Question No: 1 (Marks: 1) - Please choose one

If for a linear transformation the equation T(x) =0 has only the trivial solution then T is

- **One-to-one**
- Onto

Question No: 2 (Marks: 1) - Please choose one

Which one of the following is an elementary matrix?

- $\begin{bmatrix} 1 & 0 \\ 0 & -3 \end{bmatrix}$
- $\begin{bmatrix} 1 & 0 & 1 \\ 0 & -3 & -3 \end{bmatrix}$
- $\begin{bmatrix} 1 & 0 \\ 2 & -3 \end{bmatrix}$
- $\begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix}$

Question No: 3 (Marks: 1) - Please choose one

Let $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ and let k be a scalar .A formula that relates det kA to k and det A is

- det kA= k det A
- det kA = det (k+A)
- **det k A = k^2 det A**
- det A = k.det A

Question No: 4 (Marks: 1) - Please choose one

The equation x = p + t v describes a line

- through v parallel to p
- **through p parallel to v**
- through origin parallel to p

Question No: 5 (Marks: 1) - Please choose one

Determine which of the following sets of vectors are linearly dependent.

- $v_1 = \begin{bmatrix} 1 \\ 2 \end{bmatrix}, \quad v_2 = \begin{bmatrix} 6 \\ 2 \end{bmatrix}$
- $v_1 = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix}, \quad v_2 = \begin{bmatrix} 6 \\ 2 \\ 1 \end{bmatrix}$
- $v_1 = \begin{bmatrix} 5 \\ 2 \\ 3 \end{bmatrix}, \quad v_2 = \begin{bmatrix} 10 \\ 4 \\ 6 \end{bmatrix}$ **(lec 8) hint* vector v1 is a multiple of v2**

Question No: 6 (Marks: 1) - Please choose one

Every linear transformation is a matrix transformation

- True
- False

Question No: 7 (Marks: 1) - Please choose one

A null space is a vector space.

- **True**
- False

Question No: 8 (Marks: 1) - Please choose one

If two row interchanges are made in succession, then the new determinant

- equals to the old determinant
- equals to -1 times the old determinant

Question No: 9 (Marks: 1) - Please choose one

The determinant of A is the product of the pivots in any echelon form U of A , multiplied by $(-1)^r$, Where r is

- the number of rows of A
- the number of row interchanges made during row reduction from A to U
- the number of rows of U
- the number of row interchanges made during row reduction U to A

Question No: 10 (Marks: 1) - Please choose one

If A is invertible, then $\det(A)\det(A^{-1})=1$.

- True
- False

Question No: 11 (Marks: 1) - Please choose one

A square matrix $A=[a_{ij}]$ is lower triangular if and only if $a_{ij}=0$ for

- $i>j$
- $i<j$
- $i\leq j$

- $i = j$

Question No: 12 (Marks: 1) - Please choose one

The product of upper triangular matrices is

- lower triangular matrix
- upper triangular matrix
- diagonal matrix

Question No: 13 (Marks: 1) - Please choose one

The matrix multiplication is associative

- **True**
- False

Question No: 14 (Marks: 1) - Please choose one

We can add the matrices of _____.

- **same order**
- same number of columns.
- same number of rows
- different order

Question No: 15 (Marks: 1) - Please choose one

By solving system of equations with iterative method, we stop the process when the entries in two successive iterations are _____.

- **repeat(same)**
- large difference
- different

Question No: 16 (Marks: 1) - Please choose one

Jacobi's Method is _____ converges to solution than Gauss Siedal Method.

- slow
- fast
- better

Question No: 17 (Marks: 1) - Please choose one

A system of linear equations is said to be homogeneous if it can be written in the form _____.

- $AX = B$
- **$AX = 0$**
- $AB = X$
- $X = A^{-1}$

Question No: 18 (Marks: 1) - Please choose one
The row reduction algorithm applies only to augmented matrices for a linear system.

- True
- **False**

Question No: 19 (Marks: 1) - Please choose one
Whenever a system has no free variable, the solution set contains many solutions.

- True
- **False**

Question No: 20 (Marks: 1) - Please choose one

Which of the following is not a linear equation?

- $x_1 + 4x_2 + 1 = x_3$
- $x_1 = 1$
- $x_1 + 4x_2 - \sqrt{2}x_3 = \sqrt{4}$
- $x_1 + 4x_1x_2 - \sqrt{2}x_3 = \sqrt{4}$

Question No: 21 (Marks: 1) - Please choose one

If A is a 2×2 matrix, the area of the parallelogram determined by the columns of A is

- det A
- adj A

Question No: 22 (Marks: 1) - Please choose one

Cramer's rule leads easily to a general formula for

- the inverse of n x n matrix A
- the adjugate of an matrix A
- the determinant of an matrix A

Question No: 23 (Marks: 1) - Please choose one

The transpose of a lower triangular matrix is

- Lower triangular matrix
- Upper triangular matrix
- Diagonal matrix

Question No: 24 (Marks: 1) - Please choose one

The transpose of an upper triangular matrix is

- Lower triangular matrix
- Upper triangular matrix
- Diagonal matrix

Question No: 25 (Marks: 1) - Please choose one

Let A be a square matrix of order 3x3 with det (A)=21 , then Det (2A)

- 168
- 186
- 21
- 126

Question No: 26 (Marks: 1) - Please choose one

A basis is a linearly independent set that is as large as possible.

- True
- False

Question No: 27 (Marks: 1) - Please choose one

Let A be an n X n matrix. If for each b in the equation Ax=b has a solution then

- A has pivot position in only one row.
- Columns of A span
- Rows of A span

Question No: 28 (Marks: 1) - Please choose one

If the columns of A are linearly independent, then

- **Columns of A span Rn**
- Rows of A span Rn
- A has a pivot only in one row

Question No: 29 (Marks: 1) - Please choose one
The determinant of a triangular matrix is the sum of the entries of the main diagonal.

- **True**
- **False**

product

Question No:30 (Marks: 1) - Please choose one
If A^T is not invertible, then A is not invertible.

- **True**
- **False**

Question No: 31 (Marks: 1) - Please choose one

Col A is all of $\mathbb{R}^n$ if and only if

- the equation $Ax = 0$ has a solution for each b in $\mathbb{R}^n$
- the equation $Ax = b$ has a solution for each b in $\mathbb{R}^n$
- the equation $Ax = b$ has a solution for a fixed b in $\mathbb{R}^n$.

Question No: 32 (Marks: 1) - Please choose one

$$A = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \end{bmatrix} \qquad B = \begin{bmatrix} B_1 \\ B_2 \end{bmatrix}$$

If and , then the partitions of A and B

- are not conformable for block multiplication
- are conformable for AB block multiplication
- are not conformable for BA block multiplication

Question No: 33 (Marks: 1) - Please choose one

Two vectors are linearly dependent if and only if they lie

- on a line parallel to x-axis
- on the same line through origin
- on a line parallel to y-axis

Question No: 34 (Marks: 1) - Please choose one

$$\begin{aligned} x_1 - 2x_2 + x_3 &= 8 \\ 2x_2 - 7x_3 &= 0 \\ -4x_1 + 3x_2 + 9x_3 &= -6 \end{aligned}$$

Given the system the augmented matrix for the system is

- $\begin{bmatrix} 1 & -2 & 1 \\ 0 & 2 & -7 \\ -4 & 3 & 9 \end{bmatrix}$
- $\begin{bmatrix} 1 & -2 & 1 & 0 \\ 0 & 2 & -7 & 8 \\ -4 & 3 & 9 & -6 \end{bmatrix}$
- $\begin{bmatrix} 1 & -2 & 1 \\ 0 & 2 & -8 \\ -4 & 5 & 9 \end{bmatrix}$
- $\begin{bmatrix} 1 & -2 & 1 & 8 \\ 0 & 2 & -7 & 0 \\ -4 & 3 & 9 & -6 \end{bmatrix}$
-

Question No: 35 (Marks: 1) - Please choose one

Consider the linear transformation T such that $\begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$ is the matrix of linear transformation then $T \begin{bmatrix} 2 \\ 4 \\ 6 \end{bmatrix}$ is

- $\begin{bmatrix} 10 \\ 4 \\ 2 \end{bmatrix}$
- $\begin{bmatrix} 1 \\ 0 \\ 9 \end{bmatrix}$
- $\begin{bmatrix} 10 \\ 4 \\ 1 \end{bmatrix}$
- $\begin{bmatrix} 1 \\ 2 \\ 3 \\ 2 \end{bmatrix}$

Question No: 36 (Marks: 1) - Please choose one

$$\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix} = 5 \qquad \begin{vmatrix} a & b & c \\ 3d & 3e & 3f \\ g & h & i \end{vmatrix}$$

If then will be

- 15
- 45
- 135
- 60

Question No: 37 (Marks: 1) - Please choose one

For an n×n matrix $(A^t)^t =$

- A^t
- A
- A^{-1}
- $(A^{-1})^{-1}$

Question No: 38 (Marks: 1) - Please choose one

Each Linear Transformation T from R^n to R^m is equivalent to multiplication by a matrix A of order

- m*n ⊗
- n*m
- n*n
- m*m

Question No: 39 (Marks: 1) - Please choose one

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \end{bmatrix}$$

Reduced echelon form of the matrix is

$$\begin{bmatrix} 1 & 2 & 3 \\ 0 & 0 & 1 \end{bmatrix}$$

-

$$\begin{bmatrix} 1 & 0 & 3 \\ 0 & 0 & 1 \end{bmatrix}$$

▶

$$\begin{bmatrix} 1 & 0 & -1 \\ 0 & 1 & 2 \end{bmatrix}$$

▶

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 1 \end{bmatrix}$$

▶

Question No: 40 (Marks: 1) - Please choose one

How many subspaces R2 have?

- **only two: {0} and R2**
- Only four: {0} x- axis and y -axis and R
- Infinitely many.
- None of the above.

Question No: 41 (Marks: 1) - Please choose one

Which statement about the set S is false where S = {(1, 1, 3), (2, 3, 7),(2, 2, 6)}

- The set S contain an element which is solution of the equation 5x − y-
- **The Set S is linearly independent.**
- The set S contain two elements which are multiple of each other.
- The Set S is linearly dependent.

Question No: 42 (Marks: 1) - Please choose one

Basis is a spanning set that is as small as possible.

- **True**
- False

Question No: 43 (Marks: 1) - Please choose one

For any 3x3 matrix A where det (A) = 3, then det (2A) = _____.

24
20
15
6

Question No: 44 (Marks: 1) - Please choose one

Which of the following is the coefficient matrix?

$$\begin{aligned} x_1 - 2x_2 + x_3 &= 0 \\ +2x_2 - 7x_3 &= 8 \\ -4x_1 + 3x_2 + 9x_3 &= -6 \end{aligned}$$

for the system?

- Parallel and distinct
- Intersecting (one solution)
- Coincident
- Perpendicular

Question No: 45 (Marks: 1) - Please choose one

If a system of linear equations is inconsistent then it has _____

- Infinite solutions
- Finite solutions
- Unique solution
- **No solution**

Question No: 46 (Marks: 1) - Please choose one

Two simultaneous linear equations in two variables have no solution if their corresponding lines are _____.

- ...
- ...
- ...
- ...

Question No: 47 (Marks: 1) - Please choose one

Which of the following is true for the matrix?

$$\begin{pmatrix} 1 & 3 & 2 \\ 0 & 1 & -1 \\ 0 & 0 & 1 \end{pmatrix}?$$

- It is an identity matrix
- It is in reduced echelon form
- **It is in echelon form**
- It is a rectangular matrix

Question No: 48 (Marks: 1) - Please choose one

Which of the following is the simplified form of
-1 [-1 2] + [2 3]?

- ...
- ...
- ...
- ...

Question No: 49 (Marks: 1) - Please choose one

If $v_1=(2,2,2)$, $v_2=(0,0,3)$, and $v_3=(0,1,1)$ span R^3, then which of the following is true for any arbitrary $\bar{b}=(b_1,b_2,b_3)\in R^3$?

- $(0,1,1) = k_1(b_1,b_2,b_3)+k_2(2,2,2)+k_3(0,0,3)$
- **$(b_1,b_2,b_3) = k_1(2,2,2)+k_2(0,0,3)+k_3(0,1,1)$**
- $(0,0,3) = k_1(2,2,2)+k_2(b_1,b_2,b_3)+k_3(0,1,1)$
- $(0,1,1) = k_1(2,2,2)+k_2(0,0,3)+k_3(b_1,b_2,b_3)$

Question No: 50 (Marks: 1) - Please choose one

If a homogeneous system Ax=0 has a trivial Solution, then which of the following is (are) the Value(s) of the vector ^{x}?

- -1
- **0**
- 1
- 2

Question No: 51 (Marks: 1) - Please choose one

$\vec{v_1}=(2,1),\vec{v_2}=(3,4)$ *and* $\vec{v_3}=(7,8)$ Which of the following is true?

- $\{v_1,v_2,v_3\}$ is linearly dependent
- **$\{v_1,v_2,v_3\}$ is linearly independent** (set of vectors does not contain zero vector)
- The vector equation has trivial solution
- $\vec{v_1}=\frac{2}{3}\vec{v_2}$

Question No: 52 (Marks: 1) - Please choose one

Since every linear transformation $T : R^n \to R^m$ is actually a matrix transformation, then which of the following is the alternate notation for the transformation?

- $Ax \to x$
- $A\vec{x} \to T(\vec{x})$
- $\vec{x} \to A\vec{x}$
- $T(\vec{x}) \to A\vec{x}$

Question No: 53 (Marks: 1) - Please choose one

If T be a transformation, then which of the following is true for its linearity?

- $T(c\vec{u} + d\vec{v}) = cT(\vec{u}) dT(\vec{v})$ where 'c' and 'd' are scalars
- $T(cu + dv) = cT(u) + dT(v)$ **where 'c' and 'd' are scalars lec 9-> exmple 7-> property 2**
- $T(c\vec{u} x d\vec{v}) = cT(\vec{u}) x dT(\vec{v})$ where 'c' and 'd' are scalars
- $T(c\vec{u} + d\vec{v}) = dT(\vec{u}) + cT(\vec{v})$ where 'c' and 'd' are scalars

Question No: 54 (Marks: 1) - Please choose one

If $A = \begin{bmatrix} 2 & 1 \\ 4 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 1+1 & 2-1 \\ 2+2 & 4-1 \end{bmatrix}$, then which of the following is true for A and B?

- **A and B are equal matrices**
- A is the transpose of B
- B is the transpose of A
- B is the multiplicative inverse of A

Question No: 55 (Marks: 1) - Please choose one

Which of the following id true for the matrix

$A = \begin{bmatrix} 1 & 0 \\ 0 & -5 \end{bmatrix}$?

- Identity matrix
- **Elementary matrix**
- Rectangular matrix
- Singular matrix

Question No: 56 (Marks: 1) - Please choose one

$$A = \begin{bmatrix} 1 & 2 & 0 & 0 & 0 & 0 \\ -1 & 3 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 1 & 0 & 0 \\ 0 & 0 & 3 & 5 & 0 & 0 \\ 0 & 0 & 0 & 0 & 3 & -2 \\ 0 & 0 & 0 & 0 & 2 & 1 \end{bmatrix}$$

If the matrix is partitioned into square sub-matrices, then
Which of the following is true for matrix A?

- **Block diagonal matrix**
- Block upper triangular matrix
- Diagonal-constant matrix
- Partitioning is not possible in the matrix A

Question No: 57 (Marks: 1) - Please choose one

If A is a matrix of order m x n, then which of the following is true for LU factorization of A?

- **The order of L is m x m and the order of U is m x n**
- The order of L is m x p and the order of U is p x n
- The order of both L and U is m x m
- The order of both L and U is m x n

Question No: 58 (Marks: 1) - Please choose one

If $A\vec{x} = \vec{b}$ and factorization of A is LU, then Which of the following pair of equations can be used to solve $LU\vec{x} = \vec{b}$ for the value of "x"?

- $U\vec{x} = \vec{y} and L\vec{y} = \vec{b}$
- $L\vec{x} = \vec{y} and U\vec{y} = \vec{b}$
- $U\vec{b} = \vec{y} and L\vec{y} = \vec{x}$
- $L\vec{b} = \vec{y} and U\vec{y} = \vec{x}$

Question No:59 (Marks: 1) - Please choose one

If a system of equations is solved using the Jacobi's method, then which of the following is NOT true about the matrix M that is derived from the coefficient matrix?

- All of its entries below the diagonal must be zero
- All of its entries above the diagonal must be zero
- It may or may not be invertible

- It is a non-singular matrix

Question No: 60 (Marks: 1) - Please choose one

If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then which of the following is

- ad+bc
- **ad-bc**
- bc+ad
- bc-ad

Question No: 61 (Marks: 1) - Please choose one

If $A = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 4 & 0 \\ 3 & 5 & 6 \end{bmatrix}$ then which of the following is the value of det(A)?

- 3
- 10
- 12
- **24**

Question No: 62 (Marks: 1) - Please choose one

If $A = \begin{bmatrix} 0 & 0 & 1 \\ 1 & -k & 0 \\ 1 & 0 & 0 \end{bmatrix}$ then which of the following is the value of det(A)?

- **k**
- k-1
- 1
- k+1

Question No: 63 (Marks: 1) - Please choose one

Let $A = \begin{bmatrix} 2 & 3 & 4 & 5 \\ 4 & 3 & 1 & 2 \\ 1 & 2 & 5 & 3 \end{bmatrix}$ and the null space of A is a subspace of E^k, then which of the following is value of k?

- 1
- 2
- 3
- 4

Last 20 mcqs are from current paper of 2013