Part - III

PAPER - VI

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Def **Rings** Let R be a non-empty set and $a, b, c \in R$ be arbitrary. The set R with two binary operations addition and multiplication is called Ring if the following conditions are satisfied.

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

A_1 Closure Axiom ; $a, b \in R \Rightarrow a+b \in R$

A_2 Existence of identity : $\exists\, e \in R$, called additive identity or zero element s.t $a+e = e+a = a$

A_3 Existence of inverse : $a \in R \Rightarrow \exists -a \in R$, called additive inverse of a s.t $-a+a = a+(-a) = 0$

A_4 Associative law : $(a+b)+c = a+(b+c)$

A_5 Commutative law $a+b = b+a$

(ii) $R, \cdot$ is semigroup

B_1 Closure Axiom - $a, b \in R \Rightarrow ab \in R$

B_2 Associative law : $(ab)c = a(bc)$

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(iii.) Distributive Laws holds, i.e.

$a(b+c) = ab + ac$ (Right dis. Law)

$(b+c)a = ba + ca$ (Left dis. Law)