Q2.) write the following sets in set-builder/Rule met

(d) From:

(ii) $B_1 = \{6, 9, 12, 15, \ldots\}$
$= \{x : x = 3n + 3 ; n \in N\}$

(ii) $B_2 = \{11, 13, 17, 19\}$
$= \{x : x$ is a prime number between 10 & 20$\}$

(iii) $B_3 = \{\frac{1}{3}, \frac{3}{5}, \frac{5}{7}, \frac{7}{9}, \frac{9}{11}, \ldots\}$
$= \{x : x = \frac{n}{n+2}$, where n is an odd natural no$\}$

(iv) $B_4 = \{8, 27, 64, 125, 216\}$
$= \{x : x = n^3 ; n \in N$ and $2 \leq n \leq 6\}$

(v) $B_5 = \{-5, -4, -3, -2, -1\}$
$= \{x : x \in Z, -5 \leq x \leq -1\}$

(vi) $B_6 = \{\ldots -6, -3, 0, 3, 6, \ldots\}$
$= \{x : x = 3n, n \in Z\}$

Q3 (i) Is $\{1, 2, 4, 16, 64 = \{x : x$ is a factor of 32$\}$? Give reason.

Ans → No, $\{1, 2, 4, 16, 64\} \neq \{x : x$ is factor of 32$\}$
Because 64 is not a factor 32

(ii) Is $\{x : x$ is a factor of 27$\} \neq \{3, 9, 27, 54\}$? Give reason.

Ans → Yes, $\{x : x$ is a factor of 27$\} + \{3, 9, 27, 54\}$
Because 54 is not a factor of 27

(iii) write the set of even factor of 124

Ans → $1 \times 124 = 124$
$2 \times 62 = 124$
$4 \times 31 = 124$
Factors of 124 = 1, 2, 4, 31, 62, 124
set of even factors of 124 = {2, 4, 62, 124}

) write the set of odd factors of 72.

1 → 1 x 72 = 72
2 x 36 = 72
3 x 24 = 72
4 x 18 = 72
6 x 12 = 72
8 x 9 = 72

Factors of 72 = 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72
set of odd factors of 72 = {1, 3, 9}

write the set of prime factors of 3234.

1 → 2 | 3234
3 | 1617
7 | 539
7 | 77
11

3234 = 2 x 3 x 7 x 7 x 11
set of prime factors of 3234 = {2, 3, 7, 11}

IS $\{x : x^2 - 7x + 12 = 0\} = \{3, 4\}$?

1 → $\Rightarrow x^2 - 4x - 3x + 12 = 0$
$\Rightarrow x(x-4) - 3(x-4) = 0$
$\Rightarrow (x-4)(x-3) = 0$
. Either $x - 4 = 0$ or $x - 3 = 0$
$x = 4 \Rightarrow x = 3$
$\{x : x^2 - 7x + 12 = 0\} = \{3, 4\}$ is true

) IS $\{x : x^2 - 5x - 6 = 0\} = \{2, 3\}$?
$x^2 - 6x + x - 6 = 0$
$x(x-6) + 1(x-6) = 0$
$(x-6)(x+1) = 0$
Either $x - 6 = 0$ or $x + 1 = 0$

i.e., $x = 6$ i.e. $x = -1$

$\therefore \{x : x^2 - 5x - 6 = 0\} \neq \{2, 3\}$

In other words $\{x : x^2 - 5x - 6 = 0\} = \{2, 3\}$ is not true.

Q4) write the following sets in Roster Form:

(i) The set of letters in the word 'MEERUT'.

Ans → Roster form of the set of letters in the word 'MEERUT'

$= \{m, e, r, u, t\}$

(ii) The set of letters in the word 'UNIVERSAL'.

Ans → Roster Form of the set of letters in the word 'UNIVERSAL' $= \{U, n, i, v, e, r, s, a, l\}$

(iii) $A = \{x : x = y + 3, y \in N \text{ and } y > 3\}$

Ans → ~~$A = \{x : x = y + 3, y \in N \text{ and } y > 3\}$~~

$x = y + 3$

when $y = 4$

~~(iv) $B = \{p : p \in W \text{ and } p^2 < 20\}$~~

when $y = 5$ $\quad x = 4 + 3 = 7$

when $y = 6$ $\quad x = 5 + 3 = 8$

when $y = 7$ $\quad x = 6 + 3 = 9$

when $y = 8$ $\quad x = 7 + 3 = 10$

$x = 8 + 3 = 11$

$\therefore$ Roster Form of the given set $A = \{7, 8, 9, 10, 11\}$

(iv) $B = \{p : p \in W \text{ and } p^2 < 20\}$

Ans → when $p^2 = 0$

$p = \sqrt{0} = 0$

when $p^2 = 1$

$p = \sqrt{1} = 1$

when $p^2 = 4$

$p = \sqrt{4} = 2$

when $p^2 = 9$

$p = \sqrt{9} = 3$

when $p^2 = 16$

$p = \sqrt{16} = 4$

∴ Roster Form of the given set $B = \{0, 1, 2, 3, 4\}$

(v) $C = \{x : x$ is composite number and $5 \leq x \leq 21\}$

Ans → $5 \leq x \leq 21$ means $x = 5, 6, 7, 8, 9, 10 \ldots, 21$

But we are given that x is a composite no

∴ $x = 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21$

∴ Roster Form of the given set $C = \{6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21\}$

note: composite number: The natural numbers (greater than 1), which are not prime, are called composite no.

Q5) List the elements of the following sets:

(i) $\{x : x^2 - 2x - 3 = 0\}$

$x^2 - 2x - 3 = 0$

$\Rightarrow x^2 - 3x + x - 3 = 0$

$\Rightarrow x(x-3) + 1(x-3) = 0$

$\Rightarrow (x+1)(x-3) = 0$

∴ Either $x - 3 = 0$ or $x + 1 = 0$

$x = 3$ $x = -1$

∴ elements of the set $\{x : x^2 - 2x - 3 = 0\}$ are 3 and -1

(ii) $\{x : x = 2y + 5;\ y \in N$ and $2 \leq y < 6\}$

$x = 2y + 5$

when $y = 2$, $x = 2 \times 2 + 5$

$= 4 + 5 = 9$

when $y = 3$ $\quad x = 2 \times 3 + 5$

$= 6 + 5 = 11$

when $y = 4$ $\quad x = 2 \times 4 + 5$

$= 8 + 5 = 13$

when $y = 5$ $\quad x = 2 \times 5 + 5$

$= 10 + 5 = 15$

$\therefore$ elements of the given set $\{x : x = 2y + 5;$ $y \in N$ and $2 < < 6\}$ are 9, 11, 13, 15

(iii) $\{x : x$ is a Factor of $24\}$

$24 = 1 \times 24$

$24 = 2 \times 12$

$24 = 3 \times 8$

$24 = 4 \times 6$

$\therefore$ elements of the given set $\{x : x$ is a Factor of $24\}$ are 1, 2, 3, 4, 6, 8, 12, 24

(iv) $\{x : x \in Z$ and $x^2 \leq 4\}$

when $x^2 = 4$

$x = \pm\sqrt{4} = \pm 2$

when $x^2 = 1$

$x = \pm\sqrt{1} = \pm 1$

when $x^2 = 0$

$x = \sqrt{0} = 0$

$\therefore$ elements of the given set $\{x : x \in Z$ and $x^2 \leq 4\}$

$\Rightarrow 3x \leq 12$

$\Rightarrow x \leq \frac{12}{3}$

$\Rightarrow x \leq 4$

$\therefore$ Elements of the given set $\{x : 3x - 2 \leq 10, x \in N\}$ are 1, 2, 3 and 4

(v) $\{x : 4 - 2x \geq -6, x \in Z\}$

$4 - 2x > -6$

$-4 + 4 - 2x > -6 - 4$

[Subtracting 4 from both sides]

$-2x > -10$

$-2x + 2x + 10 > -10 + 2x + 10$

[Adding $2x + 10$ to both the sides]

$+10 > 2x$

$\frac{10}{2} > x$

$5 > x$

$\therefore$ Elements of the given set $\{x : 4 - 2x > -6, x \in Z\}$ are $4, 3, 2, 1, 0, -1 \ldots\ldots$