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

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

iii) $B_2 = \{\frac{1}{3}, \frac{3}{5}, \frac{5}{7}, \frac{7}{9}, \frac{9}{11} \ldots\}$
$= \{x : x = \frac{n}{n+2}$ where n is an odd natural number$\}$

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

3) i) No, $\{1, 2, 4, 16, 64\} \neq \{x :$ x is a factor of 32$\}$
because 64 is not a factor of 32.

ii) Yes $\{x :$ x is a factor of 27$\} = \{3, 9, 27, 54\}$
because 54 is not a factor of 27.

iii) Set of even factor of 124 $= \{2, 4, 62, 124\}$

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3) iv) Set of odd factor of 72 = {1, 3, 9}

v) Set of prime factors of 3234 = {2, 3, 7, 11}

vi) Yes, ~~$x + x^2 = 7x$~~,
$\{x : x \in N, x \in (3, 4)\}$

vii) NO, $\{x : x \in N, x \notin (2, 3)\}$

4) i) ~~Meerut = m~~

MEERUT = {m, e, r, u, t}

ii) UNIVERSAL = {u, n, i, v, e, r, s, a, l}

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

$y \in N$ and $y > 3 = 4, 5, 6, 7 \ldots\ldots$

In roaster form $= \{4+3, 5+3, 6+3, 7+3, \ldots\}$

$= \{7, 8, 9, 10 \ldots\ldots\}$

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

$p \in W$ and $p^2 < 20 = 0^2, 1^2, 2^2, 3^2, 4^2$

$p \Rightarrow \{0, 1, 2, 3, 4\}$

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

x is a composite number and $5 \leq x < 21 = \{6, 8, 9, 10, 12, 14, 15, 16, 18, 20\}$

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

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

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

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

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

Either

$\Rightarrow x + 1 = 0$ $\quad x - 3 = 0$

$\Rightarrow x = 0 - 1$ Or $\Rightarrow x = 0 + 3$

$\Rightarrow x = -1$ $\quad \Rightarrow x = 3$

∴ the elements of this set is -1 or 3

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

$y \in N$ and $2 \leq y < 6 = 2, 3, 4, 5$

$x = 2\times2+5,\ 2\times3+5,\ 2\times4+5,\ 2\times5+5$

$= 9, 11, 13,$

$\Rightarrow$ When $y = 2$

$x = 2\times2+5$

$= 9$

When $y = 4$

$x = 2\times4+5$

$= 13$

When $y = 3$

$x = 2\times3+5$

$= 11$

When $y = 5$

$x = 2\times5+5$

$= 15$

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

iii) $\{x : x \text{ is a factor of } 24\}$

$24 = 1 \times 24$

$24 = 2 \times 12$

$24 = 3 \times 8$

$24 = 4 \times 6$

∴ Elements of the given set $\{x : x \text{ is a factor of } 24\}$ are $1, 2, 3, 4, 6, 8, 12, 24$

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

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

$x^2 = 1 \quad = \pm\sqrt{1} = \pm 1$

$x^2 = 0 \quad = \pm\sqrt{0} = \pm 0$

∴ Elements of the given set $\{x : x \in Z \text{ and } x^2 \leq 4\}$ are $-2, -1, 0, 1, 2$

v) $\{x : 3x - 2 \leq 10 \text{ and } x \in N\}$

$3x - 2 \leq 10$

$\Rightarrow 3x - 2 = 10$

$\Rightarrow 3x = 12$

$\Rightarrow x = \frac{12}{3} 4$

$\Rightarrow x = 4$

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