Q Determine the limit points of the set $\mathbb{N}$.

Ans → $D(\mathbb{N}) = \phi$

Q Determine the limit points of the following sets —

(i) $[a, b]$

(ii) $R - Q$

(iii) Finite set

(i) $D\{[a,b]\} = [a,b]$

(ii) $D\{R-Q\} = R$

(iii) $D\{\text{Finite Set}\} = \phi$

Q Give example of set E such that —

(i) $E \cap D(E) = \phi$

Let $E = \left\{1, \frac{1}{2}, \frac{1}{3}, \dots\right\}$ Ans

$D(E) = \{0\}$

$E \cap D(E) = \phi$

(ii) $E \subset D(E)$

Let $E = (a,b)$ Ans

$D\{(a,b)\} = [a,b]$

$\Rightarrow E \subset D(E)$

(iii) $D(E) \subset E$

Let $E = \left\{0, 1, \frac{1}{2}, \frac{1}{3}, \dots\right\}$ Ans

$D(E) = \{0\}$

$\Rightarrow D(E) \subset E$

(iv) $E = D(E)$

Let $E = [a,b]$ Ans

$D(E) = [a,b]$

$\Rightarrow E = D(E)$

Closed Set:- A subset E of $\mathbb{R}$ is said to be closed if it contains all its limit points.

or

$\boxed{D(E) \subseteq E}$

Eg (i) The set of R is closed.

(ii) Any $[a,b]$ is a closed set.

(iii) Semi-open interval $[0,1)$ is neither open nor closed set.

(iv) Every finite set $\{1,2,3\}$ is closed.

(v) Null set ϕ is both closed and open.

Q. Give an example of each of the following-

(i) A closed set which is not an interval.

$E = [2,3] \cup [4,5]$

or any finite set

(ii) An interval which is not a closed set.

Open Interval $(0,1)$

Semi-open Interval $[0,1)$

(iii) A set which is neither an interval nor a closed set.

$E = \left\{1, \frac{1}{2}, \frac{1}{3}, \dots\right\}$ or $E = (2,3) \cup (4,5)$

(iv) A set which is neither closed nor open.

Semi-open Interval $(0,1]$

$$E = \left\{ \frac{1}{2}, \frac{2}{3}, \ldots, \frac{n}{n+1}, \ldots \right\}$$

(v) A set which is both open & closed

ϕ