CIVIL AVIATION DIRECTIVE – 1801

AIRCRAFT MAINTENANCE LICENCE

CAAM Part 66

CIVIL AVIATION AUTHORITY OF MALAYSIA

ISSUE 01
REVISION 00 – 1ST MAY 2021

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Introduction

In exercise of the powers conferred by section 24O of the Civil Aviation Act 1969 (Act 3), the Chief Executive Officer makes this Civil Aviation Directives (CAD) 1801 – Aircraft Maintenance Licence (CAAM Part 66), pursuant to Regulation 30, 35, 189, 193 of the Malaysian Civil Aviation Regulations (MCAR) 2016.

This CAD provides the requirement governing the issuance, renewal and variation of Aircraft Maintenance Licence and is compliant with Malaysian Civil Aviation Regulations and CAD 1 – Personnel Licensing, and in accordance with the Standards and Recommended Practices (SARPs) contained in the International Civil Aviation Organisation (ICAO) Annex 1 – Personnel Licensing.

This Civil Aviation Directive 1801 – Aircraft Maintenance Licence ("CAD 1801 – Aircraft Maintenance Licence") is published by the Chief Executive Officer under section 24O of the Civil Aviation Act 1969 (Act 3) and come into operation on 1st May 2021.

Non-compliance with this CAD

Any person who contravenes any provision in this CAD commits an offence and shall on conviction be liable to the punishments under section 24O of the Civil Aviation Act 1969 (Act 3) and/or under Malaysia Civil Aviation Regulation 2016.

(Captain Chester Voo Chee Soon)
Chief Executive Officer
Civil Aviation Authority of Malaysia

Civil Aviation Directive components and Editorial practices

This Civil Aviation Directive is made up of the following components and are defined as follows:

Standards: Usually preceded by words such as *"shall"* or *"must"*, are any specification for physical characteristics, configuration, performance, personnel or procedure, where uniform application is necessary for the safety or regularity of air navigation and to which Operators must conform. In the event of impossibility of compliance, notification to the CAAM is compulsory.

Recommended Practices: Usually preceded by the words such as "*should"* or "*may*", are any specification for physical characteristics, configuration, performance, personnel or procedure, where the uniform application is desirable in the interest of safety, regularity or efficiency of air navigation, and to which Operators will endeavour to conform.

Appendices: Material grouped separately for convenience but forms part of the Standards and Recommended Practices stipulated by the CAAM.

Definitions: Terms used in the Standards and Recommended Practices which are not self-explanatory in that they do not have accepted dictionary meanings. A definition does not have an independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.

Tables and Figures: These add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

Notes: Included in the text, where appropriate, Notes give factual information or references bearing on the Standards or Recommended Practices in question but not constituting part of the Standards or Recommended Practices;

Attachments: Material supplementary to the Standards and Recommended Practices or included as a guide to their application.

It is to be noted that some Standards in this Civil Aviation Directive incorporates, by reference, other specifications having the status of Recommended Practices. In such cases, the text of the Recommended Practice becomes part of the Standard.

The units of measurement used in this document are in accordance with the International System of Units (SI) as specified in CAD 5. Where CAD 5 permits the use of non-SI alternative units, these are shown in parentheses following the basic units. Where two sets of units are quoted it must not be assumed that the pairs of values are equal and interchangeable. It may, however, be inferred that an equivalent level of safety is achieved when either set of units is used exclusively.

Any reference to a portion of this document, which is identified by a number and/or title, includes all subdivisions of that portion.

Throughout this Civil Aviation Directive, the use of the male gender should be understood to include male and female persons.

Record of Revisions

Revisions to this CAD shall be made by authorised personnel only. After inserting the revision, enter the required data in the revision sheet below. The *'Initials'* has to be signed off by the personnel responsible for the change.

Rev No.	Revision Date	Revision Details	Initials

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Table of Contents

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1 General

1.1 Citation

1.1.1 These Directives are the Civil Aviation Directives 1801 – Aircraft Maintenance Licence (CAAM Part 66) (CAD 1801), Issue 01/Revision 00, and comes into operation on 1st May 2021.

1.1.2 This CAD 1801 - Aircraft Maintenance Licence, Issue 01/Revision 00 will remain current until withdrawn or suspended.

1.2 Applicability

1.2.1 This CAD shall apply to—

a) an applicant for issuance, renewal and variation of Aircraft Maintenance Licence (AML); and

b) a holder of AML

1.3 Revocation

1.3.1 This CAD, revokes Notice 1101 – Aircraft Maintenance Licence (CAAM Part 66) issue 3 dated 13th October 2020.

1.4 Definition

1.4.1 In this CAD, unless the context otherwise requires:.

AML means Aircraft Maintenance Licence issued by CAAM in accordance with regulation 35 of the MCAR

AMO means approved maintenance organisation which holds a valid certificate of approval granted under regulation 31(1)(b) of the MCAR.

Approved Training means training conducted under syllabus defined in Appendix 1 or Appendix 3 of this CAD and approved by CAAM.

Avionics System means an aircraft system that transfers, processes, displays or stores analogue or digital data using data lines, data buses, coaxial cables, wireless or other data transmission medium, and includes the system's components and connectors.

Certifying Staff means personnel of a maintenance organisation under regulations 31 and 32 of the MCAR as applicable, who is responsible for the release of an aircraft or component after maintenance.

Electrical System means the aircraft electrical power supply source, plus the distribution system to the different components contained in the aircraft and relevant connectors.

Knowledge Examiner means an appropriately qualified person nominated by the maintenance training organisation to develop theoretical examination question paper and conduct assessment on the performance of the examinations.

Large Aircraft means—

a) an aeroplane with a maximum certificated take-off mass exceeding 5,700 kg;

b) an aeroplane equipped with turbojet engine(s) or more than one turboprop engine;

c) a rotorcraft with a maximum certificated take-off mass exceeding 3,175 kg; or

d) a rotorcraft with more than one engine;

Maintenance Experience means experience of being involved in maintenance tasks on operating aircraft and cover a wide range of tasks in length, complexity and variety.

Maintenance Experience Logbook means CAAM Part 66 Logbook issued by CAAM for aircraft maintenance experience gathering and evidence of practical assessments.

MTO means approved maintenance training organisation which holds a valid certificate of approval granted under regulation 31(1)(c) or 32(1) of the MCAR.

Practical Assessor means an appropriately qualified person in MTO or AMO, to conduct the practical assessments in determining the level of practical knowledge or skill whether the trainee is competent.

Simple Test means a test described in approved maintenance data which does not requires specific training, or particular competencies required to perform maintenance task on a specific type of equipment and in specific environment.

Troubleshooting means the procedures and actions necessary, using approved maintenance data, in order to identify the root cause of a defect or malfunction.

Type Ratings means aircraft type rating endorsed in an AML either in category/ subcategories B or C or both.

Type Task Ratings means aircraft type rating endorsed in an AML in category/ subcategories A, for the specific maintenance task as specified in Appendix 3 of this CAD.

Validator means a licensed personnel or a person authorised by the maintenance training organisation who is responsible to train and validate the skill training and experience acquisition of aircraft maintenance trainee or personnel.

1.5 Eligibility (66.15)

1.5.1 An applicant for an AML shall be at least 21 years of age.

1.6 AML categories (Basic ratings) (66.30)

1.6.1 The following are categories and subcategories in relations to combination of aeroplanes, helicopters, turbine and piston engines:

a) Category A (Aircraft Maintenance Technician)
Subcategories:

1) A1 - Aeroplanes Turbine
2) A2 - Aeroplanes Piston
3) A3 - Helicopters Turbine
4) A4 - Helicopters Piston

b) Category B1 (Aircraft Maintenance Engineer – Mechanical)
Subcategories:

1) B1.1 - Aeroplanes Turbine
2) B1.2 - Aeroplanes Piston
3) B1.3 - Helicopters Turbine
4) B1.4 - Helicopters Piston

c) Category B2 (Aircraft Maintenance Engineer – Avionics)

d) Category C (Aircraft Maintenance Engineer - Base Maintenance)

1) Large Aircraft
2) Other than Large Aircraft.

1.7 Application for Aircraft Maintenance Licence

1.7.1 General

1.7.1.1 Each application shall be supported by documentation to demonstrate compliance with the applicable theoretical knowledge, practical training and maintenance experience requirements at the time of application.

1.7.1.2 CAAM will issue, renew or vary an AML upon being satisfied that the applicant is a fit person to hold an AML and has furnished the evidences and passed the examinations and tests as may be required of him/her, for the purpose of establishing that the applicant has sufficient knowledge, experience, competence and skill in aircraft maintenance.

1.7.1.3 An AML when issued in accordance with this CAD meets the intent of Annex 1 to the Convention on International Civil Aviation.

1.7.1.4 CAAM Part 66 Category A AML will be issued separately from Category B1 or B2 AML upon application.

1.7.2 An applicant for issuance or variation of AML shall:

a) Submit an application which is acceptable in content and presentation as per form CAAM/AW/1801-01 accompanied by the prescribed fee together with the following documentation:

1) In relation to evidence of knowledge requirement;

   i) Certificate of recognition of approved basic training course or approved type training course, with relevant examination result as applicable; or
   ii) Relevant examination report acceptable to CAAM with evidence of practical assessment as applicable;

2) Maintenance experience logbook or in case of first type endorsement, evidence of aircraft type practical experience and On-the-Job Training; and
3) In the case of issuance of AML,

   i) evidence of assessment on Module 10 certified by practical assessor in MTO or AMO, and
   ii) evidence of proficiency in English language, for issuance of AML. Evidence of qualification at least Sijil Pelajaran Malaysia (SPM) or equivalent which is acceptable to CAAM with credits in English Language;

1.7.3 Application through MTO

1.7.3.1 MTO shall apply for issuance of AML for its own candidates who have successfully completed their basic training courses.

1.7.3.2 MTO shall submit an application which is acceptable in content and presentation as per form CAAM/AW/1801-01 accompanied by the prescribed fee together with the following documentation:

a) Certificate of recognition on approved basic training course with relevant exam result and practical assessment as applicable;

b) Maintenance experience logbook;

c) Evidence of assessment on Module 10 certified by practical assessor in MTO;

d) Recommendation from the MTO; and

e) Evidence of proficiency in English language, for issuance of AML. Evidence of qualification at least SPM or equivalent which is acceptable to CAAM with credits in English Language.

1.7.4 Application by personnel working in maintenance organisations outside civil aircraft environment

1.7.4.1 Applicant shall submit an application which is acceptable in content and presentation as per form CAAM/AW/1801-01 accompanied by the prescribed fee together with the following documentation:

a) Certificate of recognition on relevant exam result and practical assessment as applicable;

b) Evidence of assessment on Module 10 certified by practical assessor in MTO or AMO;

c) Evidence of previous experience as required by paragraph 3.2.5 of this CAD;

d) Maintenance experience logbook; and

e) Evidence of proficiency in English language, for issuance of AML. Evidence of qualification at least SPM or equivalent which is acceptable to CAAM with credits in English Language.

1.7.4.2 Applications shall be subjected to the following previous experience requirements:

a) Minimum of two (2) years direct involvement in maintenance of aircraft for the application of Category A AML, or three (3) years direct involvement in maintenance of aircraft for the application of Category B AML as appropriate;

b) Relevant maintenance experience in military and/or civil aircraft must be certified by commanding officer or an appropriate person from such organisation; and

c) Application can only be made upon leaving such services, with evidence from the relevant agency presented to CAAM upon application.

Note. – For Category A, the additional experience of civil aircraft maintenance should be a minimum of 6 months. For Category B1 or B2 the additional experience of civil aircraft maintenance should be a minimum of 12 months.

1.7.4.3 Applicant may engage the service of appropriate MTO for the purpose of application of AML.

1.7.5 Application for Renewal of AML

1.7.5.1 Applicant shall submit an application which is acceptable in content and presentation as per form CAAM/AW/1801-01 accompanied by the prescribed fee.

1.7.5.2 Applicant must have been engaged on work affording experience comparable with that required for the issuance of AML for a period totalling at least 6 months, during the 24 months preceding the expiry of the AML, unless otherwise agreed.

1.7.6 AML which has lapsed will not be renewed unless, at the discretion of CAAM, the AML renewal can be considered with conditions that may be imposed after providing an acceptable justification.

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2 Privileges (66.20)

2.1 The following privileges shall apply:

2.1.1 A category A permits the holder to issue maintenance release following minor scheduled line maintenance and simple defect rectification within the limits of tasks specifically endorsed on the certification authorisation referred to relevant paragraphs of CAD 8601 or CAD 8602. The certification privileges shall be restricted to tasks that the AML holder has personally performed under the certification authorization and limited to the ratings endorsed in the category A AML.

2.1.2 A category B1 shall permit the holder to issue maintenance release for the following:

a) maintenance performed on aircraft structure, powerplant and mechanical and electrical systems; and

b) work on avionic systems requiring only simple tests to prove their serviceability and not requiring troubleshooting.

Note. – Category B1 holder automatically covers CAAM Part 66 Category A sub-category certification privileges

2.1.3 A category B2 shall permit the holder:

a) to issue maintenance release and to act as B2 certifying staff for following: −

1) maintenance performed on avionic and electrical systems;
2) maintenance on electrical and avionics tasks within powerplant and mechanical systems, requiring only simple tests to prove their serviceability; and

b) to issue maintenance release following minor scheduled line maintenance and simple defect rectification within the limits of tasks specifically endorsed on the certification authorisation referred to the relevant paragraphs of CAD 8601 or CAD 8602. This certification privilege shall be restricted to work that the AML holder has personally performed in the maintenance organisation which issued the certification authorisation and limited to the ratings already endorsed in the B2 AML.

2.1.4 A category C shall permit the holder to issue a single maintenance release following a scheduled base maintenance on aircraft. The privileges apply to the aircraft in its entirety.

2.2 The holder of an AML shall not exercise its certification privileges unless: −

2.2.1 He/she is in compliance with the applicable requirements of CAD 8601 and CAD 8602;

2.2.2 In the preceding 24 months period he/she has, either had 6 months of maintenance experience in accordance with the privileges granted by the AML or, met the provision for the issue of the appropriate privileges;

2.2.3 He/she has the adequate competency to certify maintenance on the corresponding aircraft;

2.2.4 He/she must be able to read, write and communicate to an understandable level in the English language.

3 Requirements

3.1 Basic knowledge requirements (66.25)

3.1.1 An applicant for issuance or variation of AML shall demonstrate by examination a level of knowledge of the appropriate subject modules in accordance with the Basic Knowledge Requirements as specified in Appendix 1 to this CAD. The basic knowledge examinations shall be conducted either by an appropriately approved MTO or by CAAM.

3.1.2 The basic knowledge examinations shall have been passed within 7 years prior to the application for issuance or variation of AML.

3.1.3 The applicant may apply to CAAM for examination credits for the basic knowledge requirements that do not meet the requirement laid down in 3.1.2 of this CAD.

3.2 Basic experience requirements (66.30)

3.2.1 An applicant for an AML shall have acquired:

a) For category A, subcategories B1.2 and B1.4:

1) three (3) years of practical maintenance experience on operating aircraft, if the applicant has no previous relevant technical training;
2) two (2) years of practical maintenance experience on operating aircraft and completion of training considered relevant by CAAM as a skilled worker, in a technical trade; or
3) one (1) year of practical maintenance experience on operating aircraft and completion of a basic training course approved in accordance with CAD 1821.

b) for category B2 and subcategories B1.1 and B1.3:

1) five (5) years of practical maintenance experience on operating aircraft if the applicant has no previous relevant technical training; or
2) three (3) years of practical maintenance experience on operating aircraft and completion of training considered relevant by CAAM as a skilled worker, in a technical trade; or
3) two (2) years of practical maintenance experience on operating aircraft and completion of a basic training course approved in accordance with CAD 1821.

c) for category C with respect to large aircraft:

1) three (3) years of experience exercising certification privileges on category B1.1, B1.3 or B2 on large aircraft in accordance with paragraph 5.3 of CAD 8601; or

2) five (5) years of experience exercising certification privileges on category B1.2 or B1.4 on large aircraft in accordance with paragraph 5.3 of CAD 8601.

d) for category C with respect to other than large aircraft, three (3) years of experience exercising certification privileges on category B1 or B2 or a combination of both on other than large aircraft in accordance with paragraph 5.3 of CAD 8601 and/or CAD 8602.

3.2.2 An applicant for variation of AML shall have a minimum civil aircraft maintenance experience requirement appropriate to the additional category or subcategory of AML applied for as defined in Appendix 4 of this CAD.

3.2.3 The experience shall be practical and involve a representative cross section of maintenance tasks on operating aircraft, covering elements of maintenance, inspections and routine work according to the maintenance manual and other relevant instructions and tasks as appropriate for the aircraft, for example troubleshooting, repairs, servicing, adjustments, replacements, rigging and functional checks.

3.2.4 At least 1 year of the required experience shall be recent maintenance experience on aircraft of the category/subcategory for which the initial AML is sought. For subsequent category/subcategory additions to an existing AML, the additional recent maintenance experience required may be less than 1 year but shall be at least 3 months. The required experience shall be dependent upon the difference between the AML category/subcategory held and applied for. Such additional experience shall be typical of the new AML category/subcategory sought.

3.2.5 Notwithstanding paragraph 3.2.1, aircraft maintenance experience gained outside a civil aircraft maintenance environment may be acceptable when such maintenance is equivalent to that required by this CAD. However, additional experience on civil aircraft maintenance is required to ensure adequate understanding of the civil aircraft maintenance environment.

3.2.6 Experience shall have been acquired within the 10 years preceding the application for an AML or the addition of a category or subcategory to such an AML.

3.2.7 Experience requirements for removal of limitations shall be in accordance with Appendix 5 of this CAD.

3.3 Endorsement with aircraft ratings (66.45)

3.3.1 In order to be entitled to exercise certification privileges on a specific aircraft type, the holder of an AML need to have his AML endorsed with the relevant aircraft type ratings.

3.3.2 For category B1, B2 or C the endorsement of appropriate aircraft type ratings shall be in accordance with the requirements of Appendix 3 of this CAD.

3.3.3 The endorsement of aircraft type ratings requires satisfactory completion of the relevant category B1, B2 or C aircraft type training, as specified in Appendix 3 of this CAD.

3.3.4 For category A, the endorsement of appropriate aircraft type task ratings is required, subject to compliance with the requirements of Appendix 3 of this CAD. The endorsement of aircraft type task ratings requires the satisfactory completion of the relevant category A aircraft type task training.

3.3.5 For other than category C, in addition to the requirements of paragraph 3.3.3 and 3.3.4 above, the endorsement of the first aircraft type/type task rating for relevant category/subcategory requires satisfactory completion of the corresponding on-the-job training. This on-the-job training shall comply with Appendix 3 of this CAD.

3.3.6 In addition to paragraph 2.2 of this CAD, a type rated AML holder shall not exercise the certification privileges in respect of that type unless the relevant aircraft type or type task rating, is endorsed in the AML.

3.3.7 An aircraft type rating endorsement may be issued subject to an aircraft type that is intended to be or has been registered under Malaysian registry

3.3.8 For Category B1, B2 and C, the type training shall have been started and completed within the three (3) years preceding the application for endorsement of the relevant aircraft type ratings.

3.3.9 For Category A, the type task training shall have been started and completed within the three (3) years preceding the application for endorsement of the relevant aircraft type task ratings.

3.3.10 The endorsement of the first aircraft type rating within a given category/sub-category requires satisfactory completion of the corresponding On the Job Training, as described in Appendix 3 of this CAD.

3.3.11 Category A approved type task training or, category B1 and B2 approved type training shall consist of theoretical and practical element in relation to Appendix 3 of this CAD. Category C type training shall consist of theoretical element only.

3.3.12 The aircraft type task training or type training shall be conducted by an appropriate MTO, or in accordance with approved training.

3.3.13 In the case of type training provided by original equipment manufacturer (OEM), the OEM shall be subjected to a validation to determine that such type training meets the intent of Appendix 3 of this CAD. In such cases, unless agreed otherwise, the OEM training organisation is required to hold MTO approval under Regulation 32 of CAR 2016.

3.4 Limitations (66.50)

3.4.1 Limitations introduced on AML are exclusions from the certification privileges and affect the aircraft in its entirety.

3.4.2 Removal of limitation on basic categories of AML is subject to the following conditions: -

a) Applicant is required to pass all applicable modules examination as per CAAM Part 66 AML Limitations in Appendix 5 to this CAD;

b) Applicant is required to submit evidence of competency in practical skills with practical assessments certified by a Practical Assessor; and

c) Applicant is required to submit documented evidence of appropriate maintenance experience.

3.4.3 Removal of limitation on type ratings is subject to the following condition:

a) Applicant is required to provide evidence of theoretical and practical training in relation to the limitation to be removed which is related to the aircraft type; and

b) Limitation on type ratings shall not be removed unless such limitation has been removed from the basic category.

3.4.4 Removal of limitation is a variation to AML and application shall be made in accordance with paragraph 1.7.2 this CAD.

4 Continued validity of aircraft maintenance licence (66.40)

4.1 General

4.1.1 The continued validity of AML may be applied for up to 5 years from the date it is issued or renewed. The expiry date of AML is specified in the AML.

4.1.2 The AML is only valid:

a) when issued, renewed or varied by CAAM and

b) when the holder has signed the AML.

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5 Appendices

5.1 Appendix 1 - Basic knowledge requirements

1.0 Knowledge levels for category A, B1, B2 and C aircraft maintenance licence

1.1 Basic knowledge for categories A, B1 and B2 are indicated by knowledge levels (1, 2 or 3) against each applicable subject. Category C applicants shall meet either the category B1 or the category B2 basic knowledge levels.

1.2 The knowledge level indicators are defined on 3 levels as follows:

(a) Level 1: *A familiarisation with the principal elements of the subject.*

Objectives:

(i) The applicant should be familiar with the basic elements of the subject.

(ii) The applicant should be able to give a simple description of the whole subject, using common words and examples.

(iii) The applicant should be able to use typical terms.

(b) Level 2: *A general knowledge of the theoretical and practical aspects of the subject and an ability to apply that knowledge.*

Objectives:

(i) The applicant should be able to understand the theoretical fundamentals of the subject.

(ii) The applicant should be able to give a general description of the subject using, as appropriate, typical examples.

(iii) The applicant should be able to use mathematical formulae in conjunction with physical laws describing the subject.

(iv) The applicant should be able to read and understand sketches, drawings and schematics describing the subject.

(v) The applicant should be able to apply his knowledge in a practical manner using detailed procedures.

(c) Level 3: *A detailed knowledge of the theoretical and practical aspects of the subject and a capacity to combine and apply the separate elements of knowledge in a logical and comprehensive manner.*

Objectives:

(i) The applicant should know the theory of the subject and interrelationships with other subjects.

(ii) The applicant should be able to give a detailed description of the subject using theoretical fundamentals and specific examples.

(iii) The applicant should understand and be able to use mathematical formula related to the subject.

(iv) The applicant should be able to read, understand and prepare sketches, simple drawings and schematics describing the subject.

(v) The applicant should be able to apply his knowledge in a practical manner using manufacturer's instructions.

(vi) The applicant should be able to interpret results from various sources and measurements and apply corrective action where appropriate.

2.0 Modularisation

2.1 Qualification on basic subjects for each AML category or subcategory should be in accordance with the following matrix, where applicable subjects are indicated by an 'X':

SUBJECT MODULE	AEROPLANES WITH:				HELICOPTER WITH:				B2
	TURBINE ENGINE(S)		PISTON ENGINE(S)		TURBINE ENGINE(S)		PISTON ENGINE(S)		AVIONICS
	A1	B1.1	A2	B1.2	A3	B1.3	A4	B1.4	B2
1	X	X	X	X	X	X	X	X	X
2	X	X	X	X	X	X	X	X	X
3	X	X	X	X	X	X	X	X	X
4		X		X		X		X	X
5	X	X	X	X	X	X	X	X	X
6	X	X	X	X	X	X	X	X	X
7	X	X	X	X	X	X	X	X	X
8	X	X	X	X	X	X	X	X	X
9	X	X	X	X	X	X	X	X	X
10	X	X	X	X	X	X	X	X	X
11A	X	X							
11B			X	X					
12					X	X	X	X	
13									X
14									X
15	X	X			X	X			
16			X	X			X	X	
17	X	X	X	X					

Note: Module 11A and Module 11B syllabus are constructed/ tabled as appropriate to the nature/ grouping of aircraft. Full module training and examination shall be accomplished, as appropriate.

MODULE 1 : MATHEMATICS

SUBTOPIC	LEVEL		
	A	B1	B2
1.1 Arithmetic (a) 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.	1	2	2
1.2 Algebra (a) Evaluating simple algebraic expressions, addition, subtraction, multiplication and division, use of brackets, simple algebraic fractions;	1	2	2
(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
1.3 Geometry (a) Simple geometrical constructions;	-	1	1
(b) Graphical representation; nature and uses of graphs, graphs of equations/functions;	2	2	2
(c) Simple trigonometry; trigonometrical relationships, use of tables and rectangular and polar coordinates.	-	2	2

MODULE 2 : PHYSICS

SUBTOPIC	LEVEL		
	A	B1	B2
2.1 Matter Nature of matter: the chemical elements, structure of atoms, molecules; Chemical compounds; States: solid, liquid and gaseous; Changes between states.	1	1	1
2.2 Mechanics			
2.2.1 *Statics* 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).	1	2	2
2.2.2 *Kinetics* Linear movement: uniform motion in a straight line, motion under constant acceleration (motion under gravity); Rotational movement: uniform circular motion (centrifugal/centripetal forces); Periodic motion: pendular movement; Simple theory of vibration, harmonics and resonance; Velocity ratio, mechanical advantage and efficiency.	1	2	2
2.2.3 *Dynamics* (a) Mass: Force, inertia, work, power, energy (potential, kinetic and total energy), heat, efficiency;	1	2	2
(b) Momentum, conservation of momentum; Impulse; Gyroscopic principles; Friction: nature and effects, coefficient of friction (rolling resistance).	1	2	2
2.2.4 *Fluid dynamics* (a) Specific gravity and density;	2	2	2
(b) Viscosity, fluid resistance, effects of streamlining; Effects of compressibility on fluids; Static, dynamic and total pressure: Bernoulli's Theorem, venturi.	1	2	2
2.3 Thermodynamics (a) Temperature: thermometers and temperature scales: Celsius, Fahrenheit and Kelvin; Heat definition.	2	2	2
(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	-	2	2

SUBTOPIC	LEVEL		
	A	B1	B2
volume and constant pressure, work done by expanding gas;			
Isothermal, adiabatic expansion and compression, engine cycles, constant volume & constant pressure, refrigerators & heat pumps; Latent heats of fusion and evaporation, thermal energy, heat of combustion.			
2.4 Optics (Light) Nature of light; speed of light; Laws of reflection and refraction: reflection at plane surfaces, reflection by spherical mirrors, refraction, lenses; Fibre optics	-	2	2
2.5 Wave Motion and Sound Wave motion: mechanical waves, sinusoidal wave motion, interference phenomena, standing waves; Sound: speed of sound, production of sound, intensity, pitch and quality, Doppler effect.	-	2	2

MODULE 3 : ELECTRICAL FUNDAMENTALS

SUBTOPIC	LEVEL		
	A	B1	B2
3.1 Electron Theory Structure and distribution of electrical charges within: Atoms, molecules, ions, compounds; Molecular structure of conductors, semiconductors and insulators.	1	1	1
3.2 Static Electricity and Conduction 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 a vacuum.	1	2	2
3.3 Electrical Terminology The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.	1	2	2
3.4 Generation of Electricity Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.	1	1	1
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.	1	2	2
3.6 DC Circuits Ohms Law, Kirchhoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage & current; Significance of the internal resistance of a supply.	-	2	2
3.7 Resistance/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	2
(b) Positive and negative temperature coefficient conductance; Fixed resistors, stability, tolerance and limitations, methods of construction;	-	1	1

SUBTOPIC	LEVEL		
	A	B1	B2
Variable resistors, thermistors, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge;			
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	2
3.9 Capacitance/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	2
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	2
(b) Magnetomotive 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	2

SUBTOPIC	LEVEL		
	A	B1	B2
3.11 Inductance/Inductor 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; Principle uses of inductors;	-	2	2
3.12 DC Motor/Generator Theory 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.	-	2	2
3.13 AC Theory Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values & calculations of these values, in relation to voltage, current & power; Triangular/Square waves; Single/3 phase principles.	1	2	2
3.14 Resistive (R), Capacitive (C) and Inductive (L) Circuits 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.	1	2	2
3.15 Transformers 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 three phase system; Primary and Secondary current, voltage, turns ratio, power, efficiency; Auto transformers.	-	2	2

SUBTOPIC	LEVEL		
	A	B1	B2
3.16 Filters Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.	-	1	1
3.17 AC Generators Rotation of loop in a magnetic field and waveform produced; Operation and construction of revolving armature and revolving field type AC generators; Single phase, two phase and three phase alternators; Three phase star and delta connections advantages and uses; Permanent Magnet Generators.	-	2	2
3.18 AC Motors 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.	-	2	2

MODULE 4 : ELECTRONIC FUNDAMENTALS

SUBTOPIC	LEVEL		
	A	B1	B2
4.1 Semiconductors			
4.1.1 Diodes	-	2	2
(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.			
(b) Materials, electron configuration, electrical properties; P and N type materials: effects of impurities on conduction, majority and minority characters; PN junction in a semiconductor, development of a potential across a PN junction in unbiased, forward biased & reverse biased conditions; Diode parameters: peak inverse voltage, maximum forward current, temperature, frequency, leakage current, power dissipation; Operation and function of diodes in the following circuits: clippers, clampers, full and half wave rectifiers, bridge rectifiers, voltage doublers and triplers; Detailed operation and characteristics of the following devices: silicon controlled rectifier (thyristor), light emitting diode, Schottky diode, photo conductive diode, varactor diode, varistor, rectifier diodes, Zener diode.	-	2	2
4.1.2 Transistors			
(a) Transistor symbols; Component description and orientation; Transistor characteristics and properties.	-	2	2
(b) Construction and operation of PNP and NPN transistors; Base, collector and emitter configurations; Testing of transistors. Basic appreciation of other transistor types and their uses. Application of transistors: classes of amplifier (A, B, C); Simple circuits including: bias, decoupling, feedback & stabilisation; Multistage circuit principles: cascades, push-pull, oscillators, multivibrators, flip-flop circuits.	-	2	2
4.1.3 Integrated Circuits			
(a) Description and operation of logic circuits and linear circuits/operational amplifiers.	-	1	1

SUBTOPIC		LEVEL	
	A	B1	B2
(b) Description and operation of logic circuits and linear circuits; Introduction to operation and function of an operational amplifier used as: integrator, differentiator, voltage follower, comparator; Operation and amplifier stages connecting methods: resistive capacitive, inductive (transformer), inductive resistive (IR), direct; Advantages and disadvantages of positive and negative feedback.	-	2	2
4.2 Printed Circuit Boards Description and use of printed circuit boards.	-	2	2
4.3 Servo mechanisms (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/features: resolvers, differential, control and torque, transformers, inductance and capacitance transmitters	-	1	1
(b) Understanding of the following terms: Open & closed loop, follow up, servomechanism, analogue, transducer, null, damping, feedback, deadband; Construction operation and use of the following synchro system components: resolvers, differential, control and torque, E and I transformers, inductance transmitters, capacitance transmitters, synchronous transmitters; Servomechanism defects, reversal of synchro leads, hunting.	-	2	2

MODULE 5 : DIGITAL TECHNIQUES / ELECTRONIC INSTRUMENT SYSTEMS

SUBTOPIC	LEVEL			
	A	B1.1 B1.3	B1.2 B1.4	B2
5.1 Electronic Instrument Systems Typical systems arrangements & cockpit layout of electronic instrument systems.	1	2	2	3
5.2 Numbering Systems Numbering systems: binary, octal and hexadecimal; Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa.	-	1	-	2
5.3 Data Conversion Analogue Data, Digital Data; Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.	-	1	-	2
5.4 Data Buses Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications; Aircraft network / Ethernet.	-	2	-	2
5.5 Logic Circuits				
(a) Identification of common logic gate symbols, tables and equivalent circuits; Applications used for aircraft systems, schematic diagrams.	-	2	-	2
(b) Interpretation of logic diagrams.	-	-	-	2
5.6 Basic Computer Structure				
(a) Computer terminology (including bit, byte, software, hardware, CPU, IC, & various memory devices such as RAM, ROM, PROM); Computer technology (as applied in aircraft systems).	1	2	-	2
(b) Computer related terminology; Operation, layout and interface of the major components in a microcomputer including their associated bus systems; Information contained in single and multiaddress instruction words; Memory associated terms; Operation of typical memory devices; Operation, advantages and disadvantages of the various data storage systems.	-	-	-	2
5.7 Microprocessors Functions performed and overall operation of a microprocessor; Basic operation of each of the following microprocessor elements: control and processing unit, clock, register, arithmetic logic unit	-	-	-	2
5.8 Integrated Circuits Operation and use of encoders and decoders; Function of encoder types; Uses of medium, large and very large scale integration.	-	-	-	2

SUBTOPIC	LEVEL			
	A	B1.1 B1.3	B1.2 B1.4	B2
5.9 Multiplexing Operation, application and identification in logic diagrams of multiplexers and demultiplexers.	-	-	-	2
5.10 Fibre Optics 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.	-	1	1	2
5.11 Electronic Displays Principles of operation of common types of displays used in modern aircraft, including Cathode Ray Tubes, Light Emitting Diodes & Liquid Crystal Display.	-	2	-	2
5.12 Electrostatic Sensitive Devices Special handling of components sensitive to electrostatic discharges; Awareness of risks and possible damage, component and personnel anti-static protection devices.	1	2	2	2
5.13 Software Management Control Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes.	-	2	1	2
5.14 Electromagnetic Environment Influence of the following phenomena on maintenance practices for electronic system: EMC-Electromagnetic Compatibility EMI-Electromagnetic Interference HIRF-High Intensity Radiated Field Lightning/lightning protection	-	2	2	2
5.15 Typical Electronic/Digital Aircraft Systems General arrangement of typical electronic/digital aircraft systems and associated BITE (Built In Test Equipment) testing such as: (a) For B1 and B2 only: ACARS-ARINC communication & addressing and reporting system EICAS-Engine Indication and Crew Alerting System FBW-Fly by Wire FMS-Flight Management System IRS-Inertial Reference System ECAM-Electronic Centralised Aircraft Monitoring EFIS-Electronic Flight Instrument System GPS-Global Positioning System TCAS-Traffic Alert Collision Avoidance System Integrated Modular Avionics Cabin Systems Information System	-	2	2	2

MODULE 6 : MATERIALS & HARDWARE

SUBTOPIC	LEVEL		
	A	B1	B2
6.1 Aircraft Materials — Ferrous			
(a) Characteristics, properties and identification of common alloy steels used in aircraft; Heat treatment and application of alloy steels;	1	2	1
(b) Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance.	-	1	1
6.2 Aircraft Materials — Non-Ferrous			
(a) Characteristics, properties and identification of common non-ferrous materials used in aircraft; Heat treatment and application of non-ferrous materials;	1	2	1
(b) Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance.	-	1	1
6.3 Aircraft Materials — Composite and Non-Metallic			
6.3.1 ***Composite and non-metallic other than wood and fabric***			
(a) Characteristics, properties and identification of common composite and non-metallic materials, other than wood, used in aircraft; Sealant and bonding agents.	1	2	2
(b) The detection of defects/deterioration in composite and non-metallic material; Repair of composite and non-metallic material.	1	2	-
6.3.2 ***Wooden structures*** Construction methods of wooden airframe structures; Characteristics, properties & types of wood & 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.	1	2	-
6.3.3 ***Fabric covering*** Characteristics, properties and types of fabrics used in aeroplanes; Inspections methods for fabric; Types of defects in fabric; Repair of fabric covering.	1	2	-
6.4 Corrosion			
(a) Chemical fundamentals; Formation by, galvanic action process microbiological stress;	1	1	1
(b) Types of corrosion and their identification; Causes of corrosion; Material types, susceptibility to corrosion.	2	3	2
6.5 Fasteners			
6.5.1 ***Screw threads*** Screw nomenclature; Thread forms, dimensions & tolerances for standard threads used in aircraft; Measuring screw threads;	2	2	2

SUBTOPIC	LEVEL		
	A	B1	B2
6.5.2 Bolts, studs and screws 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.	2	2	2
6.5.3 *Locking devices* Tab and spring washers, locking plates, split pins, pal-nuts, wire locking, quick release fasteners, keys, circlips, cotter pins.	2	2	2
6.5.4 *Aircraft rivets* Types of solid and blind rivets: specifications & identification, heat treatment.	1	2	1
6.6 Pipes and Unions			
(a) Identification of, and types of rigid and flexible pipes and their connectors used in aircraft;	2	2	2
(b) Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.	2	2	1
6.7 Springs Types of springs, materials, characteristics and applications.	-	2	1
6.8 Bearings Purpose of bearings, loads, material, construction; Types of bearings and their application.	1	2	2
6.9 Transmissions 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.	1	2	2
6.10 Control Cables Types of cables; End fittings, turnbuckles and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems.	1	2	1
6.11 Electrical Cables and Connectors 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**.**	1	2	2

MODULE 7 : MAINTENANCE PRACTICES

SUBTOPIC		LEVEL		
		A	B1	B2
7.1	**Safety Precautions-Aircraft and Workshop** Aspects of working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. Also, 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.	3	3	3
7.2	**Workshop Practices** Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards.	3	3	3
7.3	**Tools** 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;	3	3	3
7.4	**Avionic General Test Equipment** Operation, function and use of avionic general test equipment.	-	2	3
7.5	**Engineering Drawings, Diagrams and Standards** Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information; Microfilm, microfiche and computerised presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams.	1	2	2
7.6	**Fits and Clearances** 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.	1	2	1
7.7	**Electrical Wiring Interconnection System (EWIS)** 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 & damage tolerance	1	3	3

SUBTOPIC	LEVEL		
	A	B1	B2
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 Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints.	1	2	-
7.9 Pipes and Hoses Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes.	1	2	-
7.10 Springs Inspection and testing of springs.	1	2	-
7.11 Bearings Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes.	1	2	-
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	1	2	-
7.13 Control Cables Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems.	1	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	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/Balance limits calculation: use of relevant documents;	-	2	2
(b) Preparation of aircraft for weighing; Aircraft weighing;	-	2	-

SUBTOPIC	LEVEL		
	A	B1	B2
7.17 Aircraft Handling and Storage Aircraft taxiing/towing and associated safety precautions; Aircraft jacking, chocking, securing and associated safety precautions; Aircraft storage methods; Refuelling/defuelling procedures; De-icing/anti-icing procedures; Electrical, hydraulic and pneumatic ground supplies. Effects of environmental conditions on aircraft handling and operation.	2	2	2
7.18 Disassembly, Inspection, Repair and Assembly Techniques			
(a) Types of defects and visual inspection techniques; Corrosion removal, assessment and reprotection.	2	3	3
(b) General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programmes;	-	2	-
(c) Non-destructive inspection techniques including penetrant, radiographic, eddy current, ultrasonic and boroscope methods;	-	2	1
(d) Disassembly and re-assembly techniques;	2	2	2
(e) Trouble shooting techniques	-	2	2
7.19 Abnormal Events			
(a) Inspections following lightning strikes and HIRF penetration.	2	2	2
(b) Inspections following abnormal events such as heavy landings and flight through turbulence.	2	2	-
7.20 Maintenance Procedures Maintenance planning; Modification procedures; Stores procedures; Certification/release procedures; Interface with aircraft operation; Maintenance Inspection/Quality Control/Quality Assurance; Additional maintenance procedures; Control of life limited components.	1	2	2

MODULE 8 : BASIC AERODYNAMICS

SUBTOPIC	LEVEL		
	A	B1	B2
8.1 Physics of the Atmosphere International Standard Atmosphere (ISA), application to aerodynamics.	1	2	2
8.2 Aerodynamics Airflow around a body; Boundary layer, laminar and turbulent flow, free stream flow, relative airflow, upwash 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 wash out, 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.	1	2	2
8.3 Theory of Flight 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.	1	2	2
8.4 Flight Stability and Dynamics Longitudinal, lateral and directional stability (active and passive).	1	2	2

MODULE 9 : HUMAN FACTORS

SUBTOPIC		LEVEL		
		A	B1	B2
9.1	**General** The need to take human factors into account; Incidents attributable to human factors/human error; 'Murphy's' law.	2	2	2
9.2	**Human Performance and Limitations** Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access.	2	2	2
9.3	**Social Psychology** Responsibility: individual and group; Motivation and de-motivation; Peer pressure; 'Culture' issues; Team working; Management, supervision and leadership.	1	1	1
9.4	**Factors Affecting Performance** Fitness/health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and underload; Sleep and fatigue, shift work; Alcohol, medication, drug abuse.	2	2	2
9.5	**Physical Environment** Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment.	1	1	1
9.6	**Tasks** Physical work; Repetitive tasks; Visual inspection; Complex systems.	1	1	1
9.7	**Communication** Within and between teams; Work logging and recording; Keeping up to date, currency; Dissemination of information.	2	2	2
9.8	**Human Error** Error models and theories; Types of error in maintenance tasks; Implications of errors (i.e accidents); Avoiding and managing errors.	2	2	2

SUBTOPIC	LEVEL		
	A	B1	B2
9.9 Hazards in the Workplace Recognising and avoiding hazards; Dealing with emergencies.	2	2	2

MODULE 10: AVIATION LEGISLATION

SUBTOPIC	LEVEL		
	A	B1	B2
10.1 Regulatory Framework Role of the International Civil Aviation Organisation; Role of the Ministry of Transport; Role of the Civil Aviation Authority of Malaysia; Civil Aviation Act 1969 including its amendment; Civil Aviation Regulation 2016 including its amendment; Relationship between the various requirements such as Part-21, Part-M, Part-145, Part 66, Part 147, and Air Operation (CAAM Flight Operation Directives)	2	2	2
10.2 Certifying Staff — Maintenance Detailed understanding of Part 66.	2	2	2
10.3 Approved Maintenance Organisations Detailed understanding of Part-145 and Part-M Subpart F.	2	2	2
10.4 Air operations General understanding of CAAM Flight Operation Directives Air Operators Certificates; Operator's responsibilities, in particular regarding continuing airworthiness and maintenance; Aircraft Maintenance Programme; MEL/CDL; Documents to be carried on board; Aircraft placarding (markings).	1	1	1
10.5 Certification of aircraft, parts and appliances			
(a) General General understanding of Part-21 and airworthiness code/ design requirements such as FAR-23, CS-25, TSO, CS-E etc.	1	1	1
(b) Documents Certificate of Airworthiness; Permit to fly and flight conditions/ conditions; Certificate of Registration; Noise Certificate; Weight and Balance Schedule; Radio Station Licence and Approval.	2	2	2
10.6 Continuing airworthiness Detailed understanding of Part-21 provisions related to continuing airworthiness. Detailed understanding of Part-M.	2	2	2

SUBTOPIC	LEVEL		
	A	B1	B2
10.7 Applicable National and International Requirements (a) Maintenance Programmes, Maintenance checks and inspections; Airworthiness Directives; Service Bulletins, manufacturers service information; Modifications and repairs; Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.; Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists;	2	2	2
(b) Continuing airworthiness; Minimum equipment requirements — Test flights; ETOPS/EDTO, maintenance and dispatch requirements; All Weather Operations, Category 2 or 3 operations; Operational approval – airworthiness aspect such as RVSM, PBN, EFB, ADSB/ ADSC, De-icing and Anti-icing, ETOPS/EDTO, and any other operational approval requirements published by the CAAM.	1	1	1

MODULE 11A : TURBINE AEROPLANE AERODYNAMICS,STRUCTURES AND SYSTEMS

SUBTOPIC	LEVEL	
	A1	B1.1
11.1 Theory of Flight		
11.1.1 Aeroplane Aerodynamics and Flight Controls Operation and effect of: — roll control: ailerons and spoilers; — pitch control: elevators, stabilators, variable incidence stabilisers and canards; — yaw control, rudder limiters; Control using elevons, ruddervators; High lift devices, slots, slats, flaps, flaperons; Drag inducing devices, spoilers, lift dumpers, speed brakes; Effects of wing fences, saw tooth leading edges; Boundary layer control using, vortex generators, stall wedges or leading edge devices; Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;	1	2
11.1.2 High Speed Flight Speed of sound, subsonic flight, transonic flight, supersonic flight; Mach number, critical Mach number, compressibility buffet, shock wave, aerodynamic heating, area rule; Factors affecting airflow in engine intakes of high-speed aircraft; Effects of sweepback on critical Mach number.	1	2
11.2 Airframe Structures — General Concepts		
(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; Aircraft bonding	2	2
(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; 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.	1	2
11.3 Airframe Structures — Aeroplanes		
11.3.1 Fuselage (ATA 52/53/56) Construction and pressurisation sealing; Wing, stabiliser, pylon and undercarriage attachments; Seat installation and cargo loading system;	1	2

SUBTOPIC	LEVEL	
	A1	B1.1
Doors and emergency exit: construction, mechanisms, operation and safety devices; Windows and windscreen construction and mechanisms.		
11.3.2 Wings (ATA 57) Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.	1	2
11.3.3 Stabilisers (ATA 55) Construction; Control surface attachment.	1	2
11.3.4 Flight Control Surfaces (ATA 55/57) Construction and attachment; Balancing — mass and aerodynamic.	1	2
11.3.5 Nacelles/Pylons (ATA 54) Construction; Firewalls; Engine mounts.	1	2
11.4 Air Conditioning and Cabin Pressurisation (ATA 21)		
11.4.1 Air supply Sources of air supply including engine bleed, APU and ground cart;	1	2
11.4.2 Air Conditioning Air conditioning systems; Air cycle and vapour cycle machines; Distribution systems; Flow, temperature and humidity control system.	1	3
11.4.3 Pressurisation Pressurisation systems; Control and indication including control and safety valves; Cabin pressure controllers.	1	3
11.4.4 Safety and warning devices Protection and warning devices.	1	3
11.5 Instruments/Avionic Systems		
11.5.1 Instrument Systems (ATA 31) Pitot static system: 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; Angle of attack indication, stall warning systems; Glass Cockpit; Other aircraft system indication.	1	2
11.5.2 Avionic Systems (ATA 22/23/34) Fundamentals of system lay-outs and operation of; Auto Flight (ATA 22); Communications (ATA 23);	1	1

SUBTOPIC	LEVEL	
	A1	B1.1
Navigation Systems (ATA 34).		
11.6 Electrical Power (ATA 24) Batteries Installation and Operation; DC power generation; AC power generation; Emergency power generation; Voltage regulation; Power distribution; Inverters, transformers, rectifiers; Circuit protection; External/Ground power;	1	3
11.7 Equipment and Furnishings (ATA 25)		
(a) Emergency equipment requirements; Seats, harnesses and belts.	2	2
(b) Cabin lay-out; Equipment lay-out; Cabin Furnishing Installation; Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment; Airstairs.	1	1
11.8 Fire Protection (ATA 26)		
(a) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	1	3
(b) Portable fire extinguisher	1	2
11.9 Flight Controls (ATA 27) Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control; High lift devices; Lift dump, speed brakes; System operation: manual, hydraulic, pneumatic, electrical, fly-by-wire; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks systems; Balancing and rigging; Stall protection/warning system.	1	3
11.10 Fuel System (ATA 28) System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and de-fuelling; Longitudinal balance fuel systems.	1	3
11.11 Hydraulic Power (ATA 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic;	1	3

SUBTOPIC	LEVEL	
	A1	B1.1
Emergency pressure generation; Filters; Pressure Control; Power distribution; Indication and warning systems; Interface with other systems.		
11.12 Ice and Protection (ATA 30) Ice formation, classification and detection; Anti-icing systems: electrical, hot air and chemical; De-icing systems: electrical, hot air, pneumatic and chemical; Rain repellent; Probe and drain heating; Wiper systems	1	3
11.13 Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and autobraking; Tyres; Steering; Air ground sensing	2	3
11.14 Lights (ATA 33) External: navigation, anti-collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	2	3
11.15 Oxygen (ATA 35) System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings;	1	3
11.16 Pneumatic/Vacuum (ATA 36) System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems	1	3
11.17 Water/Waste (ATA 38) Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspect	2	3
11.18 On Board Maintenance Systems (ATA 45) Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring)	1	2

SUBTOPIC	LEVEL	
	A1	B1.1
11.19 Integrated Modular Avionics (ATA42) Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: 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, etc Core System; Network Components	1	2
11.20 Cabin System (ATA44) The units and components which furnish a means of entering the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). Includes voice, data, music and video transmissions. The Cabin Intercommunication Data System provides an interface between cockpit/cabin crew and cabin systems. These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels	1	2
11.21 Information Systems (ATA46) The units and components which furnish a means of storing, updating and retrieving digital information traditionally provide 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. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display. Typical example includes Air Traffic and Information Management System and Network Server Systems; Aircraft General Information Systems; Flight Deck Information System; Maintenance Information System; Passenger Cabin Information System; Miscellaneous Information System;	1	2

MODULE 11B :PISTON AEROPLANE AERODYNAMICS,STRUCTURES AND SYSTEMS

SUBTOPIC	LEVEL	
	A2	B1.2
11.1 Theory of Flight		
11.1.1 Aeroplane Aerodynamics and Flight Controls Operation and effect of: — roll control: ailerons and spoilers; — pitch control: elevators, stabilators, variable incidence stabilisers and canards; — yaw control, rudder limiters; Control using elevons, ruddervators; High lift devices, slots, slats, flaps, flaperons; Drag inducing devices, spoilers, lift dumpers, speed brakes; Effects of wing fences, saw tooth leading edges; Boundary layer control using, vortex generators, stall wedges or leading edge devices; Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;	1	2
11.1.2 High Speed Flight — N/A	-	-
11.2 Airframe Structures — General Concepts		
(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. Aircraft bonding	2	2
(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; 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	1	2
11.3 Airframe Structures — Aeroplanes		
11.3.1 Fuselage (ATA 52/53/56) Construction and pressurisation sealing; Wing, tail-plane pylon and undercarriage attachments; Seat installation; Doors and emergency exits: construction and operation; Window and windscreen attachment.	1	2
11.3.2 Wings (ATA 57) Construction; Fuel storage;	1	2

SUBTOPIC	LEVEL	
	A2	B1.2
Landing gear, pylon, control surface and high lift/drag attachments		
11.3.3 Stabilisers (ATA 55) Construction; Control surface attachment.	1	2
11.3.4 Flight Control Surfaces (ATA 55/57) Construction and attachment; Balancing — mass and aerodynamic.	1	2
11.3.5 Nacelles/Pylons (ATA 54) (a) Nacelles/Pylons: — Construction; — Firewalls; — Engine mounts.	1	2
11.4 Air Conditioning and Cabin Pressurisation (ATA 21) Pressurisation and air conditioning systems; Cabin pressure controllers, protection and warning devices.	1	3
11.5 Instruments/Avionic Systems		
11.5.1 *Instrument Systems (ATA 31)* Pitot static system: 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; Angle of attack indication, stall warning systems; Glass cockpit; Other aircraft system indication.	1	2
11.5.2 Avionic Systems (ATA22/23/34) Fundamentals of system lay-outs and operation of: — Auto Flight (ATA 22); — Communications (ATA 23); — Navigation Systems (ATA 34).	1	1
11.6 Electrical Power (ATA 24) Batteries Installation and Operation; DC power generation; Voltage regulation; Power distribution; Circuit protection; Inverters, transformers.	1	3
11.7 Equipment and Furnishings (ATA 25)		
(a) Emergency equipment requirements; Seats, harnesses and belts.	2	2
(b) Cabin lay-out; Equipment lay-out; Cabin Furnishing Installation (level 2); Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment; Airstairs	1	1

SUBTOPIC	LEVEL	
	A2	B1.2
11.8 Fire Protection (ATA 26)		
(a) Fire extinguishing systems; Fire and smoke detection and warning systems; System tests.	1	3
(b) Portable fire extinguisher.	1	2
11.9 Flight Controls (ATA 27) Primary controls: aileron, elevator, rudder; Trim tabs; High lift devices; System operation: manual; Gust locks; Balancing and rigging; Stall warning system.	1	3
11.10 Fuel Systems (ATA 28) System lay-out; Fuel tanks; Supply systems; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling.	1	3
11.11 Hydraulic Power (ATA 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical; Pressure Control; Power distribution; Indication and warning systems	1	3
11.12 Ice and Rain Protection (ATA 30) Ice formation, classification and detection; De-icing systems: electrical, hot air, pneumatic and chemical; Probe and drain heating; Wiper systems	1	3
11.13 Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and autobraking; Tyres; Steering; Air ground sensing.	2	3
11.14 Lights (ATA 33) External: navigation, anti collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency	2	3
11.15 Oxygen (ATA 35) System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings;	1	3

SUBTOPIC	LEVEL	
	A2	B1.2
11.16 Pneumatic/Vacuum (ATA 36) System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.	1	3
11.17 Water/Waste (ATA 38) Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspects.	2	3

MODULE 12 : HELICOPTER AERODYNAMICS,STRUCTURES AND SYSTEMS

SUBTOPIC	LEVEL	
	A3 A4	**B1.3 B1.4**
12.1 Theory of Flight — Rotary Wing Aerodynamics 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 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 Rotor alignment; Main and tail rotor tracking; Static and dynamic balancing; Vibration types, vibration reduction methods; Ground resonance.	1	3
12.4 Transmissions Gear boxes, main and tail rotors; Clutches, free wheel units and rotor brake. Tail rotor drive shafts, flexible couplings, bearings, vibration dampers and bearing hangers.	1	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	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;	1	2

SUBTOPIC	LEVEL	
	A3 A4	B1.3 B1.4
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)		
12.6.1 Air supply Sources of air supply including engine bleed and ground cart;	1	2
12.6.2 Air Conditioning Air conditioning systems; Distribution systems; Flow and temperature control systems; Protection and warning devices.	1	3
12.7 Instruments/Avionic Systems		
12.7.1 Instrument Systems (ATA 31) 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; Glass Cockpit; Other aircraft system indication.	1	2
12.7.2 Avionic Systems (ATA 22/23/34) 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) 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
12.9 Equipment and Furnishings (ATA 25) (a) Emergency equipment requirements; Seats, harnesses and belts; Lifting systems.	2	2

SUBTOPIC	LEVEL	
	A3 A4	B1.3 B1.4
(b) Emergency flotation systems; Cabin lay-out, cargo retention; Equipment lay-out; Cabin Furnishing Installation.	1	1
12.10 Fire Protection (ATA 26) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	1	3
12.11 Fuel Systems (ATA 28) System lay-out; 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) System lay-out; 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. Filters.	1	3
12.13 Ice and Rain Protection (ATA 30) 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.	1	3
12.14 Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, tyres, brakes; Steering; Skids, floats. Air ground sensing.	2	3
12.15 Lights (ATA 33) External: navigation, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	2	3
12.16 Pneumatic/Vacuum (ATA 36) System lay-out; Sources: engine, compressors, reservoirs, ground supply; Pressure control;	1	3

SUBTOPIC	LEVEL	
	A3 A4	B1.3 B1.4
Distribution; Indications and warnings; Interfaces with other systems.		
12.17 Integrated Modular Avionics (ATA42) Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: (a) 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, etc (b) Core System; (c) Network Components	1	2
12.18 On Board Maintenance Systems (ATA45) Central Maintenance Computers; Data loading systems; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring)	1	2
12.19 Information Systems (ATA46) The units and components which furnish a means of storing, updating and retrieving digital information traditionally provide 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. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display Typical example includes Air Traffic and Information Management System and Network Server Systems Aircraft General Information Systems; Flight Deck Information System; Maintenance Information System; Passenger Cabin Information System; Miscellaneous Information System;	1	2

MODULE 13 : AIRCRAFT AERODYNAMICS,STRUCTURES AND SYSTEMS (AVIONICS)

SUBTOPIC	LEVEL B2
13.1 Theory of Flight	
(a) Aeroplane Aerodynamics and Flight Controls Operation and effect of: — roll control: ailerons and spoilers; — pitch control: elevators, stabilators, variable incidence stabilisers and canards; — yaw control, rudder limiters; Control using elevons, ruddervators; High lift devices: slots, slats, flaps; Drag inducing devices: spoilers, lift dumpers, speed brakes; Operation and effect of trim tabs, servo tabs, control surface bias.	1
(b) High Speed Flight Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number.	1
(c) Rotary Wing Aerodynamics Terminology; Operation and effect of cyclic, collective and anti-torque controls.	1
13.2 Structures — General Concepts	
(a) Fundamentals of structural systems.	1
(b) Zonal and station identification systems; Electrical bonding; Lightning strike protection provision.	2
13.3 Autoflight (ATA 22) Fundamentals of automatic flight control including working principles and current terminology; Command signal processing; Modes of operation: roll, pitch and yaw channels; Yaw dampers; Stability Augmentation System in helicopters; Automatic trim control; Autopilot navigation aids interface; Autothrottle systems; Automatic Landing Systems: principles and categories, modes of operation, approach, glideslope, land, go-around, system monitors and failure conditions.	3
13.4 Communication/Navigation (ATA 23/34) Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver and transmitter; Working principles of following systems: — Very High Frequency (VHF) communication; — High Frequency (HF) communication; — Audio; — Emergency Locator Transmitters (ELTs); — Cockpit Voice Recorder (CVR); — Very High Frequency Omnidirectional Range (VOR); — Automatic Direction Finding (ADF); — Instrument Landing System (ILS); — Flight Director Systems (FDSs), Distance Measuring Equipment (DME); — Area navigation, RNAV systems; — Flight Management Systems (FMSs); — Global Positioning System (GPS), Global Navigation Satellite Systems	3

SUBTOPIC	LEVEL B2
(GNSSs); — Data Link. — Air Traffic Control transponder, secondary surveillance radar; — Traffic Alert and Collision Avoidance System (TCAS); — Weather avoidance radar; — Radio altimeter; — Automatic Dependent Surveillance — Broadcast (ADS-B). — Microwave Landing System (MLS); — Very Low Frequency and hyperbolic navigation (VLF/Omega); — Doppler navigation; — Inertial Navigation System (INS); — ARINC (Aircraft Radio Incorporated) communication and reporting.	
13.5 Electrical Power (ATA 24) Batteries Installation and Operation; DC power generation; AC power generation; Emergency power generation; Voltage regulation; Power distribution; Inverters, transformers, rectifiers; Circuit protection; External/Ground power.	3
13.6 Equipment and Furnishings (ATA 25) Electronic emergency equipment requirements; Cabin entertainment equipment.	3
13.7 Flight Controls (ATA 27) (a) Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control; High lift devices; Lift dump, speed brakes; System operation: manual, hydraulic, pneumatic; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks. Stall protection systems. (b) System operation: electrical, fly by wire.	2 3
13.8 Instrument Systems (ATA 31) Classification; Atmosphere; Terminology; Pressure measuring devices and systems; Pitot static systems; Altimeters; Vertical speed indicators; Airspeed indicators; Machmeters; Altitude reporting/alerting systems; Air data computers; Instrument pneumatic systems; Direct reading pressure and temperature gauges; Temperature indicating systems; Fuel quantity indicating systems; Gyroscopic principles; Artificial horizons; Slip indicators;	3

SUBTOPIC	LEVEL B2
Directional gyros; Ground Proximity Warning Systems; Compass systems; Flight Data Recording systems; Electronic Flight Instrument Systems; Instrument warning systems including master warning systems and centralised warning panels; Stall warning systems and angle of attack indicating systems; Vibration measurement and indication; Glass cockpit	
13.9 Lights (ATA 33) External: navigation, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	3
13.10 On board Maintenance Systems (ATA 45) Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).	3
13.11 Air Conditioning and Cabin Pressurisation (ATA 21)	
13.11.1 Air Supply Source of air supply including engine bleed, APU and ground chart	2
13.11.2 Air Conditioning	
Air Conditioning Systems;	2
Air cycle and vapour cycle machines;	3
Distribution systems;	1
Flow, temperature and humidity control system;	3
13.11.3 Pressurisation Pressurisation systems; Control and indicating including control and valves; Cabin pressure controllers;	3
13.11.4 Safety and warning devices Protection and warning devices.	3
13.12 Fire Protection (ATA 26)	
(a) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	3
(b) Portable fire extinguisher	1
13.13 Fuel Systems (ATA 28)	
System layout;	1
Fuel tanks;	1
Supply systems;	1
Dumping, venting and draining;	1
Cross-feed and transfer;	2
Indications and warnings;	3
Refuelling and defueling;	2
Longitudinal balance fuel systems;	3
13.14 Hydraulic Power (ATA 29)	
System lay-out;	1
Hydraulic fluids;	1
Hydraulics reservoirs and accumulators;	1

SUBTOPIC	LEVEL B2
Pressure generation, electrical, mechanical, pneumatic;	3
Emergency pressure generation;	3
Filters;	1
Pressure control;	3
Power distribution;	1
Indication and warning systems;	3
Interface with other systems.	3
13.15 Ice and Rain Protection (ATA 30)	
Ice formation, classification and detection;	2
Anti-icing systems: electrical, hot air and chemical;	2
De-icing systems: electrical, hot air, pneumatic, chemical;	3
Rain repellent;	1
Probe and drain heating;	3
Wiper systems;	1
13.16 Landing Gear (ATA 32)	
Construction, shock absorbing;	1
Extension and retraction systems: normal and emergency	3
Indications and warnings;	3
Wheel, brakes, antiskid and automatic braking system;	3
Tyres	1
Steering	3
Air ground sensing	3
13.17 Oxygen (ATA 35)	
System lay-out: cockpit, cabin	3
Sources, storages, charging and distribution;	3
Supply regulation;	3
Indications and warnings;	3
13.18 Pneumatic/Vacuum (ATA 36)	
System lay-out	2
Sources; engine/APU, compressors, reservoir, ground supply	2
Pressure control;	3
Distribution;	1
Indicators and warnings;	3
Interfaces with other systems;	3
13.19 Water / Waste (ATA 38)	2
Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing	
13.20 Integrated Modular Avionics (ATA 42)	3
Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: - 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, etc Core System; Network Components.	

SUBTOPIC	LEVEL B2
13.21 Cabin Systems (ATA 44) The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System (CIDS)) and between the aircraft cabin and ground stations (Cabin Network Service (CNS)). They include voice, data, music and video transmissions. CIDS provides an interface between cockpit/cabin crew and cabin systems. These systems support data exchange between the different related Line Replaceable Units (LRUs) and they are typically operated via Flight Attendant Panels (FAPs). CNS typically consists of a server, interfacing with, among others, the following systems: Data/Radio Communication; Cabin Core System (CCS); In-flight Entertainment System (IFES); External Communication System (ECS); Cabin Mass Memory System (CMMS); Cabin Monitoring System (CMS); Miscellaneous Cabin Systems (MCSs). CNS may host functions such as: access to pre-departure/departure reports; e-mail/intranet/internet access; passenger database.	3
13.22 Information Systems (ATA 46) The units and components which furnish a means of storing, updating and retrieving digital information traditionally provide 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. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display. Typical examples include: — Air Traffic and Information Management systems and Network Server systems. — Aircraft general information system; — Flight deck information system; — Maintenance information system; — Passenger cabin information system; — Miscellaneous information systems.	3

MODULE 14 : PROPULSION

SUBTOPIC	LEVEL B2
14.1 Turbine Engines	
(a) Constructional arrangement and operation of turbojet, turbofan, turboshaft and turbopropeller engines;	1
(b) Electronic Engine control and fuel metering systems (FADEC).	2
14.2 Engine Indicating Systems Exhaust gas temperature/Interstage turbine temperature systems; Engine speed; Engine Thrust Indication: Engine Pressure Ratio, engine turbine discharge pressure or jet pipe pressure systems; Oil pressure and temperature; Fuel pressure, temperature and flow; Manifold pressure; Engine torque; Propeller speed.	2
14.3 Starting and Ignition Systems Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements	2

MODULE 15 :GAS TURBINE ENGINE

SUBTOPIC	LEVEL	
	A	B1
15.1 Fundamentals 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, turboshaft, turboprop.	1	2
15.2 Engine Performance 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.	-	2
15.3 Inlet Compressor inlet ducts; Effects of various inlet configurations; Ice protection.	2	2
15.4 Compressors Axial and centrifugal types; Constructional features and operating principles and applications; Fan balancing; Operation: Causes and effects of compressor stall and surge; Methods of air flow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades; Compressor ratio.	1	2
15.5 Combustion Section Constructional features and principles of operation.	1	2
15.6 Turbine Section Operation and characteristics of different turbine blade types; Blade to disk attachment; Nozzle guide vanes; Causes and effects of turbine blade stress and creep.	2	2
15.7 Exhaust Constructional features and principles of operation; Convergent, divergent and variable area nozzles; Engine noise reduction; Thrust reversers.	1	2
15.8 Bearings and Seals Constructional features and principles of operation.	-	2
15.9 Lubricants and Fuels Properties and specifications; Fuel additives; Safety precautions.	1	2

SUBTOPIC	LEVEL	
	A	B1
15.10 Lubrication Systems System operation/lay-out and components.	1	2
15.11 Fuel Systems Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components.	1	2
15.12 Air Systems Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services.	1	2
15.13 Starting and Ignition Systems Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements.	1	2
15.14 Engine Indication Systems Exhaust Gas Temperature/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.	1	2
15.15 Power Augmentation Systems Operation and applications; Water injection, water methanol; Afterburner systems.	-	1
15.16 Turbo-prop Engines Gas coupled/free turbine and gear coupled turbines; Reduction gears; Integrated engine and propeller controls; Overspeed safety devices.	1	2
15.17 Turbo-shaft engines Arrangements, drive systems, reduction gearing, couplings, control systems.	1	2
15.18 Auxiliary Power Units (APUs) Purpose, operation, protective systems.	1	2
15.19 Powerplant Installation 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.	1	2
15.20 Fire Protection Systems Operation of detection and extinguishing systems.	1	2

SUBTOPIC	LEVEL	
	A	B1
15.21 Engine Monitoring and Ground Operation Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Trend (including oil analysis, vibration and boroscope) monitoring; Inspection of engine and components to criteria, tolerances and data specified by engine manufacturer; Compressor washing/cleaning; Foreign Object Damage.	1	3
15.22 Engine Storage and Preservation Preservation and depreservation for the engine and accessories/systems.	1	2

MODULE 16 : PISTON ENGINE

SUBTOPIC	LEVEL	
	A	B1
16.1 Fundamentals Mechanical, thermal and volumetric efficiencies; Operating principles — 2 stroke, 4 stroke, Otto and Diesel; Piston displacement and compression ratio; Engine configuration and firing order.	1	2
16.2 Engine Performance Power calculation and measurement; Factors affecting engine power; Mixtures/leaning, pre-ignition.	1	2
16.3 Engine Construction Crank case, crank shaft, cam shafts, sumps; Accessory gearbox; Cylinder and piston assemblies; Connecting rods, inlet and exhaust manifolds; Valve mechanisms; Propeller reduction gearboxes.	1	2
16.4 Engine Fuel Systems		
16.4.1 ***Carburettors*** Types, construction and principles of operation; Icing and heating.	1	2
16.4.2 ***Fuel injection systems*** Types, construction and principles of operation	1	2
16.4.3 ***Electronic engine control*** Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components.	1	2
16.5 Starting and Ignition Systems Starting systems, pre-heat systems; Magneto types, construction and principles of operation; Ignition harnesses, spark plugs; Low and high-tension systems.	1	2
16.6 Induction, Exhaust and Cooling Systems Construction and operation of: induction systems including alternate air systems; Exhaust systems, engine cooling systems — air and liquid.	1	2
16.7 Supercharging/Turbocharging Principles and purpose of supercharging and its effects on engine parameters; Construction and operation of supercharging/turbocharging systems; System terminology; Control systems; System protection.	1	2

SUBTOPIC	LEVEL	
	A	B1
16.8 Lubricants and Fuels Properties and specifications; Fuel additives; Safety precautions.	1	2
16.9 Lubrication Systems System operation/lay-out and components.	1	2
16.10 Engine Indication Systems Engine speed; Cylinder head temperature; Coolant temperature; Oil pressure and temperature; Exhaust Gas Temperature; Fuel pressure and flow; Manifold pressure.	1	2
16.11 Powerplant Installation 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.	1	2
16.12 Engine Monitoring and Ground Operation 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.	1	3
16.13 Engine Storage and Preservation Preservation and depreservation for the engine and accessories/systems.	1	2

MODULE 17 : PROPELLER

SUBTOPIC	LEVEL	
	A	B1
17.1 Fundamentals Blade element theory; High/low blade angle, reverse angle, angle of attack, rotational speed; Propeller slip; Aerodynamic, centrifugal, and thrust forces; Torque; Relative airflow on blade angle of attack; Vibration and resonance.	1	2
17.2 Propeller Construction Construction methods and materials used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; Fixed pitch, controllable pitch, constant speeding propeller; Propeller/spinner installation.	1	2
17.3 Propeller Pitch Control Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Overspeed protection.	1	2
17.4 Propeller Synchronising Synchronising and synchrophasing equipment.	-	2
17.5 Propeller Ice Protection Fluid and electrical de-icing equipment.	1	2
17.6 Propeller Maintenance Static and dynamic balancing; Blade tracking; Assessment of blade damage, erosion, corrosion, impact damage, delamination; Propeller treatment/repair schemes; Propeller engine running	1	3
17.7 Propeller Storage and Preservation Propeller preservation and depreservation	1	2

5.2 Appendix 2 - Basic examination standard

1.0 General

1.1. All basic examinations shall be carried out using the multi-choice question format and essay questions as specified below. The incorrect alternatives shall seem equally plausible to anyone ignorant of the subject. All of the alternatives shall be clearly related to the question and of similar vocabulary, grammatical construction and length. In numerical questions, the incorrect answers shall correspond to procedural errors such as corrections applied in the wrong sense or incorrect unit conversions: they shall not be mere random numbers.

1.2. Multi choice questions shall be developed and evaluated using the knowledge syllabus in Appendix 1 of this CAD.

1.3. Each multi-choice question shall have three alternative answers of which only one shall be the correct answer and the candidate shall be allowed a time per module which is based upon a nominal average of 75 seconds per question.

1.4. Each essay question requires the preparation of a written answer and the candidate shall be allowed 20 minutes to answer each such question.

1.5. Suitable essay questions shall be drafted and evaluated using the knowledge syllabus in CAD 1801 Appendix 1 Modules 7, 9, and 10.

1.6. Each question will have a model answer drafted for it, which will also include any known alternative answers that may be relevant for other subdivisions.

1.7. The model answer will also be broken down into a list of the important points known as Key Points.

1.8. The pass mark for each module and sub-module multi-choice part of the examination is 75 %.

1.9. The pass mark for each essay question is 75 % in that the candidates answer shall contain 75 % of the required key points addressed by the question and no significant error related to any required key point.

1.10. If either the multi-choice part only or the essay part only is failed, then it is only necessary to retake the multi-choice or essay part, as appropriate. If the candidate failed either one (1) of the questions in the essay part, he/she is considered fail for the entire part.

1.11. Penalty marking systems shall not be used to determine whether a candidate has passed.

1.12. The time periods required by paragraph 3.1 of this CAD apply to each individual module examination, with the exception of those module examinations which were passed as part of another category AML, where the AML has already been issued.

1.13. All CAAM Part 66 modules that make up a complete CAAM Part 66 AML category or subcategory must be passed within a 7 years time period of passing the first module.

A failed module may not be retaken for at least 90 days following the date of the failed module examination, except in the case of a CAAM Part 147 appropriately approved MTO which conducts a course of retraining tailored to the failed subjects in the particular module when the failed module may be retaken after 30 days.

1.14. The maximum number of consecutive attempts for each module is three. Further sets of three attempts are allowed with a 1 year waiting period between sets.

The applicant shall confirm and a declaration should be made in writing to the MTO or CAAM to which they apply for an examination, the number and dates of attempts during the last year where these attempts took place. The MTO is responsible for checking the number of attempts within the applicable timeframes.

2.0 Question numbers for the CAAM part 66 appendix-1 modules

2.1 Subject Module 1 Mathematics:

Category A: 16 multi-choice and 0 essay questions. Time allowed 20 minutes.
Category B1: 32 multi-choice and 0 essay questions. Time allowed 40 minutes.
Category B2: 32 multi-choice and 0 essay questions. Time allowed 40 minutes.

2.2 Subject Module 2 Physics:

Category A: 32 multi-choice and 0 essay questions. Time allowed 40 minutes.
Category B1: 52 multi-choice and 0 essay questions. Time allowed 65 minutes.
Category B2: 52 multi-choice and 0 essay questions. Time allowed 65 minutes.

2.3 Subject Module 3 Electrical Fundamentals:

Category A: 20 multi-choice and 0 essay questions. Time allowed 25 minutes.
Category B1: 52 multi-choice and 0 essay questions. Time allowed 65 minutes.
Category B2: 52 multi-choice and 0 essay questions. Time allowed 65 minutes.

2.4 Subject Module 4 Electronic Fundamentals:

Category A: None.
Category B1: 40 multi-choice and 0 essay questions. Time allowed 50 minutes.
Category B2: 40 multi-choice and 0 essay questions. Time allowed 50 minutes.

2.5 Subject Module 5 Digital Techniques/Electronic Instrument Systems:

Category A:	16 multi-choice and 0 essay questions. Time allowed 20 minutes.
Category B1.1 & B1.3:	40 multi-choice and 0 essay questions. Time allowed 50 minutes.
Category B1.2 & B1.4:	20 multi-choice and 0 essay questions. Time allowed 25 minutes.
Category B2:	72 multi-choice and 0 essay questions. Time allowed 90 minutes.

2.6 Subject Module 6 Materials and Hardware:

Category A: 52 multi-choice and 0 essay questions. Time allowed 65 minutes.
Category B1: 72 multi-choice and 0 essay questions. Time allowed 90 minutes.

Category B2: 60 multi-choice and 0 essay questions. Time allowed 75 minutes.

2.7 Subject Module 7 Maintenance Practices:

Category A:	72 multi-choice and 2 essay questions. Time allowed 90 minutes plus 40 minutes.
Category B1:	80 multi-choice and 2 essay questions. Time allowed 100 minutes plus 40 minutes.
Category B2:	60 multi-choice and 2 essay questions. Time allowed 75 minutes plus 40 minutes.

2.8 Subject Module 8 Basic Aerodynamics:

Category A: 20 multi-choice and 0 essay questions. Time allowed 25 minutes.
Category B1: 20 multi-choice and 0 essay questions. Time allowed 25 minutes.
Category B2: 20 multi-choice and 0 essay questions. Time allowed 25 minutes.

2.9 Subject Module 9 Human factors:

Category A:	20 multi-choice and 1 essay question. Time allowed 25 minutes plus 20 minutes.
Category B1:	20 multi-choice and 1 essay question. Time allowed 25 minutes plus 20 minutes.
Category B2:	20 multi-choice and 1 essay question. Time allowed 25 minutes plus 20 minutes.

2.10 Subject Module 10 Aviation Legislation:

Category A:	40 multi-choice and 1 essay question. Time allowed 50 minutes plus 20 minutes.
Category B1:	40 multi-choice and 1 essay question. Time allowed 50 minutes plus 20 minutes.
Category B2:	40 multi-choice and 1 essay question. Time allowed 50 minutes plus 20 minutes.

2.11 Subject Module 11A Turbine Aeroplane Aerodynamics, Structures and Systems:

Category A:	108 multi-choice and 0 essay questions. Time allowed 135 minutes.
Category B1:	140 multi-choice and 0 essay questions. Time allowed 175 minutes.
Category B2:	None.

2.12 Subject Module 11B Piston Aeroplane Aerodynamics, Structures and Systems:

Category A:	72 multi-choice and 0 essay questions. Time allowed 90 minutes.
Category B1:	100 multi-choice and 0 essay questions. Time allowed 125 minutes.
Category B2:	None.

2.13 Subject Module 12 Helicopter Aerodynamics, Structures and Systems:

Category A:	100 multi-choice and 0 essay questions. Time allowed 125 minutes.

Category B1:	128 multi-choice and 0 essay questions. Time allowed 160 minutes.
Category B2:	None.

2.14. Subject Module 13 Aircraft Aerodynamics, Structures and Systems:

Category A:	None.
Category B1:	None.
Category B2:	180 multi-choice and 0 essay questions. Time allowed 225 minutes.

Note: Questions and time allowed may be split into two examinations as appropriate.

2.15 Subject Module 14 Propulsion:

Category A:	None.
Category B1:	None.
Category B2:	24 multi-choice and 0 essay questions. Time allowed 30 minutes.

2.16 Subject Module 15 Gas Turbine Engine:

Category A:	60 multi-choice and 0 essay questions. Time allowed 75 minutes.
Category B1:	92 multi-choice and 0 essay questions. Time allowed 115 minutes.
Category B2:	None.

2.17 Subject Module 16 Piston Engine:

Category A: 52 multi-choice and 0 essay questions. Time allowed 65 minutes.
Category B1: 72 multi-choice and 0 essay questions. Time allowed 90 minutes.
Category B2: None.

2.18 Subject Module 17 Propeller:

Category A: 20 multi-choice and 0 essay questions. Time allowed 25 minutes.
Category B1: 32 multi-choice and 0 essay questions. Time allowed 40 minutes.
Category B2: None.

5.3 Appendix 3 - Aircraft type training and examination standard, and on the job training

1.0 General

1.1 Aircraft type training shall consist of theoretical training and examination, and, except for the category C ratings, practical training and assessment.

(a) Theoretical training and examination shall comply with the following requirements:

(i) Shall be conducted by a MTO appropriately approved in accordance with CAD 1821 or, when conducted by OEM subjected to a validation of training to determine that such type training meets the intent of this Appendix, or when conducted by other organisations, as approved directly by CAAM;

(ii) Except as permitted by the differences training described in point (c), the type training shall comply with: -

(1) the relevant elements defined in the standard described in paragraph 3.1 (theoretical element) of this Appendix, and

(2) the type training examination standard described in paragraph 4.1 of this Appendix.

(iii) -Reserved-

(iv) Shall have been started and completed within the 3 years preceding the application for a type rating endorsement.

(b) Practical training and assessment shall comply with the following requirements:

(i) Shall be conducted by a MTO appropriately approved in accordance with CAD 1821 or, when conducted by OEM subjected to a validation of training to determine that such type training meets the intent of this Appendix, or when conducted by other organisations, as approved directly by CAAM;

(ii) Except as permitted by the differences training described in paragraph 1.1 (c), the type training shall comply with: -

(1) the relevant elements defined in the standard described in paragraph 3.2 (practical element) of this Appendix, and

(2) the type training assessment standard described in paragraph 4.2 of this Appendix.

(iii) Shall include a representative cross section of maintenance activities relevant to the aircraft type as specify in paragraph 3.1 (b).

(iv) Shall include demonstrations using equipment, components, simulators, other training devices or aircraft.

(v) Shall have been started and completed within the 3 years preceding the application for a type rating endorsement.

(c) Differences training

(i) Differences training is the training required in order to cover the differences between two different aircraft type ratings of the same manufacturer as determined by CAAM.

(ii) Differences training has to be defined on a case-to-case basis taking into account the requirements contained in this Appendix, in respect of both theoretical and practical elements of type training.

(iii) A type rating shall only be endorsed on an AML after differences training when the applicant also complies with one of the following conditions:

(1) having already endorsed on the AML the aircraft type rating from which the differences are being identified, or

(2) having completed the type training requirements for the aircraft from which the differences are being identified.

2.0 Aircraft type training levels

2.1 The three levels listed below define the objectives, the depth of training and the level of knowledge that the training is intended to achieve.

2.2 Level 1: A brief overview of the airframe, systems and powerplant as outlined in the Systems Description Section of the Aircraft Maintenance Manual/ Instructions for Continued Airworthiness.

Course objectives: Upon completion of Level 1 training, the student will be able to:

(a) provide a simple description of the whole subject, using common words and examples, using typical terms and identify safety precautions related to the airframe, its systems and powerplant;

(b) identify aircraft manuals, maintenance practices important to the airframe, its systems and powerplant;

(c) define the general layout of the aircraft's major systems;

(d) define the general layout and characteristics of the powerplant;

(e) identify special tooling and test equipment used with the aircraft.

2.3 Level 2: Basic system overview of controls, indicators, principal components, including their location and purpose, servicing and minor troubleshooting. General knowledge of the theoretical and practical aspects of the subject.

Course objectives: In addition to the information contained in the Level 1 training, at the completion of Level 2 training, the student will be able to:

(a) understand the theoretical fundamentals; apply knowledge in a practical manner using detailed procedures;

(b) recall the safety precautions to be observed when working on or near the aircraft, powerplant and systems;

(c) describe systems and aircraft handling particularly access, power availability and sources;

(d) identify the locations of the principal components;

(e) explain the normal functioning of each major system, including terminology and nomenclature;

(f) perform the procedures for servicing associated with the aircraft for the following systems: Fuel, Power Plants, Hydraulics, Landing Gear, Water/Waste, and Oxygen;

(g) demonstrate proficiency in use of crew reports and on-board reporting systems (minor troubleshooting) and determine aircraft airworthiness per the MEL/CDL;

(h) demonstrate the use, interpretation and application of appropriate documentation including instructions for continued airworthiness, maintenance manual, illustrated parts catalogue, etc.

2.4 Level 3: Detailed description, operation, component location, removal/ installation and bite and troubleshooting procedures to maintenance manual level.

Course objectives: In addition to the information contained in Level 1 and Level 2 training, at the completion of Level 3 training, the student will be able to:

(a) demonstrate a theoretical knowledge of aircraft systems and structures and interrelationships with other systems, provide a detailed description of the subject using theoretical fundamentals and specific examples and to interpret results from various sources and measurements and apply corrective action where appropriate;

(b) perform system, powerplant, component and functional checks as specified in the aircraft maintenance manual;

(c) demonstrate the use, interpret and apply appropriate documentation including structural repair manual, troubleshooting manual, etc.;

(d) correlate information for the purpose of making decisions in respect of fault diagnosis and rectification to maintenance manual level;

(e) describe procedures for replacement of components unique to aircraft type.

3.0 Aircraft type training standard

3.1 Aircraft type training shall include both theoretical and practical elements.

(a) Theoretical element

(i) Objective:

On completion of a theoretical training course the student shall be able to demonstrate, to the levels identified in this appendix syllabus, the detailed theoretical knowledge of the aircraft's applicable systems, structure, operations, maintenance, repair, and troubleshooting according to approved maintenance data. The student shall be able to demonstrate the use of manuals and approved procedures, including the knowledge of relevant inspections and limitations.

(ii) Level of training:

Training levels are those levels defined in paragraph 2 above. After the first type course for category C certifying staff all subsequent courses need only be to Level 1.

During a level 3 theoretical training, level 1 and 2 training material may be used to teach the full scope of the chapter if required. However, during the training the majority of the course material and training time shall be at the higher level.

(iii) Duration:

The theoretical training minimum tuition hours are contained in the following table

CATEGORY	**HOURS**
Aeroplanes with a maximum take-off mass above 30,000 kg:	
B1.1	150
B1.2	120
B2	100
C	30
Aeroplanes with a maximum take-off mass equal or less than 30,000 kg and above 5700 kg:	
B1.1	120
B1.2	100
B2	100
C	25
Aeroplanes with a maximum take-off mass of 5,700 kg and below: *	
B1.1	80
B1.2	60
B2	60
C	15
Helicopters: **	

B1.3	120
B1.4	100
B2	100
C	25

For the purpose of the table above, a tuition hour means 60 minutes of teaching and exclude any breaks, examination, revision, preparation and aircraft visit.

These hours apply only to theoretical courses for complete aircraft and engine combinations according to the type rating as defined by CAAM.

(iv) Justification of course duration:

Training courses carried out in CAAM Part 147 MTO and training courses approved directly by CAAM shall justify their hour duration and the coverage of the full syllabus by a training needs analysis based on: -

(1) the design of the aircraft type, its maintenance needs and the types of operation,

(2) detailed analysis of applicable chapters — see contents table in point 3.1(v) below,

(3) detailed competency analysis showing that the objectives as stated in point 3.1(a) above are fully met.

Where the training needs analysis shows that more hours are needed, course lengths shall be longer than the minimum specified in the table.

Similarly, tuition hours of differences courses or other training course combinations (such as combined B1/ B2 courses), and in cases of theoretical type training courses below the figures given in paragraph 3.1(a)(iv) above, shall be justified to CAAM by the training needs analysis as described above.

Note: * For non-pressurised piston engine aeroplanes below 2000 kg MTOM the minimum duration can be reduced by 30 %.
** For helicopters other than large aircraft the minimum duration can be reduced by 30 %.

In addition, the course must describe and justify the following:

(1) The minimum attendance required to the trainee, in order to meet the objectives of the course.
(2) The maximum number of hours of training per day, taking into account pedagogical and human factors principles.

If the minimum attendance required is not met, a type training certificate shall not be issued. Additional training may be provided by the training organisation in order to meet the minimum attendance time.

(v) Content:

As a minimum, the elements in the Syllabus below that are specific to the aircraft type shall be covered. Additional elements introduced due to type variations, technological changes, etc. shall also be included.

The theoretical training syllabus shall be focused on mechanical and electrical aspects for B1 personnel, and electrical and avionic aspects for B2. Both shall cover relevant knowledge on engine aspects as specified in the theoretical standards below.

LICENCE CATEGORY	Aeroplanes Turbine		Aeroplanes Piston		Helicopters Turbine		Helicopters Piston		Avionics
	B1.1	C	B1.2	C	B1.3	C	B1.4	C	B2
CHAPTERS	**LEVEL**								
Introduction:									
05 Time limits/ maintenance checks	1	1	1	1	1	1	1	1	1
06 Dimensions/Areas (MTOM, etc.)	1	1	1	1	1	1	1	1	1
07 Lifting and Shoring	1	1	1	1	1	1	1	1	1
08 Levelling and weighing	1	1	1	1	1	1	1	1	1
09 Towing and taxiing	1	1	1	1	1	1	1	1	1
10 Parking/mooring, Storing and Return to Service	1	1	1	1	1	1	1	1	1
11 Placards and Markings	1	1	1	1	1	1	1	1	1
12 Servicing	1	1	1	1	1	1	1	1	1
20 Standard practices -only type particular	1	1	1	1	1	1	1	1	1
Helicopters:									
18 Vibration and Noise Analysis (Blade tracking)	—	—	—	—	3	1	3	1	—
60 Standard Practices Rotor	—	—	—	—	3	1	3	1	—
62 Rotors	—	—	—	—	3	1	3	1	1
62A Rotors — Monitoring and indicating	—	—	—	—	3	1	3	1	3
63 Rotor Drives	—	—	—	—	3	1	3	1	1
63A Rotor Drives — Monitoring and indicating	—	—	—	—	3	1	3	1	3
64 Tail Rotor	—	—	—	—	3	1	3	1	1
64A Tail rotor — Monitoring and indicating	—	—	—	—	3	1	3	1	3
65 Tail Rotor Drive	—	—	—	—	3	1	3	1	1
65A Tail Rotor Drive — Monitoring and indicating	—	—	—	—	3	1	3	1	3
66 Folding Blades/Pylon	—	—	—	—	3	1	3	1	—
67 Rotors Flight Control	—	—	—	—	3	1	3	1	—
53 Airframe Structure (Helicopter)	—	—	—	—	3	1	3	1	—
25 Emergency Flotation Equipment	—	—	—	—	3	1	3	1	1

LICENCE CATEGORY	Aeroplanes Turbine		Aeroplanes Piston		Helicopters Turbine		Helicopters Piston		Avionics
	B1.1	C	B1.2	C	B1.3	C	B1.4	C	B2
CHAPTERS	**LEVEL**								
Airframe structures:									
51 Standard practices and structures (damage classification, assessment and repair)	3	1	3	1	—	—	—	—	1
53 Fuselage	3	1	3	1	—	—	—	—	1
54 Nacelles/Pylons	3	1	3	1	—	—	—	—	1
55 Stabilisers	3	1	3	1	—	—	—	—	1
56 Windows	3	1	3	1	—	—	—	—	1
57 Wings	3	1	3	1	—	—	—	—	1
27A Flight Control Surfaces (All)	3	1	3	1	—	—	—	—	1
52 Doors	3	1	3	1	—	—	—	—	1
Zonal and Station Identification Systems.	1	1	1	1	1	1	1	1	1
Airframe systems:									
21 Air Conditioning	3	1	3	1	3	1	3	1	3
21A Air Supply	3	1	3	1	3	1	3	1	2
21B Pressurisation	3	1	3	1	3	1	3	1	3
21C Safety and Warning Devices	3	1	3	1	3	1	3	1	3
22 Autoflight	2	1	2	1	2	1	2	1	3
23 Communications	2	1	2	1	2	1	2	1	3
24 Electrical Power	3	1	3	1	3	1	3	1	3
25 Equipment and Furnishings	3	1	3	1	3	1	3	1	1
25A Electronic Equipment including emergency equipment	1	1	1	1	1	1	1	1	3
26 Fire Protection	3	1	3	1	3	1	3	1	3
27 Flight Controls	3	1	3	1	3	1	3	1	2
27A Sys. Operation: Electrical/Fly-by-Wire	3	1	—	—	—	—	—	—	3
28 Fuel Systems	3	1	3	1	3	1	3	1	2
28A Fuel Systems — Monitoring and indicating	3	1	3	1	3	1	3	1	3
29 Hydraulic Power	3	1	3	1	3	1	3	1	2

LICENCE CATEGORY		Aeroplanes Turbine		Aeroplanes Piston		Helicopters Turbine		Helicopters Piston		Avionics
		B1.1	C	B1.2	C	B1.3	C	B1.4	C	B2
CHAPTERS		**LEVEL**								
29A	Hydraulic Power — Monitoring and indicating	3	1	3	1	3	1	3	1	3
30	Ice and Rain Protection	3	1	3	1	3	1	3	1	3
31	Indicating/ Recording System	3	1	3	1	3	1	3	1	3
31A	Instruments System	3	1	3	1	3	1	3	1	3
32	Landing Gear	3	1	3	1	3	1	3	1	2
32A	Landing Gear — Monitoring and indicating	3	1	3	1	3	1	3	1	3
33	Lights	3	1	3	1	3	1	3	1	3
34	Navigation	2	1	2	1	2	1	2	1	3
35	Oxygen	3	1	3	1	—	—	—	—	2
36	Pneumatic	3	1	3	1	3	1	3	1	2
36A	Pneumatic — Monitoring and indicating	3	1	3	1	3	1	3	1	3
37	Vacuum	3	1	3	1	3	1	3	1	2
38	Water/Waste	3	1	3	1	—	—	—	—	2
41	Water Ballast	3	1	3	1	—	—	—	—	1
42	Integrated modular avionics	2	1	2	1	2	1	2	1	3
44	Cabin Systems	2	1	2	1	2	1	2	1	3
45	On-Board Maintenance System (or covered in 31)	3	1	3	1	3	1	—	—	3
46	Information Systems	2	1	2	1	2	1	2	1	3
50	Cargo and Accessory Compartments	3	1	3	1	3	1	3	1	1
Turbine Engine:										
70	Standard Practices— Engines,	3	1	—	—	3	1	—	—	1
70A	constructional arrangement and operation (Installation Inlet, Compressors, Combustion Section, Turbine Section, Bearings and Seals, Lubrication Systems).	3	1	—	—	3	1	—	—	1
70B	Engine Performance	3	1	—	—	3	1	—	—	1

LICENCE CATEGORY		Aeroplanes Turbine		Aeroplanes Piston		Helicopters Turbine		Helicopters Piston		Avionics
		B1.1	C	B1.2	C	B1.3	C	B1.4	C	B2
CHAPTERS		**LEVEL**								
71	Powerplant	3	1	—	—	3	1	—	—	1
72	Engine Turbine/Turbo Prop/Ducted Fan/Unducted fan	3	1	—	—	3	1	—	—	1
73	Engine Fuel and Control	3	1	—	—	3	1	—	—	1
75	Air	3	1	—	—	3	1	—	—	1
76	Engine controls	3	1	—	—	3	1	—	—	1
78	Exhaust	3	1	—	—	3	1	—	—	1
79	Oil	3	1	—	—	3	1	—	—	1
80	Starting	3	1	—	—	3	1	—	—	1
82	Water Injections	3	1	—	—	3	1	—	—	1
83	Accessory Gear Boxes	3	1	—	—	3	1	—	—	1
84	Propulsion Augmentation	3	1	—	—	3	1	—	—	1
73A	FADEC	3	1	—	—	3	1	—	—	3
74	Ignition	3	1	—	—	3	1	—	—	3
77	Engine Indicating Systems	3	1	—	—	3	1	—	—	3
49	Auxiliary Power Units (APUs)	3	1	—	—	—	—	—	—	2
Piston Engine:										
70	Standard Practices — Engines	—	—	3	1	—	—	3	1	1
70A	Constructional arrangement and operation (Installation, Carburettors, Fuel injection systems, Induction, Exhaust and Cooling Systems, Supercharging/ Turbocharging, Lubrication Systems).	—	—	3	1	—	—	3	1	1
70B	Engine Performance	—	—	3	1	—	—	3	1	1
71	Powerplant	—	—	3	1	—	—	3	1	1
73	Engine Fuel and Control	—	—	3	1	—	—	3	1	1
76	Engine Control	—	—	3	1	—	—	3	1	1
79	Oil	—	—	3	1	—	—	3	1	1

LICENCE CATEGORY	Aeroplanes Turbine		Aeroplanes Piston		Helicopters Turbine		Helicopters Piston		Avionics
	B1.1	C	B1.2	C	B1.3	C	B1.4	C	B2
CHAPTERS	**LEVEL**								
80 Starting	—	—	3	1	—	—	3	1	1
81 Turbines	—	—	3	1	—	—	3	1	1
82 Water Injections	—	—	3	1	—	—	3	1	1
83 Accessory Gear Boxes	—	—	3	1	—	—	3	1	1
84 Propulsion Augmentation	—	—	3	1	—	—	3	1	1
73A FADEC	—	—	3	1	—	—	3	1	3
74 Ignition	—	—	3	1	—	—	3	1	3
77 Engine Indication Systems	—	—	3	1	—	—	3	1	3
Propellers:									
60A Standard Practices — Propeller	3	1	3	1	—	—	—	—	1
61 Propellers/Propulsion	3	1	3	1	—	—	—	—	1
61A Propeller Construction	3	1	3	1	—	—	—	—	—
61B Propeller Pitch Control	3	1	3	1	—	—	—	—	—
61C Propeller Synchronising	3	1	3	1	—	—	—	—	1
61D Propeller Electronic control	2	1	2	1	—	—	—	—	3
61E Propeller Ice Protection	3	1	3	1	—	—	—	—	—
61F Propeller Maintenance	3	1	3	1	—	—	—	—	1

(vi) For category A, the minimum theoretical training syllabus shall cover the ATA chapters appropriate to the practical task as part of minor schedule line maintenance or simple defect rectification contained in the following list:-

(1) Replacement of wheel assemblies.
(2) Replacement of wheel brake units.
(3) Replacement of emergency equipment.
(4) Replacement of ovens, boilers and beverage makers.
(5) Replacement of internal and external lights, filaments and flash tubes.
(6) Replacement of windscreen wiper blades.
(7) Replacement of passenger and cabin crew seats, seat belts and harnesses.
(8) Closing of cowlings and refitment of quick access inspection panels.
(9) Replacement of toilet system components but excluding gate valves.
(10) Simple repairs and replacement of internal compartment doors and placards but excluding doors forming part of a pressure structure.
(11) Simple repairs and replacement of overhead storage compartment doors and cabin furnishing items.

(12) Replacement of static wicks.
(13) Replacement of aircraft main and APU aircraft batteries.
(14) Replacement of in-flight entertainment system components other than public address.
(15) Routine lubrication and replenishment of all system fluids and gases.
(16) The de-activation only of sub-systems and aircraft components as permitted by the operator's minimum equipment list where such de-activation is agreed by CAAM as a simple task.
(17) Inspection for and removal of de-icing/anti-icing fluid residues, including removal/closure of panels, cowls or covers or the use of special tools.
(18) Any other task agreed by CAAM as a simple task for a particular aircraft type. This may include defect deferment when all the following conditions are met:
- There is no need for troubleshooting; and
- The task is in the MEL; and
- The maintenance action required by the MEL is agreed by the CAAM to be simple.

In the particular case of helicopters, and in addition to the items above, the following:

(19) Removal and installation of Helicopter Emergency Medical Service (HEMS) simple internal medical equipment.
(20) Removal and installation of external cargo provisions (i.e., external hook, mirrors) other than the hoist.
(21) Removal and installation of quick release external cameras and search lights.
(22) Removal and installation of emergency float bags, not including the bottles.
(23) Removal and installation of external doors fitted with quick release attachments.
(24) Removal and installation of snow pads/skid wear shoes/slump protection pads.

Note: No task which requires troubleshooting should be part of the authorised maintenance actions. Maintenance release after rectification of deferred defects should be permitted as long as the task is listed above.

(vii) Multimedia Based Training (MBT) methods may be used to satisfy the theoretical training element either in the classroom or in a virtual controlled environment subject to the acceptance of CAAM.

(b) Practical Element

(i) Objective:

The objective of practical training is to gain the required competence in performing safe maintenance, inspections and routine work according to the maintenance manual and other relevant instructions and tasks as appropriate for the type of aircraft, for example troubleshooting, repairs, servicing, adjustments, replacements, rigging and functional checks. It includes the awareness of the use of all technical literature and documentation for the aircraft, the use of specialist/ special tooling and test equipment for performing removal and replacement of components and modules unique to type, including any on-wing maintenance activity.

(ii) Content:

At least 50 % of the crossed items in the table below, which are relevant to the particular aircraft type, shall be completed as part of the practical training.

Tasks crossed represent subjects that are important for practical training purposes to ensure that the operation, function, installation and safety significance of key maintenance tasks are adequately addressed; particularly where these cannot be fully explained by theoretical training alone. Although the list details the minimum practical training subjects, other items may be added where applicable to the particular aircraft type.

Tasks to be completed shall be representative of the aircraft and systems both in complexity and in the technical input required to complete that task. While relatively simple tasks may be included, other more complex tasks shall also be incorporated and undertaken as appropriate to the aircraft type.

Glossary of the table:

LOC: Location; FOT: Functional/Operational Test; SGH: Service and Ground Handling; R/I: Removal/Installation; MEL: Minimum Equipment List; TS: Troubleshooting.

Chapters		B1/B2	B1					B2				
		LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
Introduction Module:												
5	Time limits/ maintenance checks	X/X	—	—	—	—	—	—	—	—	—	—
6	Dimensions/ Areas (MTOM, etc)	X/X	—	—	—	—	—	—	—	—	—	—
7	Lifting and Shoring	X/X	—	—	—	—	—	—	—	—	—	—
8	Levelling and weighing	X/X	—	X	—	—	—	—	X	—	—	—
9	Towing and taxiing	X/X	—	X	—	—	—	—	X	—	—	—
10	Parking/ mooring, Storing and Return to Service	X/X	—	X	—	—	—	—	X	—	—	—
11	Placards and Markings	X/X	—	—	—	—	—	—	—	—	—	—
12	Servicing	X/X	—	X	—	—	—	—	X	—	—	—
20	Standard practices — only type particular	X/X	—	X	—	—	—	—	X	—	—	—
Helicopters:												
18	Vibration and Noise Analysis (Blade tracking)	X/—	—	—	—	—	X	—	—	—	—	—
60	Standard Practices Rotor — only type specific	X/X	—	X	—	—	—	—	X	—	—	—
62	Rotors	X/—	—	X	X	—	X	—	—	—	—	—
62A	Rotors — Monitoring and indicating	X/X	X	X	X	X	X	—	—	X	—	X
63	Rotor Drives	X/—	X	—	—	—	X	—	—	—	—	—
63A	Rotor Drives - Monitoring and indicating	X/X	X	—	X	X	X	—	—	X	—	X
64	Tail Rotor	X/—	—	X	—	—	X	—	—	—	—	—
64A	Tail rotor — Monitoring and indicating	X/X	X	—	X	X	X	—	—	X	—	X
65	Tail Rotor Drive	X/—	X	—	—	—	X	—	—	—	—	—
65A	Tail Rotor Drive — Monitoring and indicating	X/X	X	—	X	X	X	—	—	X	—	X
66	Folding Blades/Pylon	X/—	X	X	—	—	X	—	—	—	—	—
67	Rotors Flight Control	X/—	X	X	—	X	X	—	—	—	—	—
25	Emergency Flotation Equipment	X/X	X	X	X	X	X	X	X	—	—	—

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
53 Airframe Structure (Helicopter) Note: covered under Airframe structures											
Airframe structures:											
51 Standard Practices and Structures (damage classification, assessment and repair)											
53 Fuselage	X/—	—	—	—	—	X	—	—	—	—	—
54 Nacelles/Pylons	X/—	—	—	—	—	—	—	—	—	—	—
55 Stabilisers	X/—	—	—	—	—	—	—	—	—	—	—
56 Windows	X/—	—	—	—	—	X	—	—	—	—	—
57 Wings	X/—	—	—	—	—	—	—	—	—	—	—
27A Flight Control Surfaces	X/—	—	—	—	—	X	—	—	—	—	—
52 Doors	X/X	X	X	—	—	—	—	X	—	—	—
Airframe systems:											
21 Air Conditioning	X/X	X	X	—	X	X	X	X	—	X	X
21A Air Supply	X/X	X	—	—	—	—	X	—	—	—	—
21B Pressurisation	X/X	X	—	—	X	X	X	—	—	X	X
21C Safety and warning Devices	X/X	—	X	—	—	—	—	X	—	—	—
22 Autoflight	X/X	—	—	—	X	—	X	X	X	X	X
23 Communications	X/X	—	X	—	X	—	X	X	X	X	X
24 Electrical Power	X/X	X	X	X	X	X	X	X	X	X	X
25 Equipment and Furnishings	X/X	X	X	X	—	—	X	X	X	—	—
25A Electronic equipment including emergency equipment	X/X	X	X	X	—	—	X	X	X	—	—
26 Fire Protection	X/X	X	X	X	X	X	X	X	X	X	X
27 Flight Controls	X/X	X	X	X	X	X	X	—	—	—	—
27A Sys. Operation: Electrical/ Fly-by-Wire	X/X	X	X	X	X	—	X	—	X	X	X
28 Fuel Systems	X/X	X	X	X	X	X	X	X	—	X	—
28A Fuel Systems — Monitoring and indicating	X/X	X	—	—	—	—	X	—	X	—	X
29 Hydraulic Power	X/X	X	X	X	X	X	X	X	—	X	—

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
29A Hydraulic Power — Monitoring and indicating	X/X	X	—	X	X	X	X	—	X	X	X
30 Ice and Rain Protection	X/X	X	X	X	X	X	X	X	X	X	X
31 Indicating/Recording Systems	X/X	X	X	X	X	X	X	X	X	X	X
31A Instrument Systems	X/X	X	X	X	X	X	X	X	X	X	X
32 Landing Gear	X/X	X	X	X	X	X	X	X	X	X	—
32A Landing Gear — Monitoring and indicating	X/X	X	—	X	X	X	X	—	X	X	X
33 Lights	X/X	X	X	X	X	—	X	X	X	X	—
34 Navigation	X/X	—	X	—	X	—	X	X	X	X	X
35 Oxygen	X/—	X	X	X	—	—	X	X	—	—	—
36 Pneumatic	X/—	X	—	X	X	X	X	—	X	X	X
36A Pneumatic — Monitoring and indicating	X/X	X	X	X	X	X	X	X	X	X	X
37 Vacuum	X/—	X	—	X	X	X	—	—	—	—	—
38 Water/Waste	X/—	X	X	—	—	—	X	X	—	—	—
41 Water Ballast	X/—	—	—	—	—	—	—	—	—	—	—
42 Integrated modular avionics	X/X	—	—	—	—	—	X	X	X	X	X
44 Cabin Systems	X/X	—	—	—	—	—	X	X	X	X	X
45 On-Board Maintenance System (or covered in 31)	X/X	X	X	X	X	X	X	X	X	X	X
46 Information Systems	X/X	—	—	—	—	—	X	—	X	X	X
50 Cargo and Accessory Compartments	X/X	—	X	—	—	—	—	—	—	—	—
Turbine/Piston Engine Module:											
70 Standard Practices — Engines — only type particular	—	—	X	—	—	—	—	X	—	—	—
70A Constructional arrangement and operation (Installation Inlet, Compressors, Combustion Section, Turbine Section, Bearings and Seals, Lubrication Systems)	X/X	—	—	—	—	—	—	—	—	—	—

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
Turbine engines:											
70B Engine Performance	—	—	—	—	—	X	—	—	—	—	—
71 Power Plant	X/—	X	X	—	—	—	—	X	—	—	—
72 Engine Turbine/Turbo Prop/Ducted Fan/ Unducted fan	X/—	—	—	—	—	—	—	—	—	—	—
73 Engine Fuel and Control	X/X	X	—	—	—	—	—	—	—	—	—
73A FADEC Systems	X/X	X	—	X	X	X	X	—	X	X	X
74 Ignition	X/X	X	—	—	—	—	X	—	—	—	—
75 Air	X/—	—	—	X	—	X	—	—	—	—	—
76 Engine Controls	X/—	X	—	—	—	X	—	—	—	—	—
77 Engine Indicating	X/X	X	—	—	X	X	X	—	—	X	X
78 Exhaust	X/—	X	—	—	X	—	—	—	—	—	—
79 Oil	X/—	—	X	X	—	—	—	—	—	—	—
80 Starting	X/—	X	—	—	X	X	—	—	—	—	—
82 Water Injection	X/—	X	—	—	—	—	—	—	—	—	—
83 Accessory Gearboxes	X/—	—	X	—	—	—	—	—	—	—	—
84 Propulsion Augmentation	X/—	X	—	—	—	—	—	—	—	—	—
Auxiliary Power Units (APUs)											
49 Auxiliary Power Units (APUs)	X/—	X	X	—	—	X	—	—	—	—	—
Piston Engines:											
70 Standard Practices — Engines — only type particular	—	—	X	—	—	—	—	X	—	—	—
70A Constructional arrangement and operation (Installation Inlet, Compressors, Combustion Section, Turbine Section, Bearings and Seals, Lubrication Systems)	X/X	—	—	—	—	—	—	—	—	—	—
70B Engine Performance	—	—	—	—	—	X	—	—	—	—	—
71 Power Plant	X/—	X	X	—	—	—	—	X	—	—	—
73 Engine Fuel and Control	X/X	X	—	—	—	—	—	—	—	—	—

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
73A FADEC Systems	X/X	X	—	X	X	X	X	X	X	X	X
74 Ignition	X/X	X	—	—	—	—	X	—	—	—	—
76 Engine Controls	X/ X	X	—	—	—	X	X	—	—	—	X
77 Engine Indicating	X/X	X	—	—	X	X	X	—	—	X	X
78 Exhaust	X/—	X	—	—	X	X	—	—	—	—	—
79 Oil	X/—	—	X	X	—	—	—	—	—	—	—
80 Starting	X/—	X	—	—	X	X	—	—	—	—	—
81 Turbines	X/—	X	X	X	—	X	—	—	—	—	—
82 Water Injection	X/—	X	—	—	—	—	—	—	—	—	—
83 Accessory Gearbox	X/—	—	X	X	—	—	—	—	—	—	—
84 Propulsion Augmentation	X/—	X	—	—	—	—	—	—	—	—	—
Propellers:											
Standard Practices — Propeller	—	—	—	X	—	—	—	—	—	—	—
61 Propellers/ Propulsion	X/X	X	X	—	X	X	—	—	—	—	—
61A Propeller Construction	X/X	—	X	—	—	—	—	—	—	—	—
61B Propeller Pitch Control	X/—	X	—	X	X	X	—	—	—	—	—
61C Propeller Synchronising	X/—	X	—	—	—	X	—	—	—	X	—
61D Propeller Electronic control	X/X	X	X	X	X	X	X	X	X	X	X
61E Propeller Ice Protection	X/—	X	—	X	X	X	—	—	—	—	—
61F Propeller Maintenance	X/X	X	X	X	X	X	X	X	X	X	X

4. Type training examination and assessment standard

4.1 Theoretical elements and examination standard.

After the theoretical portion of the aircraft type training has been completed, a written examination shall be performed, which shall comply with the following:

(a) Format of the examination is of the multi-choice type. Each multi-choice question shall have 3 alternative answers of which only one shall be the correct answer. The total time is based on the total number of questions and the time for answering is based upon a nominal average of 90 seconds per question.

(b) The incorrect alternatives shall seem equally plausible to anyone ignorant of the subject. All the alternatives shall be clearly related to the question and of similar vocabulary, grammatical construction and length.

(c) In numerical questions, the incorrect answers shall correspond to procedural errors such as the use of incorrect sense (+ versus -) or incorrect measurement units. They shall not be mere random numbers.

(d) The level of examination for each chapter* shall be the one defined in paragraph 2.0 of this appendix. However, the use of a limited number of questions at a lower level is acceptable.

(e) The examination shall be of the closed book type. No reference material is permitted. An exception will be made for the case of examining a B1 or B2 candidate's ability to interpret technical documents.

(f) The number of questions shall be at least 1 question per hour of instruction. The number of questions for each chapter and level shall be proportionate to:

(i) the effective training hours spent teaching at that chapter and level,
(ii) the learning objectives as given by the training needs analysis.

CAAM will assess the number and the level of the questions when approving the course.

(g) The minimum examination pass mark is 75 %. When the type training examination is split in several examinations, each examination shall be passed with at least a 75 % mark. In order to be possible to achieve exactly a 75 % pass mark, the number of questions in the examination shall be a multiple of 4.

(h) Penalty marking (negative points for failed questions) is not to be used.

(i) End of module phase examinations cannot be used as part of the final examination unless they contain the correct number and level of questions required.

** For the purpose of this paragraph, a 'chapter' means each one of the rows preceded by a number in the table contained in paragraph 3.1(v).*

4.2 Practical element assessment standard

After the practical element of the aircraft type training has been completed, an

assessment must be performed, which must comply with the following:

(a) The assessment shall be performed by a practical assessor.

(b) The assessment shall evaluate the knowledge, skills and attitude of the trainee.

5.0 Type examination standard

5.1 The organisation shall not conduct type examination unless it is approved to conduct the corresponding training.

5.2 The examination shall be in written and practical assessment based, and it shall comply with the following requirements:

(a) Written examination questions shall be in multi-choice questions.

(b) Practical assessment shall determine a person's competence to perform a maintenance task.

(c) Examinations shall be on a sample of chapters** drawn from paragraph 3.0 of this appendix

(d) The type training examination syllabus should be at the indicated level drawn from paragraph 3.0 of this appendix

(e) The incorrect alternatives shall seem equally plausible to anyone ignorant of the subject. All of the alternatives shall be clearly related to the question and of similar vocabulary, grammatical construction and length.

(f) In numerical questions, the incorrect answers shall correspond to procedural errors such as corrections applied in the wrong sense or incorrect unit conversions: they shall not be mere random numbers.

(g) The examination shall ensure that the following objectives are met:

(i) Properly discuss with confidence the aircraft and its systems.

(ii) Ensure safe performance of maintenance, inspections and routine work according to the maintenance manual and other relevant instructions and tasks as appropriate for the type of aircraft, for example troubleshooting, repairs, adjustments, replacements, rigging and functional checks.

(iii) Correctly use all technical literature and documentation for the aircraft.

(iv) Correctly use special tool and test equipment, perform removal and replacement of components and modules unique to the type of aircraft, including any on-wing maintenance activity

(h) The following conditions apply to the examination:

(i) The type examination shall be passed and the required practical experience shall be completed within the 3 years preceding the application for the rating endorsement on the AML.

(ii) Type examination shall be performed with at least one examiner present.

The examiner(s) shall not have been involved in the applicant's training.

(i) A written and signed report shall be made by the examiner(s) to explain the status of the candidate's results whether it has passed or failed.

*** For the purpose of this paragraph, 'chapter' means each one of the rows preceded by a number in the tables contained in paragraph 3.1(v) and 3.2(ii) of this Appendix.*

6.0 On the Job Training (OJT)

6.1 OJT shall be conducted at and under the control of a maintenance organisation appropriately approved for the maintenance of the particular aircraft type and shall be assessed by a practical assessor.

6.2 It shall have been started and completed within the 3 years preceding the application for a type rating endorsement.

(a) Objective:

The objective of OJT is to gain the required competence and experience in performing safe maintenance.

(b) Content:

(i) OJT shall cover a cross section of tasks acceptable to CAAM. The OJT tasks to be completed shall be representative of the aircraft and systems both in complexity and in the technical input required to complete that task. While relatively simple tasks may be included, other more complex maintenance tasks shall also be incorporated and undertaken as appropriate to the aircraft type.

(ii) Each task shall be signed off by the student and countersigned by a validator/ supervisor. The tasks listed shall refer to an actual job card/ work sheet, or any other means that is acceptable to CAAM.

(iii) The final assessment of the completed OJT is mandatory and shall be performed by a practical assessor.

(iv) The following data shall be addressed on the OJT worksheets/logbook:

(1) Name of Trainee;

(2) Date of Birth;

(3) Approved Maintenance Organisation;

(4) Location;

(5) Name of validator(s)/ supervisor(s) and practical assessor (including AML number if applicable);

(6) Date of task completion;

(7) Description of task and job card/ work order/ technical log, or other means acceptable to CAAM.;

(8) Aircraft type and aircraft registration;

(9) Aircraft rating applied for.

(v) In order to facilitate the verification by CAAM, demonstration of the OJT shall consist of:-

(1) detailed worksheets/ logbook; and

(2) a compliance report demonstrating how the OJT meets the requirement of this Appendix.

(vi) The procedures for OJT should be included into the exposition manual of the AMO.

5.4 Appendix 4 - Experience requirements for extension of CAAM part 66 AML

1.0 Introduction

1.1 The table below shows the experience requirements for adding a new category or subcategory to an existing CAAM Part 66 AML.

1.2 The experience must be practical maintenance experience on operating aircraft in the subcategory relevant to the application.

1.3 The experience requirement will be reduced by 50 % if the applicant has completed an approved CAAM Part 147 training course relevant to the subcategory.

To From	A1	A2	A3	A4	B1.1	B1.2	B1.3	B1.4	B2
A1		6 months	6 months	6 months	2 years	6 months	2 years	1 year	2 years
A2	6 months		6 months	6 months	2 years	6 months	2 years	1 year	2 years
A3	6 months	6 months		6 months	2 years	1 year	2 years	6 months	2 years
A4	6 months	6 months	6 months		2 years	1 year	2 years	6 months	2 years
B1.1	N/A	6 months	6 months	6 months		6 months	1 year	6 months	1 year
B1.2	6 months	N/A	6 months	6 months	2 years		2 years	6 months	2 years
B1.3	6 months	6 months	N/A	6 months	6 months	6 months		6 months	1 year
B1.4	6 months	6 months	6 months	N/A	2 years	6 months	2 years		2 years
B2	6 months	6 months	6 months	6 months	1 year	1 year	1 year	1 year	

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5.5 Appendix 5 - CAAM Part 66 AML limitations

1.0 The following table is a list of limitation descriptions. The Limitation Number to be reflected in CAAM Part 66 AML are listed in, but not limited to, the following table.

Limitation No.	Limitation Descriptions
1	Excluding electrical power generation & distribution systems.
2	Excluding instrument systems, INS/IRS and Flight Directors systems.
3	Excluding autopilot systems on aeroplanes.
4	Excluding autopilot systems on helicopters
5	Excluding radio communication/navigation and radar systems
6	Excluding radio radar systems.
7	Excluding unpressurised aeroplanes
8	Reserved.
9	Excluding all pressurised aeroplanes.
10	Excluding propellers.
11	Excluding pressurised aeroplanes above 5700 Kg MTOM.
12	Excluding piston engines.
13	Excluding navigational and electronic instrument systems, FDR, GPWS and vibration monitoring systems.
14	Excluding turbine engines.
15	Excluding maintenance tasks on Wooden Structures and Fabric Coverings.
16	Excluding compass compensation and adjustment
17	Excluding electrical power and lights (helicopter)

2.0 Removal of limitation

2.1 The following table describes the additional modules to be examined before eligibility for removal of limitation annotate on CAAM Part 66 AML.

Limitation No.	Modules required
1	Modules 3, 4, and 7
2	Modules 5, 13 and 14.
3	Modules 5 and 13
4	Modules 5, 8 and 13.
5	Modules 5 and 13.
6	Modules 5, 8 and 13.
7	Modules 7 and 11.
8	Reserved
9	Modules 6, 7 and 11.
10	Module 17.
11	Modules 6, 7, 8 and 11.
12	Modules 16 and 17.
13	Modules 5, 8, 13 and 14
14	Module 15.
15	Module 6.
16	Modules 5, 8 and 13.
17	Module 12

3.0 Conversion table

3.1 CAAM Part 66 Category B1.1 with limitation number.

No.	CAAM Part 66 AML Limitation	CAAM Part 66 Modules and/ or Part-Modules Required							
		3	4	5	6	7	11	15	17
1	1, 7, 10, 14	√	√	√	-	√	√	√	√
2	1, 9	√	√	√	√	√	√	-	-
3	1, 9, 10	√	√	√	√	√	√	-	√
4	1, 7	√	√	√	-	√	√	-	-
5	1, 7, 10	√	√	√	-	√	√	-	√

3.2 CAAM Part 66 Category B1.2 with limitation number.

No.	CAAM Part 66 AML Limitation	CAAM Part 66 Modules and/ or Part-Modules Required							
		3	4	5	6	7	11	16	17
1	1, 9, 10, 12	√	√	√	-	√	√	√	√
2	1, 9, 10, 12, 15	√	√	√	√	√	√	√	√
3	1, 9, 10, 12, 15	√	√	√	√	√	√	√	√
4	1, 7, 9, 15	√	√	√	√	-	√	-	-
5	1, 7, 9, 15	√	√	√	√	-	√	-	-
6	1, 9, 12	√	√	√	-	√	√	-	-

3.3 CAAM Part 66 Category B1.3 with limitation number.

No.	CAAM Part 66 AML Limitation	CAAM Part 66 Modules and/ or Part-Modules Required					
		3	4	5	6	7	12
1	1, 17	√	√	√	√	√	√

3.4 CAAM Part 66 Category B1.4 with limitation number.

No.	CAAM Part 66 AML Limitation	CAAM Part 66 Modules and/ or Part-Modules Required					
		3	4	5	6	7	12
1	1, 17	√	√	√	√	√	√

3.5 CAAM Part 66 Category B2 with limitation number.

No.	CAAM Part66 AML Limitation	CAAM Part 66 Modules and/ or Part-Modules Required					
		4	5	8	12	13	14
1	2, 3, 4, 5, 13, 16	-	√	√	-	√	√
2	1, 3, 4, 5, 13, 16	-	-	√	-	√	√
3	1, 2, 3, 4, 6, 13, 16	-	-	-	-	√	√
4	1, 2, 3, 4, 13, 16	-	-	-	-	√	√

5	1, 2, 3, 4, 5, 13, 16	-	√	√	--	√	√
6	1, 4, 5, 16	-	-	-	-	√	√
7	1, 2, 4, 5, 13, 16	-	-	-	-	√	√
8	1, 2, 3, 5, 13, 16	-	-	-	√	-	√
9	1, 3, 4, 5, 13, 16		√	√	-	√	√
10	1, 2, 3, 4, 5, 13	√	√	√	-	√	√

4.0 Maintenance experience and assessment

4.1 The maintenance experience and practical assessment for the purpose of removal of limitations on basic categories as required by paragraph 3.2.7 of this CAD are related to the limitations as describe in the conversion table paragraph 3.0 of this Appendix.

4.2 Demonstration of maintenance experience are typically 6 months relevant to the modules and ATA chapters on limitation to be lifted covering elements of maintenance, inspections and routine work according to the maintenance manual and other relevant instructions and tasks as appropriate for the aircraft, for example troubleshooting, repairs, servicing, adjustments, replacements, rigging and functional checks, unless otherwise agreed by CAAM.