classmate

Date :

Page :

* Discrete Mathematics (DM) - Assignment Number - 6

Name:- Kaustubh Shrikant Kabra
Class:- Second Year Engineering
Div:- A Roll Number:-
Batch:-
Department:- Computer Department
College:- AISSMS's IOIT.

Q-1. What is Monoid? Show that the algebric structure (A, +) is a monoid, where A is set of integers and + is a binary operation given addition of two integers.

→ Monoid:-

A monoid is a semi-group (A, *) that has an identity element.

Example:- (A, +) is algebric system, where

A is set of integers and (+) is binary operation.

Let A = {......, 0, 1, 2, 3, ...}

Therefore checking properties:-

① Associative Property:-

The operation (+) is an associative property as,

$$(a+b)+c = a+(b+c)$$

② Closure Property:-

Operation (+) is closure as the sum of two integer numbers is integer.

③ Identity Property :- There is identity element in set A, The element 0 is an identity element, that is the operation(+).

(A, +) satisfy all three properties

Therefore,

(A, +) is a Monoid.

Hence Proved.

Q - 2. Define the following :- ① Ring
② Field
③ Integral Domain.

→ 1. Ring -

A ring R is said to be a ring with unit element if there exists an element, denoted by the symbol 1 such that $a.1 = 1.a = a$, $a \in R$.

A ring R is said to be a ring commutative ring if $a.b = b.a$ for all $a, b \in R$.

Example :- 1. The integers with the usual addition and multiplication operations. These form a commutative ring in which multiplication is commutative.

2. The integers mod m with addition and multiplication mod m.

2. Field :-

A field is a set F which is closed under two operation (+) and (*) such that

① F is an abelian group under (+).

② F - {0} is an abelian group under (*).

Example:- 1. $(Q, +)$
2. $(R, *)$
3. $(Z, +)$

3. Integral Domain:-
A non-trivial ring with unity is said to be an integral domain if it is commutative and contain no divisor of zero.

Example:- 1. $(Z, +)$
2. $(R, +)$
3. $(Q, +)$ ...