All Branches Hinglish

Subject: Engineering Mathematics

DPP-06

Chapter: Linear Algebra

Topic : Linear Dependancy of Vectors

1. The number of linearly independent solutions of the system of equations $\begin{bmatrix} 1 & 0 & 2 \\ 1 & -1 & 0 \\ 2 & -2 & 0 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = 0$ is equal to

(a) 1 (b) 2

(c) 3 (d) 0

2. Consider the following two statements:

(i) The maximum number of linearly independent column vectors of a matrix A is called the rank of A.

(ii) If A is an n × n square matrix, it will be nonsingular if rank A = *n*.

With reference to the above statements, which of the following applies?

(a) Both the statements are false
(b) Both the statements are true
(c) I is true but II is false
(d) I is false but II is true

3. If the rank of a (5 × 6) matrix Q is 4, then which one of the following statements is correct?

(a) Q will have four linearly independent rows and four linearly independent columns.

(b) Q will have four linearly independent rows and five linearly independent columns.

(c) QQ^T will be invertible

(d) Q^TQ will be invertible

4. If $A \in R_{n \times n}$, det $A \neq 0$, then

(a) A is nonsingular and the rows and columns of A are linearly independent.

(b) A is non singular and the rows A are linearly independent.

(c) A is non singular and the A has one zero rows.

(d) A is singular.

5. Which one of the following describes the relationship among the three vectors, $\hat{i}+\hat{j}+\hat{k}$, $2\hat{i}+3\hat{j}+\hat{k}$ and $5\hat{i}+6\hat{j}+4\hat{k}$?

(a) The vectors are mutually perpendicular.

(b) The vectors are linearly dependent.

(c) The vectors are linearly independent.

(d) The vectors are unit vectors.

6. Find the value of λ for which the following vectors are linearly dependent.

$x_1 = \begin{bmatrix} 1 \\ -2 \\ \lambda \end{bmatrix}$ $x_2 = \begin{bmatrix} 2 \\ -1 \\ 5 \end{bmatrix}$ $x_3 = \begin{bmatrix} 3 \\ -5 \\ 7\lambda \end{bmatrix}$

(a) 3/14 (b) 5/14

(c) 1/14 (d) None of these

7. For the following vectors

$x_1 = \begin{bmatrix} 3 \\ 1 \\ -4 \end{bmatrix}$ $x_2 = \begin{bmatrix} 2 \\ 2 \\ -3 \end{bmatrix}$

Statement I: Rank of matrix is 2
Statement II: Vectors are linearly independent.
Which of the following statements true?

(a) I (b) II

(c) I & II (d) None

8. Which of the following set of vectors is linearly dependent?

(a) (1, 0, 1) (–1, 1, 0) (5, –1, 2)

(b) (1, 2, 0) (1, 1, 1) (2, 0, 1)

(c) (1, 1, –1) (2, –3, 5) (–2, 1, 4)

(d) (2, 3, –1) (–4, 2, –6) (5, –4, 9)

Answer Key

1. **(a)**
2. **(b)**
3. **(a)**
4. **(a)**
5. **(b)**
6. **(b)**
7. **(c)**
8. **(d)**