Note: The scope of this Module should reflect the technology of aeroplanes pertinent to the A2 and B1.2 subcategory.

	Level		
	A2	B1.2	B2
11.1 **Theory of Flight**			
11.1.1 *Aeroplane Aerodynamics and Flight Controls*	1	2	—
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;			
11.1.2 *High Speed Flight — N/A*	—	—	—
11.2 **Airframe Structures — General Concepts**			
(a)	2	2	—
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 protection provision.			
Aircraft bonding			

	Level		
	A2	B1.2	B2
(b)	1	2	—
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.			
11.3 **Airframe Structures — Aeroplanes**			
11.3.1 *Fuselage (ATA 52/53/56)*	1	2	—
Construction and pressurisation sealing;			
Wing, tail-plane pylon and undercarriage attachments;			
Seat installation;			
Doors and emergency exits: construction and operation;			
Window and windscreen attachment.			
11.3.2 *Wings (ATA 57)*	1	2	—
Construction;			
Fuel storage;			
Landing gear, pylon, control surface and high lift/drag attachments.			
11.3.3 *Stabilisers (ATA 55)*	1	2	—
Construction;			
Control surface attachment.			
11.3.4 *Flight Control Surfaces (ATA 55/57)*	1	2	—
Construction and attachment;			
Balancing — mass and aerodynamic.			
11.3.5 **Nacelles/Pylons (ATA 54)**			
(a)	1	2	—
Nacelles/Pylons: — Construction; — Firewalls; — Engine mounts.			

	Level		
	A2	B1.2	B2
11.4 **Air Conditioning and Cabin Pressurisation (ATA 21)**	1	3	—
Pressurisation and air conditioning systems;			
Cabin pressure controllers, protection and warning devices.			
11.5 **Instruments/Avionic Systems**			
11.5.1 *Instrument Systems (ATA 31)*	1	2	—
Pitot static: altimeter, air speed indicator, vertical speed indicator;			
Gyroscopic: artificial horizon, 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.			
Other aircraft system indication.			
11.5.2 *Avionic Systems*	1	1	—
Fundamentals of system lay-outs and operation of: — Auto Flight (ATA 22); — Communications (ATA 23); — Navigation Systems (ATA 34).			
11.6 **Electrical Power (ATA 24)**	1	3	—
Batteries Installation and Operation;			
DC power generation;			
Voltage regulation;			
Power distribution;			
Circuit protection;			
Inverters, transformers.			
11.7 **Equipment and Furnishings (ATA 25)**			
(a)	2	2	—
Emergency equipment requirements;			
Seats, harnesses and belts.			
(b)	1	1	—
Cabin lay-out;			
Equipment lay-out;			
Cabin Furnishing Installation (level 2);			
Cabin entertainment equipment;			
Galley installation;			
Cargo handling and retention equipment;			
Airstairs.			

	Level		
	A2	B1.2	B2
11.8 **Fire Protection (ATA 26)**			
(a)	1	3	—
Fire extinguishing systems;			
Fire and smoke detection and warning systems;			
System tests.			
(b)	1	3	—
Portable fire extinguisher.			
11.9 **Flight Controls (ATA 27)**	1	3	—
Primary controls: aileron, elevator, rudder;			
Trim tabs;			
High lift devices;			
System operation: manual;			
Gust locks;			
Balancing and rigging;			
Stall warning system.			
11.10 **Fuel Systems (ATA 28)**	1	3	—
System lay-out;			
Fuel tanks;			
Supply systems;			
Cross-feed and transfer;			
Indications and warnings;			
Refuelling and defuelling.			
11.11 **Hydraulic Power (ATA 29)**	1	3	—
System lay-out;			
Hydraulic fluids;			
Hydraulic reservoirs and accumulators;			
Pressure generation: electric, mechanical;			
Pressure Control;			
Power distribution;			
Indication and warning systems.			

	Level		
	A2	B1.2	B2
11.12 **Ice and Rain Protection (ATA 30)**	1	3	—
Ice formation, classification and detection;			
De-icing systems: electrical, hot air, pneumatic and chemical;			
Probe and drain heating;			
Wiper systems.			
11.13 **Landing Gear (ATA 32)**	2	3	—
Construction, shock absorbing;			
Extension and retraction systems: normal and emergency;			
Indications and warning;			
Wheels, brakes, antiskid and autobraking;			
Tyres;			
Steering.			
11.14 **Lights (ATA 33)**	2	2	—
External: navigation, anti collision, landing, taxiing, ice;			
Internal: cabin, cockpit, cargo;			
Emergency.			
11.15 **Oxygen (ATA 35)**	1	3	—
System lay-out: cockpit, cabin;			
Sources, storage, charging and distribution;			
Supply regulation;			
Indications and warnings;			
11.16 **Pneumatic/Vacuum (ATA 36)**	1	3	—
System lay-out;			
Sources: engine/APU, compressors, reservoirs, ground supply;			
Pressure control;			
Distribution;			
Indications and warnings;			
Interfaces with other systems.			

	Level		
	A2	B1.2	B2
11.17 **Water/Waste (ATA 38)**	2	3	—
Water system lay-out, supply, distribution, servicing and draining;			
Toilet system lay-out, flushing and servicing;			
Corrosion aspects.			

MODULE 12. HELICOPTER AERODYNAMICS, STRUCTURES AND SYSTEMS

	Level		
	A3 A4	B1.3 B1.4	B2
12.1 **Theory of Flight — Rotary Wing Aerodynamics**	1	2	—
Terminology;			
Effects of gyroscopic precession;			
Torque reaction and directional control;			
Dissymmetry of lift, Blade tip stall;			
Translating tendency and its correction;			
Coriolis effect and compensation;			
Vortex ring state, power settling, overpitching;			
Auto-rotation;			
Ground effect.			
12.2 **Flight Control Systems**	2	3	—
Cyclic control;			
Collective control;			
Swashplate;			
Yaw control: Anti-Torque Control, Tail rotor, bleed air;			
Main Rotor Head: Design and Operation features;			
Blade Dampers: Function and construction;			
Rotor Blades: Main and tail rotor blade construction and attachment;			
Trim control, fixed and adjustable stabilisers;			
System operation: manual, hydraulic, electrical and fly-by-wire;			
Artificial feel;			
Balancing and Rigging.			