

# School of Basic Sciences

Department of Basic Sciences

Mid Term Examination

Exam Date: 29 Sep 2023

Time : 90 Minutes

Marks : 50

## Sem V - C1UC501T - Group and Ring Theory and Linear Algebra

*Your answer should be specific to the question asked*

*Draw neat labeled diagrams wherever necessary*

- 1) Explain that  $f(x) = x^{-1}$  is an automorphism for an abelian group  $G$ . K2 (2)
- 2) Find the automorphism group of the symmetric group  $S_3$ . K1 (3)
- 3) Estimate the number of conjugacy classes of a non-abelian group of order 27. K2 (4)
- 4) Show that the characteristic subgroup of a group  $G$  is a normal subgroup of  $G$ . K2 (6)
- 5) Using the class equation, show that a group of prime power order must have a non-trivial centre. K3 (6)
- 6) Verify the class equation for the symmetric group  $S_3$ . K3 (9)
- 7) Categorize the non-isomorphic abelian groups of order 16. K4 (8)
  
- 8) Examine, whether a group of order 27 is simple or not. K4 (12)

**OR**

- Examine, whether a group of order 18 is simple or not. K4 (12)