

The Open University of Sri Lanka

B.Sc/B.Ed. Degree Programme – Level 04

Open Book Test (OBT) - 2017/2018

Pure Mathematics

PEU4303 – Group Theory I

Duration: - One Hour.



Date: -05.01.2019

Time: - 2.30 p.m. – 3.30 p.m.

Answer All Questions.

1. (a). Let $s_y, r_{90} \in D_8$. Simplify the followings.

(i). r_{90}^{2018} (ii). $(s_y \circ r_{90})^{2019}$ (iii). s_y^{2020} (iv). r_{270}^{-2017} (v). $(s_y \circ r_{90}^3) \circ r_{90}^2$

(c). Show that the composition of two reflections is a rotation in D_8 .

(b). Write down all the rotational and reflectional symmetries of a regular triangle and find the inverses of each symmetry.

2. (a). Is usual subtraction an associative binary operation on \mathbb{Z} ? Justify your answer.

(b). Let $S = 3\mathbb{Z} \cup 2\mathbb{Z}$. Where $3\mathbb{Z} = \{3k : k \in \mathbb{Z}\}$ and $2\mathbb{Z} = \{2k : k \in \mathbb{Z}\}$

(i). Show that usual multiplication is a binary operation on S .

(ii). Show that usual addition is not a binary operation on S .

(c). Show that $*$: $\mathbb{Z} \times \mathbb{Z} \rightarrow \mathbb{Z}$, given by $a * b = \max\{a, b\} + 1$ is not an associative binary operation on \mathbb{Z} .

