**AL-FARABI KAZAKH NATIONAL UNIVERSITY**

**Faculty of Mechanics and Mathematics**

**Department of Mechanics**

**Final Control Program**

**Course: "Nanotechnology"**

**Educational Program:** **"7M05405 – Mechanics and Energy"**

**Course: 2nd year Master student**

**Semester: 3**

**Credits: 5**

**Location: Almaty, 2024**

Final control program developed by PhD, Senior Lecturer of the Department of Mechanics, Aziz Kudaikulov.

The exam program was reviewed and approved at the Department of Mechanics meeting on September 13, 2024, Protocol No. 2.

Approved by

Head of the Department of Mechanics \_\_\_\_\_\_\_\_\_\_\_\_\_ Dinara Turalina.

**Program of final control of the course**

**«Nanotechnology»**

**for the 2024-2025 academic year**

**Faculty of *Mechanics and Mathematics***

**Department of Mechanics**

**Discipline name: Nanotechnology**

**Course: 2**

**Specialty: "7M05405 – Mechanics and Energy"**

**Year: 2nd year Master student**

**Number of students: 2**

**Teacher: Kudaikulov A.A.**

**The form of the final control in the academic discipline:** WRITTEN

**Duration: 2 hours**

There are 3 questions in the exam paper. Each question is enclosed in parentheses with the corresponding maximum value expressed as a percentage.

**CHECK PROCEDURE**

* The student must arrive 20 minutes before the time indicated in the exam schedule.
* Latecomers to the exam are not allowed.
* Bring your passport, pen and pencil.
* to have a mask to comply with sanitary standards.
* The use of smartphones, calculators, dictionaries, cheat sheets, additional materials and communication with other students is prohibited. In case of violation of these warnings, an act is drawn up and the student is expelled from the exam. And in the subject examination sheet, the mark “F” (unsatisfactory or unsatisfactory) is put.

**Student behavior during the exam**

* 15 minutes before the start of the exam, the teachers on duty seat the students indicated on the arrival list, students sign the arrival list confirming that they are familiar with the place
* After answering the questions of the exam ticket (within 2 hours) the student passes his work to the teacher on duty. After 2 hours the work will not be accepted.

Examination tickets consist of 3 questions. For correctly completed tasks the maximum is 100 points, of which the first question is 33 points, the second question is 33 points, and the third question is 34 points

**List of topics for the final exam in the discipline**

1. Solar Energy Applications
2. Application of Nanofluid for Solar Stills
3. Classification of Concentrating Solar Collectors Based on Focusing Shape and Studying on Their Performance, Financial Evaluation, and Industrial Adoption
4. Nanotechnology for Heat Transfer
5. Magnetic nanoparticles for Heat Transfer
6. Nanofluids in Linear Fresnel Reflector
7. Thermal Management and Performance Enhancement of Parabolic Trough Concentrators Using Nanofluids
8. Nanofluids in Solar Thermal Parabolic Trough Collectors (PTCs)
9. Applications of Nanotechnology in the Harvesting of Solar Energy

**Literature:**

1) Mohsen Sheikholeslami. Nanotechnology Applications for Solar Energy Systems. Willey, 2023. – 445б.

2) Alessandro Lavacchi, Hamish Miller, Francesco Vizza. Nanotechnology in Electrocatalysis for Energy. - Springer, - 2013. – 334б.

**ASSESSMENT CRITERIA**

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| --- | --- | --- | --- | --- |
| Grade | GPA Equivalent | Percentage | Traditional Grade | Criteria |
| А | 4,0 | 95-100 | Excellent | Complete understanding and justification of the problem's relevance. Full command and comprehension of the physical and mathematical problem statements, research methodology, accuracy of research, comprehensive analysis of results, justified conclusions, and report formatting meeting all requirements. |
| А- | 3,67 | 90-94 |
| В+ | 3,33 | 85-89 | Good | Significant understanding and justification of the problem's relevance. Strong command of the physical and mathematical problem statements, methodology, and research, with a limited analysis of results and conclusions. Report formatting meets requirements. |
| В | 3,0 | 80-84 |
| В- | 2,67 | 75-79 |
| С+ | 2,33 | 70-74 | Satisfactory | Limited understanding and justification of the problem's relevance. Weak comprehension of the physical and mathematical problem statements, incorrect research methodology, incomplete analysis, unsubstantiated conclusions, and lack of logical flow. Report formatting does not meet requirements. |
| С | 2,0 | 65-69 |
| С- | 1,67 | 60-64 |
| D+ | 1,33 | 55-59 |
| D- | 1,0 | 50-54 |
| FX | 0,5 | 25-49 | Unsatisfactory | Complete lack of problem understanding and research accuracy. Report formatting does not meet requirements. |
| F | 0 | 0-24 | Unsatisfactory | Violation of final control regulations. |
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**Lecturer Aziz Kudaikulov**