Assignment for Class 12

Subject :Mathematics

Topic : Determinant (Important questions for Board Exam)

Type I. Problems which questions can be solved using properties and explicit expansion of the determinant is also required.

Example 1.Using properties of determinant ,show that $\begin{vmatrix} x & p & q \\ p & x & q \\ q & q & x \end{vmatrix}$ =(x-p)(x^2 +px -2q^2).   (**ISC 2020**)

$C_1 \rightarrow C_1 - C_2$

$$\Rightarrow \begin{vmatrix} x-p & p & q \\ p-x & x & q \\ 0 & q & x \end{vmatrix}$$

Taking (x-p) common from C_1

$$\Rightarrow (x\text{-}p) \begin{vmatrix} 1 & p & q \\ -1 & x & q \\ 0 & q & x \end{vmatrix}$$

$R_2 \rightarrow R_2 + R_1$

$$\Rightarrow (x\text{-}p) \begin{vmatrix} 1 & p & q \\ 0 & x+p & 2q \\ 0 & q & x \end{vmatrix}$$

Expansion along C_1

$$\Rightarrow (x\text{-}p)(1) \begin{vmatrix} x+p & 2q \\ q & x \end{vmatrix} = (x\text{-}p)[x(x+p)\text{-}2q^2)]$$

$\Rightarrow$ (x-p)(x^2+px-2q^2) proved

Type II

Problems which can be solved using properties of determinant and without explicitly expanding the determinant .

Example2 .without expanding at any stage find the value of determinant $\begin{vmatrix} 20 & a & b+c \\ 20 & b & a+c \\ 20 & c & a+b \end{vmatrix}$.   **ISC 2020**

$C_3 = C_3 + C_2$

$$\Rightarrow \begin{vmatrix} 20 & a & a+b+c \\ 20 & b & a+b+c \\ 20 & c & a+b+c \end{vmatrix}$$

Taking a+b+c common from C_3 & 20 from C_1

$$\Rightarrow 20\,(a+b+c) \begin{vmatrix} 1 & a & 1 \\ 1 & b & 1 \\ 1 & c & 1 \end{vmatrix} = 0$$

$\Rightarrow$ (by Property ie two columns C_1 & C_2 are identical)

Please note ; Questions based on Properties of determinant are solved in the video link provided to you with this assignment.