

Module 12

Helicopter Aerodynamics, Structures and Systems

	Level		
	A	B1	B2
12.1 Theory of Flight - Rotary Wing Aerodynamics	A	B1	B2
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.	1	2	-
12.2 Flight Control Systems	A	B1	B2
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.	2	3	-
12.3 Blade Tracking and Vibration Analysis	A	B1	B2
Rotor alignment; Main and tail rotor tracking; Static and dynamic balancing; Vibration types, vibration reduction methods; Ground resonance.	1	3	-
12.4 Transmissions	A	B1	B2
Gear boxes, main and tail rotors; Clutches, free wheel units and rotor brake.	1	3	-
12.5 Airframe Structures	A	B1	B2
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 protection provision;	2	2	-

Module 12

Helicopter Aerodynamics, Structures and Systems

	Level		
	1	2	-
b) Construction methods of- stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning and anti-corrosive protection. Pylon, stabiliser and undercarriage attachments; Seat installation; Doors: Construction mechanisms, operation and safety devices; Windows and windscreen construction; Fuel storage; Firewalls; Engine mounts; 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.			
12.6 Air Conditioning (ATA 21)	A	B1	B2
Air supply Sources of air supply including engine bleed and ground cart;	1	2	-
Air Conditioning Air conditioning systems; Distribution systems; Flow and temperature control systems; Protection and warning devices.	1	3	-
12.7 Instruments/Avionic Systems	A	B1	B2
Instrument Systems (ATA 31) Pilot static: altimeter, air speed indicator, vertical speed indicator; Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn co-ordinator; Compasses: direct reading, remote reading; Vibration indicating systems - HUMS; Other aircraft system indication.	1	2	-
Avionic Systems Fundamentals of system layouts and operation of: Auto Flight (ATA 22); Communications (ATA 23); Navigation Systems (ATA 34).	1	1	-
12.8 Electrical Power (ATA 24)	A	B1	B2
Batteries Installation and Operation; DC power generation, AC power generation; Emergency power generation; Voltage regulation, Circuit protection; Power distribution; Inverters, transformers, rectifiers; External/Ground power.	1	3	-



Module 12

Helicopter Aerodynamics, Structures and Systems

	Level		
	A	B1	B2
12.9 Equipment and Furnishings (ATA 25)			
a) Emergency equipment requirements; Seats, harnesses and belts; Lifting systems;	2	2	-
b) Emergency flotation systems; Cabin layout, cargo retention; Equipment layout; Cabin Furnishing Installation.	1	1	-
12.10 Fire Protection (ATA 26)	A	B1	B2
Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	1	3	-
12.11 Fuel Systems (ATA 28)	A	B1	B2
System layout; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling.	1	3	-
12.12 Hydraulic Power (ATA 29)	A	B1	B2
System layout; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Pressure Control; Power distribution; Indication and warning systems; Interface with other systems.	1	3	-
12.13 Ice and Rain Protection (ATA 30)	A	B1	B2
Ice formation, classification and detection; Anti-icing and De-icing systems: electrical, hot air and chemical; Rain repellent and removal; Probe and drain heating.	1	3	-
12.14 Landing Gear (ATA 32)	A	B1	B2
Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, Tyres, brakes; Steering; Skids, floats.	2	3	-

Module 12

Helicopter Aerodynamics, Structures and Systems

	Level		
	A	B1	B2
12.15 Lights (ATA 33)	A	B1	B2
External: navigation, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	2	3	-
12.16 Pneumatic/Vacuum (ATA 36)	A	B1	B2
System layout; Sources: engine, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.	1	3	-

