

Annex A to AMC/GM Part 147 - Module 11A – Turbine Aeroplane aerodynamics, structures, and systems

CASA module Examination subjects	CASA mech basics exams equivalent	CASA avionic basics exams equivalent
Module 11A Turbine Aeroplane aerodynamics, structures and systems (B1.1 Licence)		
11.1 Theory of flight		
11.1.1 Aeroplane aerodynamics and flight controls		
Operation and effect of:		
Roll control: ailerons and spoilers;	BB	QB
Pitch control: elevators, stabilators, variable incidence stabilisers and canards;	BB	QB
Yaw control, rudder limiters;	BB	QB
Control using elevons, ruddervators;	BB	QB
High lift devices, slots, slats, flaps, flaperons;	BB	QB
Drag inducing devices, spoilers, lift dumpers, speed brakes;	BB	QB
Effects of wing fences, sawtooth leading edges;	BB	Nil
Boundary layer control using, vortex generators, stall wedges or leading edge devices;	BB	Nil
Operation and effect of trim tabs, balance and anti-balance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels.	BB	Nil
11.1.2 High speed flight		
Speed of sound, subsonic flight, transonic flight, supersonic flight;	BB	QB
Mach number, critical Mach number, compressibility buffet, shockwave, aerodynamic heating, area rule;	BB	QB
Factors affecting airflow in engine intakes of high speed aircraft;	BB	QB
Effects of sweepback on critical Mach number.	BB	QB
11.2 Airframe structures — general concepts		
(a)		
Airworthiness requirements for structural strength;	FG	Nil
Structural classification, primary, secondary and tertiary;	FG	Nil
Fail safe, safe life, damage tolerance concepts;	FG	Nil
Zonal and station identification systems;	FG	QB
Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue;	FG	Nil
Drains and ventilation provisions;	FG	Nil
System installation provisions;	FG	Nil
Lightning strike protection provision;	FG	Nil
Aircraft bonding;	FG	QB
(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, wing, empennage and engine attachments;	FG	Nil
Structure assembly techniques: riveting,	FG	Nil
bolting,	BA	Nil
bonding;	FG	QB
Methods of surface protection, such as chromating, anodising, painting;	FG	Nil
Surface cleaning;	FG	Nil
Airframe symmetry: methods of alignment and symmetry checks.	FG	Nil
11.3 Airframe structures — aeroplanes		
11.3.1 Fuselage (ATA52/53/56)		
Construction and pressurisation sealing;	FG	Nil
Wing, stabiliser, pylon and under carriage attachments;	FG	Nil
Seat installation and cargo loading system;	FG	Nil
Doors and emergency exits: construction, mechanisms, operation and safety devices;	FG	Nil
Windows and windscreen construction and mechanisms.	FG	Nil
11.3.2 Wings (ATA57)		
Construction;	FG	Nil
Fuel storage;	FG	Nil
Landing gear, pylon, control surface and highlift and drag attachments.	FG	Nil
11.3.3 Stabilisers (ATA55)		
Construction;	FG	Nil
Control surface attachment.	FG	Nil
11.3.4 Flight control surface (ATA55/57)		
Construction and attachment;	FG	Nil
Balancing — mass and aerodynamic.	FG	QB
11.3.5 Nacelles and pylons (ATA54)		
Construction;	FG	Nil
Firewalls;	FG	Nil
Engine mounts.	FG	Nil
11.4 Air-conditioning and cabin pressurisation (ATA21)		
11.4.1 Air supply		
Sources of air supply including engine bleed, APU and ground cart.	FM	ED
11.4.2 Air-conditioning		
Air-conditioning systems;	FM	EB & ED
vapour cycle machines;	FM	EB
Air cycle and	FM	ED
Distribution systems;	FM	EB & ED
Flow, temperature and humidity control system.	FM	EB & ED

11.4.3 Pressurisation		
Pressurisation systems;	IM	IM
Control and indication including control and safety valves;	IM	IM
Cabin pressure controllers;	IM	IM
Heating systems.	FM	Nil
11.4.4 Safety and warning devices		
Protection and warning devices.	IM	IM
11.5 Instruments and avionic systems		
11.5.1 Instrument systems (ATA31)		
Pitot static: altimeter, airspeed indicator, vertical speed indicator;	BC	IA
Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator turn coordinator;	BC	IZ
Compasses: direct reading, remote reading;	BC	IZ
Angle of attack indication, stall warning systems;	Nil	Nil
Glass cockpit;	Nil	IZ
Other aircraft system indication.	Nil	IZ
11.5.2 Avionic systems		
Fundamentals of system layouts and operation of:		
Auto flight (ATA22);	BC	IF
Communications (ATA23);	Nil	WA & WZ
Navigation systems (ATA34).	Nil	WC & WD & WE & WJ
11.6 Electrical power (ATA24)		
Batteries installation and operation;	BC	EB
DC power generation;	BC	EB
AC power generation;	Nil	QD
Emergency power generation;	Nil	Nil
Voltage regulation;	BC	EB
Power distribution;	BC	ED
Inverters, transformers, rectifiers;	Nil	ED
Circuit protection;	BC	QB
External and ground power.	Nil	Nil
11.7 Equipment and furnishings (ATA25)		
(a)		
Emergency equipment requirements;	FG	Nil
Seats, harnesses and belts;	FG	Nil
(b)		
Cabin layout;	FG	Nil
Equipment layout;	FG	Nil
Cabin furnishing installation;	FG	Nil
Cabin entertainment equipment;	Nil	Nil
Galley installation;	FG	Nil
Cargo handling and retention equipment;	FG	Nil
Airstairs.	FG	Nil
11.8 Fire protection (ATA26)		
(a)		
Fire and smoke detection and warning systems;	BC	ED

Fire extinguishing systems;	BC	ED
System tests;	BC	ED
(b)		
Portable fire extinguisher.	BC	ED
11.9 Flight controls (ATA27)		
Primary controls: aileron, elevator, rudder, spoiler;	BB	QB
Trim control;	BB	QB
Active load control;	BB	QB
High lift devices;	BB	QB
Lift dump, speed brakes;	BB	QB
System operation: manual, hydraulic, pneumatic, electrical, fly by-wire;	BB	Nil
Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks systems;	BB	QB
Balancing	BB	Nil
and rigging;	BB	Nil
Stall protection and warning system.	BB	QB
11.10 Fuel systems (ATA28)		
System layout;	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	IA
Refuelling and defuelling;	FA	Nil
Longitudinal balance fuel systems.	FA	Nil
11.11 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
11.12 Ice and rain protection (ATA30)		
Ice formation, classification and detection;	FG	ED
Anti-icing systems: electrical, hot air and chemical;	FG	ED
De-icing systems: electrical, hot air, pneumatic and chemical;	FG	ED
Rain repellent;	FG	Nil
Probe and drain heating;	FG	ED
Wiper systems.	FG	Nil
11.13 Landing gear (ATA32)		
Construction, shock absorbing;	FG	Nil
Extension and retraction systems: normal and emergency;	FG	Nil
Indications and warning;	FG	EB

Wheels, brakes, antiskid and auto braking;	FF	ED
Tyres;	FA	Nil
Steering,	FF	Nil
Air-ground sensing.	FG	EB
11.14 Lights (ATA33)		
External: navigation, anti-collision, landing, taxiing, ice;	Nil	EB
Internal: cabin, cockpit, cargo; emergency.	Nil	EB
11.15 Oxygen (ATA35)		
System layout: cockpit, cabin;	FG	IZ
Sources, storage, charging and distribution;	FG	IZ
Supply regulation;	FG	IZ
Indications and warnings.	FG	IZ
11.16 Pneumatic and vacuum (ATA36)		
System layout;	FM IM	IM
Sources: engine and APU, compressors, reservoirs, ground supply;	FF	Nil
Pressure control;	IM FM	IM
Distribution;	FM IM	Nil
Indications and warnings;	FM IM	IM
Interfaces with other systems.	FM IM	Nil
11.17 Water and waste (ATA38)		
Water system layout, supply, distribution, servicing and draining;	FG	Nil
Toilet system layout, flushing and servicing;	Nil	Nil
Corrosion aspects.	FG	Nil
11.18 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
11.19 Integrated modular avionics (ATA42)		
Functions that may be typically integrated in the integrated modular avionics (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, core system, network components.	Nil	Nil
11.20 Cabin systems (ATA44)		

The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (cabin intercommunication data system) and between the aircraft cabin and ground stations (cabin network service). These include voice, data, music and video transmissions.	Nil	Nil
The cabin intercommunication data system provides an interface between cockpit/cabin crew and cabin systems. These systems support data exchange of the different related LRUs and they are typically operated via flight attendant panels.	Nil	Nil
The cabin network service typically consists on a server, typically interfacing with, among others, the following systems: data/radio communication, in-flight entertainment system.	Nil	Nil
The cabin network service may host functions such as:	Nil	Nil
· access to pre-departure/departure reports	Nil	Nil
· e-mail/intranet/internet access	Nil	Nil
· passenger database	Nil	Nil
· cabin core system	Nil	Nil
· in-flight entertainment system	Nil	Nil
· external communication system	Nil	Nil
· cabin monitoring system	Nil	Nil
· cabin mass memory system	Nil	Nil
· miscellaneous cabin system.	Nil	Nil
11.21 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. Includes 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 systems; aircraft general information system; flight deck information system; maintenance information system; passenger cabin information system; miscellaneous information system.	Nil	Nil