

Annex A to AMC/GM Part 147 - Module 12 Helicopter aerodynamics, structures and systems

CASA module Examinations subjects	CASA mech basics exams equavelant	CASA avionic basics exams equavelant
Module 12 Helicopter aerodynamics, structures and systems (B1.3 & B1.4)		
12.1 Theory of flight — rotary wing aerodynamics		
Terminology;	FI	Nil
Effects of gyroscopic precession;	FI	IH
Torque reaction and directional control;	FI	Nil
Dissymmetry of lift, blade tip stall;	FI	IH
Translating tendency and its correction;	FI	Nil
Coriolis effect and compensation;	FI	IH
Vortex ring state, power settling, overpitching;	FI	IH
Auto-rotation;	FI	IH
Ground effect.	FI	IH
12.2 Flight control systems		
Cyclic control;	FI	IH
Collective control;	FI	IH
Swashplate;	FI	Nil
Yaw control: Anti-torque control, tail rotor, bleed air;	FI	IH
Main rotor head: design and operation features;	FI	Nil
Blade dampers: function and construction;	FI	Nil
Rotor blades: main and tail rotor blade construction and attachment;	FI	Nil
Trim control, fixed and adjustable stabilisers;	FI	Nil
System operation: manual, hydraulic, electrical and fly by wire;	FI	Nil
Artificial feel;	FI	Nil
Balancing and rigging.	FI	Nil
12.3 Blade tracking and vibration analysis		
Rotor alignment;	FI	Nil
Main and tail rotor tracking;	FI or FR	Nil
Static and dynamic balancing;	FI	Nil
Vibration types, vibration reduction methods;	FI	Nil
Ground resonance.	FI	IH
12.4 Transmissions		
Gearboxes, main and tail rotors;	FI	Nil
Clutches, freewheel units and rotor brake.	FI	Nil
12.5 Airframe structures		
(a)		
Airworthiness requirements for structural strength;	FI	Nil
Structural classification, primary, secondary and tertiary;	FI	Nil
Fail safe, safe life, damage tolerance concepts;	FI	Nil
Zonal and station identification systems;	FI	Nil
Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue;	FI	Nil
Drains and ventilation provisions;	FI	Nil
System installation provisions;	FI	Nil
Lightning strike protection provision;	FG	Nil

(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;	FI	Nil
Pylon, stabiliser and undercarriage attachments;	FI	Nil
Seat installation;	FI	Nil
Doors: construction, mechanisms, operation and safety devices;	FI	Nil
Windows and windscreen construction;	FI	Nil
Fuel storage;	FR	Nil
Firewalls;	FI	Nil
Engine mounts;	FI	Nil
Structure assembly techniques: riveting, bolting, bonding;	FI	Nil
Methods of surface protection, such as chromating, anodising, painting;	FI	Nil
Surface cleaning;	FI	Nil
Airframe symmetry: methods of alignment and symmetry checks.	FI	Nil
12.6 Air-conditioning (ATA21)		
12.6.1 Air supply		
Sources of air supply including engine bleed and ground cart.	FM	ED
12.6.2 Air-conditioning		
Air-conditioning systems;	FM	EB & ED
Distribution systems;	FM	EB & ED
Flow and temperature control systems;	FM	EB & ED
Protection and warning devices.	FM	IM
12.7 Instruments and avionic systems		
12.7.1 Instrument systems (ATA31)		
Pitot static: altimeter, air speed indicator, vertical speed indicator;	BC	IA
Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn coordinator;	BC	IZ
Compasses: direct reading, remote reading;	BC	IZ
Vibration indicating systems — HUMS;	Nil	Nil
Glass cockpit;	Nil	IZ
Other aircraft system indication.	Nil	IZ
12.7.2 Avionic systems		
Fundamentals of system layouts and operation of:		
Auto flight (ATA22);	BC	IF
Communications (ATA23);	Nil	WZ
Navigation Systems (ATA34).	Nil	WC & WD & WE & WJ
12.8 Electrical power (ATA24)		
Batteries installation and operation;	BC	EB
DC power generation, AC power generation;	Nil	QD
Emergency power generation;	Nil	Nil

Voltage regulation, circuit protection;	BC	ED
Power distribution;	BC	ED
Inverters, transformers, rectifiers;	Nil	ED
External and ground power.	Nil	Nil
12.9 Equipment and furnishings (ATA25)		
(a)		
Emergency equipment requirements;	FI	Nil
Seats, harnesses and belts;	FI	Nil
Lifting systems;	FI	Nil
(b)		
Emergency flotation systems;	FI	Nil
Cabin layout, cargo retention;	Nil	Nil
Equipment layout;	Nil	Nil
Cabin furnishing installation.	Nil	Nil
12.10 Fire protection (ATA26)		
Fire and smoke detection and warning systems;	BC	ED
Fire extinguishing systems;	BC	ED
System tests.	BC	ED
12.11 Fuel systems (ATA28)		
System layout;	FR FA	Nil
Fuel tanks;	FA	Nil
Supply systems;	FA	Nil
Dumping, venting and draining;	FA	Nil
Cross-feed and transfer;	FA	Nil
Indications and warnings;	FA FR	IA
Refuelling and defuelling.	FA	Nil
12.12 Hydraulic power (ATA29)		
System layout;	FF	Nil
Hydraulic fluids;	FF	Nil
Hydraulic reservoirs and accumulators;	FF	Nil
Pressure generation: electric, mechanical, pneumatic;	FF	Nil
Emergency pressure generation;	FF	Nil
Pressure control;	FF	Nil
Power distribution;	FF	Nil
Indication and warning systems;	FF	IA
Interface with other systems.	FF	Nil
12.13 Ice and rain protection (ATA30)		
Ice formation, classification and detection;	FR	ED
Anti-icing and de-icing systems: electrical, hot air and chemical;	FR	ED
Rain repellent and removal;	FR	Nil
Probe and drain heating.	Nil	ED
12.14 Landing gear (ATA32)		
Construction, shock absorbing;	FI	Nil
Extension and retraction systems: normal and emergency;	FI	Nil
Indications and warning;	FI	EB
Wheels, tyres, brakes;	FI	ED
Steering;	FI	Nil
Skids, floats.	FI	Nil

12.15 Lights (ATA33)		
External: navigation, landing, taxiing, ice;	Nil	EB
Internal: cabin, cockpit, cargo; emergency.	Nil	EB
12.16 Pneumatic and vacuum (ATA36)		
System layout;	Nil	IA
Sources: engine, compressors, reservoirs, ground supply;	FF	Nil
Pressure control;	IM	IA
Distribution;	Nil	IA
Indications and warnings;	IM	IA
Interfaces with other systems.	FF	Nil
12.17 Integrated modular avionics (ATA42)		
Functions that may be typically integrated in the integrated modular avionic (IMA) modules include: bleed management, air pressure control, air ventilation and control, avionics and cockpit ventilation control, temperature control, air traffic communication, avionics communication router, electrical load management, circuit breaker monitoring, electrical system BITE, fuel management, braking control, steering control, landing gear extension and retraction, tyre pressure indication, oleo pressure indication, brake temperature monitoring;	Nil	Nil
Core system;	Nil	Nil
Network components.	Nil	Nil
12.18 On board maintenance systems (ATA45)		
Central maintenance computers;	Nil	Nil
Data loading system;	Nil	Nil
Electronic library system;	Nil	Nil
Printing;	Nil	Nil
Structure monitoring (damage tolerance monitoring).	Nil	Nil
12.19 Information systems (ATA46)		
The units and components which furnish a means of storing, updating and retrieving digital information, traditionally provided on paper, microfilm or microfiche. These include units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. These do not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display.	Nil	Nil
Typical examples include: air traffic and information management systems; network server system; aircraft general information system; flight deck information system; maintenance information system; passenger cabin information system; miscellaneous information system.	Nil	Nil