B.TECH-CSE

Assignment-3

Semester-3rd (Odd), Session:2025-26

BCS-303: Discrete structure and Theory of Logic

Unit-4 **Unit-Name**: Group , Ring ,Field	**Course Outcome: CO3 –** Employ the rules of Group and Ring
Date of Distribution:	**Faculty Name**: Mr. Anil Gupta

1. Consider a ring (R,+,*) defined by a*a =a. Determine whether the ring is commutative or not .
2. Give an example of a graph which has Hamiltonian circuit but not Eulerian circuit.
3. How many arrangements can be made by using the letters of the word "COMPUTER" so that arrangements begin and ends with vowel?
4. Explain and proof handshaking theorem.
5. For the set $I_4 = \{0,1,2,3,4\}$. Show that the modulo 5 is a field.
6. Explain and proof handshaking theorem.
7. Let G= {1, -1, i , -i} with the binary operation multiplication be an algebraic structure, where i = √-1 be an abelian group. Also find generator of G
8. Prove that (R,+,*) is a ring with zero divisors, where R is 2*2 matrix and + & * are usual addition and multiplication operations
9. In the group **Z12** under addition modulo 12, consider the subgroup H ={0, 4, 8}. Compute all the distinct Cosets of H.
10. Determine whether the set H = {0, 1, 5} is a subgroup of **Z6** under addition modulo 6.
11. Describe Algebraic structure, semigroup, monoid and group. Also explain the relationship among them
12. Consider group G = {1, 2, 3, 4, 5, 6} under multiplication modulo 7.

(a) Construct the multiplication table of G.
(b) Compute 2^{-1}, 3^{-1}, 6^{-1}
(c) Compute the orders and subgroups generated by 2 and 3.
(d) Is G cyclic