



Semester : III

Subject : DSGT

Academic Year: 2022-2023

* Abelian group - or commutative group -

A group $(G, *)$ is said to be abelian if
 $(a * b) = (b * a)$
 $\forall a, b \in G.$

ex. (i) $(\mathbb{Z}, +)$

i) $\mathbb{Z} = \{ \dots, -3, -2, -1, 0, 1, 2, 3, \dots \}$

$$a = 10$$

$$b = 7$$

$$a + b = 10 + 7 = 17 \in \mathbb{Z}.$$

it is algebraic structure

ii)

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

$$10 + (7 + 2) = (10 + 7) + 2$$

$$19 = 19$$

it is semigroup

iii)

$$a + e = e + a = a$$

$$3 + 0 = 0 + 3 = 3$$

it is monoid

iv)

$$a + b = b + a = e$$

$$3 + (-3) = (-3) + 3 = 0$$

it is group



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v) ~~iv~~ abelian group or commutative group?

$$a + b = b + a$$

$$5 + 2 = 2 + 5$$

$$7 = 7$$

$$a + b = b + a$$

$$(-2) + 3 = 3 + (-2)$$

$$1 = 1$$

it is a commutative group.

ex. (2)

(\mathbb{N}, \cdot)