

PARSHVANATH CHARITABLE TRUST'S

A.P. SHAH INSTITUTE OF TECHNOLOGY

Department of Computer Science and Engineering
Data Science

Semester: TII Subject: DSGT Academic Year: 2022 - 2023
Module No:-5
Algebraic Structures.
Algebraic structure -
A non empty set s is called algebraic structure with respect to binary operation * if (a*b) ES where $\forall (a,b) \in S$.
'*' is closure operation on s.
Let A be a non-empty set. A function f: A x A \rightarrow A is called a binary operation Binary operation is a function, one
and only one element of A 15 assigned to one ordered pair of A XA, we denote
binary operations by * or (+) or instead of
to each (a,b) EAXA, there exists a cirique
This property is called as A is closed under x. N- Natural no = \$1,23
g. (Z, +) Z- Fintegers no={2,-1,0
set operation Q - Rational no. R - Real no. = {\frac{1}{2}} \frac{3}{2} \frac
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1) Let A = Z and axb = a+b
Then * is a binary operation on Z.
$z = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 3, 10, 10, 11, 12, 3, 10, 10, 10, 10, 10, 10, 10, 10, 10, 10$
x = + binary operation $a = 3 + b = 6$
$\frac{- + hen}{- = 9}$
here 9 EZ.
hence z is closed under *. as (a,b) e z and (a+b) e z
DA = z. and alb be a-b
Then * is not binary operation on Z since a-b may not be an element of A for some a,b in A.
$3*7 = 3-7 = -4$ $-4 \notin \mathbb{Z}$
3) $A = Z$, $a * b$ be a/b
* is not binary operation on Z since a/b may not be an element of Z
for some a, b 10 A. 5*0 = 5/0 € A.
if z is a non zero positive integers
then a * b , a b is binary operation. Subject Incharge: Page No Department of CSE-Data Science APSIT



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(4) if L be a lattice, axb be and (GLB of a,b). meet
Then a * h is a hindry approxion
because for every ordered pair a, b of L,
there exists a unique anb.
B Let l be a lattice, axb be avb
Then axb is a binary operation.
because for every ordered pair ab
of 1, there exist a unique avb.
The state of the s
* Identity and Inverse :-
1 dentity and Inverse :-
Identity - Given a non-empty set A and 10 a
binary operation (F) it there is an element
binary operation (f) it there is an element e EA, such that for every a EA,
$\alpha * e = e * \alpha = \alpha$
here e is called as identity element for the operation *.
1116 Operation x.
- e.g. in a set of real numbers
R= { set of real numbers }
R= { set of real numbers } O is identity element for the Joperation
addition
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berause o	1+0=0+a=a fo	r every a ex.
Unity or	1 is identity el	ement fer
multiplication	on because	in the second
$a \times 1 = 1$	on because ×a = a fer eve	ny a ER.
*Inverse -	E. Lander State of the Control of th	
operation e and if a * b = b	non-empty set A * if A has an -for any two ele * a - b	ment a, h ES
then b	is called the in	verse of a G.
	0	All Whiteham
e.g.,		
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		13 17 3 18 18 1 1 1 1 1
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