FORMATION OF ELECTRICAL ENGINEERING AS A SCIENCE AND ACADEMIC DISCIPLINE

Pazilova Shokhida Abdulbasitovna
Academy of the Armed Forces of the Republic of Uzbekistan
Associate Professor of the Department of Natural Sciences, PhD
E-mail: shohida.pazilova.70@gmail.com

ABSTRACT

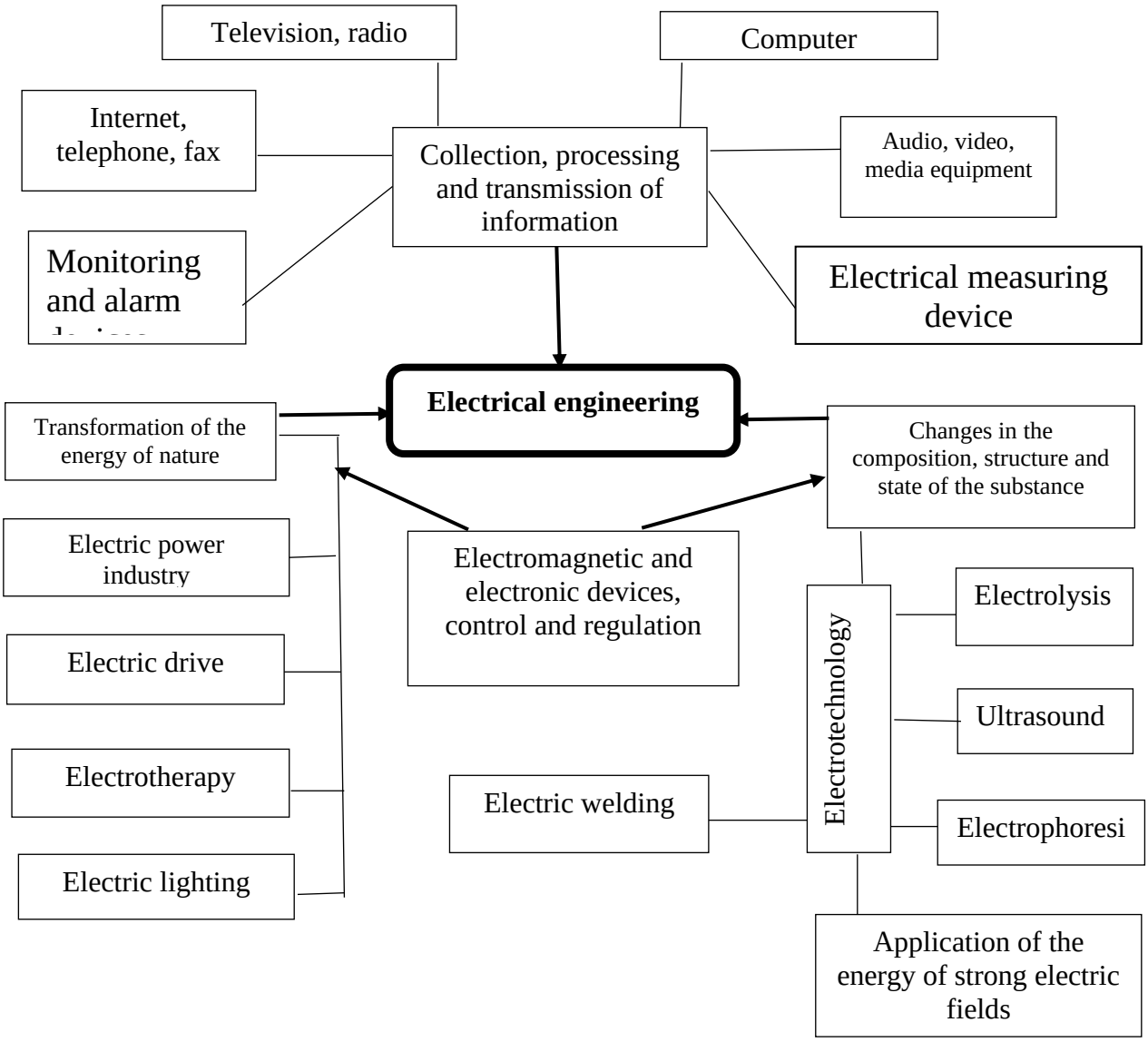
This article discusses the development and formation of electrical engineering as a science and academic discipline. It also tells about how extremely important electrical installations have become in the life of modern society, in which electrical and magnetic phenomena are used to implement a variety of technological processes.

Keywords: electrical engineering, electrical phenomena, transformation, energy source, electrical equipment, electronic devices, electric drive, magnetic phenomena.

INTRODUCTION

The development of electrical engineering clearly defines the close relationship of scientific and technical problems with social, economic, environmental and other tasks of modern society. The scope of application of electric energy in various fields of production and technology, informatization and ecology, social and household sphere has expanded. Electrical engineering in the broad sense of the word is usually understood as a field of science and technology that uses electrical and magnetic phenomena for practical purposes. This or a similar definition is given in many reference publications, as well as in educational literature. This definition is very general, depending on the current state of development of electrical engineering, it is necessary to specify it. To do this, it is possible to combine all electrical devices through which electrical and magnetic phenomena are used in three main directions: the transformation of the energy of nature; the transformation of the substance of nature; the receipt and transmission of information. Then these three main branches of electrical engineering can be respectively called: energy, technology and information. The first direction is related to the receipt, transmission, distribution and conversion of energy, therefore, in electrical engineering, sources of electrical energy obtained from mechanical, chemical, thermal, light and some other types of energy are studied; receivers of electrical energy that form electrical energy into the listed types of energy, as well as converters of one type of electrical energy into another: transformers rectifiers, frequency converters, etc.

The electric power industry is one of the foundations of the development of modern human society. The level of production and consumption of energy in general, including electric energy, largely characterizes the level of development of society, determines the pace of scientific, technical and economic growth.



Intensive use of electric energy is associated with its advantages over other types of energy: the possibility of fairly easy conversion into other types of energy; the possibility of centralized and economical production at various power plants; simplicity and cost-effectiveness of transmission to consumers over long distances. The problems of energy resources reserves, as well as environmental issues of electric energy production by existing traditional methods require the development of fundamentally new sources of electricity. In the foreseeable future, thermal power

plants will remain one of the main ones, therefore, improving their design, improving the thermodynamic cycle, increasing the efficiency of work is now a very important and urgent task. New prospects in the development of electrical equipment are outlined when using the phenomenon of superconductivity in cryogenic devices. One of the most important directions of increasing the efficiency of electrification of production processes is the use of electrical equipment and electronic devices and devices with the use of microprocessor tools and microcomputers. Electrical installations, in which electrical and magnetic phenomena are used to carry out various technological processes – changes in the shape, composition and transformations of the substance of nature, have become extremely important in the life of modern society.

Technological processes carried out by electrical methods are included in the concept of "electrotechnology" and they include: electrothermal processes in which the thermal effect of current is used for melting, changing material properties, evaporation, etc.; electrochemical methods of processing and obtaining materials, for example, electrolysis, electroplating; electrophysical processing methods, where thermal and mechanical effects are used on the material (electroerosion), magnetic pulse, electric explosion); Electroaerosol technology, where charged particles are used for processing the material, formed and directed by the energy of strong electric fields. The transition to electrotechnological processes ensures the quality of products, allows in many cases to carry out such operations and obtain materials that cannot be carried out in any other way, improve sanitary working conditions and reduce harmful effects on the environment.

Traditional methods of electrical technology based on the thermal and chemical effects of current, which were widely used earlier, have now proved insufficient to meet the requirements of modern practice. It was only on the basis of the latest achievements in electrophysics, electrical engineering and electronics that it was possible to develop new electrotechnological methods using strong electric fields and correspondingly high electrical voltages. Modern energy and technological processes take place at speeds, pressures, mechanical stresses and temperatures, so that control and control over them can be carried out only through systems of automatically operating devices and devices, among which the leading role belongs to electrical and electronic devices: automatic control and control of various processes provides for the receipt and transmission of a system of signals and information and their appropriate processing. In this regard, it is important to master and use electrical and electronic measuring devices, amplifiers, pulse and digital electronic devices, and microprocessors. Advances in electrical measurement technology have allowed the development of effective methods for converting non-electrical quantities and the creation of electrical devices for monitoring, controlling and regulating thermal

processes and physical quantities. In the process of obtaining and applying electrical energy, electromechanical, thermal, electrochemical, electronic and ionization converters are widely used with the help of which temperature, velocity, concentration and density of gas and liquid media are measured, remote measurement and recording of mechanical stresses in structural parts, vibrations, etc. is carried out.

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CONCLUSION

Advances in electrical measurement technology have allowed the development of effective methods for converting non-electrical quantities and creating electrical devices for monitoring, controlling and regulating thermal processes and physical quantities. In the process of obtaining and applying electrical energy, electromechanical, thermal, electrochemical, electronic and ionization converters are widely used, with the help of which temperature, velocity, concentration and density of gas and liquid media are measured, remote measurement and recording of mechanical stresses in structural parts, vibrations, etc. is carried out. In connection with the further development of electronics, information theory and control machines, automatic high-speed computers are increasingly being introduced to solve complex mathematical problems and automate process control, new discrete electronic devices, microprocessors and microcomputers are being created. The information direction of electrical engineering plays an important role in the generation and transmission of electricity. For example, to ensure the functioning of a powerful power unit, it is necessary to control up to 1000 variables, of which about 100 must have highly reliable automatic stabilization. Electrical and magnetic phenomena are widely used in all the mentioned devices and processes.

Summarizing all of the above, we can give the following definition of the content of the concept of "electrical engineering".

Electrical engineering is a field of science and technology that uses electrical and magnetic phenomena to carry out the processes of converting the energy of nature and transformations of matter, as well as to receive and transmit information.

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