- Equal matrices: two matrices A =  $[a_i]_{m \times n}$  and B =  $[b_{ij}] m \times n$  are equal if .
  - (a) Both have same order
  - a<sub>ii</sub>= b<sub>ii</sub>∀ iandj (b)

## **Operations on matrices**

- Two matrices can be added or subtracted, if both have same order. .
- If A=  $[a_{ij}]_{m \times n}$  and B =  $[b_{ij}]_{m \times n}$ , then .

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

- .
- Two matrices A and B can be multiplied it for our of columns in A is equal to number of rows in B. .

and  $[b_{jk}]_{n \times p}$  3 of 20 a get  $a_{1\times p}$  where  $c_{ik} = \sum_{j=1}^{n} a_{ij}b_{jk}$ If  $A = a n \times b$ Then  $AB = [c_{lk}, m \times p]$ 

## Properties

- If A, B and C are matrices of same order, then .
  - (i) A+B = B+A
  - (ii) (A+B)+C=A+(B+C)
  - (iii) A+O = O+A=A
  - A+(-A) = O(iv)

[Class XII : Maths]

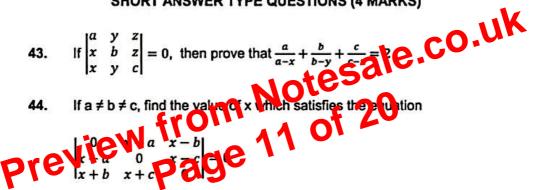
**39.** If 
$$2\begin{bmatrix} x & 5\\ 7 & y-3 \end{bmatrix} + \begin{bmatrix} 3 & -4\\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 7 & 6\\ 15 & 14 \end{bmatrix}$$

Find the valve of x - y

40. If A and B are skew symmetric matrices of the same order prove that AB + BA is symmetric matrix.

**41.** Without expending prove that  $\begin{bmatrix} o & p-q & p-r \\ q-p & o & q-r \\ r-p & r-q & o \end{bmatrix} = 0$ 2! 3! 11 42. Evaluate 2! 3! 4! 3! 4! 5!

## SHORT ANSWER TYPE QUESTIONS (4 MARKS)



45. Using properties of determinants, show that

$$\begin{vmatrix} a & a+b & a+2b \\ a+2b & a & a+b \\ a+b & a+2b & a \end{vmatrix} = 0$$
46. Find the value of 
$$\begin{vmatrix} \sqrt{13} + \sqrt{3} & 2\sqrt{5} & \sqrt{5} \\ \sqrt{15} + \sqrt{26} & 5 & \sqrt{10} \\ 3 + \sqrt{65} & \sqrt{15} & 5 \end{vmatrix}$$

47. If  $A = \begin{bmatrix} 5 & 3 \\ 12 & 7 \end{bmatrix}$ , show that  $A^2 - 12A - I = 0$ . Hence find  $A^{-1}$ .

57. If 
$$A = \begin{bmatrix} 0 & -1 & 2 \\ 4 & 3 & -4 \end{bmatrix}$$
 and  $B = \begin{bmatrix} 4 & 0 \\ 1 & 3 \\ 2 & 6 \end{bmatrix}$ , then verify that  $(AB)' = B'A'$   
58. If  $A = \begin{bmatrix} 0 & -x \\ x & 0 \end{bmatrix}$ ,  $B = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$  and  $x^2 = -1$   
Then show that  $(A + B)^2 = A^2 + B^2$   
59. Prove that  $al + bA + cA^2 = A^3$ , if  $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ a & b & c \end{bmatrix}$   
60. If  $A = \begin{bmatrix} \cos 2\theta & \sin 2\theta \\ -\sin 2\theta & \cos 2\theta \end{bmatrix}$ , then find  $A^3$ .  
61. If  $A = \begin{bmatrix} 1 & -1 \\ 2 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} a & 1 \\ b & -1 \end{bmatrix}$  and  $(A + B)^2 = A^2 + B^2 + 2AB$ , find a and  $b$ .  
62. If  $A = \begin{bmatrix} 0 & 2b & c \\ a & b & -c \\ a & -b & c \end{bmatrix}$ , then find  $A^3$ .  
62. If  $A = \begin{bmatrix} 0 & 2b & c \\ a & b & -c \\ a & -b & c \end{bmatrix}$ , then find  $A^3$ .  
63. If  $A = \begin{bmatrix} a & b \\ 0 & 1 \end{bmatrix}$ , then prove that  $A^n = \begin{bmatrix} a^n & b(\frac{a^n-1}{1}) \\ 0 & 1 \end{bmatrix}$ , for all  $n \in N$ .  
64. If  $A = \begin{bmatrix} 1 & 21 & 31 \\ 21 & 31 & 41 \\ 31 & 41 & 51 \end{bmatrix}$ , then find  $A^{-1}$  and hence prove that  $A^2 - 4A - 5I = 0$ .  
65. Find the value of k, if:  $\begin{bmatrix} a+b & b+c & c+a \\ b+c & c+a & a+b & b+c \end{bmatrix} = k \begin{bmatrix} a & b & c \\ b & c & a \\ c & a & b \end{bmatrix}$