Determinants - Class XII

Related Questions with Solutions

Questions

Quetion: 01

$$\begin{vmatrix} b^2+c^2 & ab & ac \\ ab & c^2+a^2 & bc \\ ca & cb & a^2+b^2 \end{vmatrix} =$$

A. $4a^2b^2c^2$
B. $8a^2b^2c^2$
C. $12a^2b^2c^2$
D. $a^2b^2c^2$

Solutions

Solution: 01

Given: $\begin{vmatrix} b^2+c^2 & ab & ac \\ ab & c^2+a^2 & bc \\ ca & cb & a^2+b^2 \end{vmatrix}$

$$\Rightarrow \frac{1}{abc}\begin{vmatrix} ab^2+ac^2 & ab^2 & ac^2 \\ a^2b & bc^2+a^2b & bc^2 \\ ca^2 & cb^2 & a^2c+b^2c \end{vmatrix}$$

Applying $C_1 \Rightarrow C_1 - C_2 - C_3$

$$\Rightarrow \frac{1}{abc}\begin{vmatrix} 0 & ab^2 & ac^2 \\ -2bc^2 & bc^2+a^2b & bc^2 \\ -2b^2c & cb^2 & a^2c+b^2c \end{vmatrix}$$

$$\Rightarrow \frac{abc}{abc}\begin{vmatrix} 0 & b^2 & c^2 \\ -2c^2 & c^2+a^2 & c^2 \\ -2b^2 & b^2 & a^2+b^2 \end{vmatrix}$$

Expanding along R1 ,

$\Rightarrow -b^2\left(-2c^2a^2-2b^2c^2+2b^2c^2\right)+c^2\left(-2c^2b^2+2b^2c^2+2b^2a^2\right)$

$\Rightarrow 2a^2b^2c^2+2a^2b^2c^2=4a^2b^2c^2$

Correct Options

Answer:01

Correct Options: A