Reg. No.:

Name :

TERM END EXAMINATIONS (TEE) –MAY 2022

Programme	:	**B.Tech. – BCE,MIP,MIM**	**Semester**	:	**Winter 2021-22**
Course Name	:	**Applied Linear Algebra**	**Course Code**	:	**MAT3002**
Faculty Name	:	**Dr.A.Manickam**	**Slot / Class No**	:	**A21+A22 / 0626**
Time	:	**1½ hours**	**Max. Marks**	:	**50**

Answer ALL the Questions

Q. No.		Question Description	Marks

PART - A (30 Marks)

1 (a) In the problem posed at the beginning of the section, John invested his inheritance of Rs. 12, in three different funds: part in a money-market fund paying 3% interest annually; part in municipal bonds paying 4% annually; and the rest in mutual funds paying 7% annually. John invested Rs.4, more in mutual funds than he invested in municipal bonds. The total interest earned in one year was Rs.6.7. Using Gauss Elimination method, Form the system of equation and find how much did he invest in each type of fund? — 10

OR

(b) Find a basis for row space, column space, and null space for the following matrix: — 10

$$M = \begin{bmatrix} 1 & 2 & 0 & 2 & 5 \\ -2 & -5 & 1 & -1 & 8 \\ 0 & -3 & 3 & 4 & 1 \\ 3 & 6 & 0 & -7 & 2 \end{bmatrix}$$

2 (a) Suppose $A = \begin{bmatrix} 1 & 3 & 0 \\ 3 & 1 & 0 \\ 0 & 0 & -2 \end{bmatrix}$ is the matrix for T: $R^3 \to R^3$ relative the standard basis. Find the matrix for T relative to the basis — 10

$B' = (1,1,0), (1,-1,0)(0,0,1)$

OR

(b) Define an inner product on $V = C[a,b]$ by $\langle f,g\rangle = \int_a^b f(x)g(x)dx$.Also verify that the set of vectors given below are orthogonal. — 10

(1) $\{1, \cos x, \sin x\}$; $a = -\pi$, $b = \pi$.

(2) $\left\{1, 2x-1,\ -x^2+x-\frac{1}{6}\right\}$; $a = 0, b = 1$

3 (a) By standard inner product on n dimensional space. Use the basis B and the Gram Schmidt process to find an orthonormal basis. 10

$B = \{(1,1,1), (-1,1,0), (-1,0,1)\}$

OR

(b) Let $A = \begin{bmatrix} 2 & 0 & 4 \\ 0 & 6 & 0 \\ 4 & 0 & 2 \end{bmatrix}$, find the orthogonal matrix P such that $P^{-1}AP$ is a diagonal matrix. 10

PART - B (20 Marks)

4 Decode the following Message "BE HAPPY". By using key matrix $\begin{bmatrix} 1 & -2 & 2 \\ -1 & 1 & 3 \\ 1 & -1 & -4 \end{bmatrix}$. 10

5 Find the singular value decomposition of the matrix $A = \begin{bmatrix} 2 & 2 \\ 4 & -1 \end{bmatrix}$. 10

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