Exercise 2.1

Question 1:

Which of the following expressions are polynomials in one variable and which are not? State reasons for your answer.

(i) $4x^2 - 3x + 7$ **(ii)** $y^2 + \sqrt{2}$ **(iii)** $3\sqrt{t} + t\sqrt{2}$

(iv) $y + \frac{2}{y}$ **(v)** $x^{10} + y^3 + t^{50}$

Answer 1:

(i) $4x^2 - 3x + 7$ Polynomials in one variable as it contains only one variable x.

(ii) $y^2 + \sqrt{2}$ Polynomials in one variable as it contains only one variable y.

(iii) $3\sqrt{t} + t\sqrt{2} = 3t^{\frac{1}{2}} + t\sqrt{2}$, It is in one variable but not a polynomial as it contains $(t^{\frac{1}{2}})$, in which power is not a whole number.

(iv) $y + \frac{2}{y} = y + 2y^{-1}$, It is in one variable but not a polynomial as it contains (y^{-1}), in which power is not a whole number.

(v) $x^{10} + y^3 + t^{50}$, It is a polynomials in three variable as it contains three variable $(x,\ y,\ t)$.

Question 2:

Write the coefficients of x^2 in each of the following:

(i) $2 + x^2 + x$ (ii) $2 - x^2 + x^3$ (iii) $\frac{\pi}{2}x^2 + x$ (iv) $\sqrt{2}x - 1$

Answer 2:

(i) In $2 + x^2 + x$ में x^2 is 1.

(ii) In $2 - x^2 + x^3$ the coefficients of x^2 is -1.

(iii) In $\frac{\pi}{2}x^2 + x$ the coefficients of x^2 is $\frac{\pi}{2}$.

(iv) In $\sqrt{2}x - 1 = 0.x^2 + \sqrt{2}x - 1$ the coefficients of x^2 is 0.

Question 3:

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

Answer 3:

A binomial of degree 35 = $x^{35} + 3$

A monomial of degree 100 = $3x^{100}$

Question 4:

Write the degree of each of the following polynomials:

(i) $5x^3 + 4x^2 + 7x$ **(ii)** $4-y^2$ **(iii)** $5t - \sqrt{7}$ **(iv)** 3

Answer 4:

(i) The degree of $5x^3 + 4x^2 + 7x$ is 3.

(ii) The degree of $4-y^2$ is 2.

(iii) The degree of $5t - \sqrt{7} = 5t^1 - \sqrt{7}$ is 1.

(iv) The degree of $3 = 3x^0$ is 0.

Q.5 Classify the following as linear, quadratic and cubic polynomials:-

(i) x^2+x
Quadratic Polyno

(ii) $x-x^3$
Cubic

(iii) $y+y^2+4$
Quadratic

(iv) $1+x$
Linear

(v) $3t$
~~Quadratic~~
Linear

(vi) r^2
Quadratic

(vii) $7x^3$
Cubic

Exercise - 2.2

Q.1 Find the value of polynomial $5x-4x^2+3$ at.

(i) $x=0$
$5x-4x^2+3$
$5(0)-4(0)^2+3$
$=0-0+3$
$=3$

(ii) $x=-1$
$5x-4x^2+3$
$=5(-1)-4(-1)^2+3$
$=-5-4+3$
$=-9+3$
$=-6$

(iii) $x=2$
$5x-4x^2+3$
$=5(2)-4(2)^2+3$
$=10-4(4)+3$
$=13-16$
$=-3$

(iv)

Q.2 Find $p(0)$, $p(1)$ and $p(2)$ for each of the following polynomial:

(i) $p(y) = y^2 - y + 1$

Ans $p(0) = 0^2 - 0 + 1$

$= 0 - 0 + 1$

$= 1$ Ans

$p(1) = 1^2 - 1 + 1$

$= 1 - 1 + 1$

$= 1$ Ans

$p(2) = 2^2 - 2 + 1$

$= 4 - 2 + 1$

$= 2 + 1$

$= 3$ Ans

(ii) $p(t) = 2 + t + 2t^2 - t^3$

Ans $p(0) = 2 + 0 + 2(0)^2 - 0^3$

$2 =$ Ans

$p(1) = 2 + 1 + 2(1)^2 + (1)^3$

$= 3 + 2 - 1$

$= 5 - 1 = 4$

$p(2) = 2 + 2 + 2(2)^2 - (2)^3$

$= 4 + 8 - 8$

$= 4$ Ans

(iii) $p(x) = x^3$

Ans $p(0) = 0^3 = 0$

$p(1) = 1^3 = 1$

$p(2) = 2^3 = 2 \times 2 \times 2 = 8$.

(iv) $p(x) = (x-1)(x+1)$

$p(0) = (0-1)(0+1)$

$= -1 \times 1$

$= -1$ Ans

$p(1) = (1-1)(1+2)$

$= 0 \times 2$

$= 0$ Ans

$p(2) = (2-1)(2+1)$

$= 1 \times 3$

$= 3$ Ans

Q.3 Verify whether the following are zeros of the polynomial, indicate against them

(i) $p(x) = 3x + 1$, $x = -\frac{1}{3}$

Ans $p\left(-\frac{1}{3}\right) = 3\left(-\frac{1}{3}\right) + 1$

$= -1 + 1 = 0$

Yes

(ii) $p(x) = 5x - \pi$ $x = \frac{4}{5}$

Ans $p\left(\frac{4}{5}\right) = 5\left(\frac{4}{5}\right) - \pi$

$= 4 - \pi \neq 0$ Not

(iii) $p(x) = x^2 - 1$, $x = 1, -1$

Ans $p(1) = 1^2 - 1$

$= 1 - 1$

$= 0$ Ans Yes

(iv) $p(x)(x+1)(x-2)$ $(x = -1, 2$

$p(x) = (-1+1)(-1-2)$

$= 0(-3) = 0$ Ans

$p(2) = (2+1)(2-2)$

$= 3 \times 0$
$= 3$ No

(v) $p(x) = x^2$ $x = 0$
Ans $p(0) = 0^2$
$= 0$ Ans
Yes

(vi) $p(x) = lx + m$ $x = \frac{-m}{l}$
Ans $p\left(\frac{-m}{l}\right) = \cancel{l}\left(\frac{-m}{\cancel{l}}\right) + m$
$= -m + m$
$= 0 =$ Yes = Ans

(vii) $p(x) = 3x^2 -1$ $x = \frac{-1}{\sqrt{3}}, \frac{2}{\sqrt{3}}$
Ans $p\left(\frac{-1}{\sqrt{3}}\right) = 3\left(\frac{-1}{\sqrt{3}}\right)^2 - 1$
$= \cancel{3} \times \frac{1}{\cancel{3}} = \cancel{3} \times \frac{1}{\cancel{3}} = 1$
$= 1 - 1$
$= 0$ Yes
$p\left(\frac{2}{\sqrt{3}}\right) = 3\left(\frac{2}{\sqrt{3}}\right)^2 - 1$
$= \cancel{3} \times \frac{4}{\cancel{3}} - 1$
$= 4 - 1 \neq 3 \neq$ No.

$\frac{-1}{\sqrt{3}}$ = Yes

$\frac{2}{\sqrt{3}}$ = No

(viii) $p(x) = 2x + 1$ $x = \frac{1}{2}$
Ans $p\left(\frac{1}{2}\right) = 2\left(\frac{1}{2}\right) + 1$
$= 2 \neq 0$
No

Q.4 Find the zero of the polynomial in each of the following cases

(i) $p(x) = x + 5$
$= x + 5 = 0$
$= x = -5$ = Ans

(ii) $p(x) = x - 5$
$x - 5 = 0$
$x = 5$ Ans

(iii) $p(x) = 2x + 5$
$2x + 5 = 0$
$2x = -5$
$x = \frac{-5}{2}$

(iv) $p(x) = 3x - 2$
Ans $3x - 2 = 0$
$x = \frac{2}{3}$ Ans

(v) $p(x) = 3x$
$3x = 0$
$x = \frac{0}{3} = 0$ Ans

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

$ax = 0$

$x = \frac{0}{a} = 0.$

(vii) $p(x) = cx + d, c \neq 0$, c and d are real

$ax = 0$

$x = \frac{0}{a} = 0$ Ans

(vii) $p(x) = cx + d, c \neq 0$, c and d are real

$cx + d = 0$

$= cx = -d$

$x = \frac{-d}{c}$ Ans.

Exercise 2.3

Q.1. Find the remainder when $x^3 + 3x^2 + 3x + 1$ is divisible by.

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

(iv) $x + \pi$ (v) $5 + 2x$

Ans(i) $x + 1$

$x = -1$

$= x^2 + 3x^2 + 3x + 1$

$= (-1)^2 + 3(-1)^2 + 3(-1) + 1$

$= \cancel{1} + \cancel{3} - \cancel{3} + \cancel{1}$

$= 0$ Ans.

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

$x = \frac{1}{2}$

$\Rightarrow x^3 + 3x^2 + 3x + 1$

$= \left(\frac{1}{2}\right)^3 + 3\left(\frac{1}{2}\right)^2 + 3\left(\frac{1}{2}\right) + 1$

$= \frac{1}{8} + 3\left(\frac{1}{4}\right) + \frac{3}{2} + 1$

$= \frac{1}{8} + \frac{3}{4} + \frac{3}{2} + \frac{1}{1}$

$\frac{1 + 6 + 12 + 8}{8} \Rightarrow \frac{27}{8}$ Ans.

Ans(iii) x

$x = 0$

$\Rightarrow x^3 + 3x^2 + 3x + 1$

$\Rightarrow 0^3 + 3(0)^2 + 3(0) + 1$

$\Rightarrow 0 + 0 + 0 + 1$

$\Rightarrow 1$ Ans.

Ans(iv) $x + \pi$

$x = -\pi$

$\Rightarrow x^3 + 3x^2 + 3x + 1$

$\Rightarrow (-\pi)^3 + 3(-\pi)^2 + 3(-\pi) + 1$

$\Rightarrow -\pi^3 + 3\pi^2 - 3\pi + 1$ Ans.

Ans(v) $5 + 2x$

$2x = 5$

$x = \frac{5}{2}$

$= x^3 + 3x^2 + 3x + 1$

$= (\frac{-5}{2})^3 + 3(\frac{-5}{2})^2 + 3(\frac{-5}{2}) + 1$

$= \frac{-125}{8} + 3(\frac{-25}{4}) + (\frac{-15}{2}) + 1$

$\Rightarrow \frac{-125}{8} + \frac{75}{4} - \frac{15}{2} + \frac{1}{1}$

$\frac{-125 + 150 - 60 + 8}{8} \Rightarrow \frac{-27}{8}$ Ans.

2. Find the remainder when $x^3 - ax^2 + 6x - a$ is divided by $x - a$.

By Remainder Theorm $x - a$
$x = a$

$= x^3 - ax^2 + 6x - a$

$= (a)^3 - a(a)^2 + 6(a) - a$

$= \cancel{a^3} - \cancel{a^3} + 6a - a$

$= 5a$ Ans

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

By Remainder Theorm.

$7 + 3x$

$3x \Rightarrow -7$

$x \Rightarrow \frac{-7}{3}$

$P(x) = 3x^3 + 7x$

$P(\frac{-7}{3}) = 3(\frac{-7}{3})^3 + 7(\frac{-7}{3})$

$\Rightarrow \cancel{3}(\frac{-343}{\cancel{3} \times 3 \times 3}) + (\frac{-49}{3})$

$\Rightarrow \frac{-343}{9} - \frac{49}{3}$

$\Rightarrow \frac{-343 - 147}{9}$

$\Rightarrow \frac{-490}{9}$

No, $7 + 3x$ is not a factor of $3x^3 + 7x$

Exercise 2.4

Q.1. Determine which of the following polynomials has $(x+1)$ a factor.

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

$x + 1 = 0$

$x = -1$

$P(x) = x^3 + x^2 + x + 1$

$P(-1) = (-1)^3 + (-1)^2 + (-1) + 1$

$\Rightarrow \cancel{-1} + \cancel{1} \cancel{-1} + \cancel{1}$

$\Rightarrow 0$ Ans. (Yes).

(ii) $x^4 + x^3 + x^2 + x + 1$.

$x + 1 = 0$

$x = -1$

$P(x) = (-1)^4 + (-1)^3 + (-1)^2 + (-1) + 1$

$\Rightarrow (-1 \times -1 \times -1 \times -1) + (-1 \times -1 \times -1) + (-1$

$\Rightarrow 1 - 1 + 1 - 1 + 1$

$\Rightarrow 3 - 2$

$\Rightarrow 1$ Ans. (No).

(iii) $x^4 + 3x^3 + 3x^2 + x + 1$

$P(x) = (-1)^4 + 3(-1)^3 + 3(-1)^2 + (-1) + 1$

$\Rightarrow 1 + (-3) + 3 - 1 + 1$

$\Rightarrow 1 - \cancel{3} + \cancel{3} - \cancel{1} + 1$

$\Rightarrow 1$ Ans (No)

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

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

$P(-1) = (-1)^3 - (-1)^2 - (2+\sqrt{2}) - 1 + \sqrt{2}$

$\Rightarrow -1 - 1 - (-2 - \sqrt{2}) + \sqrt{2}$

$\Rightarrow -\cancel{2} + \cancel{2} + \sqrt{2} + \sqrt{2}$

$\Rightarrow 0 + 2\sqrt{2}$

$\Rightarrow 2\sqrt{2}$ Ans (No)

Q.2 Use the factor Theorm to determine whether $g(x)$ is a factor of $P(x)$ in each of the following cases:-

(i) $P(x) = 2x^3 + x^2 - 2x - 1$, $g(x) = x + 1$

$g(x) = x + 1 = 0$

$\Rightarrow x = 1$

$P(-1) = 2(-1)^3 + (-1)^2 - 2(-1) - 1$

$\Rightarrow -\cancel{2} + \cancel{1} + \cancel{2} - \cancel{1}$

$\Rightarrow 0$ (Yes)

(ii) $P(x) = x^3 + 3x^2 + 3x + 1$, $g(x) = x + 2$

$g(x) = x + 2 = 0$

$\Rightarrow x = -2$

$P(-2) \Rightarrow (-2)^3 + 3(-2)^2 + 3(-2) + 1$

$\Rightarrow -8 + 12 - 6 + 1$

$\Rightarrow 13 - 14$

$\Rightarrow -1$ (No

(iii) $p(x) = x^3 - 4x^2 + x + 6$, $g(x) = x - 3$

$x - 3 = 0$

$x = 3$

$P(3) = (3)^3 - 4(3)^2 + (3) + 6$

$\Rightarrow 27 - 36 + 3 + 6$

$\Rightarrow 36 - 36$

$\Rightarrow 0$ (Yes)

Q.3 Find the value of k, if $x - 1$ is a factor of $P(x)$ in each of the following cases:-

$x - 1 = 0$, $x = 1$ (By Remainder Theorm

(i) $P(x) = x^2 + x + K$

$P(1) = (1)^2 + 1 + K$

$\Rightarrow 1 + 1 + K$

$\Rightarrow 2 + K$

$K = -2$ Ans

(ii) $P(x) = 2x^2 + Kx + \sqrt{2}$

$P(1) = 2(1)^2 + K(1) + \sqrt{2}$

$= 2 + K + \sqrt{2}$

$K = -2 - \sqrt{2}$

$K = -(2+\sqrt{2})$ Ans

(iii) $P(x) = Kx^2 - \sqrt{2}x + 1$

$P(1) \Rightarrow K(1)^2 - \sqrt{2}(1) + 1$

$\Rightarrow K - \sqrt{2} + 1$

$\Rightarrow K = \sqrt{2} - 1$ Ans

(iv) $P(x) = Kx^2 - 3x + K$

$p(1) = k(1)^2 - 3(1) + k$

$\Rightarrow k - 3 + k$

$\Rightarrow 2k - 3$

$\Rightarrow 2k = 3$

$k = \frac{3}{2}$ Ans.

Q.4 Factorise:-

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

$12x^2 - 3x - 4x + 1$

$3x(4x-1)(3x-1)$ Ans.

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

$2x^2 + 6x + 1x + 3$

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

$(x+3)(2x+1)$ Ans.

(iii) $6x^2 + 5x - 6$

$6x^2 + 9x - 4x - 6$

$3x(2x+3) - 2(2x+3)$

$(2x+3)(3x-2)$ Ans.

(iv) $3x^2 - x - 4$

$3x^2 + 3x - 4x - 4$

$3x(x+1) - 4(x+1)$

$(x+1)(3x-4)$ Ans.

Q.5 Factorize:

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

Factor of $2 \Rightarrow 1, 2$

By trial method

$(x-1)$

By remainder Theorm.

$x+1 = 0, x = -1$

$x^3 - 2x^2 - x + 2$

$(-1)^3 - 2(-1)^2 - (-1) + 2$

$\cancel{-1} - \cancel{2} + \cancel{1} + \cancel{2}$

0

$$
\begin{array}{r|l}
x+1 & x^3 - 2x^2 - x + 2 \quad (x^2 - 3x + 2 \\
 & \underline{-\cancel{x^3} + \cancel{x^2}} \\
 & -3\cancel{x^2} - x + 2 \\
 & \underline{-\cancel{3x^2} - 3x} \\
 & + \quad\quad + \\
 & +2\cancel{x} + \cancel{2} \\
 & \underline{+\cancel{2x} + \cancel{2}} \\
 & - \quad - \\
 & 0
\end{array}
$$

$\Rightarrow (x+1)(x-1)$ Ans.

$x^2 - 3x + 2$

$x^2 - 1x - 2x + 2$

$x(x-1) - 2(x-1)$

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

$x^3 - 3x^2 - 9x - 5$ Factor of 5 = 15

By trial Method
$(x+1)$
By remainder Theorm
$x+1 = 0$
$x = -1$
$x^3 - 3x^2 - 9x - 5$
$(-1)^3 - 3(-1)^2 - 9(-1) - 5$
$-1 - 3 + 9 - 5$
$+\cancel{9} - \cancel{9}$
0

$$
\begin{array}{r|l}
x+1 & x^3 - 3x^2 - 9x - 5 \quad x^2 - 4x - 5 \\
 & x^3 + x^2 \\
 & - \quad - \\ \hline
 & -4x^2 - 9x - 5 \\
 & -4x^2 - 4x \\
 & + \quad + \\ \hline
 & -5x - 5 \\
 & -5x - 5 \\
 & + \quad + \\ \hline
 & 0
\end{array}
$$

$x^2 - 4x - 5$
$x^2 + 1x - 5x - 5$
$x(x+1) - 5(x+1)$
$(x+1)(x-5)$
$(x+1)(x+1)(x-5)$
Ans.

(iii) $x^3 + 13x^2 + 32x + 20$
Factor of 20 = 1, 2, 3, 5

By trial Method
$(x+1)$
By remainder Theorm.

$x+1 \Rightarrow 0, x = -1$
$P(x) \Rightarrow x^3 + 13x^2 + 32x + 20$
$\Rightarrow (-1)^3 + 13(-1)^2 + 32(-1) + 20$
$\Rightarrow -1 + 13 - 32 + 20$
$\Rightarrow -3\cancel{3} + 3\cancel{3}$
$\Rightarrow 0$

$$
\begin{array}{r|l}
x+1 & x^3 + 13x^2 + 32x + 20 \quad x^2 + 12x + 20 \\
 & x^3 + x^2 \\
 & - \quad - \\ \hline
 & 12x^2 + 32x + 20 \\
 & 12x^2 + 12x \\
 & - \quad - \\ \hline
 & 20x + 20 \\
 & 20x + 20 \\
 & - \quad - \\ \hline
 & 0
\end{array}
$$

$x^2 + 12x + 20$
$x^2 + 2x + 10x + 20$
$x(x+2) + 10(x+2)$
$(x+2)(x+10)$

$(x+1)(x+2)(x+10)$
Ans

(ii) $2y^3 + y^2 - 2y - 1$

$P(y) = 2y^3 + y^2 - 2y - 1$

By Trial Method

$(y+1)$

$y = (-1)$

$P(-1) = 2(-1)^3 + (-1)^2 - 2(-1) - 1$

$= -\cancel{2} + \cancel{1} + \cancel{2} - 1$

$= 0$

$$
\begin{array}{l}
y+1 \overline{)\, 2y^3 + y^2 - 2y - 1\,(} \; 2y^2 - y - 1 \\
\quad\;\; \underline{2y^3 + 2y^2} \\
\quad\quad\;\; 0 - y^2 - 2y - 1 \\
\quad\quad\quad\; \underline{-y^2 - y} \\
\quad\quad\quad\quad\; 0 - y - 1 \\
\quad\quad\quad\quad\quad\; \underline{-y - 1} \\
\quad\quad\quad\quad\quad\quad 0 \; 0
\end{array}
$$

$2y^2 - y - 1$

$2y^2 + y - 2y - 1$

$y(2y+1) - 1(2y+1)$

$(y-1)(2y+1)$

$(y+1)(2y+1)(y+1)$

Ans.

Exercise 2.5

Q1. Use suitable identities to find the following products :-

(i) $(x+4)(x+10) \Rightarrow$

$(x+a)(x+b) \Rightarrow x^2 + (a+b)x + ab$

$(x+4)(x+10) \Rightarrow x^2 + (4+10)x + 4 \times 10$

$\Rightarrow x^2 + 14x + 40$ Ans.

(ii) $(x+8)(x-10)$

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

$(x+8)(x-10) \Rightarrow x^2 + (8+(-10))x + 8 \times -10$

$\Rightarrow x^2 - 2x - 80$ Ans.

(iii) $(3x+4)(3x-5)$

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

$(3x+4)(3x-5) \Rightarrow 3x^2 + (4+(-5))3x + 4 \times -5$

$\Rightarrow 9x^2 - 3x - 20$ Ans.

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

$(a+b)\ (a-b) \Rightarrow a^2 - b^2$

$\left(y^2 + \frac{3}{2}\right)\left(y^2 - \frac{3}{2}\right) \Rightarrow (y^2)^2 - \left(\frac{3}{2}\right)^2$

$y^4 - \frac{9}{4}$ Ans.

Q2. Evaluate the following products with out multiplying directly:-

(i) 103×107

$(100+3)(100+7)$

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

$(100+3)(100+7) \Rightarrow (100)^2+(3+7)100+3\times7$

$\Rightarrow 10,000+1000+21$

$\Rightarrow 11,021$ Ans.

(ii) 95×96

$(100-5)(100-4)$

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

$(100-5)(100-4) = (100)^2+(-5+(-4))100+-5\times-4$

$\Rightarrow 10,000-900+20$

$\Rightarrow 9120$ Ans.

(iii) 104×96

$(100+4)(100-4)$

$(a+b)(a-b) = a^2-b^2$

$(100+4)(100-4) = (100)^2-(4)^2$

$\Rightarrow 10,000-16$

$\Rightarrow 9984$ Ans

Q3. Factorise the following using appropriate identities:

(i) $9x^2 + 6xy + y^2$ $\Rightarrow x^2 + 2xy + y^2 = (x+y)^2$

$(3x)^2 + 2 \times 3x \times y + (y)^2$

$(3x + y)^2$ or $(3x+y)(3x+y)$

(ii) $4y^2 - 4y + 1$ $\Rightarrow x^2 - 2xy + y^2 = (x-y)^2$

$(2y)^2 - 2 \times 2 \times y + (1)^2$

$(2y - 1)^2$ or $(2y-1)(2y-1)$

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

$x^2 - \frac{y^2}{10^2}$

$a^2 - b^2 \Rightarrow (a+b)(a-b)$

$\Rightarrow \left(x + \frac{y}{10}\right)\left(x - \frac{y}{10}\right)$ Ans.

Q4. Expand each of the following, using suitable indentities:-

(i) $(x+2y+4z)^2$

$(x+y+z)^2 \Rightarrow x^2+y^2+z^2+2xy+2yz+2zx$

$(x+2y+4z)^2 \Rightarrow (x)^2+(2y)^2+(4z)^2+2(x)(2y)+2(2y)(4z)$
$+2(4z)(x)$

$\Rightarrow x^2+4y^2+16z^2+4xy+16yz+8zx$ Ans.

(ii) $(2x-y+z)^2$

$(x+y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx$

$(2x-y+z)^2 \Rightarrow (2x)^2+(-y)^2+(z)^2+2(2x)(-y)+2(-y)(z)+$
$2(z)(2x)$

$\Rightarrow 4x^2+y^2+z^2-4xy-2yz+4xz$ Ans.

(iii) $(-2x+3y+2z)^2$

$(x+y+z)^2 \Rightarrow x^2+y^2+z^2+2xy+2yz+2zx$

$(-2x+3y+2z)^2 \Rightarrow (-2x)^2+(3y)^2+(2z)^2+2(-2x)(3y)+$
$2(3y)(2z)+2(2z)(-2x)$

$\Rightarrow 4x^2+9y^2+4z^2-12xy+12yz-8xz$ Ans.

(iv) $(3a-7b-c)^2$

$(x+y+z)^2 \Rightarrow x^2+y^2+z^2+2xy+2yz+2zx$

$(3a-7b-c)^2 \Rightarrow (3a)^2+(-7b)^2+(-c)^2+2(3a)(-7b)+$
$2(-7b)(-c)+2(-c)(3a)$

$\Rightarrow 9a^2+49b^2+c^2-42ab+14bc-6ac$ Ans.

(vi) $(-2x+5y-3z)^2$

$(x+y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx$

$(-2x+5y-3z)^2 \Rightarrow (-2x)^2+(5y)^2+(-3z)^2+2(-2x)(5y)+2(5y)(-3z)+2(-3z)(-2x)$

$\Rightarrow 4x^2+25y^2+9z^2-20xy-30yz+12xz$ Ans

(vii) $\left[\frac{1}{4}a-\frac{1}{2}b+1\right)^2$

$(x+y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx$

$\left(\frac{1}{4}a-\frac{1}{2}b+1\right)^2 = \left(\frac{1}{4}a\right)^2+\left(\frac{-1}{2}b\right)^2+(1)^2+2\left(\frac{1}{4}a\right)\left(-\frac{1}{2}b\right)$

$+2\left(\frac{-1}{2}b\right)\left(\frac{1}{1}\right)+2\left(\frac{1}{1}\right)\left(\frac{1}{4}a\right)$

$\Rightarrow \frac{1}{16}a^2+\frac{1}{4}b^2+1-\frac{\cancel{2}ab}{\cancel{8}_4}-\frac{\cancel{2}b}{\cancel{2}}+\frac{\cancel{2}a}{\cancel{4}_2}$

$\Rightarrow \frac{1}{16}a^2+\frac{1}{4}b^2+1-\frac{1}{4}ab-1b+\frac{1}{2}a$ Ans