



EESTI LENNUAKADEEMIA

## Õppematerjalide ajakohasuse protokoll 2023/2024 õppeaasta

Õppematerjal on vastavuses Eesti Lennuakadeemia õppeprogrammile (MTOE 4.2.0, 4.2.1, 4.2.2, 4.2.3), Euroopa Komisjoni regulatsiooni Osa-66 liitega I.

**Mooduli nr:** Moodul 3

**Õppematerjali nimetus:** AIRCRAFT TECHNICAL BOOK (ATB) MODULE 3 - ELECTRICAL FUNDAMENTALS FOR B1 & B2 CERTIFICATION

**Lisainfo:** Aircraft Technical Book (ATB) paber kandjal ja e-raamatuna (B1, B2 kategooria)

**Õppematerjali pealkiri:** AIRCRAFT TECHNICAL BOOK (ATB) MODULE 3 - ELECTRICAL FUNDAMENTALS FOR B1 & B2 CERTIFICATION

**Revisjoni number:** 1

**Kasutusperiood:** september 2023 – september 2024

Heaks kiidetud veebikeskkond distantõppe läbiviimiseks

Zoom (<https://zoom.us/>)

Google Classroom ([classroom.google.com](https://classroom.google.com))

Protokolli koostamise kuupäev: 02.08.2023

MTO koolitusjuht: Madis Parv  
(allkirjastatud digitaalselt)

## ÕPPEMATERJALI VASTAVUSHINDAMISE KONTROLL-LEHT

Mooduli nr. ja nimetus: Module 3 Electrical Fundamentals	Tase			Õppematerjali vastavus Osa-66 Lisa III mooduli programmile
	A	B1	B2	
<b>3.1 Electron Theory</b>  <i>Structure and distribution of electrical charges within: atoms, molecules, ions, compounds; Molecular structure of conductors, semiconductors and insulators.</i>	1	1	1	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<b>3.2 Static Electricity and Conduction</b>  <i>Static electricity and distribution of electrostatic charges; Electrostatic laws of attraction and repulsion; Units of charge, Coulomb's Law; Conduction of electricity in solids, liquids, gases and a vacuum.</i>	1	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<b>3.3 Electrical Terminology</b>  <i>The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.</i>	1	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<b>3.4 Generation of Electricity</b>  <i>Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.</i>	1	1	1	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<b>3.5 DC Sources of Electricity</b>  <i>Construction and basic chemical action of: primary cells, secondary cells, lead acid cells, nickel cadmium cells, other alkaline cells; Cells connected in series and parallel; Internal resistance and its effect on a battery; Construction, materials and operation of thermocouples; Operation of photo-cells.</i>	1	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<b>3.6 DC Circuits</b>  <i>Ohms Law, Kirchoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage and current; Significance of the internal resistance of a supply.</i>	-	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<b>3.7 Resistance/Resistor</b>  <i>(a) Resistance and affecting factors; Specific resistance; Resistor colour code, values and tolerances, preferred values, wattage ratings; Resistors in series and parallel; Calculation of total resistance using series, parallel and series parallel combinations; Operation and use of potentiometers and rheostats; Operation of Wheatstone Bridge;</i>	-	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta

<p>(b) Positive and negative temperature coefficient conductance;  Fixed resistors, stability, tolerance and limitations, methods of construction;  Variable resistors, thermistors, voltage dependent resistors;  Construction of potentiometers and rheostats;  Construction of Wheatstone Bridge.</p>				
<p><b>3.8 Power</b></p> <p>Power, work and energy (kinetic and potential);  Dissipation of power by a resistor;  Power formula;  Calculations involving power, work and energy.</p>	-	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<p><b>3.9 Capacitance/Capacitor</b></p> <p>Operation and function of a capacitor;  Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric constant, working voltage, voltage rating;  Capacitor types, construction and function;  Capacitor colour coding;  Calculations of capacitance and voltage in series and parallel circuits;  Exponential charge and discharge of a capacitor, time constants;  Testing of capacitors.</p>	-	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<p><b>3.10 Magnetism</b></p> <p>(a) Theory of magnetism;  Properties of a magnet;  Action of a magnet suspended in the Earth's magnetic field;  Magnetisation and demagnetisation;  Magnetic shielding;  Various types of magnetic material;  Electromagnets construction and principles of operation;  Hand clasp rules to determine: magnetic field around current carrying conductor;</p> <p>(b) Magnetomotive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents;  Precautions for care and storage of magnets.</p>	-	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<p><b>3.11 Inductance/Inductor</b></p> <p>Faraday's Law;  Action of inducing a voltage in a conductor moving in a magnetic field;  Induction principles;  Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductor turns;  Mutual induction;  The effect the rate of change of primary current and mutual inductance has on induced voltage;  Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other;  Lenz's Law and polarity determining rules;  Back emf, self induction;</p>	-	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta

<i>Saturation point; Principle uses of inductors.</i>				
<b>3.12 DC Motor/Generator Theory</b>  <i>Basic motor and generator theory; Construction and purpose of components in DC generator; Operation of, and factors affecting output and direction of current flow in DC generators; Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors; Series wound, shunt wound and compound motors; Starter Generator construction.</i>	-	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<b>3.13 AC Theory</b>  <i>Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power; Triangular/Square waves; Single/3 phase principles.</i>	1	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<b>3.14 Resistive (R), Capacitive (C) and Inductive (L) Circuits</b>  <i>Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel; Power dissipation in L, C and R circuits; Impedance, phase angle, power factor and current calculations; True power, apparent power and reactive power calculations.</i>	-	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<b>3.15 Transformers</b>  <i>Transformer construction principles and operation; Transformer losses and methods for overcoming them; Transformer action under load and no-load conditions; Power transfer, efficiency, polarity markings; Calculation of line and phase voltages and currents; Calculation of power in a three phase system; Primary and Secondary current, voltage, turns ratio, power, efficiency; Auto transformers.</i>	-	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<b>3.16 Filters</b>  <i>Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.</i>	-	1	1	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<b>3.17 AC Generators</b>  <i>Rotation of loop in a magnetic field and waveform produced; Operation and construction of revolving armature and revolving field type AC generators; Single phase, two phase and three phase alternators; Three phase star and delta connections advantages and uses; Permanent Magnet Generators.</i>	-	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta
<b>3.18 AC Motors</b>  <i>Construction, principles of operation and characteristics of: AC synchronous and induction motors both single and polyphase;</i>	-	2	2	<input checked="" type="checkbox"/> Kontrollitud, vastab <input type="checkbox"/> Kontrollitud, ei vasta

<i>Methods of speed control and direction of rotation; Methods of producing a rotating field: capacitor, inductor, shaded or split pole.</i>				
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**OTSUS:**

Õppematerjal **vastab** kehtiva määruse Osa-66 Lisa III I liite mooduli programmile.

Õppematerjali vastavuse kontrollis ja kinnitas:

MTO koolitusjuht:           Madis Parv  
  /*allkirjastatud digitaalselt*/

Kuupäev: 02.08.2023