

Module 15

Gas Turbine Engine

	Level		
	A	B1	B2
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 & operation of turbojet, turbofan, turboshaft, turboprop.	1	2	-
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 & engine pressure ratio; Pressure, temperature & velocity of the gas flow; Engine ratings, static thrust, influence of speed, altitude & hot climate, flat rating, limitations.	-	2	-
15.3 Inlet Compressor inlet ducts; Effects of various inlet configurations; Ice protection.	2	2	-
15.4 Compressors Axial & centrifugal types; Constructional features & operating principles & applications; Fan balancing; Operation; Causes & effects of compressor stall & surge; Methods of air flow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades; Compressor ratio.	1	2	-
15.5 Combustion Section Constructional features & principles of operation.	1	2	-
15.6 Turbine Section Operation & characteristics of different turbine blade types; Blade to disk attachment; Nozzle guide vanes; Causes & effects of turbine blade stress & creep.	2	2	-
15.7 Exhaust Constructional features & principles of operation; Convergent, divergent & variable area nozzles; Engine noise reduction; Thrust reversers.	1	2	-
15.8 Bearings & Seals Constructional features & principles of operation.	-	2	-
15.9 Lubricants & Fuels Properties & specifications; Fuel additives; Safety precautions.	1	2	-
15.10 Lubrication Systems System operation/layout & components.	1	2	-
15.11 Fuel Systems Operation of engine control & fuel metering systems including electronic engine control (FADEC); Systems layout & components.	1	2	-
15.12 Air Systems Operation of engine air distribution & anti-ice control systems, including internal cooling, sealing & external air services.	1	2	-
15.13 Starting & Ignition Systems Operation of engine start systems & components; Ignition systems & components; Maintenance safety requirements.	1	2	-

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15.14 Engine Indication Systems Exhaust Gas Temperature/Interstage Turbine Temperature; Engine Thrust Indication: Engine Pressure Ratio, engine turbine discharge pressure or pipe pressure systems; Oil pressure & temperature; Fuel pressure & flow; Engine speed; Vibration measurement & indication; Torque; Power.	1	2	-
15.15 Power Augmentation Systems Operation & applications; Water injection, water methanol; Afterburner systems.	-	1	B2
15.16 Turbo-prop Engines Gas coupled/free turbine & gear coupled turbines; Reduction gears; Integrated engine & propeller controls; Overspeed safety devices.	1	2	B2
15.17 Turbo- shaft Engines Arrangements, drive systems, reduction gearing, couplings, control systems.	1	2	B2
15.18 Auxiliary Power Units (APUs) Purpose, operation, protective systems.	1	2	B2
15.19 Powerplant Installation Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables & rods, lifting points & drains.	1	2	B2
15.20 Fire Protection Systems Operation of detection & extinguishing systems.	1	2	B2
15.21 Engine Monitoring & Ground Operation Procedures for starting & ground run-up; Interpretation of engine power output & parameters; Trend (including oil analysis, vibration & boroscope) monitoring; Inspection of engine & components to criteria, tolerances & data specified by engine manufacturer; Compressor washing/cleaning; Foreign Object Damage.	1	3	B2
15.22 Engine Storage & Preservation Preservation & depreservation for the engine & accessories/systems.	-	2	B2

