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 15
Õppematerjali nimetus: INTERNATIONAL CENTRE FOR AEROSPACE TRAINING (ICAT) MODULE 15 - GAS TURBINE ENGINE
Lisainfo: International Centre for Aerospace Training (ICAT) paberkandjal ja e-raamatuna (A, B1 kategooria)
Õppematerjali pealkiri: INTERNATIONAL CENTRE FOR AEROSPACE TRAINING (ICAT) MODULE 15 - GAS TURBINE ENGINE
Revisjoni number: 1
Kasutusperiood: september 2023 – september 2024

Heaks kiidetud veebikeskkond distantsõppe läbiviimiseks	Zoom (https://zoom.us/)
	Google Classroom (classroom.google.com)

Protokolli koostamise kuupäev: 02.08.2023

MTO koolitusjuht: Madis Parv
(allkirjastatud digitaalselt)

ÕPPEMATERJALI VASTAVUSHINDAMISE KONTROLL-LEHT

Mooduli nr. ja nimetus: **Module 15 Gas Turbine Engine**	**Tase**		**Õppematerjali vastavus Osa-66 Lisa III mooduli programmile**
	A	**B1**	
15.1 Fundamentals *Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle;* *The relationship between force, work, power, energy, velocity, acceleration;* *Constructional arrangement and operation of turbojet, turbofan, turboshaft, turboprop.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.2 Engine Performance *Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption;* *Engine efficiencies;* *By-pass ratio and engine pressure ratio;* *Pressure, temperature and velocity of the gas flow;* *Engine ratings, static thrust, influence of speed, altitude and hot climate, flat rating, limitations.*	-	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.3 Inlet *Compressor inlet ducts* *Effects of various inlet configurations;* *Ice protection.*	2	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.4 Compressors *Axial and centrifugal types;* *Constructional features and operating principles and applications;* *Fan balancing;* *Operation:* *Causes and effects of compressor stall and surge;* *Methods of air flow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades;* *Compressor ratio.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.5 Combustion Section *Constructional features and principles of operation.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.6 Turbine Section *Operation and characteristics of different turbine blade types;* *Blade to disk attachment;* *Nozzle guide vanes;* *Causes and effects of turbine blade stress and creep.*	2	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.7 Exhaust *Constructional features and principles of operation;* *Convergent, divergent and variable area nozzles;* *Engine noise reduction;* *Thrust reversers.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.8 Bearings and Seals *Constructional features and principles of operation.*	-	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.9 Lubricants and Fuels	1	2	☑Kontrollitud, vastab

Properties and specifications; *Fuel additives;* *Safety precautions.*			☐Kontrollitud, ei vasta
15.10 Lubrication Systems *System operation/lay-out and components.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.11 Fuel Systems *Operation of engine control and fuel metering systems including electronic engine control (FADEC);* *Systems lay-out and components.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.12 Air Systems *Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.13 Starting and Ignition Systems *Operation of engine start systems and components;* *Ignition systems and components;* *Maintenance safety requirements.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.14 Engine Indication Systems *Exhaust Gas Temperature/Interstage Turbine Temperature;* *Engine Thrust Indication: Engine Pressure Ratio, engine turbine discharge pressure or jet pipe pressure systems;* *Oil pressure and temperature;* *Fuel pressure and flow;* *Engine speed;* *Vibration measurement and indication;* *Torque;* *Power.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.15 Power Augmentation Systems *Operation and applications;* *Water injection, water methanol;* *Afterburner systems.*	-	1	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.16 Turbo-prop Engines *Gas coupled/free turbine and gear coupled turbines;* *Reduction gears;* *Integrated engine and propeller controls;* *Overspeed safety devices.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.17 Turbo-shaft Engines *Arrangements, drive systems, reduction gearing, couplings, control systems.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.18 Auxiliary Power Units (APUs) *Purpose, operation, protective systems.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.19 Powerplant Installation *Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.20 Fire Protection Systems *Operation of detection and extinguishing systems.*	1	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta
15.21 Engine Monitoring and Ground Operation	1	3	☑Kontrollitud, vastab

Procedures for starting and ground run-up; *Interpretation of engine power output and parameters;* *Trend (including oil analysis, vibration and boroscope) monitoring;* *Inspection of engine and components to criteria, tolerances and data specified by engine manufacturer;* *Compressor washing/cleaning;* *Foreign Object Damage.*			☐Kontrollitud, ei vasta
15.22 Engine Storage and Preservation *Preservation and depreservation for the engine and accessories/systems.*	-	2	☑Kontrollitud, vastab ☐Kontrollitud, ei vasta

OTSUS:
Õppematerjal **<u>vastab</u>** 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