

## 2. Polynomials

Q 1 Check, whether 1 is the zero of the polynomial  $9x^3 - 5x + 20$ .

Mark (1)

Q 2 Factorise  $\frac{2x^2}{8} - \frac{2y^2}{8}$ .

Mark (1)

Q 3 Show that  $x = 1$  is a zero of the polynomial  $3x^3 - 4x^2 + 8x - 7$ .

Mark (1)

Q 4 Is  $(y^2)^{\frac{1}{2}} + 2\sqrt{3}$  a polynomial ?

Mark (1)

Q 5 Check whether  $\sqrt[3]{x} - \sqrt{2}x$  is a polynomial.

Mark (1)

Q 6 Find the degree of polynomial  $30x^5 - 15x^2 + 40$ .

Mark (1)

Q 7 Find the degree of the polynomial  $4x+5$ .

Mark (1)

Q 8 If  $\left(a + \frac{1}{a}\right) = b$ , then find the value of  $a^3 + \frac{1}{a^3} + 3\left(a + \frac{1}{a}\right)$ .

Mark (1)

Q 9 Find the remainder when  $6x^3 - 5x^2 + 2x - 9$  is divided by  $(x - 1)$ .

Mark (1)

Q 10 Find the zeroes of the polynomial  $6x^2 - 3$ .

Mark (1)

Q 11 Find the zeroes of the quadratic polynomial  $x^2 - 4x + 3$ .

Mark (1)

Q 12 Find the zeroes of the quadratic polynomial  $x^2 + 7x + 10$ .

Mark (1)

Q 13 Given a polynomial  $p(x)$ . The graph of  $y = p(x)$  intersects the  $x$ -axis at three points. Find the number of zeroes of  $p(x)$ .

Mark (1)

Q 14 Find the zeroes of polynomial  $2x^2 - 8$ .

Marks (2)

Q 15 Using a suitable identity, factorise the following expressions:

(i)  $\frac{x^2}{4} - \frac{y^2}{4}$

(ii)  $x^2 - \frac{y^2}{100}$

Marks (2)

Q 16 Factorise:  $4y^2 - 4y + 1$ .

Marks (2)

Q 17 Show that  $x = 1$  is a zero of the polynomial  $2x^3 - 3x^2 + 7x - 6$ .

Marks (2)

Q 18 Give one example each of a binomial of degree 35 and a monomial of degree 100.

Marks (2)

Q 19 Classify the following polynomials as linear, quadratic, cubic & bi-quadratic polynomials:

**(i)  $x + x^2 + 4$**

**(ii)  $3x - 2$**

**(iii)  $3y$**

**(iv)  $7t^4 + 4t^3 + 3t - 2$**

Marks (2)

Q 20 Write the degrees of each of the following polynomials:

**(i)  $7x^3 + 4x^2 - 3x + 12$**

**(ii)  $12 - x + 2x^3$**

**(iii)  $5x - \sqrt{2}$**

**(iv)  $7$**

Marks (2)

Q 21 Write the coefficient of  $x^2$  in each of the following:

**(1)  $17 - 2x + 7x^2$**

**(2)  $9 - 12x + x^3$**

**(3)  $\frac{\pi}{6}x^2 - 3x + 4$**

**(4)  $\sqrt{3}x - 7$**

Marks (2)

Q 22 Find the zeroes of the quadratic polynomial  $x^2 - 4x + 3$ .

Marks (2)

Q 23 Resolve into factors:  $27x^3 + y^3 + z^3 - 9xyz$ .

Marks (3)

Q 24 Factorise:  $64a^3 - 27b^3 - 144a^2b + 108ab^2$ .

Marks (3)

Q 25 If  $p = 2 - a$ , then show that  $a^3 + 6ap + p^3 - 8 = 0$ .

Marks (3)

Q 26 If  $x + y + z = 6$ ,  $xy + yz + zx = 11$ . Find the value of  $x^2 + y^2 + z^2$ .

Marks (3)

Q 27 Factorise:

(i)  $27y^3 + 125z^3$

(ii)  $64m^3 - 343n^3$

Marks (3)

Q 28 Factorise:

$$27p^3 - \frac{1}{216} - \frac{9}{2}p^2 + \frac{1}{4}p$$

Marks (3)

Q 29 Find the value of k, if  $(x - 1)$  is a factor of the following expression:

$$p(x) = kx^2 - \sqrt{2}x + 1$$

Marks (3)

Q 30 Divide the polynomial  $3x^4 - 4x^3 - 3x - 1$  by  $x - 1$ .

Marks (3)

Q 31 Check whether  $7 + 3x$  is a factor of  $3x^3 + 7x$ .

Marks (3)

Q 32 Find the zero of the polynomial in each of the following cases:

(i)  $h(x) = 2x$

(ii)  $p(x) = cx + d, c \neq 0$

(iii)  $p(x) = ax, a \neq 0$

Marks (3)

Q 33 If  $x = 4/3$  is a zero of the polynomial  $f(x) = 2x^3 - 11x^2 + kx - 20$ , find the value of k.

Marks (3)

Q 34 Identify constant, linear, quadratic &amp; cubic polynomials from the following polynomials:

(i)  $f(x) = 0$

(ii)  $g(x) = 2x^3 - 7x + 4$

(iii)  $h(x) = -3x + \frac{1}{2}$

(iv)  $p(x) = 2x^2 - x + 4$

(v)  $q(x) = 4x + 3$

(vi)  $r(x) = 3x^3 + 4x^2 + 5x - 7$

Marks (3)

Q 35 Give possible expressions for the length & breadth of the rectangle whose area is given by  $A = 25a^2 - 35a + 12$ .

Marks (4)

Q 36 Factorise the polynomial  $x^3 - 23x^2 + 142x - 120$ .

Marks (4)

Q 37 Factorise:

(i)  $12x^2 - 7x + 1$

(ii)  $f(x) = 2x^2 + 7x + 3$

Marks (4)

Q 38 Write each of the following expressions, as a product of linear factors, with integer coefficient:

(i)  $5x^2 + 16x + 3$

(ii)  $24p^2 - 41p + 12$

Marks (4)

Q 39 Use the factor theorem to determine whether  $g(x)$  is a factor of  $f(x)$  in each of the following cases:

(i)  $f(x) = x^3 - 3x^2 + 4x - 4$ ,  $g(x) = x - 2$

(ii)  $f(x) = 2\sqrt{2}x^2 + 5x + \sqrt{2}$ ,  $g(x) = x + \sqrt{2}$  Marks (4)

Q 40 Check whether the following polynomials have  $(x + 1)$  as a factor.

(i)  $x^3 + x^2 + x + 1$

(ii)  $x^3 - x^2 - (2\sqrt{2})x + \sqrt{2}$

Marks (4)

Q 41 Find the remainder when  $x^3 + 3x^2 + 3x + 1$  is divided by

(i)  $x + 1$

(ii)  $x - \frac{1}{2}$

Marks (4)

Q 42 Which of the following expressions are polynomial and which are not? State reasons for your answer.

(1)  $3x^2 - 4x + 15$

(2)  $y^2 + 2\sqrt{3}$

(3)  $3\sqrt{x} - 2\sqrt{x}$

Marks (4)

Q 43 If  $f(x) = 2x^3 - 13x^2 + 17x + 12$ , find

(i)  $f(2)$

(ii)  $f(-3)$

Marks (4)

Most Important Questions

Q 1 Find the degree of the following polynomials.

a)  $x^3 + 4x^5 + 3x - 7$       b)  $x^2 - 5x + 7$

Q 2 Identify the following polynomials as linear, Quadratic or cubic.

a)  $5x+7$

b)  $x^3-8$

Q 3 Identify which if the following are polynomials?

a)  $x^3 - \sqrt{(2)x + 5x^2 + 7}$       b)  $x + (1/x)$

Q 4 Find the coefficient of  $x^2$  in the following expressions.

a)  $x^3 - 2x^2 + 5x - 9$       b)  $-\pi x^2 + x - 5$

Q 5 Find the value of  $\sqrt{2x^2 - 5x + 3}$  at  $x = 0$ .

Q 6 Verify whether  $x = -4$  is a Zero of the polynomial  $x^2 - 5x + 36$ .

$$x = -\frac{2}{\sqrt{3}}$$

Q 7 Verify if  $-\frac{2}{\sqrt{3}}$  is a root (Zero) of the polynomial  $f(x) = 3x^2 - 2$ .

Q 8 If  $x = 2$  is a root of the polynomial  $f(x) = 2x^2 - 3x + 7a$ , find the value of 'a'.

Q 9 If  $x = -(1/2)$  is a zero of the polynomial  $f(x) = 2x^3 + ax^2 - 3x + 2$ , find the value of 'a'.

Q 10 Find one integral roots of the polynomial  $f(x) = x^3 + 6x^2 + 11x + 6$ .

Q 11 If  $x = 0$  and  $x = -2$  be the zeros of the polynomial  $p(x) = x^3 - 2x^2 + 3ax + b$ . Find the values of a and b.

Q 12 Check whether 2, 3,  $-1/2$  are the rational roots of the polynomial  $2x^3 + 3x^2 - 11x - 6$ .

Q 13 If  $x = 4/3$  is a root of the polynomial  $f(x) = 6x^3 - 11x^2 + kx - 20$ , find the value of k.

Q 14 Define a polynomial. Are all algebraic expressions polynomials. Explain with the help of examples.

Q 15 Find all the rational roots of the polynomial  $f(x) = 2x^3 + x^2 - 7x - 6$ .

Q 16 Using remainder theorem find the remainder when  $x = 0$  of the polynomial  $2x^2 + 7x + 5$ .

Q 17 Check if  $x + 3$  is a factor of the polynomial  $3x^2 + 7x - 6$ .

Q 18 Find the remainder when  $(x - 1/2)$  is divided by the polynomial  $4x^2 - 2x + 1$ .

Q 19 Show that  $(x-1)$  is a factor of  $x^{10}-1$ .

Q 20 Find the remainder when  $x^3 + 3x^2 + 3x + 1$  is divided by  $x + \pi$ .

Q 21 Find the remainder when  $x^3 + 3x^2 + 3x + 1$  is divided by  $x + \pi$ .

Q 22 Find a and b, if  $x + 1$  and  $x + 2$  are the factors of  $x^3 + 3x^2 - 2ax + b$ .

Q 23 What should be subtracted from the polynomial  $x^3 - 6x^2 - 15x + 80$  so that the result is exactly divisible by  $x^2 + x - 12$ .

Q 24 What is the value of k, if  $x - 3$  is a factor of the polynomial  $k^2x^3 - kx^2 + 3kx - k$ ?

Q 25 The polynomials  $ax^3 + 3x^2 - 13$  and  $2x^3 - 5x + a$  are divided by  $x + 2$ . If the remainder in each case is the same, find the value of 'a'.

Q 26 Factorize  $x^3 - 2x^2y + x$ .

Q 27 Evaluate:  $23^3 - 17^3$ .

Q 28 Write the expanded form of  $(3x + 2y - z)^2$ .

Q 29 Factorize the following  $8a^3 + b^3 + 12a^2b + 6ab^2$ .

Q 30 Factorize  $3 - 12(a - b)$ .

Q 31 Factorize the following  $x^3 + x - 3x^2 - 3$ .

Q 32 Factorize  $a^2 + b^2 + 2(ab + bc + ca)$ .

$$\begin{aligned}
 27a^3 + 125b^3 &= (3a)^3 + (5b)^3 \\
 &= (3a + 5b)\{(3a)^2 - 15ab + (5b)^2\} \\
 &= (3a + 5b)(9a^2 - 15ab + 25b^2)
 \end{aligned}$$

Q 33 Factorize  $27a^3 + 125b^3$ .

Q 34 Factorize  $10x^4y - 10xy^4$ .

Q 35 Factorize  $x^3 - 12x(x - 4) - 64$ .

Q 36 Factorize  $8x^3 + 27y^3 + z^3 - 18xyz$ .

Q 37 Factorize  $(a^2 - b^2)^3 + (b^2 - c^2)^3 + (c^2 - a^2)^3$ .

Q 38 Factorize  $32a^3 + 108b^3$ .

$$155 \times 155 \times 155 - 55 \times 55 \times 55$$

Q 39 Simplify the following  $155 \times 155 + 155 \times 55 + 55 \times 55$

Q 40 Factorize  $x^8 - y^8$ .

Q 41 Using factor theorem factorize the following expression  $x^3 - 6x^2 + 3x + 10$ .