MATHS CLASS XII (Relations and Functions) Continuation......

General direction for the students :-Whatever be the notes provided , everything must be copied in the Maths Copy and then do the Home work in the same Copy.

BINARY OPERATIONS (*)

A binary operator * on a non empty set A is a function $*: AXA \to A$.

Types of operation

Let * be a binary operations on a set A , then

i) the operation is called Commutative(or Abelian) iff a*b=b*a for all a, b ϵA.

ii) the operation is called Associative iff $(a * b) * c = a * (b * c)$, $\forall a, b, c \epsilon A$

iii) an element $e \epsilon A$ is called identity element of the operation iff $e * a = a = a * e$, $\forall a \epsilon A$

iv) if $e \epsilon A$ is identity element and $a \epsilon A$ is invertible iff there exists $b \epsilon A$ such that $a * b = e = b * a$.
Element b is called inverse of a.

NOTE

1. Identity element is unique, if it exists.

2. Inverse element is unique, if it exists.

3. If $n(A) = n$, then the number of binary operations on A is n^{n^2}.

****** For further explanation of above points watch the video*.

1 v) . $Given\ a * b = a - b + ab$

Now $b * a = b - a + ba$

$\Rightarrow a * b \neq b * a$

$\Rightarrow$ not commutative.

For Associative, $(a * b) * c = (a - b + ab) * c$

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

$$= a - b + ab - c + ac - bc + abc$$

$$= a - b - c + ab + ac - bc + abc$$

$$a * (b * c) = a * (b - c + bc)$$

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

$$= \boldsymbol{a - b + c - bc + ab - ac + abc}$$

$$\Rightarrow (a * b) * c \neq a * (b * c)$$

$\Rightarrow$ *not Associative.*

10. Given $a * b = 2a + b - 3$

$3 * 4 = 2.3 + 4 - 3$

=7

19. $given\ a * b = a + b - 5$

Let the identity element be e , then a*e=a=e*a

Now a*e=a+e-5=a

$\Rightarrow$ e=5 is the identity element.

23. Number of binary operations=3^{3^2}=3^9=19683.

HOME WORK : Left over questions from the exercise.

CHAPTER IS COMPLETED