**Program of the**

**final control of the course «5B070200 - Automation and Control»**

**for the 2020-2021 academic year**

**Faculty of Information Technology**

**Department Artificial Intelligence & Big Data Code and name of the educational program:**

**Discipline name:** Electronics

***Course*** 3

**Lecturer: Zhandos Dosbayev M.**

**The form** of the final control of the academic discipline – written traditional (topics should be included: SRO, seminars)

**Platform:** Univer System.

**STUDENT ACTIONS DURING THE EXAM**

1. In a browser (Google Chrome is recommended) open the page https: /univer.kaznu.kz/

2. Using your username and password, enter the Univer system (the username and password are received in the IS Univer).

3. In the section "Bachelor" Login - this is your login to enter the Univer system.

**ATTENTION**. You can work with the program from a mobile device or computer.

**WITHOUT ACCESS TO THE MICROPHONE AND THE CAMERA, THE EXAM CANNOT BE PASSED.**

7. In the displayed list, to start the exam, double-click on its name with the left mouse button.

8. Grant access to the camera and microphone, as well as screen recording. Following the instructions on the screen, go through the identification (bring your head closer, turn it to the left, then to the right).

9. After passing the identification, you must read the description for the exam. The description indicates the duration of the exam and the materials allowed.

10. After clicking on the "start" button, you can start passing the exam.

• The answer is made by entering text from the keyboard into the program editor.

A handwritten response form on a piece of paper is NOT PROVIDED.

• You can answer the questions in any order.

• To send an answer, you must press the "Send" button for each question.

• You can make changes to already submitted answers throughout the exam.

11. Click the Finish button to "complete" the exam. Once the exam time has ended or you clicked the Finish button, you cannot edit the answers.

**Requirements for passing the exam:**

- according to the schedule;

- the originality of the student's answer must be 70%. At 69% and below, the exam is not allowed.

**Exam description:**

The duration of the written examination is 2 hours.

If the description does not indicate additional materials, then:

- you can use only a keyboard and a mouse for working in the editor of the "System Univer" program;

- it is forbidden to open other tabs, run other programs, use objects, including dictionaries, books, textbooks, drafts, calculators, e-books, etc.

- it is forbidden to use any additional technical means (phones, gadgets, personal computers, laptops) except for the main one, on which the exam is taken.

- the answer is made by entering text from the keyboard into the program editor;

- you can answer the questions in any order.

- if the use of unauthorized materials or other prompts to students is found, or identification marks (such as the student's name, special symbols and designations) are left in the student's work, the exam may be canceled.

To send an answer, you must press the "Send" button for each question.

You can make changes to already submitted answers throughout the exam.

The exam ends after clicking the "Finish" button.

**IMPORTANT NOTES**

1. It is recommended to press the "Send" button more often to save the typed text.

2. If you have problems with the Internet, you can re-enter the program and continue the exam. In this case, no additional time is given. The maximum absence time from the exam for technical reasons is 20 minutes. If it is exceeded, a decision will be made to cancel the work or postpone the exam to another day, depending on the circumstances.

3. If the exam time is up and you did not have time to submit your answer, an empty answer will be sent.

4. the exam records the absence of you behind the device or averting your gaze to the side of the screen. Therefore, if there is an urgent need for such actions, you should loudly and clearly state the reason. The decision to fix the violation will be made by the inspector based on video recording.

5. Written responses are checked for plagiarism;

Maintain academic integrity.

**IMPORTANT** During the examination, only the examinee must be in the room. Unauthorized persons do not have the right to prompt, being in the room, or to prompt remotely.

**IMPORTANT** - the exam will be accompanied by proctoring. The given mark may be canceled if, after watching the video recording of the passing of the exam, the proctor reveals violations of the rules.

**MORE DETAILED INSTRUCTIONS FOR STUDENTS**

available on the website of KazNU named after al-Farabi by reference

[**https://www.kaznu.kz/content/files/pages/folder22185/app.oqylyq.kz%20%D1%81%D1%82%D1%83%D0%B4%D0%B5%D0%BD%D1%82%D1%8B%20%D1%80%D1%83%D1%81.pdf**](https://www.kaznu.kz/content/files/pages/folder22185/app.oqylyq.kz%20%D1%81%D1%82%D1%83%D0%B4%D0%B5%D0%BD%D1%82%D1%8B%20%D1%80%D1%83%D1%81.pdf)

**Assessment criteria (Assessment scale):**

|  |  |  |  |
| --- | --- | --- | --- |
| «**excellent**» | А | 4,0 | 95-100 |
| А- | 3,67 | 90-94 |
| «good» - | В+ | 3,33 | 85-89 |
| В | 3,0 | 80-84 |
| В- | 2,67 | 75-79 |
| С+ | 2,33 | 70-74 |
| «satisfactorily» - | С | 2,0 | 65-69 |
| С- | 1,67 | 60-64 |
| D+ | 1,33 | 55-59 |
| D- | 1,0 | 50-54 |
| «unsatisfactory» - | FX | 0,5 | 25-49 |
| F | 0 | 0-24 |

**Topics for which the exam questions were drawn up (program)**

1. Semiconductors. Basic elements of electronics.
2. Doping. Density of carriers.
3. Electron-hole p-n junction. Basic physical processes.
4. The forward and reverse bias of the p-n junction.
5. Diffusion and drift currents.
6. Classification of semiconductor diodes.
7. Stabilitron and stabilistor, varicap, Schottky diode, inverted diode, emitting diodes, tunnel diodes, photodiode.
8. Symbols, IV characteristic and main parameters of a semiconductor diodes.
9. Rectifiers. Classification of rectifiers.
10. Classification of transistors.
11. The principle of operation and modes of operation. Schemes of connection, basic parameters and characteristics.
12. Bipolar junction transistors. Switching connections of BJT.
13. Classification, arrangement and principle of operation of field-effect transistors. Switching circuits, basic parameters and static characteristics.
14. Electric signal amplifiers. Classification, basic parameters and characteristics of amplifiers.
15. Feedback in amplifiers.
16. Generators of sinusoidal oscillations.
17. Secondary power sources. Block diagrams and properties.
18. Generators on logical elements.
19. Smoothing filters.
20. Digital and linear integrated circuits. Classification, schemes andworking principles.
21. Drawing the circuits and perform measurements on the Electronic Workbench program.
22. Calculating the parameters of semiconductor devices

**LIST OF RECOMMENDED LITERATURE**

**1.** Wiley Razavi. Fundamentals of Microelectronics. Preview edition, 834 pages, 2008.

**2.** Adel S. Sedra, Kenneth C. Smith, Microelectronic circuits. Fifth edition, New York Oxford, Oxford University Press, 2009.

**3.** Richard C.Jaeger, Travis N. Blalock, Microelectronic circuit design. Fourth edition, McGraw-Hill,2008.

4. Belov, N.V. Electrical Engineering and Electronics Basics: Textbook / N.V. Belov, Yu.S. Volkov. - St. Petersburg: Doe, 2012 .—432

5. Borisov, Yu.M. Electrical Engineering: Textbook / Yu.M. Borisov. - St. Petersburg: BHV, 2014 .-- 592 .