

MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS

	Level		
	A	B1	B2
13.1 Theory of Flight			
(a) <i>Aeroplane Aerodynamics and Flight Controls</i>	—	—	1
Operation and effect of:			
— roll control: ailerons and spoilers;			
— pitch control: elevators, stabilators, variable incidence stabilisers and canards;			
— yaw control, rudder limiters;			

	Level		
	A	B1	B2
Control using elevons, ruddervators;			
High lift devices: slots, slats, flaps;			
Drag inducing devices: spoilers, lift dumpers, speed brakes;			
Operation and effect of trim tabs, servo tabs, control surface bias.			
(b) <i>High Speed Flight</i>	—	—	1
Speed of sound, subsonic flight, transonic flight, supersonic flight,			
Mach number, critical Mach number.			
(c) <i>Rotary Wing Aerodynamics</i>	—	—	1
Terminology;			
Operation and effect of cyclic, collective and anti-torque controls.			
13.2 Structures — General Concepts			
(a)	—	—	1
Fundamentals of structural systems.			
(b)	—	—	2
Zonal and station identification systems;			
Electrical bonding;			
Lightning strike protection provision.			
13.3 Autoflight (ATA 22)	—	—	3
Fundamentals of automatic flight control including working principles and current terminology;			
Command signal processing;			
Modes of operation: roll, pitch and yaw channels;			
Yaw dampers;			
Stability Augmentation System in helicopters;			
Automatic trim control;			

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	A	B1	B2
Autopilot navigation aids interface;			
Autothrottle systems.			
Automatic Landing Systems: principles and categories, modes of operation, approach, glideslope, land, go-around, system monitors and failure conditions.			
13.4 Communication/Navigation (ATA 23/34)	—	—	3
Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver and transmitter;			
Working principles of 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 Director systems; Distance Measuring Equipment (DME);			
— Very Low Frequency and 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 and Collision Avoidance System (TCAS);			
— Weather avoidance radar;			
— Radio altimeter;			
— ARINC communication and reporting;			
13.5 Electrical Power (ATA 24)	—	—	3
Batteries Installation and Operation;			
DC power generation;			
AC power generation;			
Emergency power generation;			

	Level		
	A	B1	B2
Voltage regulation;			
Power distribution;			
Inverters, transformers, rectifiers;			
Circuit protection;			
External/Ground power.			
13.6 Equipment and Furnishings (ATA 25)	—	—	3
Electronic emergency equipment requirements;			
Cabin entertainment equipment.			
Flight Controls (ATA 27)			
(a)	—	—	1
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.			
(b)	—	—	2
System operation: electrical, fly by wire.			
13.8 Instrument Systems (ATA 31)	—	—	2
Classification;			
Atmosphere;			
Terminology;			
Pressure measuring devices and systems;			
Pitot static systems;			
Altimeters;			
Vertical speed indicators;			
Airspeed indicators;			
Machmeters;			
Altitude reporting/alerting systems;			
Air data computers;			
Instrument pneumatic systems;			
Direct reading pressure and temperature gauges;			
Temperature indicating systems;			
Fuel quantity indicating systems;			

	Level		
	A	B1	B2
Gyroscopic principles;			
Artificial horizons;			
Slip indicators;			
Directional gyros;			
Ground Proximity Warning Systems;			
Compass systems;			
Flight Data Recording systems;			
Electronic Flight Instrument Systems;			
Instrument warning systems including master warning systems and centralised warning panels;			
Stall warning systems and angle of attack indicating systems;			
Vibration measurement and indication.			
13.9 Lights (ATA 33)	—	—	3
External: navigation, landing, taxiing, ice;			
Internal: cabin, cockpit, cargo;			
Emergency.			
13.10 On board Maintenance Systems (ATA 45)	—	—	2
Central maintenance computers;			
Data loading system;			
Electronic library system;			
Printing;			
Structure monitoring (damage tolerance monitoring).			