Part 66 B1.3-4 AME Helicopter Training Trade T0 Licence Syllabi and Learning Levels

Nominal Course hours: 2400 hours. Source: Appendix 1, EASR Part 147

Compiled from CASA Part 66 MoS Licencing: Module 10 at end. P0st Trade Licencing Module

Subject Modules		B1.3 helicopter with:	B1.4 helicopter with
		Turbine engine(s)	Piston engine(s)
1	Mathematics	X	X
2	Physics	X	X
3	Electrical fundamentals	X	X
4	Electronic fundamentals	X	X
5	Digital techniques electronic instrument systems – varies 1.3 – 1.4	X	X
6	Materials and hardware	X	X
7	Maintenance practices	X	X
8	Basic aerodynamics	X	X
9	Human factors	X	X
10	Aviation legislation	X	X
11A	Turbine aeroplane aerodynamics, structures and systems		
11B	Piston aeroplane aerodynamics, structures and systems		
12	Helicopter aerodynamics, structures and systems	X	X
13	Aircraft aerodynamics, structures and systems		
14	Propulsion		
15	Gas turbine engine – 1.3	X	
16	Piston engine 1.4		X
17	Propeller 1.4		

B1.3/4 Index

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Module 1 - Mathematics	Level of knowledge for the category
	B1.3-4
1.1 Arithmetic	
Arithmetical terms and signs, methods of multiplication and division, fractions and decimals, factors and multiples, weights, measures and conversion factors, ratio and proportion, averages and percentages, areas and volumes, squares, cubes, square and cube roots.	2
1.2 Algebra	
(a) Evaluating simple algebraic expressions, addition, subtraction, multiplication and division, use of brackets, simple algebraic fractions;	2

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Module 1 - Mathematics	Level of knowledge for the category
	B1.3-4
(b) Linear equations and their solutions; Indices and powers, negative and fractional indices; Binary and other applicable numbering systems; Simultaneous equations and second degree equations with one unknown; Logarithms.	1
1.3 Geometry	1
(a) Simple geometrical constructions;	
(b) Graphical representation, nature and uses of graphs, graphs of equations and functions;	2
(c) Simple trigonometry, trigonometrical relationships, use of tables and rectangular and polar coordinates.	2

Module 2 Physics	Level of knowledge for the category
	B1.3/4
2.1 Matter	1
Nature of matter: the chemical elements, structure of atoms, molecules; Chemical compounds; States: solid, liquid and gaseous; Changes between states.	
2.2 Mechanics ***2.2.1 Statics***	2
Forces, moments and couples, representation as vectors; Centre of gravity; Elements of theory of stress, strain and elasticity: tension, compression, shear and torsion; Nature and properties of solid, fluid and gas; Pressure and buoyancy in liquids (barometers).	
2.2.2 Kinetics	2
Linear movement: uniform motion in a straight line, motion under constant acceleration (motion under gravity); Rotational movement: uniform circular motion (centrifugal and centripetal forces); Periodic motion: pendular movement; Simple theory of vibration, harmonics and resonance; Velocity ratio, mechanical advantage and efficiency.	
2.2.3 Dynamics	2
(a) Mass; Force, inertia, work, power, energy (potential, kinetic and total energy), heat, efficiency;	
(b) Momentum, conservation of momentum; Impulse; Gyroscopic principles; Friction: nature and effects, coefficient of friction (rolling resistance).	2

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Module 2 Physics	Level of knowledge for the category
	B1.3/4
2.2.4 Fluid dynamics	2
(a) Specific gravity and density;	
(b) Viscosity, fluid resistance, effects of streamlining; Effects of compressibility on fluids; Static, dynamic and total pressure: Bernoulli's Theorem, venturi.	2
2.3 Thermodynamics	2
(a) Temperature: thermometers and temperature scales: Celsius, Fahrenheit and Kelvin, heat definition;	
(b) Heat capacity, specific heat; Heat transfer: convection, radiation and conduction; Volumetric expansion; First and second law of thermodynamics; Gases: ideal gases laws, specific heat at constant volume and constant pressure, work done by expanding gas; Isothermal, adiabatic expansion and compression, engine cycles, constant volume and constant pressure, refrigerators and heat pumps; Latent heats of fusion and evaporation, thermal energy, heat of combustion.	2
2.4 Optics (light)	2
Nature of light, speed of light; Laws of reflection and refraction: reflection at plane surfaces, reflection by spherical mirrors, refraction, lenses; Fiberoptics.	
2.5 Wave motion and sound	2
Wave motion: mechanical waves, sinusoidal wave motion, interference phenomena, standing waves; Sound: speed of sound, production of sound, intensity, pitch and quality, Doppler effect.	

Module 3 Electrical fundamentals	Level of knowledge for the category
	B1.3/4
3.1 Electron theory	1
Structure and distribution of electrical charges within atoms, molecules, ions, compounds; Molecular structure of conductors, semiconductors and insulators.	
3.2 Static electricity and conduction	2
Static electricity and distribution of electrostatic charges; Electrostatic laws of attraction and repulsion; Units of charge, Coulomb's Law; Conduction of electricity in solids, liquids, gases and vacuum.	
3.3 Electrical terminology	2
The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.	
3.4 Generation of electricity	1
Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.	

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Module 3 Electrical fundamentals	Level of knowledge for the category B1.3/4
3.5 DC sources of electricity	
Construction and basic chemical action of: primary cells, secondary cells, lead acid cells, nickel cadmium cells, other Alkaline cells; Cells connected in series and parallel; Internal resistance and its effect on a battery; Construction, materials and operation of thermocouples; Operation of photo-cells.	2
3.6 DC circuits	
Ohms Law, Kirchoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage and current; Significance of the internal resistance of a supply.	2
3.7 Resistance and resistor	
(a) Resistance and affecting factors; Specific resistance; Resistor colour code, values and tolerances, preferred values, wattage ratings; Resistors in series and parallel; Calculation of total resistance using series parallel and series parallel combinations; Operation and use of potentiometers and rheostats; Operation of Wheatstone Bridge;	2
(b) Positive and negative temperature coefficient conductance; Fixed resistors, stability, tolerance and limitations, methods of construction; Variable resistors, thermistors, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge.	1
3.8 Power	
Power, work and energy (kinetic and potential); Dissipation of power by a resistor; Power formula; Calculations involving power, work and energy.	2
3.9 Capacitance and capacitor	
Operation and function of a capacitor; Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric constant, working voltage, voltage rating; Capacitor types, construction and function; Capacitor colour coding; Calculations of capacitance and voltage in series and parallel circuits; Exponential charge and discharge of a capacitor, time constants; Testing of capacitors.	2

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Module 3 Electrical fundamentals	Level of knowledge for the category B1.3/4
3.10 Magnetism (a) Theory of magnetism; Properties of a magnet; Action of a magnet suspended in the Earth's magnetic field; Magnetisation and demagnetisation; Magnetic shielding; Various types of magnetic material; Electromagnets construction and principles of operation; Hand clasp rules to determine: magnetic field around current carrying conductor.	2
(b) Magneto-motive force, field strength, magnetic flux density, permeability, hysteresis loop, retentivity, coercive force reluctance, saturation point, eddy currents; Precautions for care and storage of magnets.	2
3.11 Inductance and inductor	2
Faraday's Law; Action of inducing a voltage in a conductor moving in a magnetic field; Induction principles; Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductor turns; Mutual induction; The effect the rate of change of primary current and mutual inductance has on induced voltage; Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other; Lenz's Law and polarity determining rules; Back emf, self-induction; Saturation point; Principal uses of inductors.	
3.12 DC motor and generator theory	2
Basic motor and generator theory; Construction and purpose of components in DC generator; Operation of, and factors affecting output and direction of, current flow in DC generators; Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors; Series wound, shunt wound and compound motors; Starter generator construction.	
3.13 AC theory	2
Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power; Triangular and square waves; Single and 3 phase principles.	
3.14 Resistive (R), Capacitive (C) and Inductive (L) Circuits	2
Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel; Power dissipation in L, C and R circuits; Impedance, phase angle, power factor and current calculations; True power, apparent power and reactive power calculations.	
3.15 Transformers	2

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Module 3 Electrical fundamentals	Level of knowledge for the category B1.3/4
Transformer construction principles and operation; Transformer losses and methods for overcoming them; Transformer action under load and no-load conditions; Power transfer, efficiency, polarity markings; Calculation of line and phase voltages and currents; Calculation of power in a 3 phase system; Primary and secondary current, voltage, turns ratio, power, efficiency; Autotransformers.	
3.16 Filters	1
Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.	
3.17 AC generators	2
Rotation of loop in a magnetic field and waveform produced; Operation and construction of revolving armature and revolving field type AC generators; Single phase, 2 phase and 3 phase alternators; Three phase star and delta connections advantages and uses; Permanent magnet generators.	
3.18 AC motors	2
Construction, principles of operation and characteristics of: AC synchronous and induction motors both single and polyphase; Methods of speed control and direction of rotation; Methods of producing a rotating field: capacitor, inductor, shaded or split pole.	

Module 4 Electronic fundamentals	Level of knowledge for the category B1.3/4
4.1 Semiconductors	2
4.1.1 Diodes	
(a) Diode symbols; Diode characteristics and properties; Diodes in series and parallel; Main characteristics and use of silicon controlled rectifiers (thyristors), light emitting diode, photo conductive diode, varistor, rectifier diodes; Functional testing of diodes;	
4.1.2 Transistors	1
(a) Transistor symbols; Component description and orientation; Transistor characteristics and properties;	
4.1.3 Integrated circuits	1
(a) Description and operation of logic circuits and linear circuits and operational amplifiers;	
4.2 Printed circuit boards	1

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Module 4 Electronic fundamentals	Level of knowledge for the category
	B1.3/4
Description and use of printed circuit boards.	
4.3 Servomechanisms	1
(a) Understanding of the following terms: open and closed loop systems, feedback, follow up, analogue transducers; Principles of operation and use of the following synchro system components and features: resolvers, differential, control and torque, transformers, inductance and capacitance transmitters;	

Module 5 Digital techniques/electronic instrument systems	Level of knowledge for the category	
	B1.3	B1.4
5.1 Electronic instrument systems	2	2
Typical systems arrangements and cockpit layout of electronic instrument systems.		
5.2 Numbering systems	1	—
Numbering systems: binary, octal and hexadecimal; Demonstration of conversions between the decimal and binary, octal and hexadecimal systems, and vice versa.		
5.3 Data conversion	1	—
Analogue data, digital data; Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.		
5.4 Data buses	2	—
Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications; Aircraft network/ethernet.		
5.5 Logic circuits	2	—
(a) Identification of common logic gate symbols, tables and equivalent circuits; Applications used for aircraft systems, schematic diagrams;		
5.6 Basic computer structure	2	—
(a) Computer terminology (including bit, byte, software, hardware, CPU, IC, and various memory devices, such as RAM, ROM, PROM); Computer technology (as applied in aircraft systems);		
5.10 Fibre optics	1	1
Advantages and disadvantages of fibre-optic data transmission over electrical wire propagation; Fibre-optic data bus; Fibre-optic related terms; Terminations; Couplers, control terminals, remote terminals; Application of fibre optics in aircraft systems.		
5.11 Electronic displays	2	1
Principles of operation of common types of displays used in modern aircraft, including cathode ray tubes, light emitting diodes and liquid crystal display.		

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Module 5 Digital techniques/electronic instrument systems	Level of knowledge for the category	
	B1.3	B1.4
5.12 Electrostatic sensitive devices	2	2
Special handling of components sensitive to electrostatic discharges; Awareness of risks and possible damage, component and personnel anti-static protection devices.		
5.13 Software management control	2	1
Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programs.		
5.14 Electromagnetic environment	2	2
Influence of the following phenomena on maintenance practices for electronic system: • EMC – electromagnetic compatibility • EMI – electromagnetic interference • HIRF – high-intensity radiated field • Lightning and lightning protection.		
5.15 Typical electronic/digital aircraft systems	2	2
General arrangement of typical electronic/digital aircraft systems and associated built-in test equipment (BITE), such as the following: • ACARS – ARINC communication and addressing and reporting system • ECAM – electronic centralised aircraft monitoring • EFIS – electronic flight instrument system • EICAS – engine indication and crew alerting system • FBW – fly-by-wire • FMS – flight management system • GPS – global positioning system • IRS – inertial reference system • TCAS – traffic alert collision avoidance system.		

Module 6 Materials and hardware	Level of knowledge for the category
	B1.3/4
6.1 Aircraft materials ferrous	2
(a) Characteristics, properties and identification of common alloy steels used in aircraft; Heat treatment and application of alloy steels;	
(b) Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance.	1
6.2 Aircraft materials — non-ferrous	2
(a) Characteristics, properties and identification of common non-ferrous materials used in aircraft; Heat treatment and application of non-ferrous materials;	
(b) Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance.	1
6.3 Aircraft materials — composite and non-metallic	2
6.3.1 Composite and non-metallic other than wood and fabric	

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Module 6 Materials and hardware	Level of knowledge for the category B1.3/4
(a) Characteristics, properties and identification of common composite and non-metallic materials, other than wood, used in aircraft; Sealant and bonding agents;	
(b) The detection of defects and deterioration in composite and non-metallic material; Repair of composite and non-metallic material.	2
6.3.2 Wooden structures	2
Construction methods of wooden airframe structures; Characteristics, properties and types of wood and glue used in aeroplanes; Preservation and maintenance of wooden structure; Types of defects in wood material and wooden structures; The detection of defects in wooden structure; Repair of wooden structure.	
6.3.3 Fabric covering	2
Characteristics, properties and types of fabrics used in aeroplanes; Inspections methods for fabric; Types of defects in fabric; Repair of fabric covering.	
6.4 Corrosion	1
(a) Chemical fundamentals; Formation by galvanic action process, microbiological, stress;	
(b) Types of corrosion and their identification; Causes of corrosion; Material types, susceptibility to corrosion.	3
6.5 Fasteners	2
6.5.1 Screw threads	
Screw nomenclature; Thread forms, dimensions and tolerances for standard threads used in aircraft; Measuring screw threads;	
6.5.2 Bolts, studs and screws	2
Bolt types: specification, identification and marking of aircraft bolts, international standards; Nuts: self-locking, anchor, standard types; Machine screws: aircraft specifications; Studs: types and uses, insertion and removal; Self tapping screws, dowels.	
6.5.3 Locking devices	2
Tab and spring washers, locking plates, split pins, pal-nuts, wire locking, quick release fasteners, keys, circlips, cotter pins.	

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Module 6 Materials and hardware	Level of knowledge for the category
	B1.3/4
6.5.4 Aircraft rivets	2
Types of solid and blind rivets: specifications and identification, heat treatment.	
6.6 Pipes and unions	
(a) Identification of, and types of, rigid and flexible pipes and their connectors used in aircraft;	2
(b) Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.	2
6.7 Springs	2
Types of springs, materials, characteristics and applications.	
6.8 Bearings	2
Purpose of bearings, loads, material, construction; Types of bearings and their application.	
6.9 Transmissions	2
Gear types and their application; Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns; Belts and pulleys, chains and sprockets.	
6.10 Control cables	2
Types of cables; End fittings, turn buckles and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems.	
6.11 Electrical cables and connectors	2
Cable types, construction and characteristics; High tension and co-axial cables; Crimping; Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes.	

Module 7 Maintenance practices	Level of knowledge for the category
	B1.3/4
7.1 Safety precautions — aircraft and workshop	3
Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals; Instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.	
7.2 Workshop practices	3
Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards.	

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Module 7 Maintenance practices	Level of knowledge for the category
	B1.3/4
7.3 Tools	3
Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods; Operation, function and use of electrical general test equipment.	
7.4 Avionic general test equipment	**2**
Operation, function and use of avionic general test equipment.	
7.5 Engineering drawings, diagrams and standards	**2**
Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information; Microfilm, microfiche and computerised presentations; Specification 100 of the ATA; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams.	
7.6 Fits and clearances	**2**
Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist and wear; Standard methods for checking shafts, bearings and other parts.	
7.7 Electrical wiring interconnection system (EWIS)	**3**
Continuity, insulation and bonding techniques and testing; Use of crimp tools: hand and hydraulic operated; Testing of crimp joints; Connector pin removal and insertion; Co-axial cables: testing and installation precautions; Identification of wire types, their inspection criteria and damage tolerance; Wiring-protection techniques: cable looming and loom support, cable clamps, protective sleeving techniques, including heat shrink wrapping, shielding; EWIS installations, inspection, repair, maintenance and cleanliness standards.	
7.8 Riveting	2
Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints.	
7.9 Pipes and hoses	2
Bending and belling and flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes.	
7.10 Springs	2
Inspection and testing of springs.	
7.11 Bearings	2
Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes.	

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Module 7 Maintenance practices	Level of knowledge for the category
	B1.3/4
7.12 Transmissions	
Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems.	2
7.13 Control cables	
Swaging of end fittings; Inspection and testing of control cables; Bowden cables; Aircraft flexible control systems.	2
7.14 Material handling	
7.14.1 Sheet Metal	
Marking out, and calculation of, bend allowance; Sheet metal working including bending and forming; Inspection of sheet metal work.	2
7.14.2 Composite and non-metallic	
Bonding practices; Environmental conditions; Inspection methods.	2
7.15 Welding, brazing, soldering and bonding	
(a) Soldering methods, inspection of soldered joints;	2
(b) Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints.	2
7.16 Aircraft weight and balance	
(a) Centre of gravity and balance limits calculation: use of relevant documents;	2
(b) Preparation of aircraft for weighing; Aircraft weighing.	2
7.17 Aircraft handling and storage	
Aircraft taxiing and towing and associated safety precautions; Aircraft jacking, chocking, securing and associated safety precautions; Aircraft storage methods; Refuelling and defuelling procedures; De-icing and anti-icing procedures; Electrical, hydraulic and pneumatic ground supplies; Effects of environmental conditions on aircraft handling and operation.	2
7.18 Disassembly, inspection, repair and assembly techniques	
(a) Types of defects and visual inspection techniques; Corrosion removal, assessment and reprotection;	3

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Module 7 Maintenance practices	Level of knowledge for the category
	B1.3/4
(b) General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programs;	2
(c) Non-destructive inspection techniques including: penetrant, radiographic, eddy current, ultrasonic and borescope methods;	2
(d) Disassembly and re-assembly techniques;	2
(e) Trouble shooting techniques.	2
7.19 Abnormal events	2
(a) Inspections following lightning strikes and HIRF penetration.	
(b) Inspections following abnormal events such as heavy landings and flight through turbulence.	2
7.20 Maintenance procedures	2
Maintenance planning; Modification procedures; Stores procedures; Certification and release procedures; Interface with aircraft operation; Maintenance inspection, quality control and quality assurance; Additional maintenance procedures; Control of life limited components.	

Module 8 Basic aerodynamics	Level of knowledge for the category
	B1.3/4
8.1 Physics of the atmosphere	2
International Standard Atmosphere (ISA), application aerodynamics.	
8.2 Aerodynamics	2
Air flow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, up wash and downwash, vortices, stagnation; The terms: camber, chord, mean aerodynamic chord, profile (parasite) drag, induced drag, centre of pressure, angle of attack, wash in and washout, fineness ratio, wing shape and aspect ratio; Thrust, weight, aerodynamic resultant; Generation of lift and drag: angle of attack, lift coefficient, drag coefficient, polar curve, stall; Aerofoil contamination including ice, snow, frost.	
8.3 Theory of flight	2
Relationship between lift, weight, thrust and drag; Glide ratio; Steady state flights, performance; Theory of the turn; Influence of load factor: stall, flight envelope and structural limitations; Lift augmentation.	

Module 8 Basic aerodynamics	Level of knowledge for the category
	B1.3/4
8.4 Flight stability and dynamics	2
Longitudinal, lateral and directional stability (active and passive).	

Module 9 Human factors	Level of knowledge for the category
	B1.3/4
9.1 General	2
The need to take human factors into account; Incidents attributable to human factors and human error; "Murphy's" law.	
9.2 Human performance and limitations	2
Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access.	
9.3 Social psychology	1
Responsibility: individual and group; Motivation and de-motivation; Peer pressure; Culture issues; Team working; Management, supervision and leadership.	
9.4 Factors affecting performance	2
Fitness and health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and underload; Sleep and fatigue, shiftwork; Alcohol, medication, drug abuse.	
9.5 Physical environment	1
Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment.	
9.6 Tasks	1
Physical work; Repetitive tasks; Visual inspection; Complex systems.	

Module 9 Human factors	Level of knowledge for the category
	B1.3/4
9.7 Communication	2
Within and between teams; Work logging and recording; Keeping up-to-date, currency; Dissemination of information.	
9.8 Human error	2
Error models and theories; Types of error in maintenance tasks; Implications of errors (i.e. accidents); Avoiding and managing errors.	
9.9 Hazards in the workplace	2
Recognising and avoiding hazards; Dealing with emergencies.	

Module 12 Helicopter aerodynamics, structures and systems	Level of knowledge for the category
	B1.3/4
12.1 Theory of flight — rotary wing aerodynamics	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	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.	
12.3 Blade tracking and vibration analysis	3
Rotor alignment; Main and tail rotor tracking; Static and dynamic balancing; Vibration types, vibration reduction methods;	

Module 12 Helicopter aerodynamics, structures and systems	Level of knowledge for the category	
	B1.3/4	
Ground resonance.		
12.4 Transmission		
Gearboxes, main and tail rotors; Clutches, freewheel units and rotor brake; Tail rotor drive shafts, flexible couplings, bearings, vibration dampers and bearing hangers.	3	
12.5 Airframe structures		
(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	
(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.	2	
12.6 Air-conditioning (ATA21)	B1.3	B1.4
12.6.1 Air supply Sources of air supply including engine bleed and ground cart.	2	0
12.6.2 Air-conditioning	B1.3	B1.4
Air-conditioning systems; Distribution systems; Flow and temperature control systems; Protection and warning devices.	3	0
12.7 Instruments and avionic systems		
12.7.1 Instrument systems (ATA31) 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; Vibration indicating systems — HUMS;	2	

Module 12 Helicopter aerodynamics, structures and systems	Level of knowledge for the category B1.3/4
Glass cockpit; Other aircraft system indication.	
12.7.2 Avionic systems Fundamentals of system layouts and operation of: Auto flight (ATA22); Communications (ATA23); Navigation Systems (ATA34).	1
12.8 Electrical power (ATA24)	
Batteries installation and operation; DC power generation, AC power generation; Emergency power generation; Voltage regulation, circuit protection; Power distribution; Inverters, transformers, rectifiers; External and ground power.	3
12.9 Equipment and furnishings (ATA25)	
(a) Emergency equipment requirements; Seats, harnesses and belts; Lifting systems;	2
(b) Emergency flotation systems; Cabin layout, cargo retention; Equipment layout; Cabin furnishing installation.	1
12.10 Fire protection (ATA26)	
Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	3
12.11 Fuel systems (ATA28)	
System layout; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling.	3
12.12 Hydraulic power (ATA29)	**B1.3 Only**
System layout; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Filters; Pressure control; Power distribution; Indication and warning systems;	3

Module 12 Helicopter aerodynamics, structures and systems	Level of knowledge for the category B1.3/4
Interface with other systems.	
12.13 Ice and rain protection (ATA30)	3
Ice formation, classification and detection; Anti-icing and de-icing systems: electrical, hot air and chemical; Rain repellent and removal; Probe and drain heating; Wiper system.	
12.14 Landing gear (ATA32)	**B1.3 Only**
Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, tyres, brakes; Steering; Air-ground sensing; Skids, floats.	3
12.15 Lights (ATA33)	3
External: navigation, landing, taxiing, ice; Internal: cabin, cockpit, cargo; emergency.	
12.16 Pneumatic and vacuum (ATA36)	3
System layout; Sources: engine, compressors, reservoirs, ground supply; Pressure control; Distribution; Indication sand warnings; Interfaces with other systems.	
12.17 Integrated modular avionics (ATA42)	**B1.3 Only**
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.	2
12.18 On-board maintenance systems (ATA45)	**B1.3 Only**
Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).	2
12.19 Information systems (ATA46)	**B1.3 Only**
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.	2

Module 12 Helicopter aerodynamics, structures and systems	Level of knowledge for the category
	B1.3/4
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.	

Module 15 Gas turbine engine (B1.3)	Level of knowledge for the category
	B1.3
15.1 Fundamentals	2
Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle; The relationship between force, work, power, energy, velocity, acceleration; Constructional arrangement and operation of turbojet, turbofan, turbo shaft, turboprop.	
15.2 Engine performance	2
Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption; Engine efficiencies; By-pass ratio and engine pressure ratio; Pressure, temperature and velocity of the gas flow; Engine ratings, static thrust, influence of speed, altitude and hot climate, flat rating, limitations.	
15.3 Inlet	2
Compressor inlet ducts; Effects of various inlet configurations; Ice protection.	
15.4 Compressors	2
Axial and centrifugal types; Constructional features and operating principles and applications; Fan balancing; Operation; Causes and effects of compressor stall and surge; Methods of airflow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades; Compressor ratio.	
15.5 Combustion section	2
Constructional features and principles of operation.	
15.6 Turbine section	2
Operation and characteristics of different turbine blade types; Blade to disk attachment; Nozzle guide vanes; Causes and effects of turbine blade stress and creep.	
15.7 Exhaust	2
Constructional features and principles of operation; Convergent, divergent and variable area nozzles; Engine noise reduction;	

Module 15 Gas turbine engine (B1.3)	Level of knowledge for the category
	B1.3
Thrust reversers.	
15.8 Bearings and seals	2
Constructional features and principles of operation.	
15.9 Lubricants and fuels	2
Properties and specifications; Fuel additives; Safety precautions.	
15.10 Lubrication systems	2
System operation and layout and components.	
15.11 Fuel systems	2
Operation of engine control and fuel metering systems including: electronic engine control (FADEC), systems layout and components.	
15.12 Air systems	2
Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services.	
15.13 Starting and ignition systems	2
Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements.	
15.14 Engine indication systems	2
Exhaust gas temperature and interstage turbine temperature; Engine thrust indication: engine pressure ratio, engine turbine discharge pressure or jet pipe pressure systems; Oil pressure and temperature; Fuel pressure and flow; Engine speed; Vibration measurement and indication; Torque; Power.	
15.15 Power augmentation systems	1
Operation and applications; Water injection, water methanol; Afterburner systems.	
15.16 Turbo-prop engines	2
Gas coupled and free turbine and gear coupled turbines; Reduction gears; Integrated engine and propeller controls; Over speed safety devices.	
15.17 Turbo-shaft engines	2
Arrangements drive systems, reduction gearing, couplings, control systems.	
15.18 Auxiliary power units (APUs)	2
Purpose, operation, protective systems.	

Part 66 B1.3-4 AME Helicopter Training Trade T0 Licence Syllabi and Learning Levels

Module 15 Gas turbine engine (B1.3)	Level of knowledge for the category
	B1.3
15.19 Powerplant installation	2
Configuration of fire walls, cowlings, acoustic panels engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.	
15.20 Fire protection systems	2
Operation of detection and extinguishing systems.	
15.21 Engine monitoring and ground operation	3
Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Trend (including oil analysis, vibration and borescope) monitoring; Inspection of engine and components to criteria, tolerances and data specified by engine manufacturer; Compressor washing and cleaning; Foreign object damage.	
15.22 Engine storage and preservation	2
Preservation and depreservation for the engine and accessories and systems.	

Module 16 Piston engine (B1.4)	Level of knowledge for the category
	B1.4
16.1 Fundamentals	2
Mechanical, thermal and volumetric efficiencies; Operating principles: 2 stroke, 4 stroke, otto and diesel; Piston displacement and compression ratio; Engine configuration and firing order.	
16.2 Engine performance	2
Power calculation and measurement; Factors affecting engine power; Mixtures and leaning, pre-ignition.	
16.3 Engine construction	2
Crankcase, crankshaft, camshafts, sumps; Accessory gearbox; Cylinder and piston assemblies; Connecting rods, inlet and exhaust manifolds; Valve mechanisms; Propeller reduction gearboxes.	
16.4 Engine fuel systems	2
16.4.1 Carburettors	
Types, construction and principles of operation; Icing and heating.	
16.4.2 Fuel injection systems	2
Types, construction and principles of operation.	

Module 16 Piston engine (B1.4)	Level of knowledge for the category B1.4
16.4.3 Electronic engine control	2
Operation of engine control and fuel metering systems including: electronic engine control (FADEC), systems layout and components.	
16.5 Starting and ignition systems	2
Starting systems, pre-heat systems; Magneto types, construction and principles of operation; Ignition harnesses, sparkplugs; Low and high-tension systems.	
16.6 Induction, exhaust and cooling systems	2
Construction and operation of induction systems, including alternate air systems; Exhaust systems, engine cooling systems — air and liquid.	
16.7 Supercharging and turbo charging	2
Principles and purpose of supercharging and its effects on engine parameters; Construction and operation of supercharging and turbo charging systems; System terminology; Control systems; System protection.	
16.8 Lubricants and fuels	2
Properties and specifications; Fuel additives; Safety precautions.	
16.9 Lubrication systems	2
System operation and layout and components.	
16.10 Engine indication systems	2
Engine speed; Cylinder head temperature; Coolant temperature; Oil pressure and temperature; Exhaust gas temperature; Fuel pressure and flow; Manifold pressure.	
16.11 Powerplant installation	2
Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.	
16.12 Engine monitoring and ground operation	3
Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Inspection of engine and components: criteria, tolerances and data specified by engine manufacturer.	
16.13 Engine storage and preservation	2
Preservation and depreservation for the engine and accessories and systems.	

Part 66 B1.3-4 AME Helicopter Training Trade T0 Licence Syllabi and Learning Levels

Post Trade Training Licencing Module

Module 10 Aviation legislation	Level of knowledge for the category
	B1.3/4
10.1 Regulatory Framework	1
Role of International Civil Aviation Organization; Role of CASA; Relationship between Parts 21, 42, 66, 145 and 147 of CASR 1998; Relationship with other aviation authorities.	
10.2 Part 66 Certifying Staff	2
Detailed understanding of Part 66 of CASR 1998.	
10.3 Part 145 – Approved maintenance organisations	2
Detailed understanding of Part 145 of CASR 1998.	
10.4 Air operations	1
Air Operators' Certificates; Operators' responsibilities, in particular regarding continuing airworthiness and maintenance; Aircraft maintenance program; MEL/CDL; Documents to be carried on board; Aircraft placarding (markings).	
10.5 Certification of aircraft, parts and appliances	2
(a) General General understanding of Parts 21, 23, 25, 27 and 29 of CASR 1998;	
10.6 Continuing airworthiness	2
(a) Detailed understanding of Part 21 of CASR 1998 provisions relating to continuing airworthiness; (b) Detailed understanding of Part 42 of CASR 1998.	
10.7 Applicable national and international requirements	2
(a) Management programs, maintenance checks and inspections; Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists; Airworthiness Directives; Service bulletins, manufacturers' service information; Modification and repairs; Maintenance documentation: maintenance manuals, structural repair manuals, illustrated parts catalogue, etc.	

Part 66 B1.3-4 AME Helicopter Training Trade T0 Licence Syllabi and Learning Levels

Module 10 Aviation legislation	Level of knowledge for the category
	B1.3/4
(b) Continuing airworthiness; Minimum equipment requirements —test flights; ETOPS, maintenance and dispatch requirements; All weather operations: categories 2 and 3 operations.	1