

# «ELECTRIC DRIVE THEORY»

## ANNOTATION

### TO THE CURRICULUM OF THE INSTITUTION OF HIGHER EDUCATION

Specialty: 1-53 01 05 «Automated electric drives»

	Form of higher education		
	Full-time	Part-time	Part-time (shortened program)
Course	<b>3</b>	<b>3</b>	<b>3</b>
Semester	5, 6	6, 7	5, 6
Lectures, hours	68	4 уст + 8	4 уст + 8
Laboratory classes, hours	68	12	12
Practical classes (seminars), hours	32	8	8
Course project, semester	6	7	6
Classroom examination (semester, hours)		6/(2 часа) 7/(2 часа)	
Pass/fail, semester	7	8	7
Exam, semester	5, 6	6,7	5,6
Contact hours (Classroom hours per academic discipline)	168	36	32
Independent study, hours	72	204	208
Total course duration in hours / credit units	240 / 6		

#### 1. Brief content of the discipline

The purpose of studying the discipline "Theory of Electric Drive" is to study by students the basic laws of electromechanical energy conversion, methods for studying the mechanical properties of electric drives and electric motors and calculating their characteristics in steady and transient conditions, methods for choosing electric motors for production machines and mechanisms, and evaluating their energy indicators, principles of regulation of the coordinates of the electric drive.

#### 2. Learning outcomes

As a result of mastering the academic discipline, the student should

know: physical properties, mathematical description and block diagrams of the mechanical part of the electric drive; patterns of electromechanical energy conversion; characteristics and properties of DC motors, asynchronous and synchronous motors; indicators for assessing the quality of the dynamics of a single- and two-mass electric drive system; reasons for the appearance of power and energy losses in the electric drive and methods for their reduction; nominal modes of operation and methods for selecting the power of electric motors; ways to control the speed and torque of the electric drive, methods and evaluation of these methods; transformation of mechanical energy parameters with the help of transmission mechanisms; energy ratios in the power channel of the electric drive; features of electromechanical and mechanical transient processes; methods for calculating electromechanical and mechanical transients in an electric drive;

be able to: be able to: calculate the parameters of the mechanical part of the electric drive; draw up design schemes for single- and multi-mass models of the electric drive; calculate the indicators of transient processes of the electric drive and compare them with technological requirements; determine the energy performance of the electric drive; calculate the required engine power and select engines from the catalog; evaluate ways to control the speed and torque of the electric drive; compose mathematical models of a generalized electric machine in the corresponding coordinate system; perform coordinate and phase transformations of the equations of a generalized electric machine; calculate the transient processes of the electric drive for a given type of control or disturbing influences; calculate and build load diagrams of the mechanism and electric drive;

possess: experience in calculating the static and dynamic characteristics of electric motors and drives of alternating and direct current; methods of analysis of static and dynamic modes of operation of electromechanical energy converters; skills in the calculation and selection of electric motors in terms of power for the main production mechanisms; skills in simulation modeling of the main dynamic modes of operation of AC and DC electric drives.

#### 3. Formed competencies

Mastering this academic discipline should ensure the formation of the following competencies:

Codes of competencies to be formed	Names of competencies to be formed
BPK-12	Own the methodology for calculating the required characteristics of the electric drive, be able to choose technical means and develop a control scheme for the electric drive.

4. Requirements and forms of current and intermediate certification: defense of laboratory work, defense of an individual assignment, test, defense of a course project, exam.