29. a. Find the value of λ and μ for which $2x+3y+5z=9, 7x+3y-2z=8$ *and* $2x+3y+\lambda z=\mu$ have (i) unique solution (ii) no solution and (iii) infinite number of solution. 12 4 2 2

(OR)

b. Using LU decomposition method, solve the system of equations $x-2y+z=1, -x+y=-1$ and $y-2z=-1$. 12 4 2 1

30. a. Find QR decomposition of the matrix $\begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 3 \\ 0 & 0 & -1 \end{bmatrix}$. 12 4 3 2

(OR)

b. Determine whether the set $\{(1,1,0),(1,0,1),(0,1,1)\}$ is a basis of R^3. 12 4 3 2

31. a. Find eigen values and eigen vectors of the matrix $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$. 12 3 4 1

(OR)

b. Find the matrix of linear transformation $T: V_2(R) \to V_2(R)$ whose domain basis is $\{(1,0),(0,1)\}$ and range basis is $\{(1,1),(1,-1)\}$. 12 4 4 2

32. a. Find the singular value decomposition of the matrix $\begin{bmatrix} 5 & 5 \\ -1 & 7 \end{bmatrix}$. 12 4 5 1

(OR)

b. Using principal component analysis, reduce the dimension of the data. 12

x:	1	3	5
y:	3	4	5

* * * * *

Reg. No.														

B.Tech. DEGREE EXAMINATION, JUNE 2023

Second Semester

18MAB163T – LINEAR ALGEBRA

(For the candidates admitted from the academic year 2018-2019 to 2021-2022)

Note:

(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

(ii) **Part - B & Part - C** should be answered in answer booklet.

Time: 3 hours Max. Marks: 100

PART – A (20 × 1 = 20 Marks)

Answer **ALL** Questions

	Marks	BL	CO	PO

1. If $2A+\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}=\begin{bmatrix} 3 & 8 \\ 7 & 2 \end{bmatrix}$ then A is — 1 2 1 1

(A) $\begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$ (B) $\begin{bmatrix} -1 & 2 \\ 1 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} 2 & 2 \\ -1 & 1 \end{bmatrix}$ (D) $\begin{bmatrix} 5 & 1 \\ 6 & 2 \end{bmatrix}$

2. A matrix having only one row is called as — 1 1 1 1

(A) Column matrix (B) Row matrix

(C) Unit matrix (D) Triangle matrix

3. If a column of a matrix A is scalar multiple of another column of A then det A is — 1 1 1 1

(A) 2 (B) 1

(C) 0 (D) –1

4. Value of A(adj A) is — 1 2 1 1

(A) A^2 (B) A

(C) AI (D) |A|I

5. If the rank of A is zero, then A is — 1 1 2 1

(A) Diagonal matrix (B) Unit matrix

(C) Null matrix (D) Rectangle matrix

6. In the system of n-linear equations AX=B, if rank of A is less than n then AX=B has — 1 1 2 1

(A) No solution (B) Infinite number of solutions

(C) n-solutions (D) n–1 solutions

7. In Gaussian elimination method, coefficient matrix transformed in to — 1 1 2 1

(A) Diagonal matrix (B) Lower triangular matrix

(C) Upper triangular matrix (D) Unit matrix

8. Gaussian elimination method is a — 1 1 2 1

(A) Direct method (B) Indirect method
(C) LUD method (D) QRD method

9. An abstract vector space is a set whose elements are called as vectors with two operations. — 1 1 3 1

(A) Vector addition and scalar addition (B) Vector multiplication and scalar multiplication
(C) Vector addition and scalar multiplication (D) Vector multiplication and scalar addition

10. Standard basis of R^2 is — 1 1 3 1

(A) {(1,1), (–1,1)} (B) {(1,0), (0,1)}
(C) {(1,0), (0,–1)} (D) {(1,1), (–1,–1)}

11. Inner product space over a field of real number is — 1 2 3 1

(A) Euclidean space (B) Unitary space
(C) Vector space (D) Orthogonal space

12. If $v=(1,0,3)$ then ||v|| is — 1 2 3 1

(A) 10 (B) $\sqrt{10}$
(C) $\frac{1}{\sqrt{10}}(1,0,3)$ (D) (1,0,3)

13. Characteristic equation of the matrix A is — 1 1 4 1

(A) $|A-\lambda I|=0$ (B) $A-\lambda I=0$
(C) $(A-\lambda I)X=0$ (D) |A|=0

14. Two similar matrices — 1 1 4 1

(A) Have same eigen values (B) May not have same eigen values
(C) Will have different eigen values (D) Will have different characteristic equations

15. Identity linear transformation is — 1 1 4 1

(A) T(v)=v (B) T(v)=0
(C) T(v)=2v (D) T(v)= v+1

16. Absolute value of eigen values of unitary matrix is — 1 2 4 1

(A) 0 (B) 1
(C) 2 (D) 3

17. Principal component is the eigen vector with — 1 1 5 1

(A) Lowest eigen value (B) Highest eigen value
(C) Lowest singular value (D) Highest singular value

18. Artificial neural networks is the one of the popular algorithm in — 1 1 5 2

(A) Fluid dynamics (B) Topology
(C) Machine learning (D) Human learning

19. Photoshop is the example for — 1 1 5 2

(A) Image processing (B) Sound processing
(C) Digital sound processing (D) Digital image processing

20. Trimming set is used in machine learning for — 1 2 5 2

(A) Factorization (B) Digital processing
(C) Generalization (D) Image process

PART – B (5 × 4 = 20 Marks)

Answer **ANY FIVE** Questions

Marks BL CO PO

21. Solve $x+y=\begin{bmatrix}3 & -1\\ 0 & 1\end{bmatrix}$ and $x-y=\begin{bmatrix}2 & -2\\ 1 & 0\end{bmatrix}$. — 4 2 1 1

22. If $A=\begin{bmatrix}a & b & c\\ b & c & a\\ c & a & b\end{bmatrix}$ and $B=\begin{bmatrix}b+c & a+c & a+b\\ a+c & a+b & b+c\\ a+b & b+c & a+c\end{bmatrix}$ show that |B|=2|A|. — 4 2 1 1

23. Find the rank of the matrix $\begin{bmatrix}6 & 5 & 1\\ 2 & 3 & 0\\ 1 & 6 & 1\end{bmatrix}$. — 4 2 2 1

24. Verify whether the set $\{(1,-1,0),(2,-1,1),(3,6,1)\}$ is linearly independent or not in R^3. — 4 3 3 1

25. Find the nature of the matrix $\begin{bmatrix}-3 & 3 & 4\\ 2 & -3 & 4\\ 0 & -1 & 1\end{bmatrix}$. — 4 2 4 1

26. Show that $\begin{pmatrix}\frac{1+i}{2} & \frac{-1+i}{2}\\ \frac{1+i}{2} & \frac{1-i}{2}\end{pmatrix}$ is unitary. — 4 2 4 1

27. Discuss about machine learning. — 4 4 5 2

PART – C (5 × 12 = 60 Marks)

Answer **ALL** Questions

Marks BL CO PO

28. a. Using Cramer's rule, solve — 12 3 1 2
$3x+y+2z=3, 2x-3y-z=-3$ and $x+2y+z=4$.

(OR)

b. Find the inverse of the matrix $\begin{bmatrix}2 & 2 & 1\\ -2 & 1 & 2\\ 1 & -2 & 2\end{bmatrix}$ using adjoint of a matrix. — 12 3 1 2