

Module 13

Aircraft Aerodynamics, Structures & Systems

	Level		
	A	B1	B2
13.1 Theory of Flight	A	B1	B2
a) Aeroplane Aerodynamics & Flight Controls Operation and effect of: - roll control: ailerons and spoilers;- pitch control: elevators, stabilators, variable incidence stabilisers and canards; - yaw control, rudder limiters and canards; Control using elevons, ruddervators; High lift devices: slots, slats, flaps; Drag inducing devices: spoilers, lift dumpers, speed brakes; Operation & effect of trim tabs, servo tabs, control surface bias;	-	-	1
b) High Speed Flight Speed of sound, subsonic flight, transonic flight, supersonic flight; Mach number, critical Mach number;	-	-	1
c) Rotary Wing Aerodynamics Terminology; Operation & effect of cyclic, collective & anti -torque controls;	-	-	1
13.2 Structures - General Concepts	A	B1	B2
a) Fundamentals of structural systems;	-	-	1
b) Zonal & station identification systems; Electrical bonding; Lightning strike protection provision.	-	-	2
13.3 Autoflight (ATA 22)	A	B1	B2
Fundamentals of automatic flight control including working principles & current terminology; Command signal processing; Modes of operation: roll, pitch & yaw channels; Yaw dampers; Stability Augmentation System in helicopters; Automatic trim control; Autopilot navigation aids interface; Autothrottle systems; Automatic Landing Systems: principles and categories, modes of operation, approach, glideslope, land, go-around, system monitors & failure conditions.	-	-	3
13.4 Communication / Navigation (ATA 23/34)	A	B1	B2
Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver & transmitter; Working principles of the following systems: -Very High Frequency (VHF)communication; - High Frequency (HF)communication; - Audio; - Emergency Locator Transmitters; - Cockpit Voice Recorder; - Very High Frequency omnidirectional range (VOR); - Automatic Direction Finding (ADF); - Instrument Landing System (ILS); - Microwave Landing System (MLS); - Flight Directors stems, Distance Measuring Equipment (DME); - Very Low Frequency & hyperbolic navigation (VLF/Omega); - Doppler navigation; - Area navigation, RNAV systems; - Flight Management Systems; - Global Positioning System (GPS), Global Navigation Satellite Systems(GNSS); - Inertial Navigation System; - Air Traffic Control transponder, secondary surveillance radar; - Traffic Alert & Collision Avoidance System (TCAS); - Weather avoidance radar; - Radio altimeter; - ARINC communication and reporting.	-	-	3
13.5 Electrical Power (ATA 24)	A	B1	B2
Batteries Installation & Operation; DC power generation; AC power generation; Emergency power generation; Voltage regulation;Power distribution; Inverters, transformers, rectifiers; Circuit protection; External Ground power.	-	-	3
13.6 Equipment & Furnishings (ATA 25)	A	B1	B2
Electronic emergency equipment requirements; Cabin entertainment equipment	-	-	3
13.7 Flight Controls (ATA 27)	A	B1	B2
a) Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control; High lift devices; Lift dump, speed brakes; System operation: manual, hydraulic, pneumatic; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks; Stall protection systems.	-	-	1
b) System operation: electrical, fly by wire.	-	-	2

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13.8 Instrument Systems (ATA 31) Classification; Atmosphere; Terminology; Pressure measuring devices and systems; Pilot static systems; Altimeters; Vertical speed indicators; Airspeed indicators; Machmeters; Altitude reporting / alerting systems; Air data computers; Instrument pneumatic systems; Direct reading pressure & temperature gauges; Temperature indicating systems; Fuel quantity indicating systems; Gyroscopic principles; Artificial horizons; Slip indicators; Ground Proximity Warning Systems; Directional gyros; Compass systems; Flight Data Recording systems; Electronic Flight Instrument Systems; Instrument warning systems including master warning systems & centralised; Stall warning systems & angle of attack indicating systems; Vibration measurement & indication.	-	-	2
13.9 Lights (ATA 33) External: navigation, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	-	-	3
13.10 On Board Maintenance Systems (ATA 45) Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).	-	-	2

