PROFICIENCY EXERCISE

■ **Objective Type Questions:** **[1 mark each]**

1. Choose and write the correct option in each of the following questions.

(*i*) If 5 is a zero of the quadratic polynomial, $x^2 - kx - 15$ then the value of k is

(*a*) 2 (*b*) –2 (*c*) 4 (*d*) – 4

(*ii*) The number of polynomials having zeros 1 and –2 is

(*a*) 1 (*b*) 2 (*c*) 3 (*d*) more than 3

(*iii*) A quadratic polynomial, whose zeros are –3 and 4, is

(*a*) $x^2 - x + 12$ (*b*) $x^2 + x + 12$

(*c*) $\frac{x^2}{2} - \frac{x}{2} - 6$ (*d*) $2x^2 + 2x - 24$

(*iv*) The zeros of the quadratic polynomial $x^2 + kx + k, k \neq 0$

(*a*) cannot be positive (*b*) cannot be negative

(*c*) are always equal (*d*) are always unequal

(v) If the graph of a polynomial intersects the x-axis at exactly two points, then it

(a) cannot be a linear or a cubic polynomial

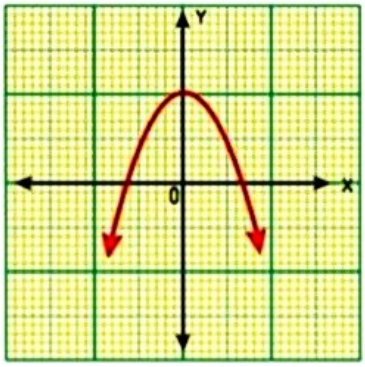
(b) can be a quadratic polynomial only

(c) can be a cubic or a quadratic polynomial

(d) can be a linear or a quadratic polynomial

■ Very Short Answer Questions: [1 mark each]

2. If 1 is a zero of the polynomial $p(x) = ax^2 - 3(a-1)x - 1$, then find the value of a.
3. If one root of the polynomial $p(y) = 7y^2 + 14y + m$ is reciprocal of other, then find the value of m.
4. Find the other zero of the quadratic polynomial $y^2 + 7y - 60$ if one zero is -12.
5. Find the quadratic polynomial whose zeros are -3 and -5.
6. What number should be added to the polynomial $x^2 + 7x - 35$ so that 3 is the zero of the polynomial?
7. The graph of $y = p(x)$ where $p(x)$ is a polynomial in variable x, is as follows:



Write the number of zeros of $p(x)$.

8. If one zero of the quadratic polynomial $p(x) = x^2 + 4kx - 25$ is negative of the other, find the value of k.

■ Short Answer Questions–I: [2 marks each]

9. If m and n are the zeros of the polynomial $3x^2 + 11x - 4$, find the value of $\frac{m}{n} + \frac{n}{m}$.

[Competency Based Question]

10. Find the zeros of the polynomial $5y^2 - 11y + 2$.
11. If one of the zeros of the quadratic polynomial $(k-2)x^2 - 2x - (k+5)$ is 4, find the value of k.
12. If α, β are the zeros of the polynomial $x^2 + x - 6$, find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$.
13. If α, β are the two zeros of the polynomial $f(y) = y^2 - 8y + a$ and $\alpha^2 + \beta^2 = 40$, find the value of a.
14. If the sum of the zeros of the quadratic polynomial $f(x) = kx^2 + 2x + 3k$ is equal to their product, find the value of k.

■ Short Answer Questions–II: [3 marks each]

15. Find the zeros of the following polynomials and verify the relationship between the zeros and the coefficients of the polynomials.

(i) $x^2 + \frac{1}{6}x - 2$ (ii) $\sqrt{3}x^2 - 11x + 6\sqrt{3}$ (iii) $a(x^2+1) - x(a^2+1)$

16. If α and β are the zeros of the quadratic polynomial $f(t) = t^2 - p(t + 1) - c$, show that $(\alpha + 1)(\beta + 1) = 1 - c$. **[*Competency Based Question*]**

17. If $(x - 2)$ is a factor of $x^3 + ax^2 + bx + 16$ and $b = 4a$, find the values of a and b.

■ Long Answer Questions: [5 marks each]

18. If α and β are zeros of polynomial $f(x) = 2x^2 + 11x + 5$, then find

    (*i*) $\alpha^4 + \beta^4$ (*ii*) $\frac{1}{\alpha} + \frac{1}{\beta} - 2\alpha\beta$

19. Verify that the numbers given alongside the cubic polynomials below are their zeros. Also verify the relationship between the zeros and the coefficients.

    (*i*) $x^3 - 2x^2 - 5x + 6$; $-2, 1, 3$ (*ii*) $2x^3 + 7x^2 + 2x - 3$; $-3, -1, \frac{1}{2}$

20. If the zeroes of the polynomial $x^3 - 3x^2 + x + 1$ are $a - b, a, a + b$, find a and b. **[*Competency Based Question*]**

Self-Assessment

Time allowed: 1 hour **Max. marks: 40**

SECTION A

1. Choose and write the correct option in the following questions. **(3 × 1 = 3)**

(*i*) A quadratic polynomial with 3 and 2 as the sum and product of its zeros respectively is

(*a*) $x^2 + 3x - 2$ (*b*) $x^2 - 3x + 2$

(*c*) $x^2 - 2x + 3$ (*d*) $x^2 - 2x - 3$

(*ii*) The zeros of the quadratic polynomial $x^2 + 99x + 127$ are

(*a*) both positive (*b*) both negative

(*c*) one positive and one negative (*d*) both equal

(*iii*) If the product of the zeros of the polynomial $p(x) = ax^3 - 6x^2 + 11x - 6$ is 4, then a equals

(*a*) $-\frac{2}{3}$ (*b*) $\frac{2}{3}$ (*c*) $-\frac{3}{2}$ (*d*) $\frac{3}{2}$

2. Solve the following questions. **(2 × 1 = 2)**

(*i*) If α and β are zeros of a polynomial $x^2 - 4\sqrt{3}x + 3$, then find the value of $\alpha + \beta - \alpha\beta$.

(*ii*) If the square of difference of the zeros of the quadratic polynomial $x^2 + px + 45$ is equal to 144. Find out the value of p. ***[Competency Based Question]***

SECTION B

■ **Solve the following questions.** **(4 × 2 = 8)**

3. If p and q are the zeros of the polynomial $f(x) = 2x^2 - 7x + 3$, find the value of $p^2 + q^2$.
4. If α and β are the zeros of the quadratic polynomial $f(x) = 3x^2 - 5x - 2$, then evaluate $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$.
5. If α, β are the zeros of the quadratic polynomial $p(y) = y^2 - 4y + 3$, find the value of $\alpha^4\beta^3 + \alpha^3\beta^4$.
6. Find the cubic polynomial with the sum, sum of the products of its zeros taken two at a time, and the products of its zeros as –3, –8 and 2 respectively.

■ **Solve the following questions.** **(4 × 3 = 12)**

7. If $\frac{2}{3}$ and -3 are the zeros of the polynomial $ax^2 + 7x + b$, then find the values of a and b.
8. If $(x + a)$ is a factor of two polynomials $x^2 + px + q$ and $x^2 + mx + n$ then prove that $a = \frac{n - q}{m - p}$.

[Competency Based Question]

9. If α and β are the zeros of the polynomial $2x^2 - 3x + 1$, then find the value of (*i*) $\alpha^2\beta + \alpha\beta^2$ (*ii*) $\alpha^2 + \beta^2$.
10. Find a quadratic polynomial whose zeros are

$$\frac{5 + \sqrt{2}}{5 - \sqrt{2}}, \frac{5 - \sqrt{2}}{5 + \sqrt{2}}.$$

■ **Solve the following questions.** **(3 × 5 = 15)**

11. If the sum of squares of the zeroes of the quadratic polynomial $x^2 - 8x + k$ be 40, find k.
12. If α and β are the zeros of the quadratic polynomial $f(x) = 3x^2 - 7x - 6$, find a polynomial whose zeros are (*i*) α^2 and β^2 (*ii*) $2\alpha + 3\beta$ and $3\alpha + 2\beta$.
13. Find the zeroes of the following quadratic polynomials and verify the relationship between the zeroes and the coefficients:

$$x^2 - (2a + b)x + 2ab$$