SECTION 5

Q2

Ans (a) (i) Power set of $\{a\} = \{\{\phi\}, \{a\}\}$

(ii) Power set of $\{a, b\} = \{\{\phi\}, \{a\}, \{b\}, \{a, b\}\}$

(iii) Power set of $\{\phi, \{\phi\}\} = \{\phi\}$

(iv) power set of $\{a, \{a\}\} =$

$= \{\{\phi\}, \{a\}, \{\{a\}\}, \{a, \{a\}\}\}$

(b) Ring : A non-empty set R is a ring if it is equipped with two binary operations called addition and multiplication and denoted by '+' and '.' respectively i.e., for all $a, b \in R$ we have $a+b \in R$ and $a.b \in R$ and it satisfies the following properties:

(i) Addition is associative i.e,

$(a+b)+c = a+(b+c) \ \forall a, b, c \in R$

(ii) Addition is commutative i.e,

$a+b = b+a \ \forall a, b \in R$

(iii) There exists an element $0 \in R$ such that
$0 + a = a = a + 0, \forall a \in R$

(iv) To each element a in R there exists an element $-a$ in R such that $a + (-a) = 0$

(v) Multiplication is associative i.e.,
$a.(b.c) = (a.b).c, \forall a, b, c \in R$

(vi) Multiplication is distributive with respect to addition i.e, for all $a, b, c \in R$,

Example of ring with zero divisors:
$R = \{$ a set of 2×2 matrices $\}$.

Field: A ring R with at least two element called a field if it has following properties:
(i) R is Commutative
(ii) R has unity
(iii) R is such that each non-zero element possesses multiplicative inverse.

For example: The rings of real number and Complex numbers are also fields.