



GATE SMASHERS

GATE2024

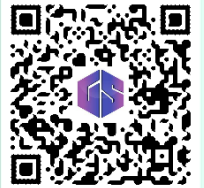
Engineering Mathematics

Topic: Probability and Statistics

Subtopic: *Algebra of Matrices*

LECTURE - 1

EXPLANATION



Matrix-

$$A = [a_{ij}]_{m \times n}$$

$$A = [a_{ij}]_{m \times n} = \begin{bmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \dots & \dots & \dots & \dots \\ \dots & \dots & \dots & \dots \\ a_{m1} & a_{m2} & \dots & a_{mn} \end{bmatrix}$$

Special Types of Matrices:-

- Square Matrix $(m = n)$
- Diagonal Matrix $(a_{ij} = 0 \text{ where } i \neq j)$
- Scalar Matrix $(a_{ij} = k \text{ where } i = j)$
- Unit Matrix or Identity Matrix (I) $(a_{ij} = 1 \text{ where } i = j)$
 $a_{ij} = 0 \text{ where } i \neq j)$
- Null Matrix $(a_{ij} = 0)$
- Upper Triangular Matrix $(a_{ij} = 0, i > j)$
- Lower Triangular Matrix $(a_{ij} = 0, i < j)$
- Idempotent Matrix $(A^2 = A)$
- Involuntary Matrix $(A^2 = I)$
- Nilpotent Matrix $A^k = 0 \text{ } (k \rightarrow \text{lowest}) \text{ } (k \rightarrow \text{Index})$
- Singular Matrix $|A| = 0$
- Row Matrix $m = 1 \text{ (No. of Row)}$
- Column Matrix $n = 1 \text{ (No. of Column)}$

NOTES PREPARED BY: ANKIT ARORA



GATE SMASHERS

GATE2024

Engineering Mathematics

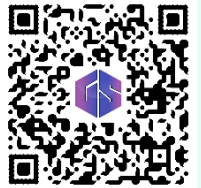
Topic: Probability and Statistics

Subtopic: *Algebra of Matrices*
LECTURE - 45

EXPLANATION

Equality of Two Matrices:-

Two matrices $A = [a_{ij}]$ and $B = [b_{ij}]$ are said to be equal if,



1. They are of same size.
2. The elements in the corresponding places of two matrices are the same i.e. $a_{ij} = b_{ij}$ for each pair of subscripts i and j .