Subject: MAINTENANCE PRACTICES - I

Module: 7A

SUB MODULE	TOPIC	LEVEL
7.1 Safety Precautions- Aircraft and Workshop	Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. Also, instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.	3
7.2 Workshop Practices	Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards.	3
7.3 Tools	Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods. Operation, function and use of electrical general test equipment;	3
7.4 Avionic general Test Equipment	Operation, function and use of avionic general test equipment	2
7.6 Fits and Clearances	Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist and wear; Standard methods for checking shafts, bearings and other parts.	2
7.15 Welding, Brazing, Soldering and Bonding	(a) Soldering methods; inspection of soldered joints. (b) Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints.	2 2

7.1 Safety Precautions-Aircraft and Workshop	Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. Also, instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.	3

Subject: BASIC AERODYNAMICS

Module: 8

SUB MODULE	TOPIC	LEVEL
8.1 Physics of the Atmosphere	International Standard Atmosphere (ISA), application to aerodynamics.	2
8.2 Aerodynamics	Airflow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, upwash and downwash, vortices, stagnation; The terms: camber, chord, mean aerodynamic chord, profile (parasite) drag, induced drag, centre of pressure, angle of attack, wash in and wash out, fineness ratio, wing shape and aspect ratio; Thrust, Weight, Aerodynamic Resultant; Generation of Lift and Drag: Angle of Attack, Lift coefficient, Drag coefficient, polar curve, stall; Aerofoil contamination including ice, snow, frost.	2
8.3 Theory of Flight	Relationship between lift, weight, thrust and drag; Glide ratio; Steady state flights, performance; Theory of the turn; Influence of load factor: stall, flight envelope and structural limitations; Lift augmentation.	2
8.4 Flight Stability and Dynamics	Longitudinal, lateral and directional stability (active and passive).	2

Subject: AVIATION LEGISLATION – I

Module: 10

SUB MODULE	TOPIC	LEVEL
10.1 Regulatory Framework	Role of International Civil Aviation Organization; The Aircraft Act and Rules made there under Role of the DGCA; Relationship between CAR-21, CAR-M, CAR-145, CAR-66, CAR 147The Aircraft Rules (Applicable to Aircraft Maintenance and Release)Aeronautical Information Circulars (Applicable to Aircraft Maintenance and Release) CAR Sections 1 and 2	1
10.2 CAR-66 Certifying Staff – Maintenance	Detailed understanding of CAR-66.	2
10.3 CAR-145 — Approved Maintenance Organizations	Detailed understanding of CAR-145 and CAR M Subpart F	2
10.4 Aircraft Operations	Commercial Air Transport/Commercial Operations, Air Operators Certificates; Operators Responsibilities, in particular regarding continuing airworthiness and maintenance; Documents to be carried on board; Aircraft Placarding (Markings).	2
10.6 CAR-M	Detail understanding of CAR M provisions related to Continuing Airworthiness Detailed understanding of CAR-M.	2

Subject: ELECTRICAL FUNDAMENTALS – I

Module: 3

SUB MODULE	TOPIC	LEVEL
3.1 Electron Theory	Structure and distribution of electrical charges within: atoms, molecules, ions, compounds; Molecular structure of conductors, semiconductors and insulators.	1
3.2 Static Electricity and Conduction	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.	2
3.3 Electrical Terminology	The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.	2
3.4 Generation of Electricity	Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.	1
3.5 DC Sources of Electricity	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.	2
3.6 DC Circuits	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.	2
3.7 Resistance /	(a) Resistance and affecting factors; Specific	2

Resistor	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. (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;	1
3.9 Capacitance / Capacitor	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	2
3.10 Magnetism	(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. (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.	2
3.11 Inductance/Inductor	Faraday's Law; Action of inducing a voltage in a conductor moving in a magnetic field; Induction principles; - Effects of the following on the	2

	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; Saturation point; Principle uses of inductors;	

Subject: **MATERIALS AND HARDWARE – I**

Module: **6**

SUB MODULE	TOPIC	LEVEL
6.1 Aircraft Materials — Ferrous	(a) Characteristics, properties and identification of common alloy steels used in aircraft; Heat treatment and application of alloy steels; (b) Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance.	2 1
6.2 Aircraft Materials — Non-Ferrous	(a) Characteristics, properties and identification of common non-ferrous materials used in aircraft; Heat treatment and application of non-ferrous materials; (b) Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance.	2 1
6.3 Aircraft Materials - Composite and Non- Metallic 6.3.1 Composite and non-metallic other than wood and fabric	(a) Characteristics, properties and identification of common composite and non-metallic materials, other than wood, used in aircraft; Sealant and bonding agents. (b) The detection of defects/deterioration in composite and non-metallic material. Repair of composite and non-metallic material.	2 2

6.3.2 Wooden structures	Construction methods of wooden airframe structures; Characteristics, properties and types of wood and glue used in aero planes; Preservation and maintenance of wooden structure; Types of defects in wood material and wooden structures; The detection of defects in wooden structure; Repair of wooden structure.	2
6.3.3 Fabric covering	Characteristics, properties and types of fabrics used in aero planes; Inspections methods for fabric; Types of defects in fabric; Repair of fabric covering.	2
6.4 Corrosion	(a) Chemical fundamentals; Formation by, galvanic action process, microbiological, stress; (b) Types of corrosion and their identification; Causes of corrosion; Material types, susceptibility to corrosion.	1 3

Subject: **AVIATION LEGISLATION – II**

Module: **10**

SUB MODULE	TOPIC	LEVEL
10.5 Aircraft Certification	(a) General Certification rules: such as FAA & EACS 23/25/27/29; Type Certification; Supplemental Type Certification; CAR-21 Design/Production Organization Approvals. Aircraft Modifications and repairs approval and certification Permit to fly requirements (b) Documents Certificate of Airworthiness; Certificate of Registration; Noise Certificate; Weight Schedule; Radio Station License and Approval.	1
10.7 Applicable National and International Requirements	(a) Maintenance Programme, Maintenance checks and inspections; Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists; Airworthiness Directives; Service Bulletins, manufacturers service information; Modifications and repairs; Maintenance documentation:	2

	maintenance manuals, structural repair manual, illustrated parts catalogue, etc.; (b) Continuing airworthiness; Test flights; ETOPS /EDTO , maintenance and dispatch requirements; RVSM, maintenance and dispatch requirements RNP, MNPS Operations All Weather Operations, Category 2/3 operations and minimum equipment requirements.	
10.8 Safety Management System	State Safety Programme Basic Safety Concepts Hazards & Safety Risks SMS Operation SMS Safety performance Safety Assurance	2
10.9 Fuel Tank Safety	Special Federal Aviation Regulations (SFARs) from 14 CFR SFAR 88 of the FAA and of JAA TGL 47 Concept of CDCCL, Airworthiness Limitations Items (ALI)	2

Subject: **ELECTRICAL FUNDAMENTALS-II**

Module: **3**

SUB MODULE	TOPIC	LEVEL
3.8 Power	Power, work and energy (kinetic and potential); Dissipation of power by a resistor; Power formula; Calculations involving power, work and energy	2
3.12 DC Motor/Generator Theory	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.	2
3.13 AC Theory	Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square,	2

	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.	
3.14 Resistive (R), Capacitive (C) and Inductive (L) Circuits	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.	2
3.15 Transformers	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.	2
3.16 Filters	Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.	1
3.17 AC Generators	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.	2
3.18 AC Motors	Construction, principles of operation and characteristics of: AC synchronous and induction motors both single and polyphase; Methods of speed control and direction of rotation; Methods of producing a rotating field: capacitor, inductor, shaded or split pole.	2

Subject: **MATERIALS AND HARDWARE-II**

Module: **6**

SUB MODULE	TOPIC	LEVEL
6.5 Fasteners 6.5.1 Screw threads	Screw nomenclature; Thread forms, dimensions and tolerances for standard threads used in aircraft; Measuring screw threads;	2
6.5.2 Bolts, studs and screws	Bolt types: specification, identification and marking of aircraft bolts, international standards; Nuts: self locking, anchor, standard types; Machine screws: aircraft specifications; Studs: types and uses, insertion and removal; Self tapping screws, dowels.	2
6.5.3 Locking devices	Tab and spring washers, locking plates, split pins, pal nuts, wire locking, quick release fasteners, keys, circlips, cotter pins.	2
6.5.4 Aircraft rivets	Types of solid and blind rivets: specifications and identification, heat treatment.	2
6.6 Pipes and Unions	(a) Identification of, and types of rigid and flexible pipes and their connectors used in aircraft; (b) Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.	2
6.7 Springs	Types of springs, materials, characteristics and applications.	2
6.8 Bearings	Purpose of bearings, loads, material, construction; Types of bearings and their application.	2

6.9 Transmissions	Gear types and their application; Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns; Belts and pulleys, chains and sprockets.	2
6.10 Control Cables	Types of cables; End fittings, turnbuckles and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems.	2
6.11 Electrical Cables and Connectors	Cable types, construction and characteristics; High tension and co-axial cables; Crimping; Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes.	2

Subject: **HUMAN FACTORS**

Module: **9**

SUB MODULE	TOPIC	LEVEL
9.1 General	The need to take human factors into account; Incidents attributable to human factors/human error; 'Murphy's' law.	2
9.2 Human Performance and Limitations	Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access.	2
9.3 Social Psychology	Responsibility: individual and group; Motivation and de motivation; Peer pressure; 'Culture' issues; Team working; Management, supervision and leadership	1
9.4 Factors Affecting Performance	Fitness/health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and underload; Sleep and fatigue, shiftwork; Alcohol, medication, drug abuse.	2

9.5 Physical Environment	Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment.	1
9.6 Tasks	Physical work; Repetitive tasks; Visual inspection; Complex systems.	1
9.7 Communication	Within and between teams; Work logging and recording; Keeping up to date, currency; Dissemination of information.	2
9.8 Human Error	Error models and theories; Types of error in maintenance tasks; Implications of errors (i.e accidents) Avoiding and managing errors.	2
9.9 Hazards in the Workplace	Recognising and avoiding hazards; Dealing with emergencies.	2

Subject: **ELECTRONIC FUNDAMENTALS**

Module: **4**

SUB MODULE	TOPIC	LEVEL
4.1 Semiconductors 4.1.1 Diodes	Diode symbols; Diode characteristics and properties; Diodes in series and parallel; Main characteristics and use of silicon controlled rectifiers (thyristors), light emitting diode, photo conductive diode, varistor, rectifier diodes; Functional testing of diodes.	2
4.1.2 Transistors	*(a)* Transistor symbols; Component description and orientation; Transistor characteristics and properties.	1
4.1.3 Integrated Circuits	(a) Description and operation of logic circuits and linear circuits/operational amplifiers.	1
4.2 Printed Circuit Boards	Description and use of printed circuit boards.	1
4.3 Servomechanisms	(a) Understanding of the following terms: Open and closed loop systems, feedback, follow up, analogue	1

	transducers; Principles of operation and use of the following synchro system components/features: resolvers, differential, control and torque, transformers, inductance and capacitance transmitters.	

Subject: **MAINTENANCE PRACTICES-II**

Module: **7**

SUB MODULE	TOPIC	LEVEL
7.7 Electrical Wiring Interconnection System (EWIS)	Continuity, insulation and bonding techniques and testing; Use of crimp tools: hand and hydraulic operated; Testing of crimp joints; Connector pin removal and insertion; Co-axial cables: testing and installation precautions; Identification of wire types, their inspection criteria and damage tolerance. Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding. EWIS installations, inspection, repair, maintenance and cleanliness standards.	3
7.8 Riveting	Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints.	2
7.9 Pipes and Hoses	Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes.	2
7.10 Springs	Inspection and testing of springs.	2
7.11 Bearings	Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes.	2

7.12 Transmissions	Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems.	2
7.13 Control Cables	Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems.	2
7.14 Material handling 7.14.1 Sheet Metal	Marking out and calculation of bend allowance; Sheet metal working, including bending and forming; Inspection of sheet metal work.	2
7.14.2 Composite and non-metallic	Bonding practices; Environmental conditions Inspection methods	2
7.16 Aircraft Weight and Balance	(a) Centre of Gravity/Balance limits calculation: use of relevant documents; (b) Preparation of aircraft for weighing; Aircraft weighing;	2
7.17 Aircraft Handling and Storage	Aircraft taxiing/towing and associated safety precautions; Aircraft jacking, chocking, securing and associated safety precautions; Aircraft storage methods; Refuelling/defuelling procedures; De-icing/anti-icing procedures; Electrical, hydraulic and pneumatic ground supplies. Effects of environmental conditions on aircraft handling and operation.	2
7.18 Disassembly, Inspection, Repair and Assembly Techniques	(a) Types of defects and visual inspection techniques. Corrosion removal, assessment and reprotection. (b) General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programmes; (c) Non destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and boroscope methods. (d) Disassembly and re-assembly techniques. (e) Trouble shooting techniques	3
7.19 Abnormal Events	(a) Inspections following lightning strikes and HIRF penetration. (b) Inspections following abnormal events such as	2

	heavy landings and flight through turbulence.	
7.20 Maintenance Procedures	Maintenance planning; Modification procedures; Stores procedures; Certification/release procedures; Interface with aircraft operation; Maintenance Inspection/Quality Control/Quality Assurance; Additional maintenance procedures. Control of life limited components	2

Subject: PISTON AEROPLANE AERODYNAMICS STRUCTURES AND SYSTEMS–I

Module: 11B

SUB MODULE	TOPIC	LEVEL
11.1 Theory of Flight 11.1.1 Aeroplane Aerodynamics and Flight Controls	Operation and effect of: roll control: ailerons and spoilers; pitch control: elevators, stabilators, variable incidence stabilisers and canards; yaw control, rudder limiters; Control using elevons, ruddervators; High lift devices, slots, slats, flaps, flaperons; Drag inducing devices, spoilers, lift dumpers, speed brakes; Effects of wing fences, saw tooth leading edges; Boundary layer control using, vortex generators, stall wedges or leading edge devices; Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;	2
11.2 Airframe Structures — General Concepts	(a) Airworthiness requirements for structural strength; Structural classification, primary, secondary and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Lightning strike	2

	protection provision. Aircraft bonding (b) Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning, anti-corrosive protection, wing, empennage and engine attachments; Structure assembly techniques: riveting, bolting, bonding; Methods of surface protection, such as chromating, anodising, painting; Surface cleaning; Airframe symmetry: methods of alignment and symmetry checks.	2
11.3 Airframe Structures — Aeroplanes 11.3.1 Fuselage (ATA 52/53/56)	Construction and pressurisation sealing; Wing, tail-plane pylon and undercarriage attachments; Seat installation; Doors and emergency exits: construction and operation; Window and windscreen attachment.	2
11.3.2 Wings (ATA 57)	Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.	2
11.3.3 Stabilisers (ATA 55)	Construction; Control surface attachment.	2
11.3.4 Flight Control Surfaces (ATA 55/57)	Construction and attachment; Balancing — mass and aerodynamic.	2
11.3.5Nacelles/Pylons (ATA 54)	Nacelles/Pylons: Construction; Firewalls; Engine mounts.	2
11.77 Equipment and Furnishings (ATA 25)	(a) Emergency equipment requirements; Seats, harnesses and belts. (b) Cabin lay-out; Equipment lay-out; Cabin Furnishing Installation; Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment; Airstairs	2 1
11.9 Flight Controls (ATA 27)	Primary controls: aileron, elevator, rudder; Trim tabs; High lift devices; System operation:	3

	manual; Gust locks; Balancing and rigging; Stall warning system.	

Subject: DIGITAL TECHNIQUE ELECTRONIC INSTRUMENT SYSTEMS

Module: 5

SUB MODULE	TOPIC	LEVEL
5.1 Electronic Instrument Systems	Typical systems arrangements and cockpit layout of electronic instrument systems.	2
5.10 Fiber Optics	Advantages and disadvantages of fiber optic data transmission over electrical wire propagation; Fibre optic data bus; Fibre optic related terms; Terminations; Couplers, control terminals, remote terminals; Application of fibre optics in aircraft systems.	1
5.11 Electronic Displays	Principles of operation of common types of displays used in modern aircraft, including Cathode Ray Tubes, Light Emitting Diodes and Liquid Crystal Display.	1
5.12 Electrostatic Sensitive Devices	Special handling of components sensitive to electrostatic discharges; Awareness of risks and possible damage, component and personnel anti-static protection devices.	2
5.13 Software Management Control	Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes.	1

5.14 Electromagnetic Environment	Influence of the following phenomena on maintenance practices for electronic system: EMC-Electromagnetic Compatibility EMI-Electromagnetic Interference HIRF-High Intensity Radiated Field Lightning/lightning protection	2
5.15 Typical Electronic / Digital Aircraft Systems	General arrangement of typical electronic/digital aircraft systems and associated BITE(Built In Test Equipment) testing such as: (a) For B1 and B2 only: ACARS-ARINC Communication and Addressing and Reporting System EICAS-Engine Indication and Crew Alerting System FBW-Fly by Wire, FMS-Flight Management System IRS-Inertial reference system (b) For B1, B2 and B3: ECAM-Electronic Centralised Aircraft Monitoring EFIS-Electronic Flight Instrument System GPS-Global Positioning System TCAS-Traffic Collission Avoidance system Integrated modular Avionics Cabin System, Information system	2

Subject: **PISTON AERO PLANE AERODYNAMICS, STRUCTURE & SYSTEMS-II**

Module: **11B**

SUB MODULE	TOPIC	LEVEL
11.4 Air Conditioning and Cabin Pressurization (ATA 21)	Pressurization and air conditioning systems; Cabin pressure controllers, protection and warning devices Heating Systems	3
11.5 Instruments / Avionic Systems	Pitot static: altimeter, air speed indicator, vertical speed indicator; Gyroscopic: artificial horizon,	2

11.5.1 Instrument Systems (ATA 31)	attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn coordinator; Compasses: direct reading, remote reading; Angle of attack indication, stall warning systems. Glass cockpit; Other aircraft system indication.	
11.5.2 Avionic Systems	Fundamentals of system lay-outs and operation of: Auto Flight (ATA 22); Communications (ATA 23); Navigation Systems (ATA 34).	1
11.6 Electrical Power (ATA 24)	Batteries Installation and Operation; DC power generation; Voltage regulation; Power distribution; Circuit protection; Inverters, transformers.	3
11.8 Fire Protection (ATA 26)	(a) Fire extinguishing systems; Fire and smoke detection and warning systems; System tests. (b) Portable fire extinguisher.	3
11.10 Fuel Systems (ATA 28)	System lay-out; Fuel tanks; Supply systems; Cross-feed and transfer; Indications and warnings; Refueling and defueling.	3
11.11 Hydraulic Power (ATA 29)	System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical; Filters Pressure Control; Power distribution; Indication and warning systems.	3
11.12 Ice and Rain Protection (ATA 30)	Ice formation, classification and detection; De-icing systems: electrical, hot air, pneumatic and chemical; Probe and drain heating; Wiper systems.	3
11.13 Landing Gear (ATA 32)	Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and auto braking; Tires; Steering. Air-ground sensing	3
11.14 Lights (ATA 33)	External: navigation, anti collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	3
11.15 Oxygen (ATA 35)	System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation;	3

	Indications and warnings;	
11.16Pneumatic/Vacuum (ATA 36)	System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.	3
11.17 Water / Waste (ATA 38)	Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspects.	3

Subject: **PISTON ENGINE- I**

Module: **16**

SUB MODULE	TOPIC	LEVEL
16.1 Fundamentals	Mechanical, thermal and volumetric efficiencies; Operating principles — 2 stroke, 4 stroke, Otto and Diesel; Piston displacement and compression ratio; Engine configuration and firing order.	2
16.2 Engine Performance	Power calculation and measurement; Factors affecting engine power; Mixtures/leaning, pre-ignition.	2
16.3 Engine Construction	Crank case, crank shaft, cam shafts, sumps; Accessory gearbox; Cylinder and piston assemblies; Connecting rods, inlet and exhaust manifolds; Valve mechanisms; Propeller reduction gearboxes.	2
16.4 Engine Fuel Systems 16.4.1 Carburetors	Types, construction and principles of operation; Icing and heating.	2
16.4.2 Fuel injection systems	Types, construction and principles of operation.	2
16.5 Starting and Ignition Systems	Starting systems, pre-heat systems; Magneto types, construction and principles of operation; Ignition harnesses, spark plugs; Low and high tension systems.	2

16.7 Supercharging / Turbocharging	Principles and purpose of supercharging and its effects on engine parameters; Construction and operation of supercharging/ turbocharging systems; System terminology; Control systems; System protection.	2

Subject: **PISTON ENGINE- II**

Module: **16**

SUB MODULE	TOPIC	LEVEL
16.4.3 Electronic engine control	Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components.	2
16.6 Induction, Exhaust and Cooling Systems	Construction and operation of: induction systems including alternate air systems; Exhaust systems, engine cooling systems — air and liquid	2
16.8 Lubricants and Fuels	Properties and specifications; Fuel additives; Safety precautions.	2
16.9 Lubrication Systems	System operation/lay-out and components.	2
16.10 Engine Indication Systems	Engine speed; Cylinder head temperature; Coolant temperature; Oil pressure and temperature; Exhaust Gas Temperature; Fuel pressure and flow; Manifold pressure.	2
16.11 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.	2

16.12 Engine Monitoring and Ground Operation	Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Inspection of engine and components: criteria, tolerances, and data specified by engine manufacturer.	3
16.13 Engine Storage and Preservation	Preservation and depreservation for the engine and accessories/ systems	2

Subject: **PROPELLER**

Module: **17A**

SUB MODULE	TOPIC	LEVEL
17.1 Fundamentals	Blade element theory; High/low blade angle, reverse angle, angle of attack, rotational speed; Propeller slip; Aerodynamic, centrifugal, and thrust forces; Torque; Relative airflow on blade angle of attack; Vibration and resonance.	2
17.2 Propeller Construction	Construction methods and materials used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; Fixed pitch, controllable pitch, constant speeding propeller; Propeller/spinner installation.	2
17.3 Propeller Pitch Control	Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Over speed protection.	2
17.4 Propeller Synchronising	Synchronizing and Synchrophasing equipment.	2
17.5 Propeller Ice	Fluid and electrical de-icing equipment.	2

Protection		
17.6 Propeller Maintenance	Static and dynamic balancing; Blade tracking; Assessment of blade damage, erosion, corrosion, impact damage, de-lamination; Propeller treatment/repair schemes; Propeller engine running.	3
17.7 Propeller Storage and Preservation	Propeller preservation and de-preservation	2