Determinants - Class XII

Related Questions with Solutions

Questions

Quetion: 01

An equilateral triangle has each of its sides of length 6 cm. If $(x_1, y_1), (x_2, y_2), (x_3, y_3)$ are its vertices, then the value of the determinant $\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}^2$ is equal to

A. 192
B. 243
C. 486
D. 972

Quetion: 02

If A, B and C are square matrices of order n such that $\det(A) = 3, \det(B) = 4, \det(C) = 5,$ then the value of $\left[\det\left(A^2BC^{-1}\right)\right]$ equals (where [.] represent greatest integral function)

A. 2
B. 5
C. 7
D. 11

Quetion: 03

If $A(x_1, y_1), B(x_2, y_2)$ and $C(x_3, y_3)$ are the vertices of an equilateral triangle whose each side is equal to a, then $\begin{vmatrix} x_1 & y_1 & 2 \\ x_2 & y_2 & 2 \\ x_3 & y_3 & 2 \end{vmatrix}^2$ is equal to

A. $2a^2$
B. $2a^4$
C. $3a^2$
D. $3a^4$

Quetion: 04

If A is a square matrix of order 3 such that $A^2 + A + 4I = O$, where O is the zero matrix and I is the unit matrix of order 3 , then

A. A is singular and A + I is non-singular
B. Both A and A + I are non-singular
C. A is non-singular and A + I is singular
D. Both A and A + I are singular

Solutions

Solution: 01

Now,

$$\left|\frac{1}{2}\right|\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = 9\sqrt{3} \Rightarrow \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}^2 = 243 \times 4 = 972$$

Solution: 02

Given, $|A| = 3, |\ B| = 4$ and $|C| = 5$

Now, $\det\left(A^2BC^{-1}\right) = \left|A^2BC^{-1}\right| = \frac{|A|^2|B|}{|C|} = \frac{9 \times 4}{5}$

$$\left[\det\left(A^2BC^{-1}\right)\right] = \left[\frac{36}{5}\right] = 7$$

Solution: 03

Step I : Find the area of triangle using determinant

Let area of ΔABC be Δ

Then, $\Delta = \frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$

$$\Rightarrow 2\Delta = \begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} \Rightarrow 4\Delta = \begin{vmatrix} x_1 & y_1 & 2 \\ x_2 & y_2 & 2 \\ x_3 & y_3 & 2 \end{vmatrix}$$

Step II : Find the area of equilateral triangle whose side is a

$$\therefore \quad \Delta = \frac{\sqrt{3}}{4}a^2$$

$$\Rightarrow \quad 4\Delta = \sqrt{3}a^2$$

$$\Rightarrow 16\Delta^2 = 3a^4$$

$$\therefore \begin{vmatrix} x_1 & y_1 & 2 \\ x_2 & y_2 & 2 \\ x_3 & y_3 & 2 \end{vmatrix}^2 = 3a^4$$

Solution: 04

$$A(A+1) = -4\,I$$

$$|A||A+I| = -64$$

Both A and A + I are non-singular

Correct Options

Answer:01

Correct Options: D

Answer:02

Correct Options: C

Answer:03

Correct Options: D

Answer:04

Correct Options: B