PART NUMBER SYSTEM + ALGEBRA

1. POLYNOMIALS

BATCH EX

MATRIX HIGH SCHOOL
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POLYNOMIALS

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DPP # 01

CONCEPT : Introduction to Polynomials, Degree of a Polynomial, Classification of Polynomials on the Basis of Their Degree and Number of Terms Contained

Choose the correct answer from the given four options :

(Based on Introduction to Polynomials)

1. If $A = 4x^3 - 5x + 7$, $B = 2x^3 + x^2 + 3$ and $C = 5x^3 - 8x^2 + 10$, then $A - 2B - C$, is

   (A) $5x^3 - 2x^2 + x + 4$ (B) $-5x^3 + 6x^2 - 5x - 9$

   (C) $x^3 + 10x^2 - 5x + 9$ (D) $5x^3 - 8x^2 + x - 1$

2. Which one is not a polynomial?

   (A) $x^3 - \sqrt{3}x^2 + 7$ (B) $x^3 - \sqrt{3}x^{-2} + 7$ (C) $x^3 - \sqrt{3x^2} + 7$ (D) $\sqrt{x^2 - 6x + 9}$

3. $ax^3 + bx^2 + cx + d = 0$ is said to be cubic polynomial if

   (A) $d \neq 0$ (B) $c \neq 0$ (C) $b \neq 0$ (D) $a \neq 0$

(Based on Degree of a Polynomial)

4. Degree of zero polynomial is

   (A) 1 (B) 0 (C) 3 (D) Not define

5. The degree of polynomial $\sqrt[3]{x^3}\sqrt{x^{-2}} + 7$ is

   (A) 3 (B) 1 (C) 0 (D) – 2

6. If the degree of a polynomial AB is 25 and the degree of polynomial B is 15, then what is the degree of polynomial A?

   (A) 10 (B) 15 (C) 25 (D) 40

7. The degree of polynomial $\frac{x^4 + x^2 + 3x}{x}$ is

   (A) 2 (B) 3 (C) 4 (D) Not define

(Based on Classification of Polynomials on the Basis of Their Degree and Number of Terms Contained)

8. Classify the following as linear, quadratic, cubic and biquadratic polynomials

   (i) $-x^3$ (ii) $(2 + x)^2$ (iii) $x^4 + x^2 + 4$ (iv) $(x - 1)(x - 2)(x - 3)$ (v) $6 - 5x$

9. Classify the following as monomial, Binomial and trinomials.

   (i) $15x^2$ (ii) $7x^2 + 4x + 5$ (iii) $3x^2 + 4x - 5$ (iv) $7x - 4$

10. Identify the following polynomials on the basis of their degree and number of terms contained.

    (i) $20x^2 - 53x^3 - 44x^4$ (ii) $12a^3 b^4 c^2 + 18a^4 b^3 c^3 + 24a^6 b^2 c^4 - 6a^2 b^3 c$

DPP # 02

CONCEPT : Remainder Theorem, Factor Theorem

Choose the correct answer from the given four options :

1. The additive inverse of $3x-4+\frac{x}{2x-1}$ is

(A) $\frac{6x^2-10x+4}{2x-1}$ (B) $-3x+4-\frac{x}{2x-1}$ (C) $-3x+4+\frac{x}{2x-1}$ (D) $-3x+4-\frac{x}{1-2x}$

(Based on Remainder Theorem)

2. Find the remainder when $P(x)=x^2+16x+18$ is divided by $x-2$ is

(A) – 10 (B) 10 (C) – 54 (D) 54

3. Find remainder, when $f(x)=x^3-6x^2+2x-4$ is divided by $g(x)=1-2x$

(A) $\frac{-61}{8}$ (B) $\frac{61}{8}$ (C) $\frac{-35}{8}$ (D) $\frac{35}{8}$

4. The remainder when $3x^4-2x^3+4x^2-5$ is divided by $x+3$.

(A) –328 (B) 328 (C) 232 (D) 47

5. If $2x^3+ax^2+bx-6$ has $(x-1)$ as a factor and leaves a remainder 2 when divided by $(x-2)$, find the values of 'a' and 'b'

(A) a = – 8, b = 12 (B) a = 8, b = –12 (C) a = – 4, b = 10 (D) a = 4, b = – 10

6. Let R_1 and R_2 are the remainders when the polynomials $x^3+2x^2-5ax-7$ and $x^3+ax^2-12x+6$ are divided by $x+1$ and $x-2$ respectively. If $2R_1+R_2=6$, find the value of a.

(A) – 2 (B) 2 (C) 3 (D) – 3

7. Use the remainder theorem to factorise :

(i) $x^3-13x-12$

(ii) $x^3-9x^2+23x-15$

(Based on Factor Theorem)

8. Find the value of a if $x+1$ is a factor of $P(x)=ax^2-7x+3$.

(A) – 4 (B) 4 (C) – 10 (D) 10

9. Find the value of a if $x-a$ is a factor of the polynomial

$x^6-ax^5+x^4-ax^3+3x^2-3ax+a-7$

10. Check wheather $x-5$ is factor of $3x^3+2x^2-5x+4$ or not.

DPP # 03

CONCEPT : Zeroes of a Polynomial, Factorisation of Polynomials

Choose the correct answer from the given four options :

1. Prove $5+\sqrt{2}$ is irrational number.

2. Which of the follo wing digits is ruled out in the units place of $12^n + 1$ for every positive integer n?

   (A) 1 (B) 3 (C) 5 (D) 7

3. Given that $\frac{1}{7} = 0.\overline{142857}$, which is a repeating decimal having six different digits. If x is the sum of such first three positive integers n such that $\frac{1}{n} = 0.\overline{abcdef}$, where a, b, c, d, e and f are different digits, then the value of x is

   (A) 20 (B) 21 (C) 41 (D) 42

4. The largest power of 2 that divides $2^{2008} + 10^{2008}$ is

   (A) 2^{2008} (B) 2^{2009} (C) 2^{2010} (D) 2^{2011}

(Based on Zeroes of a Polynomial)

5. If 2 is one of the zeros of polynomial $2x^2 - x + k$, then the value of k is

   (A) –2 (B) –6 (C) –4 (D) 4

6. If x = 2 and x = 0 are two roots of the polynomial $f(x) = 2x^3 - 5x^2 + ax + b$. Find the value of a and b.

   (A) a = 0, b = 2 (B) a = 2, b = 2 (C) a = 2, b = 0 (D) a = 0, b = 1

7. The values of k, so that the equations $2x^2 + kx - 5 = 0$ and $x^2 - 3x - 4 = 0$ have one root in common, are

   (A) $3, \frac{27}{2}$ (B) $9, \frac{27}{4}$ (C) $-3, \frac{-27}{4}$ (D) $-3, \frac{4}{27}$

8. Find the zero of following polynomials

   (i) P(x) = x + 2 (ii) P(x) = 2x + 5 (iii) P(x) = 3 – x (iv) P(x) = 10 + 2x

9. Simplify $x = \cfrac{1}{\sqrt{3} + \cfrac{1}{\sqrt{3} + \cfrac{1}{\sqrt{3} + ...}}}$

   (A) $x^2 + \sqrt{3}x - 1 = 0$ (B) $x^2 - \sqrt{3}x - 1 = 0$ (C) $x^2 - \sqrt{3}x + 1 = 0$ (D) $x^2 + \sqrt{3}x + 1 = 0$

(Based on Factorisation of Polynomials)

10. Factorize

    (i) $7x^2 - 2\sqrt{14}x + 2$ (ii) $\sqrt{2}x^2 + 3x + \sqrt{2}$

DPP # 04

CONCEPT : FACTORISATION OF POLYNOMIALS

Choose the correct answer from the given four options :

1. How many factors are of number 120?

   (A) 16 (B) 8 (C) 10 (D) 18

2. How many factors of $2^5 \cdot 3^6 \cdot 5^2$ are perfect squares?

   (A) 18 (B) 24 (C) 36 (D) 8

3. Factorise the following :

   (i) $a^2 - 4a + 3 + 2b - b^2$

   (ii) $x^4 + 4$

4. Factorise the following :

   (i) $(x + 1)(x + 2)(x + 3)(x + 4) - 8$

   (ii) $(x - 3)(x + 2)(x - 6)(x - 1) + 56$

5. Factorise the following :

   (i) $8a^3 + b^3 + c^3 - 6abc$

   (ii) $8a^6 + 5a^3 + 1$

6. HCF of 525 and 3000 is

   (A) 525 (B) 75 (C) 3000 (D) 25

7. Find HCF of given polynomials.

   (i) $a^3 + 2a^2 - 3a$ and $2a^3 + 5a^2 - 3a$

   (ii) $4u^2 - 9v^2$ and $2u^2 - 3uv$

8. Find LCM of given polynomials.

   (i) $m^2 + 9m + 20$ and $m^2 + 13m + 36$

   (ii) $4u^2 - 9v^2$ and $2u^2 - 3uv$

9. The HCF and LCM of the polynomials P(x) and Q(x) are $(2x + 3)$ and $(2x + 3)(x + 5)(x - 4)(x - 2)(x + 1)$ respectively. If $P(x) = (2x + 3)(x^2 + x - 20)$, then $Q(x) = ?$

   (A) $(2x + 3)(x - 4)(x + 1)$ (B) $(2x + 3)(x^2 - x - 2)$

   (C) $(2x + 3)(x + 5)(x - 2)$ (D) None

10. Can two numbers have 12 as their HCF and 54 as their LCM ? Give the reason.

DPP # 05

CONCEPT : Value of a Polynomial, Geometrical Meaning of Zeroes of a Polynomial, Relationship between Zeroes and Co-efficient of a Polynomial

Choose the correct answer from the given four options :

(Based on Value of a Polynomial)

1. $P(x) = 5x^2 + 7x + 15$, then find $P(-2) = ?$

   (A) 15 (B) 31 (C) 21 (D) 27

(Based on Geometrical Meaning of Zeroes of a Polynomial)

2. The number of point of intersection of the polynomial $p(x) = x^3 + 8$ with x-axis is

   (A) 0 (B) 1 (C) 2 (D) 3

(Based on Relationship between Zeroes and Co-efficient of a Polynomial)

3. If sum of the roots is p and the sum of their squares is q^2, the equation is

   (A) $x^2 - px + p^2q^3 = 0$ (B) $x^2 - px + q^3 = 0$

   (C) $x^2 - px + \frac{p^2 - q^2}{2} = 0$ (D) None of these

4. If p and q are the roots of the equations $x^2 - px + q = 0$, then

   (A) $p = 1, q = 0$ (B) $p = 0, q = 1$ (C) $p = -2, q \neq 0$ (D) $p = -2, q = 1$

5. m, n are zeros of $ax^2 - 5x + c$, find the value of a and c. If $m + n = mn = 10$.

6. If one zero of the polynomial $(a^2 + 9)x^2 + 13x + 6a$ is reciprocal of the other, find the value of 'a'.

7. If α and β are the zeroes of the quadratic polynomial $f(t) = t^2 - 4t + 3$, find the value of $\alpha^4\beta^3 + \alpha^3\beta^4$

8. Find the condition which must be satisfied by the coefficients of the polynomial $f(x) = x^3 - px^2 + qx - r$ when the sum of its two zeros is zero.

9. Find the quadratic polynomial each with the given numbers as the sum and product of its zeroes respectively:

   (i) $\frac{1}{4}, -1$ **(ii)** $\sqrt{2}, \frac{1}{3}$

10. Write the polynomial whose zeros are the following :

    (i) 0, 5 **(ii)** $\sqrt{3}, -\sqrt{3}$

DPP # 06

CONCEPT : Relationship between Zeroes and Co-efficient of a Polynomial

Choose the correct answer from the given four options :

1. If α and β are the zeros of the quadratic polynomial $f(x) = x^2 - x - 2$, find a polynomial whose zeros are $2\alpha + 1$ and $2\beta + 1$.

2. If α and β are the zeros of the quadratic polynomial $f(x) = x^2 - x - 2$, find a polynomial whose zeros are $2\alpha + 1$ and $2\beta + 1$.

3. If α and β are the zeros of the quadratic polynomial $f(x) = 3x^2 - 4x + 1$, find a quadratic polynomial whose zeros are $\frac{\alpha^2}{\beta}$ and $\frac{\beta^2}{\alpha}$.

4. If α and β are the zeros of the polynomial $f(x) = x^2 - 5x + k$, such that $\alpha - \beta = 1$, find the value of k.

5. If α, β are the zeros of the polynomial $f(x) = 2x^2 + 5x + k$ satisfying the relation $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, then find the value of k for this to be possible.

6. If α and β are the zeros of the quadratic polynomial $f(x) = ax^2 + bx + c$, then evaluate :

(i) $\frac{1}{\alpha} + \frac{1}{\beta}$ (ii) $\alpha^2 + \beta^2$ (iii) $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ (iv) $\alpha^3 + \beta^3$ (v) $\frac{1}{\alpha^3} + \frac{1}{\beta^3}$ (vi) $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$

Direction (Q.7 to 10)Find the zeros of each of the following quadratic polynomials and verify the relationship between the zeros and their coefficients:

7. **(i)** $g(s) = 4s^2 - 4s + 1$ **(ii)** $h(t) = t^2 - 15$

8. **(i)** $p(x) = x^2 + 2\sqrt{2}x - 6$ **(ii)** $q(x) = \sqrt{3}x^2 + 10x + 7\sqrt{3}$

9. **(i)** $f(x) = x^2 - \left(\sqrt{3} + 1\right)x + \sqrt{3}$ **(ii)** $f(x) = 4\sqrt{3}x^2 + 5x - 2\sqrt{3}$

10. **(i)** $g(x) = a(x^2 + 1) - x(a^2 + 1)$ **(ii)** $f(x) = abx^2 + (b^2 - ac)x - bc$

DPP # 07

CONCEPT : Division Algorithm for Polynomials

Choose the correct answer from the given four options :

1. a679b is a 5-digit number in decimal system which is divisible by 72 find a + b ?

   (A) 4 (B) 5 (C) 6 (D) 7

2. On dividing a natural number by 13, the remainder is 3 and on dividing the same number by 21, the remainder is 11. If the number lies between 500 and 600. Then the remainder on dividing the number by 19 is

   (A) 4 (B) 6 (C) 9 (D) 13

3. Find all the zeros of the polynomial $f(x) = 2x^4 - 3x^3 - 3x^2 + 6x - 2$, if two of its zeros are $\sqrt{2}$ and $-\sqrt{2}$.

4. Find all the zeros of the polynomial $2x^3 + x^2 - 6x - 3$, if two of its zeros are $-\sqrt{3}$ and $\sqrt{3}$.

5. Given that $\sqrt{2}$ is a zero of the cubic polynomial $6x^3 + \sqrt{2}x^2 - 10x - 4\sqrt{2}$, find its other two zeroes.

6. Apply the division algorithm to find the quotient and remainder on dividing f(x) by g(x) as given below

   $f(x) = x^4 - 3x^2 + 4x + 5$, $g(x) = x^2 + 1 - x$.

   (A) $x^2 + x - 3$; 8 (B) $x^2 - x - 3$; 7 (C) $x^2 - x - 3$; 8 (D) $x^2 + x - 3$; 7

7. If the polynomial $x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the remainder comes out to be x + a, then the value of a is

   (A) – 1 (B) – 5 (C) 1 (D) 5

8. On dividing $x^3 - 3x^2 + x + 2$ by a polynomial g(x); the quotient is x – 2 and remainder is –2x + 4. Find g(x).

9. If $P(x) = x^{97} + x^{95} - 3x^{43} + 5$ is divided by $(x^2 - 1)$ remainder is R(x), find R(5).

10. What must be subtracted from $8x^4 + 14x^3 - 2x^2 + 7x - 8$ so that the resulting polynomial is exactly divisible by $4x^2 + 3x - 2$.

DPP # 08

CONCEPT : NCERT EXEMPLAR-I

Choose the correct answer from the given four options :

1. Which one of the following is a polynomial?

(A) $\frac{x^2}{2}-\frac{2}{x^2}$ (B) $\sqrt{2x}-1$ (C) $x^2+\frac{3x^{\frac{3}{2}}}{\sqrt{x}}$ (D) $\frac{x-1}{x+1}$

2. $\sqrt{2}$ is a polynomial of degree

(A) 2 (B) 0 (C) 1 (D) $\frac{1}{2}$

3. Degree of the polynomial $4x^4 + 0x^3 + 0x^5 + 5x + 7$ is

(A) 4 (B) 5 (C) 3 (D) 7

4. Degree of the zero polynomial is

(A) 0 (B) 1

(C) Any natural number (D) Not defined

5. If $p(x) = x^2 - 2\sqrt{2}x + 1$, then $p\left(2\sqrt{2}\right)$ is equal to

(A) 0 (B) 1 (C) $4\sqrt{2}$ (D) $8\sqrt{2}+1$

6. The value of the polynomial $5x - 4x^2 + 3$, when $x = -1$ is

(A) – 6 (B) 6 (C) 2 (D) –2

7. If $p(x) = x + 3$, then $p(x) + p(-x)$ is equal to

(A) 3 (B) 2x (C) 0 (D) 6

8. Zero of the zero polynomial is

(A) 0 (B) 1 (C) Any real number (D) Not defined

9. Zero of the polynomial $p(x) = 2x + 5$ is

(A) $-\frac{2}{5}$ (B) $-\frac{5}{2}$ (C) $\frac{2}{5}$ (D) $\frac{5}{2}$

10. One of the zeroes of the polynomial $2x^2 + 7x - 4$ is

(A) 2 (B) $\frac{1}{2}$ (C) $-\frac{1}{2}$ (D) –2

11. If $x^{51} + 51$ is divided by $x + 1$, the remainder is

(A) 0 (B) 1 (C) 49 (D) 50

12. If $x + 1$ is a factor of the polynomial $2x^2 + kx$, then the value of k is

(A) –3 (B) 4 (C) 2 (D) –2

13. $x + 1$ is a factor of the polynomial

(A) $x^3 + x^2 - x + 1$ (B) $x^3 + x^2 + x + 1$ (C) $x^4 + x^3 + x^2 + 1$ (D) $x^4 + 3x^3 + 3x^2 + x + 1$

14. One of the factors of $(25x^2 - 1) + (1 + 5x)^2$ is

(A) $5 + x$ (B) $5 - x$ (C) $5x - 1$ (D) $10x$

15. The value of $249^2 - 248^2$ is

(A) 1^2 (B) 477 (C) 487 (D) 497

16. The factorisation of $4x^2 + 8x + 3$ is

(A) $(x + 1)(x + 3)$ (B) $(2x + 1)(2x + 3)$ (C) $(2x + 2)(2x + 5)$ (D) $(2x - 1)(2x - 3)$

17. Which of the following is a factor of $(x + y)^3 - (x^3 + y^3)$?

(A) $x^2 + y^2 + 2xy$ (B) $x^2 + y^2 - xy$ (C) xy^2 (D) $3xy$

18. The coefficient of x in the expansion of $(x + 3)^3$ is

(A) 1 (B) 9 (C) 18 (D) 27

19. If $\frac{x}{y} + \frac{y}{x} = -1\ (x, y \neq 0)$, the value of $x^3 - y^3$ is

(A) 1 (B) –1 (C) 0 (D) $\frac{1}{2}$

20. If $49x^2 - b = \left(7x + \frac{1}{2}\right)\left(7x - \frac{1}{2}\right)$, then the value of b is

(A) 0 (B) $\frac{1}{\sqrt{2}}$ (C) $\frac{1}{4}$ (D) $\frac{1}{2}$

21. If $a + b + c = 0$, then $a^3 + b^3 + c^3$ is equal to

(A) 0 (B) abc (C) 3abc (D) 2abc

22. If $x^2 + kx + 6 = (x + 2)(x + 3)$ for all x, then the value of k is

(A) 1 (B) –1 (C) 5 (D) 3

DPP # 09

CONCEPT : NCERT EXEMPLAR-II

Choose the correct answer from the given four options :

1. If one of the zeroes of the quadratic polynomial $(k-1)x^2 + kx + 1$ is -3, then the value of k is

   (A) $\frac{4}{3}$ (B) $\frac{-4}{3}$ (C) $\frac{2}{3}$ (D) $\frac{-2}{3}$

2. A quadratic polynomial, whose zeroes 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) $2x^2 + 2x - 24$

3. If the zeroes of the quadratic polynomial $x^2 + (a+1)x + b$ are 2 and -3, then

   (A) $a = -7, b = -1$ (B) $a = 5, b = -1$ (C) $a = 2, b = -6$ (D) $a = 0, b = -6$

4. The number of polynomials having zeroes as -2 and 5 is

   (A) 1 (B) 2 (C) 3 (D) more than 3

5. Given that one of the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d$ is zero, the product of the other two zeroes is

   (A) $-\frac{c}{a}$ (B) $\frac{c}{a}$ (C) 0 (D) $-\frac{b}{a}$

6. If one of the zeroes of the cubic polynomial $x^3 + ax^2 + bx + c$ is -1, then the product of the other two zeroes is

   (A) $b - a + 1$ (B) $b - a - 1$ (C) $a - b + 1$ (D) $a - b - 1$

7. The zeroes of the quadratic polynomial $x^2 + 99x + 127$ are

   (A) both positive (B) both negative

   (C) one positive and one negative (D) both equal

8. The zeroes of the quadratic polynomial $x^2 + kx + k$, $k \neq 0$,

   (A) cannot both be positive (B) cannot both be negative

   (C) are always unequal (D) are always equal

9. If the zeroes of the quadratic polynomial $ax^2 + bx + c$, $c \neq 0$ are equal, then

   (A) c and a have opposite signs (B) c and b have opposite signs

   (C) c and a have the same sign (D) c and b have the same sign

10. If one of the zeroes of a quadratic polynomial of the form $x^2 + ax + b$ is the negative of the other, then it

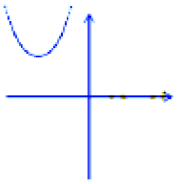
    (A) has no linear term and the constant term is negative.

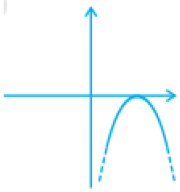
    (B) has no linear term and the constant term is positive.

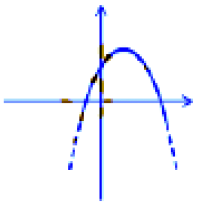
(C) can have a linear term but the constant term is negative.

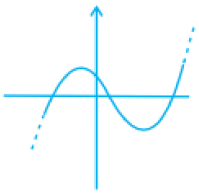
(D) can have a linear term but the constant term is positive.

11. Which of the following is not the graph of a quadratic polynomial?

(A) 

(B) 

(C) 

(D) 

12. If one zero of the quadratic polynomial $x^2 + 3x + k$ is 2, then the value of k is

(A) 10 (B) –10 (C) 5 (D) –5

13. Given that two of the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d$ are 0, the third zero is

(A) $\frac{-b}{a}$ (B) $\frac{b}{a}$ (C) $\frac{c}{a}$ (D) $-\frac{d}{a}$

DPP # 10

CONCEPT : NTSE PREVIOUS YEAR QUESTIONS

Choose the correct answer from the given four options :

STAGE-I

1. H.C.F. and L.C.M. of expressions $(x^3 - 1)$ and A are $(x - 1)$ and $(x^6 - 1)$ respectively. Then the value of A is : **[Raj. NTSE Stage -1 2005]**

(A) $x^3 + 1$ (B) $x^4 - x^3 + x - 1$

(C) $(x - 1)(x^2 - x + 1)$ (D) $(x - 1)(x^2 + x + 1)$

2. H.C.F. of $x^2 + 5x + 6$ and $x^3 + 27$ is : **[Raj. NTSE Stage-1 2006]**

(A) $x + 2$ (B) $x - 2$ (C) $x - 3$ (D) $x + 3$

3. One of the factors of the expression $x^4 + 8x$ is: **[Raj. NTSE Stage-1 2006]**

(A) $x^2 + 2$ (B) $x^2 + 8$ (C) $x + 2$ (D) $x - 2$

4. One of the factors of the expression $(2x - 3y)^2 - 7(2x - 3y) - 30$ is : **[Raj. NTSE Stage-1 2007]**

(A) $2x - 3y - 10$ (B) $2x - 3y + 10$ (C) $3x - 2y + 5$ (D) $6x - 4y - 15$

5. The value of x in the equation $\frac{x-1}{x+1} = \frac{x+5}{2x+5}$ is: **[Raj. NTSE Stage-1 2007]**

(A) -1 (B) -5 (C) 1 (D) 5

6. L.C.M. of $x^3 + x^2 + x + 1$ and $x^3 - x^2 + x - 1$ is : **[Raj. NTSE Stage-1 2007]**

(A) $x^4 + 1$ (B) $x^4 - 1$ (C) $x^2 + 1$ (D) $x^2 - 1$

7. If $x + y + z = 1$, $x^2 + y^2 + z^2 = 2$ and $x^3 + y^3 + z^3 = 3$ then the value of xyz is _____. **[Orissa NTSE Stage – 1 2012]**

(A) $\frac{1}{5}$ (B) $\frac{1}{6}$ (C) $\frac{1}{7}$ (D) $\frac{1}{8}$

8. If $x + \frac{1}{x} = 3$, then the value of $x^6 + \frac{1}{x^6}$ is: **[Raj. NTSE Stage-1 2013]**

(A) 927 (B) 114 (C) 364 (D) 322

9. If $(a - 5)^2 + (b - c)^2 + (c - d)^2 + (b + c + d - 9)^2 = 0$, then the value of $(a + b + c)(b + c + d)$ is : **[Harayana NTSE Stage-1 2013]**

(A) 0 (B) 11 (C) 33 (D) 99

10. If $x + y + z = 1$, then $1 - 3x^2 - 3y^2 - 3z^2 + 2x^3 + 2y^3 + 2z^3$ is equal to : **[Harayana NTSE Stage-1 2013]**

(A) 6xyz (B) 3xyz (C) 2xyz (D) xyz

11. A cubic polynomial p(x) is such that p(1)=1, p(2)=2, p(3)= 3 and p(4) = 5, then the value of p(6) is :

[Harayana NTSE Stage-1 2013]

(A) 16 (B) 13 (C) 10 (D) 7

12. The sum of real values of y satisfying the equations $x^2 + x^2y^2 + x^2y^4 = 525$ and $x + xy + xy^2 = 35$ is :

[Harayana NTSE Stage-1 2013]

(A) 15 (B) 10 (C) $\frac{5}{2}$ (D) $\frac{3}{2}$

13. If a, b, c and d are natural numbers such that $a^5 = b^6$, $c^3 = d^4$, and d–a = 61, then the smallest value of c–b is :

[Harayana NTSE Stage-1 2013]

(A) 61 (B) 122 (C) 239 (D) 593

14. If $x + \frac{1}{x} = 3$, then the value of $x^6 + \frac{1}{x^6}$ is: **[Delhi NTSE Stage - 1 2013]**

(A) 927 (B) 114 (C) 364 (D) 2702

15. If the zero of the polynomial $f(x) = k^2x^2 - 17x + k + 2 (k > 0)$ are reciprocal of each other, then the value of k is :

[Delhi NTSE Stage–1 2013]

(A) 2 (B) – 1 (C) – 2 (D) 1

16. If a + b = 6 and ab = 8, then $a^3 + b^3$ = ... **[Gujarat NTSE Stage - 1 2013]**

(A) 18 (B) 36 (C) 54 (D) 72

17. If polynomial $P(x) = 3x^3 - x^2 - ax - 45$ has one zero of 3, then a = ...**[Gujarat NTSE Stage - 1 2013]**

(A) 3 (B) 6 (C) 9 (D) 12

18. If one factor of $27x^3 + 64y^3$ is (3x + 4y) what is the second factor ? **[Gujarat NTSE Stage - 1 2013]**

(A) $(3x^2 - 4y)$ (B) $(3x^2 + 12xy + 4y^2)$

(C) $(9x^2 + 12xy - 16y^2)$ (D) $(9x^2 - 12xy + 16y^2)$

19. Which one of the following is a factor of the expression $(a + b)^3 - (a - b)^3$?

[Madhya Pradesh NTSE Stage-1 2013]

(A) a (B) $3a^2 - b$ (C) 2b (D) (a + b) (a – b)

20. If x + 3, divides $x^3 + 5x^2 + kx$, then k is equal to : **[Odisha NTSE Stage-1 2013]**

(A) 2 (B) 4 (C) 6 (D) 8

21. If $x^2 - x - 1 = 0$, then the value of $x^3 - 2x + 1$ is **[Harayana NTSE Stage-1 2014]**

(A) 0 (B) 2 (C) $\frac{1+\sqrt{5}}{2}$ (D) $\frac{1-\sqrt{5}}{2}$

22. If x% of y is equal to 1% of z, y% of z is equal to 1% of x and z% of x is equal to 1% of y, then the value of xy + yz + zx is - **[Harayana NTSE Stage-1 2014]**

(A) 1 (B) 2 (C) 3 (D) 4

23. If $(x + a)^2 + (y + b)^2 = 4 (ax + by)$, where x, a, y, b are real, the value of $xy - ab$ is :

[West Bengal NTSE Stage-1 2014]

(A) a (B) 0 (C) b (D) None of these

24. If $a + b + c = 0$ and $a^2 + b^2 + c^2 = k (a^2 - bc)$ then k = ... **[Bihar NTSE Stage-1 2014]**

(A) 0 (B) 1 (C) 2 (D) 3

25. If $(x - 2)$ is a factor of polynomial $x^3 + 2x^2 - kx + 10$. Then the value of k will be :

[Chattisgarh NTSE Stage-1 2014]

(A) 10 (B) 13 (C) 16 (D) 9

26. If $\frac{x+a}{b+c}+\frac{x+b}{c+a}+\frac{x+c}{a+b}+3=0, a>0, b>0, c>0,$ then the value of x is: **[Delhi NTSE Stage - 1 2014]**

(A) $-(a^2 + b^2 + c^2)$ (B) $(a + b + c)$ (C) $-(a + b + c)$ (D) $\sqrt{a+b+c}$

27. If α and β are the zeroes of the polynomial $f(x) = x^2 - 5x + k$ such that $\alpha - \beta = 1$, the value of K is :

[Delhi NTSE Stage – 1 2014]

(A) 8 (B) 6 (C) $\frac{13}{2}$ (D) 4

28. If $x = \frac{1}{1+\sqrt{2}}$, then value of $x^2 + 2x + 3$ is: **[Delhi NTSE Stage - 1 2014]**

(A) 3 (B) 0 (C) 4 (D) 1

29. If $x+\frac{1}{x}=5$, then $x^3-5x^2+x+\frac{1}{x^3}-\frac{5}{x^2}+\frac{1}{x}=$ .....: **[Bihar NTSE Stage-1 2014]**

(A) –5 (B) 0 (C) 5 (D) 10

30. If $x + y = 1$ then $x^3 + y^3 + 3xy$ = ... **[Jharkhand NTSE Stage - 1 2014]**

(A) 0 (B) 1 (C) 2 (D) None of these

31. If $x - y = 5$, $xy = 24$ then the value of $x^2 + y^2$ will be - **[Uttar Pradesh NTSE Stage-1 2014]**

(A) 23 (B) 73 (C) 65 (D) 74

32. If $x+\frac{1}{x}=2$ then $\sqrt{x}+\frac{1}{\sqrt{x}}$ will be – **[Uttar Pradesh NTSE Stage-1 2014]**

(A) $\sqrt{2}$ (B) 2 (C) $\sqrt{2}+1$ (D) 1

33. If $x + y = 8$, $xy = 15$, the value of $x^2 + y^2$ will be **[Uttar Pradesh NTSE Stage-1 2014]**

(A) 32 (B) 34 (C) 36 (D) 38

34. If $p - q = -8$ and $p.q. = -12$ then the value of $p^3 - q^3$ is : **[Madhya Pradesh NTSE Stage-1 2014]**

(A) 224 (B) – 224 (C) 242 (D) – 242

35. $(a + b + c)(ab + bc + ca) - abc$ is equal to the **[Madhya Pradesh NTSE Stage-1 2014]**

(A) $(a + b)(c + b)(c + a)$ (B) $(a - b)(b + c)(c + a)$

(C) $(a + b)(b - c)(c + a)$ (D) $(a + b)(b + c)(c - a)$

36. Find the factors of the polynomial $8a^3 + 27b^3 + 64c^3 - 72abc$. **[Maharashtra NTSE Stage-1 2014]**

(A) $(2a + 3b + 4c)(4a^2 + 9b^2 + 16c^2 - 6ab + 12bc - 8ac)$

(B) $(2a + 3b + 4c)(4a^2 + 9b^2 + 16c^2 + 6ab - 12bc + 8ac)$

(C) $(2a + 3b + 4c)(4a^2 + 9b^2 + 16c^2 - 6ab - 12bc - 8ac)$

(D) $(2a + 3b + 4c)(4a^2 + 9b^2 + 16c^2 - 6ab - 12bc + 8ac)$

37. If $2 \pm \sqrt{3}$ are zeros of $x^4 - 6x^3 - 26x^2 + 138x - 35$ then the other zeros are **[MP NTSE Stage – 1 2014]**

(A) $-5, -7$ (B) $5, -7$ (C) $-5, 7$ (D) $5, 7$

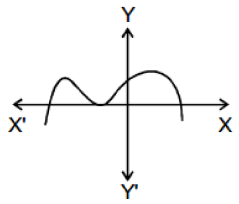
38. If α , β are the zeros of polynomial $f(x) = x^2 - p(x + 1) - c$, then $(\alpha + 1)(\beta + 1) =$ **[Raj. NTSE Stage–1 2014]**

(A) $c - 1$ (B) $1 - c$ (C) c (D) $1 + c$

39. If x, y, z are positive real numbers and a, b, c are rational numbers, then the value of $\frac{1}{1+x^{b-a}+x^{c-a}} + \frac{1}{1+x^{a-b}+x^{c-b}} + \frac{1}{1+x^{b-c}+x^{a-c}}$ is **[Raj. NTSE Stage-1 2014]**

(A) -1 (B) 0 (C) 1 (D) None of these

40. The graph of $y = p(x)$ is given below. The number of zeroes of polynomial p(x), is **[Raj. NTSE Stage–1 2015]**



(A) 3 (B) 2 (C) 1 (D) 0

41. If $\frac{p}{q} + \frac{q}{p} = 2$, what is the value of $\left(\frac{p}{q}\right)^{23} + \left(\frac{q}{p}\right)^{7}$ **[Delhi NTSE Stage - 1 2015]**

(A) 0 (B) 2 (C) –2 (D) None of these

42. Value of $x\left[\left(1+\frac{1}{x}\right)\left(1+\frac{1}{x+1}\right)\left(1+\frac{1}{x+2}\right)-1\right]$ is **[Delhi NTSE Stage - 1 2015]**

(A) 3 (B) 2x (C) 5x (D) 1

43. Simplify the value of $\frac{3.75\times3.75+1.25\times1.25-2\times3.75\times1.25}{3.75\times3.73-1.25\times1.25}$ is **[Delhi NTSE Stage - 1 2015]**

(A) 5.0 (B) 0.5 (C) 2.5 (D) 1.5

44. If $x^{47}+1$ is divided by $x^2 - 1$, the remainder will be **[Delhi NTSE Stage – 1 2015]**

(A) $x - 1$ (B) $x + 1$ (C) x (D) $-x$

45. If $p(x)= 2x^3 - 3x^2 + 5x - 4$ is divided by $(x - 2)$, what is remainder ? **[Gujarat NTSE Stage - 1 2015]**

(A) 12 (B) 8 (C) 10 (D) –10

46. What is the co-efficient of x^2y^2 in the expansion of $(x + y)^4$? **[Gujarat NTSE Stage - 1 2015]**

(A) 3 (B) 4 (C) 5 (D) 6

47. Zeroes of which quadratic polynomial are 4 and 3. **[Gujarat NTSE Stage - 1 2015]**

(A) $x^2 + 7x + 12$ (B) $x^2 - 7x + 12$ (C) $x^2 + 7x - 12$ (D) $x^2 - 7x - 12$

48. If $x^2 - 3x + 1 = 0$, then the value of $x^5 + \frac{1}{x^5}$ **[Jharkhand NTSE Stage - 1 2015]**

(A) 87 (B) 123 (C) 135 (D) 201

49. If $\frac{xy}{x+y} = a, \frac{xz}{x+z} = b$ and $\frac{yz}{y+z} = c,$ where a, b, c are non-zero numbers, then the value of x?

[Jharkhand NTSE Stage - 1 2015]

(A) $\frac{2abc}{ab+ac-bc}$ (B) $\frac{2abc}{ac+bc-ab}$ (C) $\frac{abc}{ab+bc+ac}$ (D) $\frac{2abc}{ab+bc-ac}$

50. If α, β be the zeros of the polynomial $2x^2 + 5x + k$ such that $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, than K = ?

[Jharkhand NTSE Stage – 1 2015]

(A) 3 (B) –3 (C) – 2 (D) 2

51. If pqr = 1, then the value of $\left(\frac{1}{1+p+q^{-1}} + \frac{1}{1+q+r^{-1}} + \frac{1}{1+r+p^{-1}}\right)$ **[Odisha NTSE Stage-1 2015]**

(A) 0 (B) pq (C) 1 (D) pq

52. (ab + bc + ca) can be expressed as ..... **[MP NTSE Stage – 1 2015]**

(A) abc (a+b+c) (B) ab (a+c) (C) $abc\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$ (D) $c\left(\frac{1}{a}+\frac{1}{b}\right)$

53. The square root of $x^{b^2} x^{b^2+2ab} x^{a^2-b^2}$ is **[Rajasthan NTSE Stage-1 2016]**

(A) $x^{2(a+b)}$ (B) $x^{\frac{a+b}{2}}$ (C) $x^{\frac{(a+b)^2}{2}}$ (D) X^{a+b}

54. If a + b + c = 0, then the value of $\frac{(a+b)^2}{ab} + \frac{(b+c)^2}{bc} + \frac{(c+a)^2}{ca}$ is **[Rajasthan NTSE Stage-1 2016]**

(A) 1 (B) 2 (C) 3 (D) – 3

55. One of the factors of $81a^4 + (x - 2a)(x - 5a)(x - 8a)(x - 11a)$ is **[Haryana NTSE Stage-1 2016]**

(A) $x^2 - 13ax + 31a^2$ (B) $x^2 + 13ax + 31a^2$ (C) $x^2 + 18ax - 31a^2$ (D) $x^2 - 18ax + 31a^2$

56. If $f\left(2x + \frac{1}{x}\right) = x^2 + \frac{1}{4x^2} + 1 (x \neq 0),$ the value of f(x) is **[West Bengal NTSE Stage-1 2016]**

(A) $4x^2$ (B) $\frac{1}{4}\left(2x+\frac{1}{x}\right)^2$ (C) $\frac{1}{4}x^2$ (D) $4\left(2x+\frac{1}{x}\right)^2$

57. If $2r = h + \sqrt{r^2+h^2}$, the value of r : h is (r, h ≠0) **[West Bengal NTSE Stage-1 2016]**

(A) 4 : 3 (B) 3 : 4 (C) 1 : 2 (D) 2 : 1

58. Let a, b, x, y be real numbers such that $a^2 + b^2 = 81$, $x^2 + y^2 = 121$ and ax + by = 99. Then the values of ay – bx is: **[West Bengal NTSE Stage-1 2016]**

(A) –1 (B) 1 (C) 0 (D) None of these

59. The value of $\frac{(0.03)^2-(0.01)^2}{0.03-0.01}$ is **[Bihar NTSE Stage-1 2016]**

(A) 0.02 (B) 0.004 (C) 0.4 (D) 0.04

60. If (x+ 2), is a factor of $2x^3$ - 5x + k, then the value of k is **[Raj. NTSE Stage-1 2016]**

(A) 6 (B) – 6 (C) 26 (D) -26

61. If a + b + c = 0, then the value of $\frac{(a+b)^2}{ab}+\frac{(b+c)^2}{bc}+\frac{(c+a)^2}{ca}$ is **[Raj. NTSE Stage-1 2016]**

(A) 1 (B) 2 (C) 3 (D) -3

62. The simplified form of the expression given below is **[Delhi NTSE Stage - 1 2016]**

$$\frac{\frac{y^4-x^4}{x(x+y)}-\frac{y^3}{x}}{y^2-xy+x^2}$$

(A) 1 (B) 0 (C) –1 (D) 2

63. If $a=\frac{4xy}{x+y}$, the value of $\frac{a+2x}{a-2x}+\frac{a+2y}{a-2y}$ in most simplified form is **[Delhi NTSE Stage - 1 2016]**

(A) 0 (B) 1 (C) –1 (D) 2

64. If x, y, z are real numbers such that $\sqrt{x-1}+\sqrt{y-2}+\sqrt{z-3}=0$ then the values of x, y, z are respectively **[Delhi NTSE Stage - 1 2016]**

(A) 1, 2, 3 (B) 0, 0, 0 (C) 2, 3, 1 (D) 2, 4, 1

65. If x – 2 is a factor of $3x^4 - 2x^3 + 7x^2 - 21x + k$, then the value of k is **[Gujarat NTSE Stage - 1 2016]**

(A) 2 (B) 9 (C) 18 (D) – 18

66. If 2x +3y + z = 0 then $8x^3 + 27y^3 + z^3 \div xyz$ is equal to **[Uttar Pradesh NTSE Stage-1 2017]**

(A) 0 (B) 6 (C) 18 (D) 9

67. If $p = x + \frac{1}{x}$ then the value of $p - \frac{1}{p}$ will be- **[Uttar Pradesh NTSE Stage-1 2017]**

(A) $3x$ (B) $\frac{3}{x}$ (C) $\frac{x^4+x^2+1}{x^3+x}$ (D) $\frac{x^4+3x^2+1}{x^3+x}$

68. Factors of $\frac{1}{3}c^2-2c-9$ are- **[Uttar Pradesh NTSE Stage-1 2017]**

(A) $\left(\frac{1}{3}c+3\right)(c+3)$ (B) $\left(\frac{1}{3}c-3\right)(c-3)$ (C) $\left(\frac{1}{3}c-3\right)(c+3)$ (D) $\left(c-\frac{1}{3}\right)(3c+3)$

69. The cube root of $x+y+3x^{\frac{1}{3}}y^{\frac{1}{3}}(x^{\frac{1}{3}}+y^{\frac{1}{3}})$ is: **[Rajasthan NTSE STAGE-I 2017]**

(A) $x+y$ (B) $x^{\frac{1}{3}}+y^{\frac{1}{3}}$ (C) $(x+y)^{\frac{1}{3}}$ (D) $(x+y)^3$

70. If $(x+\sqrt{2})$ is a factor of $kx^2-\sqrt{2}x+1$, then the value of k is : **[Rajasthan NTSE STAGE-I 2017]**

(A) $-\frac{3}{2}$ (B) $-\frac{2}{3}$ (C) $\frac{3}{2}$ (D) $\frac{2}{3}$

71. If $a = x-y$, $b = y-z$ and $c = z-x$ then the value of $a^3+b^3+c^3$ is : **[Rajasthan NTSE STAGE-I 2017]**

(A) $3(x-y)(y-z)(z-x)$ (B) $(x-y)^3(y-z)^3(z-x)^3$ (C) $(x+y+z)^3$ (D) $x^3+y^3+z^3$

72. If $x^2+4y^2+9z^2-4xy-12yz+6xz=0$, then **[Rajasthan NTSE STAGE-I 2018]**

(A) $x = 2y-3z$ (B) $x = y-3z$ (C) $2x = y-3z$ (D) $x = 3y-2z$

73. If any polynomial f(x) is divided by x^2-9, then remainder is $3x+2$. If it is divided by $(x-3)$ the remainder will be : **[Chhattisgarh NTSE Stage-1 2019]**

(A) -7 (B) 7 (C) 11 (D) -11

74. If $2019^x+2019^{-x}=3$, then the value of $\sqrt{\frac{2019^{6x}-2019^{-6x}}{2019^x-2019^{-x}}}$ is: **[Delhi NTSE Stage-1 2019]**

(A) 3 (B) 6 (C) 9 (D) 12

75. If $\frac{1}{x+y}=\frac{1}{x}+\frac{1}{y}$, then the value of $\left(\frac{x}{y}\right)^6+\left(\frac{x}{y}\right)^3$ is :- **[Delhi NTSE Stage-1 2019]**

(A) 0 (B) $\frac{1}{2}$ (C) 1 (D) 2

76. If $f(x) = x^4+ax^3+bx^2+cx+d$ is a polynomial such that $f(1) = 5$, $f(2) = 10$, $f(3) = 15$, $f(4) = 20$. Find the value of $\frac{f(12)+f(-8)}{100}$ **[Delhi NTSE Stage-1 2019]**

(A) 198 (B) 198.4 (C) 198.2 (D) 199.2

77. If $N=\sqrt[3]{4}+\sqrt[3]{2}+1$, then the value of $\frac{1}{N^3}+\frac{3}{N^2}+\frac{3}{N}$ is: **[Delhi NTSE Stage-1 2019]**

(A) 2 (B) 4 (C) 7 (D) 1

78. The polynomial, $f(x) = (x-1)^2 + (x-2)^2 + (x-3)^2 + (x-4)^2$ has minimum value, when x =……..

[Bihar NTSE Stage-1 2019]

(A) 40 (B) 20 (C) 10 (D) 2.5

79. If a polynomilal $x^4 - 4x^2 + x^3 + 2x + 1$ is divided by x – 1, then remainder will be

[Raj. NTSE stage-I 2019]

(A) 0 (B) 1 (C) 9 (D) –1

80. If $x^2 + 4y^2 + 9z^2 - 4xy - 12yz + 6xz = 0$ then **[Raj. NTSE stage-I 2019]**

(A) x = 2y – 3z (B) x = y – 3z (C) 2x = y – 3z (D) x = 3y – 2z

81. If $ax^3 + bx + c$ is divisible by $x^2 + dx + 1$, then : **[Hariyana NTSE Stage-I 2020-21]**

(A) $a^2 + b^2 = ac$ (B) $a^2 - c^2 = ab$ (C) $a^2 - b^2 = ac$ (D) $a^2 + c^2 = ab$

82. If $x^2 - 3x + 1 = 0$, then what is the value of $(x^5 + x^{-5})$? **[Hariyana NTSE Stage-I 2020-21]**

(A) 119 (B) 122 (C) 123 (D) 125

STAGE-II

1. If the value of quadratic polynomial p(x) is O only at x = – 1 and p(–2) = 2 then the value of p(2) is

[NTSE Stage- II 2016]

(A) 18 (B) 9 (C) 6 (D) 3

2. When a polynomial p(x) is divided by x – 1, the remainder is 3. When p(x) is divided by x – 3, the remainder is 5. If r(x) is the remainder when p(x) is divided by (x–y) (x–3), then the value of r(–2) is

[NTSE Stage- II 2017]

(A) –2 (B) –1 (C) 0 (D) 4

3. The value (s) of k for which $x^2 + 5kx + k^2 + 5$ is exactly divisble by x + 2 but not by x + 3 is (are)

[NTSE Stage- II 2017]

(A) 1 (B) 5 (C) 1, 9 (D) 9

4. If the polynomial $x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by another polynomial $x^2 - 2x + k$, the reaminder comes out to be x + a, then the value of a is **[Raj. NTSE Stage-II 2018]**

(A) –1 (B) –5 (C) 1 (D) 5

DPP # 11

CONCEPT : OLYMPIAD PREVIOUS YEAR QUESTIONS

1. Let $f(x) = x^2 + x - 6$. For what values of "t" does $f(t-5) = 0$? **[NSTSE-2009]**

(A) -3 and 2 (B) -2 and 3 (C) 5 (D) 2 and 7

2. If $a^2 + 2b = 7$, $b^2 + 4c = -7$ and $c^2 + 6a = -14$, then the value of $(a^2 + b^2 + c^2)$ is : **[IJSO-2009]**

(A) 14 (B) 25 (C) 36 (D) 47

3. If $\sqrt{\frac{x}{y}} + \sqrt{\frac{y}{x}} = \frac{10}{3}$ and $x + y = 10$, then the value of xy will be : **[NSTSE 2010]**

(A) 16 (B) 9 (C) 2 (D) 10

4. When the polynomial $(6x^4 + 8x^3 + 17x^2 + 21x + 7)$ is divided by $(3x^2 + 4x + 1)$, the remainder is $(ax - b)$. Therefore : **[IJSO-2011]**

(A) $a = 1, b = 2$ (B) $a = 1, b = -2$ (C) $a = 2, b = 1$ (D) $a = -1, b = -2$

5. If $2^{2x-1} + 2^{1-2x} = 2$, then the value of x is : **[IJSO-2011]**

(A) 0.5 (B) -0.5 (C) 1 (D) 0

6. Given that $a(a+b) = 36$ and $b(a+b) = 64$, where a and b are positive, $(a-b)$ equals : **[IJSO-2011]**

(A) 2.8 (B) 3.2 (C) -2.8 (D) -2.5

7. Find $x^2 + y^2 + z^2$ if $x^2 + xy + xz = 135$, $y^2 + yz + yx = 351$ and $z^2 + zx + zy = 243$. **[IJSO-2012]**

(A) 225 (B) 250 (C) 275 (D) 300

8. If $a + b + c = 1$, $a^2 + b^2 + c^2 = 21$ and $abc = 8$ then find the value of $(1-a)(1-b)(1-c)$. **[IJSO-2012]**

(A) -10 (B) -18 (C) -24 (D) -30

9. If $xy^2 = a^3$, $yz^2 = b^3$ and $zx^2 = c^3$ then z^3 equals **[IJSO-2013]**

(A) $\frac{bc^4}{a^2}$ (B) $\frac{b^4c}{a^2}$ (C) $\frac{b^2c^4}{b^2}$ (D) $\frac{ab^4}{c^2}$

10. If $3x + 3y - 1$, $4x^2 + y - 5$, $4x + 2y$ are the sides of an equilateral triangle, its area is closest to the integer **[IJSO-2013]**

(A) 84 (B) 85 (C) 86 (D) 87

11. If a and b are two positive real numbers such that $\frac{a^2 + b^2}{ab} = 6$, then a positive value of $\frac{a}{b}$ lies between **[IJSO-2013]**

(A) 2 and 3 (B) 3 and 4 (C) 4 and 5 (D) 5 and 6

12. The number of real values of a for which the cubic equation $x^3 - 3ax^2 + 3ax - a = 0$ has all real roots, one of which is a itself, is **[IJSO-2013]**

(A) 0 (B) 1 (C) 2 (D) 3

13. If $x^3 = a + 1$ and $x + (b/x) = a$; then x equals **[IJSO-2013]**

(A) $\frac{a(b+1)}{a^2-b}$ (B) $\frac{ab+1}{a^2-b}$ (C) $\frac{ab+a+1}{a^2-b}$ (D) $\frac{ab-a-1}{a^2-b}$

14. Let a, b, c be positive real numbers such that $abc \neq 1$, $(ab)^2 = (bc)^4 = (ca)^x = abc$. Then x equals **[IJSO-2013]**

(A) 1 (B) 2 (C) 3 (D) $\frac{4}{5}$

EXERCISE-I

ONLY ONE CORRECT TYPE

(Based on Introduction to Polynomials)

1. Which of the following algebraic expressions is not a polynomial ?

(A) $\frac{17}{2}x^2 + x - 3$ (B) $\sqrt{7}x^3 + 3x^{2/3} - 8$

(C) 3 (D) 0

2. Which one of the following algebraic expressions is a polynomial in variable x ?

(A) $x^2 + \frac{2}{x^2}$ (B) $\sqrt{x} + \frac{1}{\sqrt{x}}$

(C) $x^2 + \frac{3x^{3/2}}{\sqrt{x}}$ (D) None of these

(Based on Coefficient of Polynomials)

3. The coefficient of x^2 in $(3x^2 - 5)(4 + 4x^2)$ is.

(A) 12 (B) 8

(C) –8 (D) 5

(Based on Degree to Polynomials)

4. Degree of the polynomial $p(x) = 3x^4 + 6x + 7$ is

(A) 4 (B) 5

(C) 3 (D) 1

5. Which of the following is a quadratic polynomial in one variable ?

(A) $\sqrt{2x^3} + 5$ (B) $2x^2 + 2x^{-2}$

(C) x^2 (D) $2x^2 + y^2$

(Based on Value of Polynomials)

6. If $p(x) = x^3 + 3x^2 - 2x + 4$, then find the value of $[p(2) + p(-2) - p(0)]$.

(A) 28 (B) 14

(C) 12 (D) 16

7. If a polynomial is given by $f(x) = 5x^4 - 3x^3 + 2x^2 - 1$, then the value of $\frac{f(1) + f(-1)}{f(2)}$ is

(A) $\frac{4}{63}$ (B) $\frac{4}{21}$

(C) $\frac{9}{63}$ (D) $\frac{12}{63}$

(Based on Zeroes of Polynomials)

8. The zeroes of the poynomial $p(x) = x^2 + x - 6$ are.

(A) 2, 3 (B) –2, 3

(C) 2, –3 (D) –2, –3

(Based on Remainder Theorem)

9. When $x^{11} + 1$ is divided by $x + 1$, then the remainder is

(A) 0 (B) 2

(C) 1 (D) – 1

10. The value of m, if $2y^3 + my^2 + 11y + m + 3$ is exactly divisible by $2y - 1$ is

(A) 7 (B) – 7

(C) 6 (D) – 6

11. If $8x^4 - 8x^2 + 7$ is divided by $2x + 1$, the remainder is

(A) $\frac{11}{2}$ (B) $\frac{13}{2}$

(C) $\frac{15}{2}$ (D) $\frac{17}{2}$

12. What must be added to $x^4 + 2x^3 - 2x^2 + x - 1$ so that the resulting polynomial is divisible by $x^2 + 2x - 3$?

(A) $-x + 2$ (B) $x - 2$

(C) $2x - 1$ (D) $2x + 1$

13. If the polynomials $4x^3 + ax^2 - 2x + 7$ and $2x^3 + x^2 + x - a$ leave the same remainder when divided by $x - 3$, then the value of a is

(A) $x - 3$ (B) $4x^3 + ax^2 - 2x + 7$

(C) $\frac{-43}{10}$ (D) $\frac{-3}{13}$

(Based on Factor Theorem)

14. If $x-\frac{1}{2}$ are factors of $px^2 + 5x + r$, then p =

(A) $-\left(\frac{r+10}{4}\right)$ (B) 2r

(C) $\frac{r}{2}$ (D) r

15. Which of the following is true if (x + 1) and (x + 2) are factors of $p(x) = x^3 + 3x^2 - 2\alpha x + \beta$?

(A) $2\alpha + 3\beta = 2$ (B) $2\alpha - 3\beta = -2$

(C) $\alpha - 7\beta = 5$ (D) $7\alpha - \beta = 2$

(Based on Square Identities)

16. If $x+\frac{1}{x}=5$, then find the value of $x^2+\frac{1}{x^2}$.

(A) 26 (B) 23

(C) 30 (D) 22

17. If $3x+\frac{2}{x}=7$, then $\left(9x^2-\frac{4}{x^2}\right)=$

(A) 25 (B) 35

(C) 49 (D) 30

18. The value of $(x + 2y + 2z)^2 + (x - 2y - 2z)^2$ is

(A) $2x^2 + 8y^2 + 8z^2$

(B) $2x^2 + 8y^2 + 8z^2 + 8xyz$

(C) $2x^2 + 8y^2 + 8z^2 - 8yz$

(D) $2x^2 + 8y^2 + 8z^2 + 16yz$

19. If $a^{1/2} + b^{1/2} - c^{1/2} = 0$, then the value of $(a + b - c)^2$ is

(A) 2ab (B) 2bc

(C) 4ab (D) 4ac

(Based on Cubic Identities)

20. If p = 2 – a, then what is the value of $a^3 + 6ap + p^3 - 8$?

(A) 0 (B) – 1

(C) 1 (D) 2

21. If $x^2 - 5x + 1 = 0$ $(x \neq 0)$, then the value of $x^3+\frac{1}{x^3}$ is :

(A) 125 (B) 110

(C) 150 (D) 140

22. If a + b + c = 10 and $a^2 + b^2 + c^2 = 80$, find the value of $a^3 + b^3 + c^3 - 3abc$.

(A) 700

(B) 710

(C) 1280

(D) 950

23. If $x^3 + y^3 + z^3 = 3xyz$, then which one of the following is true ?

(A) x + y + z = 1

(B) x – y + z = 0

(C) Either x + y + z = 0 or x = y = z

(D) Neither x + y + z = 0 nor x = y = z

(Based on Miscellaneous Concepts)

24. If $(x^2 + 3x + 5)(x^2 - 3x + 5) = m^2 - n^2$, then m is

(A) $x^2 - 3x$ (B) 3x

(C) $x^2 + 5$ (D) $x^2 + 2x + 1$

25. The value of $\frac{7.83\times7.83-1.17\times1.17}{6.66}$ is

(A) 9 (B) 6.66

(C) 1.176 (D) 18

EXERCISE-II

ONLY ONE CORRECT TYPE

(Based on Introduction to Polynomials)

1. Which of the following is not a polynomial ?

(A) $x^3 + 1$ (B) $x + \frac{1}{x}$

(C) $x^2 - x$ (D) None of these

2. Which of the following polynomial has degree 2

(A) $\frac{x^2+1}{x^2}$ (B) $3x^2 + 5$

(C) $4x^3 - 3x^2 + 7$ (D) $8x^3 - 2$

(Based on Zeroes of Polynomials)

3. Sum of zeroes of polynomial $P(x) = 4x^2 - 1$ is

(A) $\frac{1}{4}$ (B) $-\frac{1}{4}$

(C) 0 (D) 4

4. How many zeros can a polynomial of degree n have

(A) n + 1 (B) n – 1

(C) n (D) n^2

5. If one of the zeroes of the quadratic polynomial $(k - 1)x^2 + kx + 1$ is (– 3), then k is equal to :

(A) $\frac{4}{3}$ (B) $-\frac{4}{3}$

(C) $\frac{2}{3}$ (D) $-\frac{2}{3}$

6. A quadratic polynomial whose sum of the zeroes is 3 and one of the zero is 0, is :

(A) $x^2 + 2x$

(B) $x^2 + 3x$

(C) $x^2 - 3x + 5$

(D) $x(x - 3)$

(Based on Geometrical Meaning of Zeroes of Polynomials)

7. Graph of a linear polynomial is :

(A) straight line (B) circle

(C) ellipse (D) parabola

8. Graph of quadratic equation is always a –

(A) Straight line (B) Circle

(C) Parabola (D) Hyperbola

9. Which of the following curve touches X – axis –

(A) $x^2 - 2x + 4$ (B) $3x^2 - 6x + 1$

(C) $4x^2 - 16x + 9$ (D) $25x^2 - 20x + 4$

10. If the sign of 'a' is positive in a quadratic polynomial $ax^2 + bx + c$ then its graph should be

(A) Parabola open upwards

(B) Parabola open downwards

(C) Parabola open leftwards

(D) Can't be determined

11. In the graph of a polynomial intersects the x-axis in 3 points, then its degree cannot be

(A) 2 (B) 3

(C) 4 (D) 5

12. The graph of polynomial $p(x) = x^3 - x^2 + x$ is always passing through the point –

(A) (0, 0) (B) (3, 2)

(C) (1, – 2) (D) All of these

13. How many time, graph of the polynomial $f(x) = x^3 - 1$ will intersect X – axis –

(A) 0 (B) 1

(C) 2 (D) 4

(Based on Relation between Zeroes and Coefficient in Quadratic Polynomials)

14. The quadratic polynomial whose zeroes are 0 and $\sqrt{2}$ is :

(A) $x^2 - \sqrt{2}x + 1$ (B) $2x^2 - \sqrt{2}x + 3$

(C) $x^2 - \sqrt{2}x$ (D) None of these

15. The quadratic polynomial whose sum of zeroes is 3 and product of zeroes is – 2 is :

(A) $x^2 + 3x - 2$ (B) $x^2 - 2x + 3$

(C) $x^2 - 3x + 2$ (D) $x^2 - 3x - 2$

16. If α and β are the zeroes of the polynomial $2 - 3x - x^2$ then $\alpha + \beta =$

(A) 2 (B) 3

(C) 1 (D) none

17. If one of the zeroes of polynomial $f(x) = 9x^2 + 13x + 6a$ is reciprocal of the other, then a is equal to:

(A) $\frac{1}{9}$ (B) $\frac{2}{3}$

(C) $\frac{3}{2}$ (D) $\frac{1}{6}$

18. If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and – 3, then

(A) a = 0, b = – 6

(B) a = 2, b = – 6

(C) a = 5, b = – 1

(D) a = – 7, b = – 1

(Based on Division Algorithm for Polynomials)

19. When $p(x) = x^3 + ax^2 + 2x + a$ is divided by $(x + a)$; the remainder is

(A) 0 (B) a

(C) –a (D) 2a

20. If $4x^4 - 3x^3 - 3x^2 + x - 7$ is divided by $1 - 2x$ then remainder will be

(A) $\frac{57}{8}$ (B) $-\frac{59}{8}$

(C) $\frac{55}{8}$ (D) $-\frac{55}{8}$

21. If $(x + 1)$ is a factor of $x^2 - 3ax + 3a - 7$. Then the value of a is :

(A) 1 (B) – 1

(C) 0 (D) 2

22. A quadratic polynomial is exactly divisible by $(x + 1)$ & $(x + 2)$ and leaves the remainder 4 after division by $(x + 3)$ then that polynomial is

(A) $x^2 + 6x + 4$ (B) $2x^2 + 6x + 4$

(C) $2x^2 + 6x - 4$ (D) $x^2 + 6x - 4$

23. The polynomials $ax^3 + 3x^2 - 3$ and $2x^3 - 5x + a$ when divided by $(x - 4)$ leaves remainders R_1 & R_2 respectively then value of 'a' if $2R_1 - R_2 = 0$.

(A) $-\frac{18}{127}$ (B) $\frac{18}{127}$

(C) $\frac{17}{127}$ (D) $-\frac{17}{127}$

24. The values of a & b so that the polynomial $x^3 - ax^2 - 13x + b$ is divisible by $(x - 1)$ & $(x + 3)$ are

(A) a = 15, b = 3 (B) a = 3, b = 15

(C) a = – 3, b = 15 (D) a = 3, b = – 15

25. If $x^2 + xy + x = 12$ and $y^2 + xy + y = 18$, then the value of x + y is.....

(A) 5, – 6 (B) 3, 4

(C) 5, 3 (D) 6, – 3

EXERCISE-III

VERY SHORT ANSWER TYPE

(Based on Introduction to Polynomials)

1. Which of the following expressions are polynomials or not ?

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

(iii) $\frac{(x^2+x+1)(x+1)}{(1+x)}$ (iv) $x^2+\frac{1}{x^2}$

(Based on Coefficient of Polynomials)

2. Write the coefficient of x^2 in each of the following :

(i) $6-2x^2+3x^3+x^4$ (ii) πx^2-x+2

(iii) $\sqrt{3}x-4$

(Based on Standard form of Polynomials)

3. Rewrite the following polynomials in the standard form :

(i) $x-7+8x^2+9x^3$

(ii) $-5x^2+6-3x^3+4x$

(Based on Zeroes of Polynomials)

4. Find zeroes of the polynomial given below :

(i) $3x+\pi$ (ii) $ly+m; l\neq 0$

(Based on Remainder Theorem)

5. Without actual division, find the remainder when :

(i) $x^6-3x^5+2x^2+8$ is divided by $x-3$.

(ii) x^2+5x+4 is divided by $x+2$.

6. The polynomials ax^3+3x^2-3 and $2x^3-5x+a$ when divided by $(x-4)$ leaves the ramainder R_1 and R_2 respectively. Find the value of a if $R_1+R_2=0$.

(Based on Factorisation of Polynomials)

7. Given possible expressions for the length and breadth of the rectangle whose area is given as $16a^2-32a+15$ square units; $a>\frac{5}{4}$.

(Based on Square Identities)

8. Simplify :

(i) $(x+y-2z)^2-x^2-y^2-3z^2+4xy$

(ii) $(x^2-x+1)^2-(x^2+x+1)^2$

9. Show that $(3a+2b-c+d)^2-12a(2b-c+d)$ is a perfect square.

10. Simplify :

$0.76\times 0.76+2\times 0.76\times 0.24+0.24\times 0.24$

SHORT ANSWER TYPE

(Based on Coefficient of Polynomials)

1. If the perimeter of a rectangle is 24 units and the length exceeds the breadth by 4 units, then find the area of a rectangle.

(Based on Factorisation of Polynomials)

2. Factorize :

(i) x^4+x^2+1

(ii) $x^4-x^4y^4$

(iii) $x^2+\frac{12}{35}x+\frac{1}{35}$

(iv) $2\sqrt{2}x^3+16\sqrt{2}y^3+z^3-12xyz$

3. Factorize :

(i) $(x^3+y^3+2x^2-2y^2)$ (ii) (x^4+4)

(iii) $(x+y)^3-(x-y)^3$ (iv) $\left(x^2+\frac{1}{x^2}-3\right)$

(v) $a^3-5\sqrt{5}\ b^3$

(Based on Cubic Identities)

4. Without actually calculating the cubes, evaluate the expression $(30)^3+(-18)^3+(-12)^3$.

5. If $x=\sqrt{7}-\sqrt{5}, y=\sqrt{5}-\sqrt{3}, z=\sqrt{3}-\sqrt{7}$, then find the value of $x^3+y^3+z^3-3xyz$.

LONG ANSWER TYPE

(Based on Remainder Theorem)

1. In each of the following questions divide the polynomial p(x) by g(x) and find the remainder. Find in which cases g(x) is a factor of p(x).
   (i) $p(x) = x^3 - 14x^2 + 37x - 60$; $g(x) = x - 2$
   (ii) $p(t) = t^3 + 6t^2 + 11t - 6$; $g(t) = t^2 - 5t + 6$
2. Given that $px^2 + qx + 6$ leaves the remainder as 1 on division by $2x + 1$ and $2qx^2 + 6x + p$ leaves the remainder as 2 on division by $3x - 1$. Find p and q.

(Based on Factor Theorem)

3. Find the values of m and n in the polynomial $2x^3 + mx^2 + nx - 14$ such that $(x - 1)$ and $(x + 2)$ are its factors.
4. Given $p(x) = 2x^5 + 3x^2 - 3x - 2$ and $q(x) = x - 1$. Find by actual division, whether q(x) is a factor of p(x). Verify your answer by factor theorem.

(Based on Miscellaneous Concepts)

5. Find the product of : $(a^{1/8} + a^{-1/8})(a^{1/8} - a^{-1/8})(a^{1/4} + a^{-1/4})(a^{1/2} + a^{-1/2})$

NUMERICAL PROBLEMS

(Based on Degree of Polynomials)

1. $p(x) = \sqrt{2}$ is a polynomial of degree.

(Based on Value of Polynomials)

2. If $p(x) = x^2 - 2\sqrt{2}x + 1$, then $p(2\sqrt{2}) =$

(Based on Remainder Theorem)

3. Find the remainder when the polynomial $p(x) = x^{100} - x^{97} + x^3$ is divided by $x + 1$.

(Based on Cubic Identities)

4. Find the constant term in the expansion of $(x + 3)^3$.
5. Value of $\frac{a^3 + b^3 + c^3 - 3abc}{ab + bc + ca - a^2 - b^2 - c^2}$, when $a = -5$, $b = -6$, $c = 10$ is.

EXERCISE-IV

VERY SHORT ANSWER TYPE

(Based on Zeroes of Polynomials)

1. If $x = \frac{4}{3}$ is a Zero of the polynomial $f(x) = 6x^3 - 11x^2 + kx - 20$, then find the value of k.

(Based on Geometrical Meaning of Zeroes of Polynomials)

2. Draw the graph of the polynomial $f(x) = x^2 - 2x - 8$.
3. Draw the graph of the polynomial $f(x) = 2x - 5$. Also, find the coordinates of the point where it crosses X-axis.

(Based on Relation between Zeroes and Coefficient in Quadratic Polynomials)

4. If the sum of the squares of zeroes of the polynomial $6x^2 + x + k$ is $\frac{25}{36}$, find the value of k.
5. If α and β are the zeroes of the quadratic polynomial $ax^2 + bx + c$. Find the value of
   (i) $\alpha^2 - \beta^2$ (ii) $\alpha^3 + \beta^3$
6. If one zero of the quadratic polynomial $2x^2 - (3k + 1)x - 9$ is negative of the other, find the value of k.
7. If α, β are the zeroes of the polynomial $x^2 + px + q$, prove that $\frac{\alpha^2}{\beta^2} + \frac{\beta^2}{\alpha^2} = \frac{p^4}{q^2} + 2 - \frac{4p^2}{q}$.

(Based on Relation between Zeroes and Coefficient in Cubic Polynomials)

8. If $x = 2$ and $x = 0$ are Zeroes of the polynomials $f(x) = 2x^3 - 5x^2 + ax + b$, then find the values of a and b.

(Based on Division Algorithm for Polynomials)

9. What must be added to the polynomial $f(x) = x^4 + 2x^3 - 2x^2 + x - 1$, so that the resulting polynomial is exactly divisible by $x^2 + 2x - 3$.
10. What should be subtracted from the polynomial $f(x) = x^4 + 2x^3 - 13x^2 - 12x + 21$, so that the resulting polynomial is exactly divisible by $x^2 - 4x + 3$.

SHORT ANSWER TYPE

(Based on Zeroes of Polynomials)

1. Find the zeroes of following polynomials
   (A) $\frac{1}{2}x^2 - 3x + 4$
   (B) $3x^3 - 5x^2 - 11x - 3$
2. For what value of k, is –2 a zero of the polynomial $3x^2 + 4x + 2k$?
3. Find the remainder when $9x^3 - 3x^2 + x - 5$ is divided by $x - \frac{2}{3}$.

(Based on Division Algorithm for Polynomials)

4. Polynomial $p(x) = -x^3 + 3x^2 - 3x + 5$ when divided by some other polynomial q(x) gives quotient $x - 2$ and remainder 3. Find q(x).
5. If $2x^3 + ax^2 + bx - 6$ has $(x - 1)$ as a factor and leaves a remainder 2 when divided by $(x - 2)$, find a and b.

LONG ANSWER TYPE

(Based on Zeroes of Polynomials)

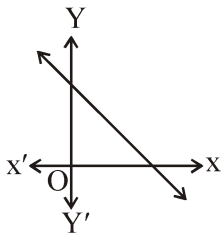
1. Obtain all the zeroes of $x^4 + 2x^3 - 7x^2 - 8x + 12$, if two of its zeroes are 2 and – 2.
2. Find all zeros of polynomial.
   $f(x) = 2x^4 + x^3 - 4x^2 - 19x - 6$ If two of its zeros are –2 and –1.
3. If p and q are zeroes of the quadratic polynomial $2x^2 + 2(m + n)x + m^2 + n^2$, form the quadratic polynomial whose zeroes are $(p + q)^2$ and

$(p - q)^2$.

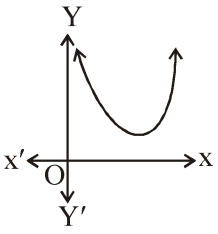
4. If α and β are the zeroes of the polynomial $x^2 + 4x + 3$, form the polynomial whose zeroes are $1+\frac{\beta}{\alpha}$ and $1+\frac{\alpha}{\beta}$.

(Based on Geometrical Meaning of Zeroes of Polynomials)

5. Which of the following correspond to the graph to a linear or a quadratic polynomial and find the number of real zeroes of polynomial.



(i)



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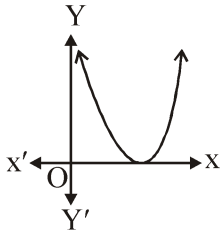

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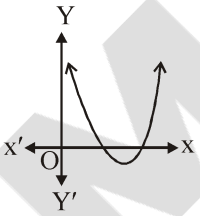

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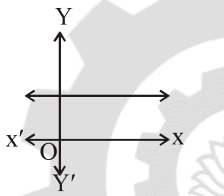

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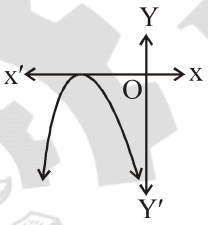

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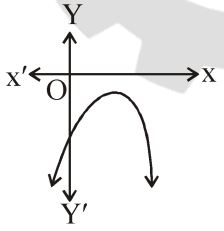
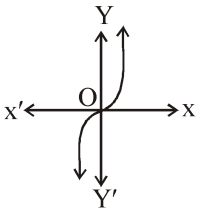
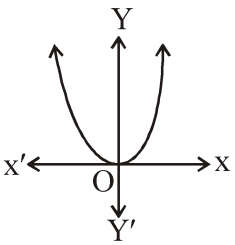
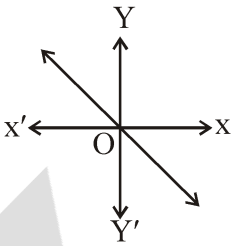




(vii)



(viii)



(ix)

(x)

NUMERICAL PROBLEMS

(Based on Zeroes of Polynomials)

1. Zeroes of a quadratic polynomial are in the ratio 2 : 3 and their sum is 15. The product of zeroes of this polynomial is.
2. The sum and product of zeroes of $p(x) = 63x^2 - 7x - 9$ are S and P respectively. Find the value of $27S + 14P$.

(Based on Division Algorithm for Polynomials)

3. If the polynomial $6x^4 + 8x^3 + 17x^2 + 25x - 9$ is divided by another polynomial $3x^2 + 4x + 1$, the remainder comes out to be $a + bx$, find $(a + b)^2$.
4. A polynomial of degree 7 is divided by a polynomial of degree 4. Degree of the quotient is
5. If $x^4 + x^3 + 8x^2 + ax + b$ is divisible by $x^2 + 1$, then find $5a + 2b$.

ANSWER KEY

DPP_01

1. B 2. B 3. D 4. D 5. C 6. A 7. B

8. (i) Cubic Polynomial (ii) Biquadratic Polynomial (iii) Biquadratic Polynomial
(iv) Cubic Polynomial (v) Linear Polynomial

9. (i) Monomial (ii) Trinomial (iii) Trinomial (iv) Binomial

10. (i) Biquadratic Polynomial, Trinomial (ii) Bicubic Polynomial, Tetranomial

DPP_02

1. B 2. D 3. C 4. B 5. A 6. B

7. (i) $(x+1)(x+3)(x-4)$ (ii) $(x-1)(x-3)(x-5)$ 8. C 9. $a = 7$

10. $x-5$ is not a factor of the given polynomial.

DPP_03

2. A 3. C 4. B 5. B 6. C 7. C

8. (i) $x = -2$ (ii) $x = -\frac{5}{2}$ (iii) $x = 3$ (iv) $x = -5$ 9. A

10. (i) $\left(\sqrt{7}x-\sqrt{2}\right)\left(\sqrt{7}x-\sqrt{2}\right)$ (ii) $\left(x+\sqrt{2}\right)\left(\sqrt{2}x+1\right)$

DPP_04

1. A 2. B

3. (i) $(a+b-3)(a-b-1)$ (ii) $(x^2+2x+2)(x^2-2x+2)$

4. (i) $(x^2+5x+2)(x^2+5x+8)$ (ii) $(x^2-4x-4)(x^2-4x-5)$

5. (i) $(2a+b+c)(4a^2+b^2+c^2-2ab-bc-2ac)$ (ii) $(2a^2-a+1)(4a^4+a^2+1+2a^3+a-2a^2)$

6. B 7. (i) $a(a+3)$ (ii) $(2u-3v)$

8. (i) $(m+4)(m+5)(m+9)$ (ii) $u(2u-3v)(2u+3v)$ 9. B

10. No, as the HCF(12) does not divide the LCM(54)

DPP_05

1. C 2. B 3. C 4. A 5. $a = \frac{1}{2}, c = 5$ 6. $a = 3$

7. 108 8. $pq = r$ 9. (i) $4x^2 - x - 4$ (ii) $3x^2 - 3\sqrt{2}x + 1$ 10. (i) $x^2 - 5x$ (ii) $x^2 - 3$

DPP_06

1. $k(x^2 - 4x - 5)$, where k is any non-zero constant.
2. $k(x^2 - 4x - 5)$, where k is any non-zero constant.
3. $k(x^2 - \frac{28}{9}x + \frac{1}{3})$, where k is any non-zero real number.
4. $k = 6$ 5. $k = 2$
6. (i) $-\frac{b}{c}$ (ii) $\frac{b^2 - 2ac}{a^2}$ (iii) $\frac{b^2 - 2ac}{ac}$ (iv) $\frac{3abc - b^3}{a^3}$ (v) $\frac{3abc - b^3}{c^3}$ (vi) $\frac{3abc - b^3}{a^2c}$
7. (i) $s = \frac{1}{2}, \frac{1}{2}$ (ii) $t = \sqrt{15}, -\sqrt{15}$ 8. (i) $x = \sqrt{2}, -3\sqrt{2}$ (ii) $x = -\sqrt{3}, -\frac{7\sqrt{3}}{3}$
9. (i) $x = 1, \sqrt{3}$ (ii) $x = -\frac{2}{\sqrt{3}}, \frac{\sqrt{3}}{4}$ 10. (i) $x = \frac{1}{a}, a$ (ii) $-\frac{b}{a}, \frac{c}{b}$

DPP_07

1. B 2. A 3. $\sqrt{2}, -\sqrt{2}, 1$ and $\frac{1}{2}$ 4. $-\sqrt{3}, \sqrt{3}$ and $-\frac{1}{2}$
5. $x = -\frac{2\sqrt{2}}{3}$ and $x = -\frac{\sqrt{2}}{2}$ 6. A 7. B 8. $g(x) = x^2 - x + 1$
9. 0 10. $14x - 10$

DPP_08

1.	C	2.	B	3.	A	4.	D	5.	B	6.	A	7.	D
8.	C	9.	B	10.	B	11.	D	12.	C	13.	B	14.	D
15.	D	16.	B	17.	D	18.	D	19.	C	20.	C	21.	C
22.	C												

DPP_09

1.	A	2.	C	3.	D	4.	D	5.	B	6.	A	7.	B
8.	A	9.	C	10.	A	11.	D	12.	B	13.	A		

DPP_10

STAGE-I

1.	B	2.	D	3.	C	4.	A	5.	D	6.	B	7.	B
8.	D	9.	D	10.	A	11.	A	12.	C	13.	D	14.	D
15.	A	16.	D	17.	C	18.	D	19.	C	20.	C	21.	B
22.	C	23.	B	24.	C	25.	B	26.	C	27.	B	28.	C
29.	B	30.	B	31.	B	32.	B	33.	B	34.	B	35.	A
36.	C	37.	C	38.	B	39.	C	40.	A	41.	B	42.	A
43.	B	44.	B	45.	C	46.	D	47.	B	48.	B	49.	B
50.	D	51.	C	52.	C	53.	C	54.	C	55.	C	56.	C
57.	A	58.	C	59.	D	60.	A	61.	C	62.	C	63.	D
64.	A	65.	D	66.	C	67.	C	68.	C	69.	C	70.	A
71.	A	72.	A	73.	C	74.	D	75.	D	76.	C	77.	D
78.	D	79.	B	80.	A	81.	B	82.	C				

STAGE-II

1.	C	2.	C	3.	D	4.	B

DPP_11

1.	D	2.	A	3.	B	4.	B	5.	A	6.	C	7.	C
8.	B	9.	B	10.	B	11.	D	12.	C	13.	C	14.	D

EXERCISE – I

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	B	C	A	A	C	B	D	C	A	B	A	B	C	A	B
Que.	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Ans.	B	B	D	C	A	B	A	C	C	A					

EXERCISE – II

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	B	B	C	C	A	D	A	C	D	A	A	A	B	C	D
Que.	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
Ans.	D	C	A	C	B	A	B	B	B	A					

EXERCISE – III

VERY SHORT ANSWER TYPE

1. (i) Yes, (ii) No, (iii) Yes, (iv) No **2.** (i) – 2, (ii) π, (iii) 0

3. (i) $9x^3 + 8x^2 + x - 7$, (ii) $-3x^3 - 5x^2 + 4x + 6$ **4.** (i) $x = -\frac{\pi}{3}$, (ii) $y = -\frac{m}{l}$ **5.** (i) R = 26, (ii) R = – 2

6. $\frac{-153}{65}$ **7.** Length = 4a – 3, breadth = 4a – 5 **8.** (i) $z^2 + 6xy - 4yz - 4zx$, (ii) $-4x(x^2 + 1)$

10. 1

SHORT ANSWER TYPE

1. 32 sq. units **2.** (i) $(x^2 + x + 1)(x^2 - x + 1)$, (ii) $x^4(1 - y)(1 + y)(1 + y^2)$, (iii) $\frac{1}{35}(7x + 1)(5x + 1)$

(iv) $\left(\sqrt{2}x + 2\sqrt{2}y + z\right)\left(2x^2 + 8y^2 + z^2 - 4xy - 2\sqrt{2}yz - \sqrt{2}xz\right)$

3. (i) $(x + y)(x^2 + y^2 - xy + 2x - 2y)$, (ii) $(x^2 + 2x + 2)(x^2 - 2x + 2)$, (iii) $2y(3x^2 + y^2)$

(iv) $\left(1 - \frac{1}{x} + 1\right)\left(x - \frac{1}{x} - 1\right)$, (v) $\left(a - \sqrt{5}b\right)\left(a^2 + \sqrt{5}ab + 5b^2\right)$

4. 19440 **5.** 0

LONG ANSWER TYPE

1. (i) R = – 34, R ≠ 0 g(x) is not factor of P,(x) (ii) R = 60t – 72 **2.** p = – 2, q = 9

3. m = 9, n = 3 **4.** $Q = 2x^4 + 2x^3 + 2x^2 + 5x + 2$, R = 0 **5.** $(a - a^{-1})$

NUMERICAL PROBLEMS

1. 0 **2.** 1 **3.** 1 **4.** 27 **5.** 1

EXERCISE – IV

VERY SHORT ANSWER TYPE

1. k = 19 **3.** $\left(\frac{5}{2}, 0\right)$ **4.** – 2 **5.** (i) $-\frac{b\sqrt{b^2-4ac}}{a^2}$, (ii) $\frac{-b^3+3abc}{a^3}$

6. $\frac{-1}{3}$ **8.** a = 2, b = 0 **9.** x – 2 **10.** 2x – 3

SHORT ANSWER TYPE

1. $a \to 4, 2$ $b \to 3, -1, -\frac{1}{3}$ **2.** –2 **3.** –3 **4.** $-x^2 + x - 1$ **5.** a = –8, b =12

LONG ANSWER TYPE

1. – 3, 1 **2.** $-\frac{1}{2}$, 3, -2, -1 **3.** $x^2 - 4mnx - (m^2 - n^2)^2$ **4.** $3x^2 - 16x + 16$

5. (i) Linear polynomial, one **(ii)** Quadratic polynomial, zero **(iii)** Quadratic polynomial, one

(iv) Quadratic polynomial, two **(v)** Linear polynomial, zero **(vi)** Quadratic polynomial, one

(vii) Quadratic polynomial, zero **(viii)** Cubic polynomial, one **(xi)** Quadratic polynomial, one

(x) Linear, one

NUMERICAL PROBLEMS

1. 54 **2.** 1 **3.** 81 **4.** 3 **5.** 19

SELF PROGRESS ASSESSMENT FRAMEWORK

(CHAPTER : POLYNOMIALS)

CONTENT	STATUS	DATE OF COMPLETION	SELF SIGNATURE
Theory			
DPP - 1			
DPP - 2			
DPP - 3			
DPP - 4			
DPP - 5			
DPP - 6			
DPP - 7			
DPP - 8			
DPP - 9			
DPP - 10			
DPP - 11			
Exercise - I			
Exercise - II			
Exercise - III			
Exercise - IV			
Revision - 1			
Revision - 2			
Remark			

NOTES :

1. In the status, put "completed" only when you have thoroughly worked through this particular section.

2. Always remember to put down the date of completion correctly. It will help you in future at the time of revision.

Space for Notes :

Space for Notes :