(13-B)

Q1) Write the cardinal number of each of the following sets:

(i) A = Set of days in a leap year.

A) $n(A) = 366$

(ii) B = Set of numbers on a clock-face.

A) $n(B) = 12$

(iii) $C = \{x : x \in N \text{ and } x \leq 7\}$

A) $n(C) = 7$

(iv) D = Set of letters in the word "PANIPAT".

A) $n(D) = 5$

(v) F = Set of prime numbers between 5 and 15.

A) $n(E) = 3$

(vi) $F = \{x : x \in Z \text{ and } -2 < x \leq 5\}$

A) $n(F) = 7$

(vii) G = {x : x is a perfect square number $x \in N$ and $x \leq 30$}

A) $n(G) = 5$

2) For each set given below state whether it is finite set or infinite set or the null set:

(i) {Natural numbers more than 100}
= It is an infinite set

(ii) A = {x : x ∈ W, x is less than 100}
It is finite set as it has 100 elements
i.e. from 0 to 99

(iii) A = {x : x is an integer between 1 and 2}
It is a null set

(iv) Set of mountains in the world.
∴ It is an infinite set

(v) {Multiples of 8}
∴ It is an infinite set

(vi) {Even numbers not divisible by 2}
∴ It is a null set

(vii) {squares of natural numbers}
∴ It is an infinite set

(viii) {coins used in India}

∴ It is a finite set as these are countable.

(x) $\{x / x$ is a prime number between 7 and 10$\}$

As there is not such prime number between 7 and 10
Hence it is null set

(x) Planets of two solar system.
It is finite set as there are countable.

3(i) $\{0, 1, 2, 6, 8\}$ and $\{$odd numbers less than 10$\}$

$\Rightarrow \{0, 1, 2, 6, 8\}$ and $\{1, 3, 5, 7, 9\}$
$\therefore$ These sets are not disjoint sets as there is one element (1) is common.

(ii) $\{$Birds$\}$ and $\{$trees$\}$
These are disjoint sets as there is no common element in term.

(iii) $\{x : x$ is an fan of cricket$\}$
and $\{x : x$ is an fan of Football$\}$
These are not disjoint sets as there can be a person who is fan of both the games.

(iv) $A = \{$Natural numbers less than 10$\}$
and $B = \{x : x$ is a multiple of 5$\}$
$\Rightarrow A = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ and
$B = \{5, 10, 15 - - - -\}$

These are not disjoint sets as there is one element 5 which is common.

v) {People living in Calcutta} and {People living in West Bengal}.
These are not disjoint sets as people of Calcutta are the people of West Bengal as Calcutta is a city of West Bengal. So only (ii) is a pair of disjoint sets.

4) State whether the given pairs of sets are equal or equivalent

(i) A = {first four natural numbers}
= {1, 2, 3, 4}

B = {first first whole number}
= {0, 1, 2, 3}

These are equivalent sets as both have equal number of elements but not same.

(ii) A = Set of letters of the word "FOLLOW"
= {F, O, L, W}

B = Set of letters of the word 'WOLF'
= {W, O, L, F}

These are equal sets as these have same and equal elements.

(iii) E = {even natural numbers less than 10}
= {2, 4, 6, 8}

O = {odd natural numbers less than 9}
= {1, 3, 5, 7}

These are equivalent sets as both have equal number of elements but not the same.

(iv) A = {Days of the week starting with letter S}
= {Sunday, Saturday}

B = {Days of the week starting with letter T}
= {Tuesday, Thursday}
These are equivalent sets as both have equal number of elements.

(v) M = {Multiples of 2 and 3 between 10 and 20}
= {12, 14, 15, 16, 18}

N = {Multiples of 2 and 5 between 10 and 20}
= {12, 14, 15, 16, 18}

These sets are equal as these have same and equal number of elements.

(iv) A = {Letters of the word SUPERSTITION}
= {S, U, P, E, R, T, T, O, N}

B = Letters of the word JURISDICTION
= {J, U, R, I, S, D, C, T, O, N}

These are neither equal nor equivalent sets as these have different and unequal elements.

5(i) The set of triangle having three equal sides.
This is not an empty set.

(ii) The set of lions in your class
This is an empty set.

(iii) {x : x + 3 = 2 and x ∈ N}

x + 3 = 2
⇒ x = 2 − 3 ⇒ −1

which is not a natural number.
∴ It is an empty set

(iv) $P = \{x : 3x = 0\} = \{0\}$

which is not an empty set
Hence (ii) and (iii) are empty sets.

6) (i) All examples of the empty set are equal. (True)

(ii) All examples of the empty set are equivalent (True)

(iii) If two sets have the same cardinal number they are equal sets. (False)

(iv) If $n(A) = n(B)$ then A and B are equivalent sets. (True)

(v) If $B = \{x : x + 4 = 4\}$ then B is the empty set. (False)

(vi) The set of all points in a line is a finite set (False)

(vii) The set of letters in your Mathematics book is an infinite set. (False)

(viii) If $M = \{1, 2, 4, 6\}$ and
$N = \{x : x$ is a factor of $12\}$
then $M = N$ (False)

(ix) The set of whole numbers greater than 50 is an infinite set. (True)

(x) If A and B are two different infinite sets then $n(A) = n(B)$. (False)

7) ϕ and $\{\}$ are the null sets other are not as there have same element.