CBSE TEST PAPER-03

Class X - Mathematics (Polynomials)

[ANSWERS]

Ans01. (c)

Ans02. (b)

Ans03. (a)

Ans04. (a)

Ans05.
$$p(x) = 4\sqrt{3}x^2 + 5x - 2\sqrt{3}$$
$$= 4\sqrt{3}x^2 + 8x - 3x - 2\sqrt{3}$$
$$= 4x\left(\sqrt{3}x + 2\right) - \sqrt{3}\left(\sqrt{3}x + 2\right)$$
$$= \left(4x - \sqrt{3}\right)\left(\sqrt{3}x + 2\right)$$

$\therefore$ zeros are $4x - \sqrt{3} = 0$ and $\sqrt{3}x + 2 = 0$

$\Rightarrow$ $x = \dfrac{\sqrt{3}}{4}$ and $x = -\dfrac{2}{\sqrt{3}}$

$$\text{Sum of zeros} = \frac{-\text{Coefficient of } x}{\text{Coefficient of } x^2} = \left[\frac{\sqrt{3}}{4} + \frac{(-2)}{\sqrt{3}}\right]$$
$$= \frac{-5}{4\sqrt{3}}$$

$$\text{Product of zeros} = \frac{\text{Constant term}}{\text{Cofficient of } x^2} = \frac{-2\sqrt{3}}{4\sqrt{3}} = \frac{-1}{2}$$

Ans06. Let the zeros are 7p and 6p.

$$3x^2 - k + 14$$

$\therefore$ $7p + 6p = \dfrac{-(-k)}{3} = \dfrac{k}{3}$

and $7p \times 6p = \dfrac{14}{3}$

$$\Rightarrow \quad 42p^2 = \frac{14}{3}$$

$$p = 3$$

$$\Rightarrow \quad 39p = k$$

$$\therefore \quad k = 39 \times 3$$

$$\therefore \quad k = 117$$

Ans07. $4x^2 - 8kx - 9,$ if one zero is α then other is $-\alpha$

$\therefore$ Sum of the zero $= 0$

$$\frac{8k}{4} = 0$$

$$\Rightarrow \quad k = 0$$

Ans08.

$$\begin{array}{r|l} & 2t^2 + 3t + 4 \\ t^2 - 3 & 2t^4 + 3t^3 - 2t^2 - 9t - 12 \\ & -2t^4 \quad \mp 6t^2 \\ \hline & 3t^3 + 4t^2 - 9t - 12 \\ & -3t^3 \quad \mp 9t \\ \hline & 4t^2 \quad -12 \\ & -4t^2 \quad \mp 12 \\ \hline & 0 \\ \hline \end{array}$$

Yes, $(t^2 - 3)$ is the factor of given polynomial.

Ans09. $3x^4 + 6x^3 - 2x^2 - 10x - 5$

zeros are $\pm\sqrt{\frac{5}{3}}$

$\left(x + \sqrt{\frac{5}{3}}\right)\left(x - \sqrt{\frac{5}{3}}\right)$ is the factor given polynomial i.e. $\left(x^2 - \frac{5}{3}\right)\frac{1}{3}\left(3x^2 - 5\right)$

$$x^2 + 2x + 1$$

$$3x^2 - 5 \overline{\big) 3x^4 + 6x^3 - 2x^2 - 10x - 5}$$

$$\underline{-3x^4 \qquad \mp 5x^2}$$

$$6x^3 + 3x^2 - 10x - 5$$

$$\underline{-6x^3 \qquad \mp 10x}$$

$$3x^2 - 5$$

$$\underline{-3x^2 \mp 5}$$

$$0$$

$Now\ x^2 + x + 1$

$\Rightarrow \quad (x+1)^2$

$\therefore$ other zeros are

$(x+1) = 0$ and $x + 1 = 0$

$x = -1$ and $x = -1$

$\therefore$ other two zeros -1 and -1

Ans10.

$$x^2 - 4x + (8-k)$$

$$x^2 - 2x + k \overline{\big) x^4 - 6x^3 + 16x^2 - 25x + 10}$$

$$\underline{-x^4 \mp 2x^3 \pm kx^2}$$

$$-4x^3 + (16-k)x^2 - 25x + 10$$

$$\underline{\mp 4x^3 \pm 8x^2 \qquad \mp 4kx}$$

$$(8-k)x^2 + (4k-25)x + 10$$

$$\underline{-(8-k)x^2 \mp (16-2k)x \pm (8k-k^2)}$$

$$(2k-9)x + (k^2 - 8k + 10)$$

but remainder is $(x+a)$

$\therefore$ equating the cofficient of x and constant term.

so $2k - 8k + 10 = a$

$\Rightarrow \quad 25 - 40 + 10 = a$

$\Rightarrow \quad -5 = a$

$\therefore \quad k = 5$ and $a = -5$

Ans11. $p(x) = x^4 + 10x^3 + 25x^2 + 15x + k$

$\therefore \quad (x+7)$ is the factor.

$\therefore \quad p(-7) = 0$

$or \quad (-7)^4 + 10(-7)^3 + 25(-7)^2 + 15(-7) + k = 0$

$$2401 - 3430 + 1225 - 105 + k = 0$$

$$k = 91$$

Ans12. $f(x) = x^2 + px + q,$ if α and β are zeros

$\therefore \ \alpha + \beta = -p \ and \ \alpha\beta = q$

If zeros are $(\alpha+\beta)^2$ and $(\alpha-\beta)^2$

$$(\alpha-\beta)^2 = (\alpha+\beta)^2 - 4\alpha\beta$$

$$= (-p)^2 - 4q$$

$$(\alpha-\beta)^2 = -p^2 - 4q$$

Now sum of zeros

$$(\alpha+\beta)^2 + (\alpha-\beta)^2 = (-p)^2 + \left(p^2 - 4q\right)$$

$$= 2p^2 - 4q$$

Pr oduct of zeros

$$(\alpha+\beta)^2 (\alpha-\beta)^2 = (-p)^2 + \left(p^2 - 4q\right)$$

$$= 4p^4 - 4p^2q$$

$\therefore$ required polynomial is

$x^2 - (\text{sum of zeros})x +$ product of zeros

$= \quad x^2 - \left(2p^2 - 4q\right)x + 4p^4 - 4p^2q$

$= \quad x^2 - 2p^2x - 4qx + p^4 - 4p^2q$