −7z = 52 ; 7x +9y +63z = 32.	[04]
Q.4	A	Verify $\begin{vmatrix} x & y & z \\ x^2 & y^2 & z^2 \\ yz & zx & xy \end{vmatrix} = \begin{vmatrix} 1 & 1 & 1 \\ x^2 & y^2 & z^2 \\ x^3 & y^3 & z^3 \end{vmatrix}$	[07]
	B	Find the direction of principal axis of the conic $8x^2 - 12xy + 17y^2 = 80$ by diagonalization method.	[07]

OR

Q.4	A	If T: $R^3 \to R^3$, T (x,y,z) = (x +y +2z ,y ,x −2y +z) then find Eigen values and Eigen vectors of T.	[07]
	B	Find the direction of principal axis of the conic $2x^2 + 3xy - 2y^2 = 10$ by diagonalization method.	[07]
Q.5	A	Discuss classification of quadrics.	[07]
	B	Identify the curve represented by the equation $2x^2 - 72xy + 23y^2 + 140x - 20y + 50 = 0$.	[07]
		OR	
Q.5	A	State and prove the properties of bilinear form on a vector space V.	[07]
	B	If $\emptyset\,(x, y) = x_1y_1 - x_1y_2 + 2x_2y_1 + 5x_2y_2$ then $\emptyset$ is bilinear or not ?	[07]