

XII - Mathematics Assignment No-04 - Relations and Functions

Q1. Let * be a binary operation on N given by $a * b = \text{l.c.m of } (a, b) \forall a, b \in N.$

Find (i) $2 * 4$ (ii) $3 * 5$ (iii) $7 * 21$

Q2. Let * be a binary operation on Z defined as $a * b = a + 3b^2 \forall a, b \in Z$

Find (i) $1 * 3$ (ii) $2 * 4$ (iii) $3 * 2$

Q3. Find the number of binary operations on the set $\{a, b\}$

Q4. Define a binary operation * on the set $\{0, 1, 2, 3, 4, 5\}$ as

$$a * b = \begin{cases} a + b & \text{if } a + b < 6 \\ a + b - 6 & \text{if } a + b \geq 6 \end{cases}$$

Show that zero is the identity for this operation and each element 'a' of the set is invertible with $(6-a)$ being the inverse of a.

Q5. Which of the following binary operations on the set N are associative and which are commutative?

- (i) $a * b = 1 \forall a, b \in N$ (ii) $a * b = \frac{a+b}{2} \forall a, b \in N$

Cont Pg-2

Q6. Consider the binary operation $*$ on the set $A = \{1, 2, 3, 4, 5\}$ defined by $a * b = \min(a, b)$. Write the operation table of the operation $*$

Q7. Let $*$ be a binary operation on the set \mathbb{Q} of rational numbers as follows

(a) $a * b = \frac{ab}{4}$ (b) $a * b = ab^2$

Find which of the binary operation are commutative and which are associative?

Q8. Let $A = N \times N$ and let $*$ be a binary operation on A defined by $(a, b) * (c, d) = (a+c, b+d)$. Show that $*$ on A is commutative and associative. Also find the identity element on A if exist.

ANSWER:

(Q1) (i) 4 (ii) 15 (iii) 21	(Q3) 16 (Q5) (i) Both commutative and associative (ii) commutative not associative	(Q6) Frame the table by taking the min of the nos. (Q7) (i) Both (ii) not associative nor commutative
(Q2) (i) 28 (ii) 50 (iii) 15		Q8. No identity element in N .