

B.Tech
Discrete Structures and Theory of Logic
Assignment-2

QNo.	Question	CO Type	Bloom's level
1	Show that every group of order 3 is cyclic.	CO2	L3
2	Show that $(R - \{1\}, *)$, where the operation $*$ is defined as $a*b = a+b-ab$, is an abelian group.	CO2	L3
3	Show that if $f: G \rightarrow G'$ is an isomorphism and G is an abelian group then G' is also abelian.	CO2	L4
4	Prove that if every element of a group except identity element is of order 2 then group is abelian.	CO2	L3
5	If a and b are two elements of a group G then $(ab)^2 = a^2b^2$ if and only if G is an abelian.	CO2	L2
6	Define ring and give an example of a ring with zero divisors.	CO2	L2
7	Prove that every cyclic group is an abelian group.	CO2	L3
8	Obtain all distinct left cosets of $\{0, 3\}$ in the group $(Z_6, +_6)$ and find their union.	CO2	L2
9	Prove that $(R, +, *)$ is a ring with zero divisors, where R is 2×2 matrix and $+$ and $*$ are usual addition and multiplication operations.	CO2	L4
10	Let $(A, *)$ be a monoid such that for every x in A , $x*x = e$, where e is the identity element. Show that $(A, *)$ is an abelian group.	CO2	L3
11	Let Z be the group of integers with binary operation $*$ defined by $a*b = a+b-2$, for all $a, b \in Z$. Find the identity element of the group $(Z, *)$.	CO2	L2
12	What do you mean by cosets of a subgroup? Consider the group Z of integers under addition and the subgroup $H = \{\dots, -12, -6, 0, 6, 12, \dots\}$ considering of multiple of 6. 1. Find the cosets of H in Z . 2. What is the index of H in Z .	CO2	L4
13	What is Ring? Define elementary properties of Ring with example.	CO2	L1
14	Prove or disprove that intersection of two normal subgroups of a group G is again a normal subgroup of G .	CO2	L4
15	Consider the group $G = \{1, 2, 3, 4, 5, 6\}$ under multiplication modulo 7. 1. Find the multiplication table of G . 2. Find $2^{-1}, 3^{-1}, 6^{-1}$. 3. Find the orders and subgroups generated by 2 and 3. 4. Is G cyclic?	CO2	L3