QUESTION BANK

EXERCISE - 1

Q.1 Define the terms : (i) polynomial (ii) degree of polynomial
(iii) coefficients of a polynomial (iv) polynomial in standard form.

Q.2 Write the following polynomials in standard form :

(i) $x^6 - 3x^4 + \sqrt{2}x + 5x^2 + 7x^5 + 4$ (ii) $m^7 + 8m^5 + 4m^6 + 6m - 3m^2 - 11$

Q.3 Find the value of polynomial $2x^2 + 7x - 4$ at $x = 1/2$.

Q.4 Evaluate each of the following using suitable identities : (i) $(104)^3$ (ii) $(999)^3$

Q.5 Verify : (i) $x^3 + y^3 = (x + y)(x^2 - xy + y^2)$ (ii) $x^3 - y^3 = (x - y)(x^2 + xy + y^2)$

Q.6 If $x + y + z = 0$ show that $x^3 + y^3 + z^3 = 3xyz$

Q.7 Evaluate the following products without multiplying directly : (i) 103×107 (ii) 104×96

Q.8 Factorize : $49a^2 + 70ab + 25b^2$

Q.9 Factorize : $2x(a - b) + 3y(5a - 5b) + 4z(2b - 2a)$

Q.10 Factorize : $25x^2 + 60xy + 36y^2$

Q.11 Factorize : $x^5 - x$

Q.12 Factorize : $xy - 3z + xz - 3y$

Q.13 Factorize : $axb + axc + 3aby + 3acy - 5b - 5c$

Q.14 Factorize : $x^2 - \left(a + \frac{1}{a}\right)x + 1$

Q.15 Factorize : $6a^2b^2x - 48abx + 96x$

Q.16 Factorize : $\frac{a^2}{4b^2} - \frac{1}{3} + \frac{b^2}{9a^2}$, $a \neq 0, b \neq 0$

Q.17 Factorize : $4x^2 - 4\sqrt{3}x + 3$

Q.18 Factorize : $3.7 \times 3.7 + 3.7 \times 2.6 + 1.3 \times 1.3$

Q.19 Find the value of 49^2

Q.20 Factorize : $(a - 2b)^3 - a + 2b$

Q.21 Factorize : $x^2 - y^2 - 4xz + 4z^2$

Q.22 Factorize : $\frac{0.564 \times 0.564 - 0.436 \times 0.436}{0.564 - 0.436}$

Q.23 Factorize : $9x^3y + 11x^2y^2 + 20xy^3$

Q.24 Factorize : $\frac{a}{b}x^2 + \left(\frac{a}{b} + \frac{c}{d}\right)x + \frac{c}{d}$; $\begin{cases} b \neq 0 \\ d = 0 \end{cases}$

Q.25 Factorize : $12(a+1)^2 - 25(a+1)(b+2) + 12(b+2)^2$

EXERCISE - 2

Q.1 Find the value of $2(x + 3)^2 + 9(x + 3) + 9$

Q.2 Find the value of $a^3 + b^3 + c^3 - 3abc$, given that $a + b + c = 10$ and $a^2 + b^2 + c^2 = 83$.

Q.3 Find a if the polynomials $2x^3 + ax^2 + 3x - 5$ and $x^3 + x^2 - 4x + a$ leave the same remainder when divided by $x - 2$.

Q.4 Factorize : $x^4 + x^3 - 7x^2 - x + 6$

Q.5 Given $f(x) = x^3 + 5x^2 + 2x - 8$. Find (i) $f(1)$ (ii) $f(-2)$ (iii) $f(-4)$. Hence find all the factors of $f(x)$.

Q.6 If $2S = a + b + c$, Prove that $(S - a)^3 + (S - b)^3 + (S - c)^3 + 3abc = S^3$

Q.7 If a polynomial $x^4 + x^3 - 3x^2 + ax - b$ is divided by $x + a$ and $2x - a$ successively, then the remainder is 9 in each case. Show that a and b are given by the equation $5a^2 - 6a = 20$ and $b = a^4 - a^3 - 4a^2 - 9$.

Q.8 If $x^2 - 1$ and $x^2 - 4$ are factors of $ax^6 + bx^5 + cx^4 + dx^3 + ex^2 + fx + g$ prove that $21a + 5c + e = 0$ and $a + c + e + g = 0$

EXERCISE - 3

Fill in the blanks –

Q.1 A polynomial of one term is called a .....

Q.2 A polynomial of three terms is called a .....

Q.3 A polynomial of degree one is called a ..... polynomial

Q.4 A polynomial of degree three is called a ..... polynomial.

Q.5 If p (x) is any polynomial degree greater than or equal to 1 and p(x) is divided by the linear polynomial x – a, then the remainder is .....

Q.6 x – a is a factor of the polynomial p (x), if p(a) = ...

True-False Statement :

Q.7 $5x^3 - 4x^2 + 2x + 3$ is a polynomial over integers. **Q.8** $3x^2 - 5x + 6$ is a polynomial of degree 2.

Q.9 $7x^3 - 3x^2 + \sqrt{2}x + 5$ is a polynomial **Q.10** $2y^2 - \sqrt{2}y + 1 - 6y^3$ is a polynomial.

Q.11 When $x^3 - 6x^2 + 9x + 7$ is divided by (x – 1) remainder is 11.

Q.12 $\sqrt{3}x^2 + 11x + 6\sqrt{3} = (x + 3\sqrt{3})(\sqrt{3}x + 2)$

EXERCISE - 4

Q.1 Factors of $(42 - x - x^2)$ are –

(A) (x – 7) (x – 6) (B) (x + 7) (x – 6) (C) (x + 7) (6 – x) (D) (x + 7) (x + 6)

Q.2 In method of factorization of an algebraic expression. Which of the following statement is false ?

(A) Taking out a common factor form two or more terms

(B) Taking out a common factor form a group of terms.

(C) By using remainder theorem (D) By using standard indentities

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

(A) 57/8 (B) –57/8 (C) 55/8 (D) –55/8

Q.4 Factors of polynomial $x^3 - 3x^2 - 10x + 24$ are –

(A) (x – 2) (x + 3) (x – 4) (B) (x + 2) (x + 3) (x + 4)

(C) (x + 2) (x – 3) (x – 4) (D) (x – 2) (x – 3) (x – 4)

Q.5 The values of a and b so that the polynomial $x^3 - ax^2 - 13x + b$ is divisible by (x – 1) and (x – 3) are

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

Q.6 Factors of $a^2 - b + ab - a$ are –

(A) (a – b) (a + 1) (B) (a + b) (a – 1) (C) (a – b) (a – 1) (D) (a + b) (a + 1)

Q.7 Expansion of $\left(x + \frac{1}{x}\right)^2$ is –

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

Q.8 If $x^2 - x - 42 = (x + k)(x + 6)$ then the value of k is –

(A) 6 (B) – 6 (C) 7 (D) – 7

Q.9 If $\left(x - \frac{1}{x}\right)^2 = x^2 + x + \frac{1}{x^2}$ the value of x is –

(A) –2 (B) 2 (C) 2x (D) –2x

Q.10 If one factor of $5 + 8x - 4x^2$ is (2x + 1) then the second factor is –

(A) (5 + 2x) (B) (2x – 5) (C) (5 – 2x) (D) – (5 + 2x)

Q.11 Expansion of $(a - b)^2$ is –

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

Q.12 Factors of $x^2 - 7x + 12$ are –

(A) (x – 3) (x + 4) (B) (x – 3) (x – 4) (C) (x + 3) (x – 4) (D) (x + 3) (x + 4)

Q.13 Value of $3.5 \times 3.5 - 2 \times 2.5 \times 2.5$ is –

(A) – 6 (B) 6 (C) 60 (D) 1

Q.14 If x = 2, y = – 1 then the value of $x^2 + 4xy + 4y^2$ is –

(A) 0 (B) 1 (C) –1 (D) 2

Q.15 If one factor of a (x + y + z) + bx + by + bz is (x + y + z) then the second factor is –

(A) ax + ay + az (B) bx + by + bz (C) bx + by – bz (D) a + b

Q.16 Factorise : $36+11\left(z-\frac{y}{3}+x\right)-12\left(z-\frac{y}{3}+x\right)^2+\left(4z-\frac{4}{3}y+4x-9\right)(5+3z-y+2x)$

(A) $(1-x)\left(4z-\frac{4y}{3}+4x-9\right)$ (B) $(1+x)\left(4z-\frac{4y}{3}+4x-9\right)$

(C) $(1-x)\left(4z+\frac{4y}{3}+4x-9\right)$ (D) $(1+x)\left(4z+\frac{4y}{3}+4x+9\right)$

Q.17 The polynomials $ax^2 + 3x^2 - 3$ and $2x^3 - 5x + a$ when divided by (x – 4) leaves remainders R_1 and R_2 respectively then value of a if $2R_1 - R_2 = 0$

(A) –18/127 (B) 18/127 (C) 17/127 (D) –17/127

Q.18 The value of n for which the expressions $9x^4 - 12x^3 - nx^2 - 8x + 4$ becomes a perfect square is –

(A) 12 (B) 16 (C) 18 (D) 24

Q.19 If $2x^2 + xy - 3y^2 + x + ay - 10 = (2x + 3y + b)(x - y - 2)$, then the values of a and b are –

(A) 11 and 5 (B) 1 and –5 (C) – 1 and – 5 (D) –11 and 5

Q.20 The expression $x^2 + px + q$ with p and q greater than zero has its minimum value when –

(A) x = – p (B) x = p (C) x = p/2 (D) x = – p/2

EXERCISE - 5

Match the column–

Each question contains statements given in two columns which have to be matched. Statements (A, B, C, D) in **column I** have to be matched with statements (p, q, r, s) in **column II**.

Q.1 Column II gives the degree of polynomials given in column I match them correctly –

Column I	**Column II**
(A) $2 - y^2 - y^3 + 2y^8$	(p) 2
(B) 2	(q) 1
(C) $5x - \sqrt{7}$	(r) 0
(D) $4 - x^2$	(s) 8

Q.2 Column II gives remainder when $x^2 + 3x^2 + 3x + 1$ is divided by expression g given in column I, match them correctly.

Column I	**Column II**
(A) x + 1	(p) 27/8
(B) x	(q) –27/8
(C) x – 1/2	(r) 1
(D) 5 + 2x	(s) 0

Q.3 Column II gives value of k for polynomials given in column I when it is divided x – 1 match them correctly.

Column I	**Column II**
(A) $kx^2 - 3x + k$	(p) – 2
(B) $x^2 + x + k$	(q) 3/2
(C) $2x^2 + kx + \sqrt{2}$	(r) $\sqrt{2} - 1$
(D) $kx^2 - \sqrt{2}x + 1$	(s) $-(2+\sqrt{2})$

Q.4 Column II gives factors for expression given in column I match them correctly.

Column I	**Column II**
(A) $9x^2 + 6xy + y^2$	(p) $(2x + 3y - 4z)(2x+3y-4z)$
(B) $4x^2 + 9y^2 + 16z^2 + 12xy - 24yz - 16xz$	(q) $\left(x + \frac{y}{10}\right)\left(x - \frac{y}{10}\right)$
(C) $27x^3 + y^3 + z^3 - 9xyz$	(r) $(3x + y + z)(9x^2 + y^2 + z^2 - 3xy - yz - 3zx)$
(D) $x^2 - \frac{y^2}{1000}$	(s) $(3x + y)(3x + y)$

EXERCISE - 6

PREVIOUS YEAR COMPETITION PROBLEMS

Q.1 $\frac{x+1}{(x-1)(x-2)(x-3)} =$

(A) $\frac{1}{x-1} + \frac{3}{x-2} + \frac{1}{x-3}$ (B) $-\frac{3}{x-1} + \frac{1}{x-2} + \frac{2}{x-3}$ (C) $\frac{1}{x-1} - \frac{3}{x-2} + \frac{2}{x-3}$ (D) None of these

Q.2 $\frac{1}{x(x^2+1)} = \frac{A}{x} + \frac{Bx+C}{(x^2+1)}$, then (A, B, C) =

(A) (1, –1, 0) (B) (–1, 0, –1) (C) (0, 1, 1) (D) None of these

Q.3 The partial fraction of $\frac{x^2}{(x-1)^3(x-2)}$ are –

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

(C) $\frac{-1}{(x-1)^3} + \frac{-3}{(x-1)^2} + \frac{-4}{(x-1)} + \frac{4}{(x-2)}$ (D) None of these

Q.4 How many roots the equation $x - \frac{2}{x-1} = 1 - \frac{2}{x-1}$ have –

(A) One (B) Two (C) Infinite (D) None