# Class - X, Polynomials

## Assignment

**Q1.** Find the zeroes of the following polynomials and verify their relation with coefficients:

i). $f(x) = 3x^2 - 6$ (Ans: $\pm\sqrt{2}$)

ii). $f(x) = 4x^2 + 4\sqrt{3}x + 3$ (Ans: $-\frac{\sqrt{3}}{2}, -\frac{\sqrt{3}}{2}$)

iii). $f(x) = x^2 - 3x - 1$ (Ans: $\frac{3 \pm \sqrt{5}}{2}$)

**Q2.** Find the quadratic polynomial, the sum and product of whose zeroes are as follows: (Also find the zeroes of the polynomial obtained)

i). $\frac{21}{8}, \frac{5}{16}$ (Ans: $f(x) = 16x^2 - 42x + 5$, zeroes $= \frac{5}{2}, \frac{1}{8}$)

ii). $\frac{-3}{2\sqrt{5}}, -\frac{1}{2}$ (Ans: $f(x) = 2\sqrt{5}x^2 + 3x - \sqrt{5}$, zeroes $= \frac{1}{\sqrt{5}}, -\frac{\sqrt{5}}{2}$)

**Q3.** Given that the zeroes of the cubic polynomial $x^3 - 6x^2 + 3x + 10$ are of the form $a, a+b, a+2b$ for some real numbers $a$ & $b$, find the values of $a$ & $b$ as well as the zeroes of the given polynomial. (Ans: $a = 5, -1$, $b = -3, 3$, zeroes $= 5, 2, -1$)

**Q4.** Verify that $\left(4, -2, \frac{1}{2}\right)$ are the zeroes of the cubic polynomial $p(x) = 2x^3 - 5x^2 - 14x + 8$. Also verify the relation between the zeroes and the coefficients.

**Q5.** If one of the zeroes of the cubic polynomial $p(x) = x^3 + ax^2 + bx + c$ is $-1$ then find the product of the other two zeroes. (Ans: $1 - a + b$)

**Q6.** If the remainder on the division of $x^3 + 2x^2 + kx + 3$ by $(x-3)$ is 21, then find the value of $k$. Hence, find the zeroes of the cubic polynomial $x^3 + 2x^2 + kx - 18$. ($k = -9$, zeroes $= 3, -2, -3$)

**Q7.** a). If $\alpha, \beta$ are zeroes of the polynomial $p(x) = x^2 - 5x + k$ such that $\alpha - \beta = 1$, find the value of $k$. (Ans: $k = 6$)

b). If $\alpha, \beta$ are zeroes of $p(x) = kx^2 + 4x + 4$ such that $\alpha^2 + \beta^2 = 24$, find the value of $k$. (Ans: $k = -1, \frac{2}{3}$)

c). If $\alpha, \beta$ are zeroes of $p(x) = 2x^2 + 5x + k$ such that $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, find the value of $k$. (Ans: $k = 2$)

Q8. a). Find the zeroes of $p(x) = x^3 - 5x^2 - 16x + 80$ if its two zeroes are equal in magnitude but opposite in sign. (Ans: $-4, 4, 5$)

b). Find the zeroes of $p(x) = x^3 - 5x^2 - 2x + 24$ if it is given that the product of its two zeroes is 12. (Ans: $3, 4, -2$)

Q9. If $\alpha$ and $\beta$ are the zeroes of $p(x) = x^2 - 4x + 3$, find the value of $\alpha^4\beta^2 + \alpha^2\beta^4$. (Ans: 90)

Q10. If a zero of $p(x) = 3x^2 - 8x + 2k + 1$ is seven times the other zero, find the value of $k$. (Ans: $k = 2/3$)

Q11. If $\sqrt{2}$ is a zero of $p(x) = 6x^3 + \sqrt{2}x^2 - 10x - 4\sqrt{2}$, find its other zeroes. (Ans: $\frac{-2\sqrt{2}}{3}, -\frac{\sqrt{2}}{2}$)

Q12. For what value of $k$ is $p(x) = 3x^4 - 9x^3 + x^2 + 15x + k$ completely divisible by $3x^2 - 5$. (Ans: $k = -10$)

Q13. If $\alpha, \beta, \gamma$ are zeroes of $p(x) = 6x^3 + 3x^2 - 5x + 1$, find the value of $\alpha^{-1} + \beta^{-1} + \gamma^{-1}$.

Q14. If $\alpha$ and $\beta$ are the zeroes of $p(x) = 2x^2 - 5x + 7$ then find the polynomial whose zeroes are $(3\alpha + 2\beta)$ and $(2\alpha + 3\beta)$.

(Ans: $p(x) = k\left(x^2 - \frac{25}{2}x + 41\right)$)

Q15. What must be added to $p(x) = 4x^4 + 2x^3 - 2x^2 + x - 1$ so that the resulting polynomial is divisible by $g(x) = x^2 + 2x - 1$.

(Ans: $(61x - 65)$)

Q16. Multiple Choice Questions:

i). If zeroes of $p(x) = x^2 + (a+1)x + b$ are 2 and $-3$ then

(a) $a = -7,\ b = -1$  (b) $a = 5,\ b = -1$

(c) $a = 2,\ b = -6$  (d) $a = 0,\ b = -6$  (Ans: )

ii). If 5 is a zero of $p(x) = x^2 - kx - 15$ then value of $k$ is

(a) 2  (b) $-2$  (c) 4  (d) $-4$

iii). The zeroes of $p(x) = x^2 + ax + b$, $a, b > 0$ are

(a) Both positive  (b) Both negative

(c) One positive, one negative  (d) Can't say.

iv). Given that one of the zeroes of $p(x) = ax^3 + bx^2 + cx + d$ is 0, the product of other 2 zeroes is

(a) $-\frac{c}{a}$ (b) $\frac{c}{a}$ (c) 0 (d) $-\frac{b}{a}$

v). If one root of $p(x) = 5x^2 + 13x + m$ is reciprocal of the other then the value of $m$ is

(a) 1 (b) 0 (c) $13/5$ (d) $1/5$

vi). Given that two zeroes of $p(x) = ax^3 + bx^2 + cx + d$ are 0, then value of $c$ is

(a) equal to 0 (b) less than zero

(c) greater than 0 (d) Can't say.