Sem. V

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MJC 08

RING THEORY

Important Point

In a group — one binary composition

But in a ring — two binary operations.

Definition of a ring Let R be a non-empty set.

Then $(R, +, \cdot)$ with two binary operations — $(+)$ addition and $(\cdot)$ multiplication is called a ring if the following properties are satisfied:

(i) $(R, +)$ is an abelian group.

(ii) Multiplication is associative i.e.

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

or $(ab)c = a(bc)$

(iii) Multiplication is distributive over addition; i.e.

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

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

Examples The set of integers with addition and multiplication is a ring.