**Final control program
for the course "Variation calculus and optimization methods"**

 **for the 2020/2021 academic year**

**Faculty of Mechanics and Mathematics**

**Department of Mathematics**

**Code and name of the educational program: 5B060100 Mathematics**

**Discipline name:** **Variation calculus and optimization methods**

**Course** **3**

**Lecturer: S. Serovajsky**

**Protocol and date of consideration and approval by the department \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**The form of the final control of the academic discipline -**

**case task**

**Platform: Moodle**

**General rules for the examination**

1. The format of the exam is remote.
2. The exam is conducted on Moodle platforms.
3. The exam is conducted in the form of a case study.
4. Themes of the case study are individual.
5. Each assignment includes two questions.
6. All questions included in the assignment represent problem solving.
7. Samples of the presented tasks are tasks for independent work performed during the academic semester.
8. The number of options for assignments (tickets) exceeds the number of students in the group by 5.
9. The exam is held according to the schedule.
10. 30 minutes before the start of the exam, the head of the group sends a list of students to Teams with the numbers of their chosen tickets, taking into account their total number.
11. A general list of all tasks is obtained by students in the form of a separate file at the time specified in the exam schedule. Each student chooses a ticket from the specified list in accordance with the number presented in advance by the headman.
12. Time to complete the work - 90 minutes. After that, the works are not accepted for consideration.
13. The response is presented in Moodle as a Word document.
14. Check for originality - in accordance with the existing requirements.
15. The criterion for evaluating the work is in accordance with the existing requirements.
16. The list of recommended literature is indicated in the syllabus uploaded in the Univer and Moodle system.
17. The full text of all lectures and related presentations are uploaded to Teams.

**List of questions included in the exam program**

1. Function minimization theory
2. Euler equation for Lagrange problem
3. Lagrange problem and the first integral
4. Vector Lagrange problem
5. Lagrange problem with high derivatives
6. Lagrange Problem for the functions with many variables
7. Bolza Problem
8. Variational problems with isoperimetric conditions
9. Variational problems with pointwise constraints
10. Standard optimization control problems
11. Optimization control problems for the vector case
12. Optimization control problem with fixed final state
13. Gradient methods for functionals
14. Variational inequalities
15. Inverse problems