University of Al-Hamdaniya, College of Education
Department of Mathematics

RING THEORY

Level Three

Asst. Lecturer. Hadil Hazim Sami

LECTURE NO. 14

Definition: Let (R,+,.) and $(R',+',.')$ are rings and let $f: R \to R'$ be a function then f is said to be a ring homomorphism iff:

1) $f(a+b)=f(a)+' f(b)$

2) $f(a.b)=f(a).' f(b)$

$\forall a, b \in R.$

Example(1): Let $f: (Z, +, .) \to (Z, +, .)$ is a function defined by:

$$f(a) = 0 \quad \forall a \in Z.$$

Is f homo. ring?

sol: Let $a, b \in Z$

1) $f(a+b) = 0$

$= 0+0$

$= f(a) + f(b)$

2) $f(a.b) = 0$

$= 0.0$

$= f(a).f(b)$

⇒ $\therefore$ f is ring homomorphism.

Example(2): Let $f: (R, +, .) \to (R, +, .)$ is a function defined by:

$f(a) = 2a \ \ \forall a \in R$ is f homo. ring?

Sol: Let $a, b \in R$

1) $f(a+b) = 2(a+b)$

$=2a+2b$

$=f(a)+f(b)$

2) $f(a.b) = 2(ab)$

$\neq f(a).f(b)$

$\therefore$ f is not ring homomorphism.