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METHODS OF DEVELOPING STUDENTS' INDEPENDENT WORK IN PRACTICAL CLASSES

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Abstract
This article contains recommendations for independent work of electrical engineering students.

Keywords: student, independent work, method, practical lesson, knowledge.

Introduction

The content of each academic discipline is focused on a specific teaching technology and a set of educational and methodological materials developed to support its study. At present, in some academic disciplines, the volume of classroom lessons is decreasing, in connection with which the role of independent work of students has increased.

In our opinion, independent work of students is an integral part of the educational process under the guidance and control of a teacher, during which creative activity is carried out to acquire and consolidate knowledge. As a result of the successful completion of independent work, cognition skills are mastered, a scientific worldview and personal beliefs are formed on the use of the acquired knowledge and skills in practical activities [1].

Methods

On the basis of the state educational standard, the time for conducting practical classes, organizing independent work of students has been increased, with a corresponding reduction in the time for lecturing. This requires the creation of conditions that ensure its effectiveness. Independent work of tens of thousands of students, many of whom are not yet accustomed to its implementation and do not have the skills to search for the necessary information, must be carried out under the guidance of teachers and be guided by them.

In addition, students must be provided with educational and methodological and reference materials. Both printed and electronic versions of training manuals for practical exercises should be prepared. It is necessary to develop and implement a

reasonable system for recording the quality of independent work in the semester when setting a rating score for a discipline [2].

We are given that it is impossible to underestimate the need for independent work of students during the educational process in practical classes, as well as to absolutize it when working outside of school hours, say, when doing individual homework. We have for students in the areas of "Vocational Education" a lot of emphasis is placed on solving problems, exercises, drawing up various diagrams, graphs. Such a differentiated approach contributes to the deepening of knowledge in the preparation of highly qualified engineering teachers [3].

Results and Discussion

For the course "Electrical Engineering" for the training of specialists in non-energy specialties, limited hours are allocated. This requires the active organization of independent work, based on the degree of readiness for it of each student. It is necessary to build a system of tasks so that in the end the student has the opportunity to really assess his knowledge, and the teacher, determining it, should provide advisory assistance to each student in the development of his independent work. As soon as they are ready for independent work, the function of control on the part of the teacher is replaced by various forms of self-control. As a result, from the initial direct guidance of the teacher, the student begins to move to self-management of his own activities.

At the course "Electrical Engineering" for students of non-energy specialties, we developed and introduced into the educational process a collection of tasks and assignments based on didactic materials, i.e. diagrams, drawings and graphs.

When compiling tasks, the following principles and methods were chosen:

1. The tasks of all tasks should be presented only in diagrams and drawings.
2. The condition of the problem is not given in clear text, but the student has the opportunity to draw it up on the basis of the scheme and electrical data.
3. The definition of electrical quantities based on the alphabetic and graphical values in the diagrams is proposed.
4. Each task consists of 5 differentiated tasks, this will enable students to self-assess their knowledge.

In the classroom, the "method of microgroups" of 5-6 people is used, they are given the same type of tasks on cards, after a certain time, a presentation of each microgroup is carried out, its discussion and self-assessment of the activities of the microgroup and students in microgroups. Such a strategy of pedagogical technologies contributes to the development of independence, scientific thinking and speech of students,

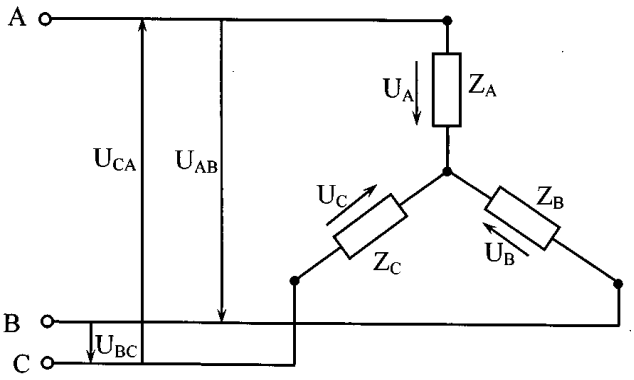
allows you to test their knowledge, in connection with which it acts as an important means of sufficiently prompt feedback.

Each problem was designed to cover important issues of the topic and, if possible, the mathematical calculations were concise. All tasks were solved in advance and methodically processed by us, and only their answers are presented to students.

It should be emphasized that the prepared didactic tasks do not play the role of a test for knowledge control, since they are intended for the development of the cognitive process. At the same time, in this case, a methodological task is also fulfilled: without understanding the electrical circuit, the student cannot solve any presented problem.

Let's give some examples from the tasks.

1. Calculation of three-phase networks:



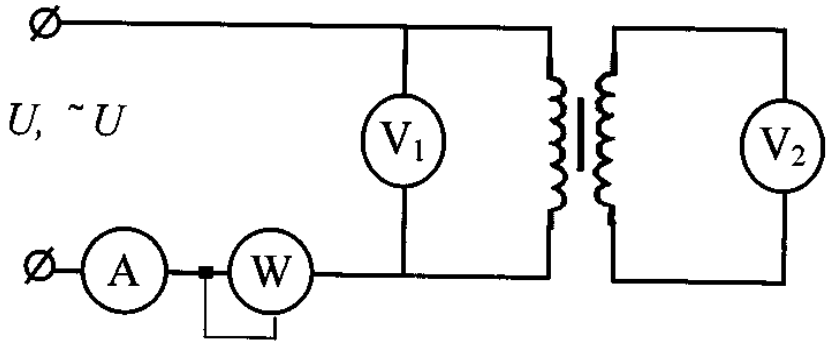
Electrical data for scheme-1:

R \u003d 16 Ohm - active resistance of each of the three consumers;
X_L \u003d 12 Ohm - inductive resistance;
$R_f = 1.2 \cdot 10^3$ W - active power of one phase.

Tasks for scheme-1:

1. Determine the phase impedance.
2. Determine the phase power factor.
3. Calculate the phase voltage.
4. Determine the phase current.
5. Calculate total power.

2. Calculation of transformer parameters.



Electrical data for scheme-2 :
S н \u003d 15 k B · A - transformer power;
U ₁ \u003d 3 V - voltage of the DC network;
I ₁ \u003d 25 A - ammeter reading at U₁.

DC networks U and AC ~ U are connected in turn.

U н \u003d 220 V - AC voltage, where f =50Hz;
I x \u003d 6 A - ammeter indicator at idle;
P x \u003d 90 W - wattmeter reading at idle;
U ₂ \u003d 36 V - voltmeter reading V ₂ .

Tasks for scheme-2:

1. Determine the active resistance - R ₁ of the primary winding.
2. Calculate the impedance - Z ₁ of the primary AC winding.
3. Determine the inductive reactance - X ₁ of the primary winding.
4. Calculate the power loss - P ₁ of the primary winding at idle and the power loss in the steel (core) - P c .
5. Determine the rated current - I ₁ н of the primary winding and the power loss - P ₁ н of the primary load at rated load.

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