

INTRODUCTION TO GROUPS AND SYMMETRY (MTH 203)

Surprise Quiz-2

Total Marks: 12  
Maximum Marks: 10

Time: 45 Minutes

Solve all Problems.

Problems: Even Roll Number

- (1) Let  $\phi : \mathbb{Z}_{36} \rightarrow \mathbb{Z}_{20}$  be a map defined by  $\phi(\bar{n}) = \overline{5n}$ . Is  $\phi$  well defined? Can you find the Kernel of  $\phi$ ? (2 Marks)
- (2) Find all group homomorphisms from  $\mathbb{Z}_4$  to  $\mathbb{Z}_{10}$ . (4 Marks)
- (3) Describe all group homomorphisms from  $\mathbb{Z}_9$  to  $S_4$ . (4 Marks)

Problems: Odd Roll Number

- (1) Let  $\phi : \mathbb{Z}_{40} \rightarrow \mathbb{Z}_{18}$  be a map defined by  $\phi(\bar{n}) = \overline{9n}$ . Is  $\phi$  well defined? Can you find the Kernel of  $\phi$ ? (2 Marks)
- (2) Find all group homomorphisms from  $\mathbb{Z}_{18}$  to  $\mathbb{Z}_{30}$ . (4 Marks)
- (3) Describe all group homomorphisms from  $\mathbb{Z}_8$  to  $S_4$ . (4 Marks)