

Module 12

Helicopter Aerodynamics, Structures & Systems

	Level		
	A	B1	B2
12.1 Theory of Flight - Rotary Wing Aerodynamics Terminology; Effects of gyroscopic precession; Torque reaction & directional control; Dissymmetry of lift, Blade tip stall; Translating tendency & its correction; Coriolis effect & compensation; Vortex ring state, power settling, overpitching; Auto-rotation; Ground effect.	1	2	-
12.2 Flight Control Systems Cyclic control; Collective control; Swashplate; Yaw control: Anti -Torque Control, Tail rotor, bleed air; Main Rotor Head: Design & Operation features; Blade Dampers: Function & construction; Rotor Blades: Main & tail rotor blade construction & attachment; Trim control, fixed & adjustable stabilisers; System operation: manual, hydraulic, electrical & fly-by-wire; Artificial feel; Balancing & Rigging.	2	3	-
12.3 Blade Tracking & Vibration Analysis Rotor alignment; Main & tail rotor tracking; Static & dynamic balancing; Vibration types, vibration reduction methods; Ground resonance.	1	3	-
12.4 Transmissions Gear boxes, main & tail rotors; Clutches, free wheel units & rotor brake.	1	3	-
12.5 Airframe Structures a) Airworthiness requirements for structural strength; Structural classification, primary, secondary & tertiary; Fail safe, safe life, damage tolerance concepts; Zonal & station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains & ventilation provisions; System installation provisions; Lightning strike protection provision; 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. Pylon, stabiliser & undercarriage attachments; Seat installation; Doors: Construction mechanisms, operation & safety devices; Windows & 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 & symmetry checks.	2 1	2 2	- -
12.6 Air Conditioning (ATA 21) Air supply Sources of air supply including engine bleed & ground cart; Air Conditioning Air conditioning systems; Distribution systems; Flow & temperature control systems; Protection & warning devices.	1 1	2 3	- -
12.7 Instruments/Avionic Systems Instrument Systems (ATA 31) Pilot static: altimeter, air speed indicator, vertical speed indicator; Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn & slip indicator, turn co-ordinator; Compasses: direct reading, remote reading; Vibration indicating systems - HUMS; Other aircraft system indication. Avionic Systems Fundamentals of system layouts and operation of: Auto Flight (ATA 22); Communications (ATA 23); Navigation Systems (ATA 34).	1 1	2 1	- -
12.8 Electrical Power (ATA 24) Batteries Installation & Operation; DC power generation, AC power generation; Emergency power generation; Voltage regulation, Circuit protection; Power distribution; Inverters, transformers, rectifiers; External/Ground power.	1	3	-

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12.9 Equipment and Furnishings (ATA 25)	A	B1	B2
a) Emergency equipment requirements; Seats, harnesses & 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 & smoke detection & 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 & draining; Cross-feed & transfer; Indications & warnings; Refuelling & defuelling.	1	3	-
12.12 Hydraulic Power (ATA 29)	A	B1	B2
System layout; Hydraulic fluids; Hydraulic reservoirs & accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Pressure Control; Power distribution; Indication & warning systems; Interface with other systems.	1	3	-
12.13 Ice & Rain Protection (ATA 30)	A	B1	B2
Ice formation, classification & detection; Anti-icing and De-icing systems: electrical, hot air & chemical; Rain repellent & removal; Probe & drain heating.	1	3	-
12.14 Landing Gear (ATA 32)	A	B1	B2
Construction, shock absorbing; Extension and retraction systems: normal & emergency; Indications & warning; Wheels, Tyres, brakes; Steering; Skids, floats.	2	3	-
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 & warnings; Interfaces with other systems.	1	3	-


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