

# **ADHIKAANSH ACADEMY (IITJEE NEET IX X XI XII)**

**RUN BY:**

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# **MATHS NOTES (CLASS 12<sup>TH</sup>)**



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*So why  
to wait...*



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# Key Notes

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## Chapter-3

### Matrices

- A matrix is an ordered rectangular array of numbers or functions.
- A matrix having  $m$  rows and  $n$  columns is called a matrix of order  $m \times n$ .
- $[a_{ij}]_{m \times 1}$  is a column matrix.
- $[a_{ij}]_{1 \times n}$  is a row matrix.
- An  $m \times n$  matrix is a square matrix if  $m = n$ .
- $A = [a_{ij}]_{m \times n}$  is a diagonal matrix if  $a_{ij} = 0$ , when  $i \neq j$
- $A = [a_{ij}]_{n \times n}$  is a scalar matrix if  $a_{ij} = 0$  when  $i \neq j$ ,  $a_{ij} = k$  ( $k$  is some constant), when  $i = j$ .
- $A = [a_{ij}]_{n \times n}$  is an identity matrix, if  $a_{ij} = 1$ , when  $i = j$ ,  $a_{ij} = 0$ , when  $i \neq j$ .
- A zero matrix has all its elements as zero.
- $A = [a_{ij}] = [b_{ij}] = B$  if (i)  $A$  and  $B$  are of same order, (ii) for all possible values of  $i$  and  $j$ .
- $kA = k[a_{ij}]_{m \times n} = [k(a_{ij})]_{m \times n}$
- $-A = (-1)A$
- $A - B = A + (-1)B$
- $A + B = B + A$
- $(A + B) + C = A + (B + C)$ , where  $A$ ,  $B$  and  $C$  are of same order.
- $k(A + B) = kA + kB$ , where  $A$  and  $B$  are of same order,  $k$  is constant.
- $(k + l)A = kA + lA$ , where  $k$  and  $l$  are constant.
- If  $A = [a_{ij}]_{m \times n}$  and  $B = [b_{jk}]_{n \times p}$ , then  $AB = C = [c_{ik}]_{m \times p}$ , where  $c_{ik} = \sum_{j=1}^n a_{ij}b_{jk}$

(i)  $A(BC) = (AB)C$ ,

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# Key Notes

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(ii)  $A(B + C) = AB + AC,$

(iii)  $(A + B)C = AC + BC$

- If  $A = [a_{ij}]_{m \times n}$ , then  $A'$  or  $A^T = [a_{ji}]_{n \times m}$
  - (i)  $(A')' = A,$
  - (ii)  $(kA)' = kA',$
  - (iii)  $(A + B)' = A' + B',$
  - (iv)  $(AB)' = B'A'$
  - A is a symmetric matrix if  $A' = A.$
  - A is a skew symmetric matrix if  $A' = -A.$
  - Any square matrix can be represented as the sum of a symmetric and a skew symmetric matrix.
  - Elementary operations of a matrix are as follows:
    - (i)  $R_1 \leftrightarrow R_j$  or  $C_1 \leftrightarrow C_j$
    - (i)  $R_1 \rightarrow kR_1$  or  $C_1 \leftrightarrow kC_1$
    - (i)  $R_1 \leftrightarrow R_j + kR_j$  or  $C_1 \leftrightarrow C_j + kC_j$
  - If A and B are two square matrices such that  $AB = BA = I,$  then B is the inverse matrix of A and is denoted by  $A^{-1}$  and A is the inverse of B.
  - Inverse of a square matrix, if it exists, is unique.
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