Program MidtermExam

on the discipline « **Selected chapters of the theoretical physics**» for undergraduates

1courses of specialty «5B060400 – Physics »

The proposed MidtermExam program on discipline « **Selected chapters of the theoretical physics** » is made according to the discipline syllabus. The program determines the requirements for the levels of mastering the academic discipline: what the student should have *an idea* after studying the course for 7 weeks, which should know what *skills* and *habits* should be formed.

At MidtermExam, students will be asked two theoretical questions and one task.

Midterm addresses the following questions:

1. Laws of Thermodynamics.
2. Thermodynamic Potentials.
3. Operators and inverse operators, the uncertainty principle and the principle of superposition, matrices.
4. Schrödinger equation, flux density, linear oscillator, potential box, the transmission coefficient.
5. Energy and momentum.
6. Transformation matrices, matrix density.
7. Angular momentum, eigenvalues and eigen functions, parity states.
8. Motion in a centrally symmetric field.
9. Spherical coordinates, decomposition in plane waves.
10. Electrostatic and Gravitational Fields.
11. Conductors, Semiconductors, Isolators.
12. Gauss's Law for Electric Fields.
13. Gauss's Law for Magnetism.
14. Maxwell's Equations.
15. Lorentz Force.
16. Fields in a Medium.
17. Magnetic Properties.
18. Diamagnetism, Paramagnetism and Ferromagnetism.
19. Phase Transitions, Spontaneous Symmetry Breaking.
20. Black Body Radiation.
21. Dispersion of Light.
22. Reflection and Refraction.
23. Wave Function.
24. Operators and States in Quantum Mechanics.
25. Harmonic Oscillator. Ladder Operators.

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Basic:

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