October - 2015

CODE : 3804

SEM-III EXAMINATION,

M-302: LINEAR ALGEBRA

TIME : 2:30 HOURS

TOTAL MARKS:70

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

Q.1	A	If W_1 & W_2 are subspaces of vector space V, then $W_1 + W_2$ and $W_1 \cap W_2$ are both subspaces of V.	[7]
	B	If V = {(x, y)/x>0, y∈R} and $\propto \in R$, for a, b, c, d ∈ R the function define as (a,b) + (c,d) = (ac, b+d) and the scalar multiplication defined as $\propto(a\ b) = (a^{\propto}, \propto b)$ then prove that V is vector space.	[7]

OR

Q.1	A	Determine which of the following vectors are in [S], where S={(1,2,1),(1,1,-1),(4,5,-2)}. (a) (0,0,0) (b) (1,-3,5)	[7]
	B	Prove that $W_1 = \{(x,y,z)/\sqrt{2}x=\sqrt{3}y\}$ is vector subspace of R^3 But $W_2 = \{(x,y,z)/x^2 + y^2 + z^2 \leq 1\}$ is not vector subspace of R^3.	[7]
Q.2	A	Check following sub sets of R^3 is linearly dependent or not? $S_1 = \{(1,0,0), (1,1,1), (1,2,3)\}$ and $S_2 = \{(1,5,2), (0,0,1), (1,1,0)\}$.	[7]
	B	W_1 and W_2 are subspaces of vector space V and W = $W_1 + W_2$ for every w ∈W, ∃ unique vector such that w= $W_1 + W_2$ iff W = $W_1 \oplus W_2$	[7]

OR

Q.2	A	If w_1 and w_2 are sub spaces of finite dimensional vector space V then Dim (w_1+w_2)=Dim w_1+Dimw_2 —Dim$(w_1 \cap w_2)$.	[7]
	B	Prove that the subsets $\{(1,\frac{2}{5},-1,(0,1,2),(\frac{3}{4},-1,1)\}$ of R^3 are its basis.	[7]
Q.3	A	If Dim V = n then prove that V is isomorphic to vector space R^n.	[7]
	B	If a linear transformation T on V satisfies the condition $T^2 + I = T$ then prove that T^{-1} exists.	[7]

OR

Q.3	A	$T:R^3 \to R^2$; T(x, y, z) = (x+y , y+z) ; B_1 ={(1,1,1), (1,1,0) (1,0,0)} B_2= {(1,0),(0,1)} then find the matrix[T:B_1,B_2].	[7]
	B	If T : U → V, is linear map then (1) R (T) is subspace of V. (2) N(T) is subspace of V.	[7]

Q.4	A	State and prove , Rank - Nullity theorem.	[7]
	B	For linear transformation $T:R^2 \to R^3$ defined as $T(x,y) = (x,x+y,y)$; for every $(x,y) \in R^2$, find R_T, N_T & $n(T)$, $r(T)$	[7]

OR

Q.4	A	Prove that parallelogram is rhombs iff the diagonals are perpendicular to each other.	[7]
	B	$T:R^4 \to R^3$ is linear transformation $T(x_1, x_2, x_3, x_4) = (x_1 + x_2, x_2 - x_4, x_3 - x_4)$ then find N_T , R_T, $n(T)$ and $r(T)$	[7]

Q.5	A	In inner product space,Prove that triangle is right angle if ∃ one side whose square equal to the sum of square of other sides.	[7]
	B	state and prove Schwarz's inequality	[7]

OR

Q.5	A	If x and are vectors in unitary space then show that, $4 < x\ y > = \| x + y \|^2 - \| x - y \|^2 + i \| x + iy \|^2 - i \| x - iy \|^2$	[7]
	B	State and prove triangle inequality.	[7]