UG SEM III INTERNAL EXAMINATION 2021

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SUBJECT- MATHEMATICS

COURSE- DC-06 (LINEAR ALGEBRA)

TIME – 1 HR. F.M-18

GROUP-A (8 MARKS)

Answer all the Questions:(2×4=8)

1. A matrix M has Eigen values 1 & 4 with corresponding Eigen vectors $(1,-1)^t \; and \; (2,1)^t$ respectively. Then find the matrix M.

2. Find the rank of the linear transformation $T: \mathbb{R}^3 \to \mathbb{R}^3$ defined by $T(x,y,z) = (y,0,z)$.

3. Let V be the set of all 3×3 real matrices such that $A = (a_{ij})$ with $a_{11} + a_{22} + a_{33} = 0$. $Find \;\; dimV$.

4. Consider the set of vectors

$$S_1 = \{(3,0,4), (-4,0,3), (0,9,0)\} \; and$$

$$S_2 = \left\{\left(\frac{3}{5},0,\frac{4}{5}\right), \left(-\frac{4}{5},0,\frac{3}{5}\right), (0,1,0)\right\}.$$

Examine if $S_1 \; is \; orthogonal \;\; \& \;\; S_2 \; is \; orthonormal$.

GROUP-B (10 MARKS)

Answer all the Questions :(5×2=10)

5. If $T: \mathbb{R}^3 \to \mathbb{R}^3$ is a linear transformation such that

$$T(1,2,-1) = (2,4,-2),$$
$$T(-1,0,2) = (3,0,-6)$$
$$and\ \ T(1,1,0) = (0,0,0).$$

Find the Eigen values of the matrix of T with respect to the ordered basis $\{(1,2,-1), (-1,0,2), (1,1,0)\}$

6. Use Gram-Schmidt process to obtain an orthogonal basis from the basis set $\{(1,1,0), (0,1,1), (1,0,1)\}$ of the Euclidean space $\mathbb{R}^3$ with standard inner product.