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| **University of Science and Technology of Hanoi**\*\*\***Retake Examination (Open Book)****Subject: Algebraic Structure****Sheet**: 01 **No of pages**: 01 | ***Intake****: BI10-ICT* ***Academic year****: 2020 - 2021****Date****: 30/06/2021* ***Time****: 60 minutes****Important instructions****(according to lecturer’s decision)*Copying from any source leads to 0 for the final mark. |
| **Pathway coordinator** |  | **Lecturer (or Head of Subject)**  | **Dr. Đoàn Nhật Quang** |
| **Student name** |  | **Student’s ID** |  |

**Problem 1** (5pts)

Solve the following linear system where x, y $\in Z\_{11}$

 $\left\{\begin{array}{c}2x+4y ≡1 (mod 11)\\3x-7y ≡3 \left(mod 11\right)\end{array}\right.$

Specify your algebra development to justify answer.

**Problem 2** (5pts)

Find an example of a cyclic group U $⊂ Z\_{11}$. Justify the generator of the cyclic group.

**Problem 3** (5pts)

Using induction to prove that the following statement is true, $a^{2}-1$ is divisble by 8 for all odd and positive integers a.

**Problem 4** (5pts)

A binary operation o is defined as following:

a o b = a+2b-1

Is the binary operation **commutative**? **associative**? Justify your answer.

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