

The Open University of Sri Lanka
 B.Sc/B.Ed. Degree Programme – Level 04
 No Book Test– 2023/2024
 Pure Mathematics
 PEU4303 – Group Theory 1



Duration: - One Hour.

Date: -28 .01.2024

Time: - 10.30 a.m. – 11.30 a.m.

Answer All Questions.

(01) (a) Let $(\mathbb{Z}_{10}^{\times}, \times_{10})$ be the group of integers modulo 10.

(i) Show that $H = \{1, 3, 7, 9\}$ is a subgroup of \mathbb{Z}_{10}^{\times} under same binary operation.

(ii) Show that H is a cyclic group.

(iii) Find all the generators of H .

(b) Let $G = \langle a \rangle$ be a cyclic group under multiplication with $o(G) = 6$.

Let $H = \langle a^3 \rangle = \{e, a^3\}$ be a subgroup of G . Find all distinct right cosets of H in G .

(02) (a) Write the permutation $\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 5 & 6 & 3 & 1 & 4 \end{pmatrix}$ as a product of disjoint cycles.

(b) Write the permutation $\beta = (1 \ 4 \ 2)(2 \ 3 \ 5)(1 \ 3 \ 4)$ as a product of disjoint Cycles.

(c) Find the order of each permutation.

(i) $\gamma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 4 & 6 & 1 & 3 & 5 & 2 \end{pmatrix}$

(ii) $\delta = (1 \ 3 \ 5)(2 \ 5 \ 6)(3 \ 4 \ 6)$.