

	LEVEL
	B2
Ignition systems and components;	
Maintenance safety requirements.	

MODULE 15. GAS TURBINE ENGINE

	LEVEL	
	A	B1
15.1 Fundamentals	1	2
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.		
15.2 Engine Performance	—	2
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.		
15.3 Inlet	2	2
Compressor inlet ducts		
Effects of various inlet configurations;		
Ice protection.		
15.4 Compressors	1	2
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.		
15.5 Combustion Section	1	2
Constructional features and principles of operation.		

	LEVEL	
	A	B1
15.6 Turbine Section	2	2
Operation and characteristics of different turbine blade types;		
Blade to disk attachment;		
Nozzle guide vanes;		
Causes and effects of turbine blade stress and creep.		
15.7 Exhaust	1	2
Constructional features and principles of operation;		
Convergent, divergent and variable area nozzles;		
Engine noise reduction;		
Thrust reversers.		
15.8 Bearings and Seals	—	2
Constructional features and principles of operation.		
15.9 Lubricants and Fuels	1	2
Properties and specifications;		
Fuel additives;		
Safety precautions.		
15.10 Lubrication Systems	1	2
System operation/lay-out and components.		
15.11 Fuel Systems	1	2
Operation of engine control and fuel metering systems including electronic engine control (FADEC);		
Systems lay-out and components.		
15.12 Air Systems	1	2
Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services.		
15.13 Starting and Ignition Systems	1	2
Operation of engine start systems and components;		
Ignition systems and components;		
Maintenance safety requirements.		
15.14 Engine Indication Systems	1	2
Exhaust Gas Temperature/Interstage Turbine Temperature;		

	LEVEL	
	A	B1
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.		
15.15 Power Augmentation Systems	—	1
Operation and applications;		
Water injection, water methanol;		
Afterburner systems.		
15.16 Turbo-prop Engines	1	2
Gas coupled/free turbine and gear coupled turbines;		
Reduction gears;		
Integrated engine and propeller controls;		
Overspeed safety devices.		
15.17 Turbo-shaft Engines	1	2
Arrangements, drive systems, reduction gearing, couplings, control systems.		
15.18 Auxiliary Power Units (APUs)	1	2
Purpose, operation, protective systems.		
15.19 Powerplant Installation	1	2
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.		
15.20 Fire Protection Systems	1	2
Operation of detection and extinguishing systems.		
15.21 Engine Monitoring and Ground Operation	1	3
Procedures for starting and ground run-up;		
Interpretation of engine power output and parameters;		

	LEVEL	
	A	B1
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.		
15.22 Engine Storage and Preservation	—	2
Preservation and depreservation for the engine and accessories/systems.		

MODULE 16. PISTON ENGINE

	LEVEL		
	A	B1	B3
16.1 Fundamentals	1	2	2
Mechanical, thermal and volumetric efficiencies;			
Operating principles — 2 stroke, 4 stroke, Otto and Diesel;			
Piston displacement and compression ratio;			
Engine configuration and firing order.			
16.2 Engine Performance	1	2	2
Power calculation and measurement;			
Factors affecting engine power;			
Mixtures/leaning, pre-ignition.			
16.3 Engine Construction	1	2	2
Crank case, crank shaft, cam shafts, sumps;			
Accessory gearbox;			
Cylinder and piston assemblies;			
Connecting rods, inlet and exhaust manifolds;			
Valve mechanisms;			
Propeller reduction gearboxes.			
16.4 Engine Fuel Systems			
16.4.1 Carburettors	1	2	2
Types, construction and principles of operation;			
Icing and heating.			