

CBSE 2016- MATHS

SECTION - A

Question numbers 1 to 6 carry 1 mark each.

1. Question 1

Write the value of:

$$\begin{bmatrix} a-b & b-c & c-a \\ b-c & c-a & a-b \\ c-a & a-b & b-c \end{bmatrix}$$

2. Question 2

If

$$A = \begin{bmatrix} -1 & -2 & 3 \\ -4 & 2 & 5 \end{bmatrix}, \quad B = \begin{bmatrix} 2 & 3 \\ 4 & 5 \\ 2 & 1 \end{bmatrix}$$

and $BA = (b_{ij})$, find $b_{21} + b_{32}$.

3. Question 3

Write the number of all possible matrices of order 2×3 with each entry 1 or 2.

4. Question 4

Write the coordinates of the point which is the reflection of the point (α, β, γ) in the XZ-plane.

5. Question 5

Find the position vector of the point which divides the join of points with position vectors $\vec{a} + 3\vec{b}$ and $\vec{a} - \vec{b}$ internally in the ratio 1 : 3.

6. Question 6

If $|\vec{a}| = 4$, $|\vec{b}| = 3$ and $\vec{a} \cdot \vec{b} = 6\sqrt{3}$, then find the value of $|\vec{a} \times \vec{b}|$.

SECTION - B

Question numbers from 7 to 19 carry 4 marks each.

7. Question 7

Solve for x :

$$\tan^{-1} \left(\frac{2-x}{2+x} \right) = \frac{1}{2} \tan^{-1} \left(\frac{1}{2}x \right), \quad x > 0.$$

OR

Prove that

$$2 \sin^{-1} \left(\frac{3}{5} \right) - \tan^{-1} \left(\frac{17}{31} \right) = \frac{\pi}{4}.$$

8. Question 8

On her birthday Seema decided to donate some money to children of an orphanage home. If there were 8 children less, every one would have got Rs.10 more. However, if there were 16 children more, every one would have got Rs.10 less. Using matrix method, find the number of children and the amount distributed by Seema. What values are reflected by Seema's decision?

9. Question 9

If $x = e^{\cos 2t}$ and $y = e^{\sin 2t}$, prove that

$$\frac{dy}{dx} = -\frac{y \log x}{x \log y}.$$

OR

Verify Mean Value Theorem for the function $f(x) = 2 \sin x + \sin 2x$ on $[0, \pi]$.

10. Question 10

Show that the function f given by

$$f(x) = \begin{cases} \frac{e^{1/x}-1}{e^{1/x}+1}, & \text{if } x \neq 0 \\ -1, & \text{if } x = 0 \end{cases}$$

is discontinuous at $x = 0$.

11. Question 11

Find the equation of the tangent line to the curve $y = \sqrt{5x-3}-5$, which is parallel to the line $4x - 2y + 5 = 0$.

12. Question 12

Evaluate:

$$\int_1^5 (|x-1| + |x-2| + |x-3|) dx$$

OR

Evaluate:

$$\int_0^\pi \frac{x \sin x}{1 + 3 \cos^2 x} dx$$

13. Question 13

Find:

$$\int \frac{2x+1}{(x^2+1)(x^2+4)} dx$$

14. Question 14

Find:

$$\int (3x+5)\sqrt{5+4x-2x^2} dx$$