Section-5

Ans-2

(a)

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

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

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

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

(b) Ring and Field.

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 ie., $a.(b.c) = (a.b).c, \forall\, a, b, c \in R$.
(vi) Multiplication is distributive with respect to addition ie., 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 ~~possesses~~ is 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 numbers and complex numbers are also fields.