EUROPEAN MILITARY AIRWORTHINESS REQUIREMENT

EMAR 66

MILITARY AIRCRAFT MAINTENANCE LICENSING

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NOTE:

This EMAR relies on definitions laid down in EMAD 1.

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SECTION A

TECHNICAL REQUIREMENTS

66.A.1 Scope

This section defines the Military Aircraft Maintenance Licence (MAML) and establishes the requirements for application, issue and continuation of its validity.

66.A.3 MAML categories

(a) Military Aircraft Maintenance Licences include the following categories:

— Category A

— Category B1

— Category B2

— Category C

(b) Categories A and B1 are subdivided into subcategories relative to combinations of aeroplanes, helicopters, turbine and piston engines. These subcategories are:

— A1 and B1.1 Aeroplanes Turbine

— A2 and B1.2 Aeroplanes Piston

— A3 and B1.3 Helicopters Turbine

— A4 and B1.4 Helicopters Piston

(c) NOT APPLICABLE.

66.A.5 Aircraft groups

All military aircraft shall be considered as complex motor-powered aircraft.

66.A.10 Application

(a) An application for a MAML or change to such a licence shall be made on an EMAR Form 19 (see Appendix V) in a manner established by the NMAA and submitted thereto.

(b) NOT APPLICABLE.

(c) In addition to the documents required in EMAR 66.A.10(a) and EMAR 66.B.105, as appropriate, the applicant for additional basic categories or subcategories to a MAML shall submit his/her current MAML to the NMAA together with the EMAR Form 19.

(d) NOT APPLICABLE.

(e) NOT APPLICABLE.

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

66.A.15 Eligibility

An applicant for a MAML shall be at least 18 years of age.

66.A.20 Privileges

(a) The following privileges shall apply:

1. A Category A MAML permits the holder to issue certificates of release to service following minor scheduled line maintenance and simple defect rectification within the limits of tasks specifically endorsed on the certification authorisation referred to in EMAR 145.A.35. The certification privileges shall be restricted to work that the licence holder has personally performed in the EMAR 145 AMO that issued the certification authorisation.

2. A Category B1 MAML shall permit the holder to issue certificates of release to service and to act as B1 support staff for the following:

— maintenance performed on aircraft structure, powerplant, mechanical systems and electrical systems, and

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

Category B1 includes the corresponding A subcategory.

3. A Category B2 MAML shall permit the holder:

(i) to issue certificates of release to service and to act as B2 support staff for the following:

— maintenance performed on avionic and electrical systems, and

— electrical and avionics tasks within powerplant and mechanical systems, requiring only simple tests to prove their serviceability

(ii) to issue certificates of release to service following minor scheduled line maintenance and simple defect rectification within the limits of tasks specifically endorsed on the certification authorisation referred to in EMAR 145.A.35. This certification privilege shall be restricted to work that the MAML holder has personally performed in the AMO which issued the certification authorisation and limited to the Military Aircraft Type Ratings already endorsed in the B2 MAML.

Category B2 does not include any A subcategory.

4. NOT APPLICABLE.

5. A Category C MAML shall permit the holder to issue certificates of release to service for aircraft following base maintenance on aircraft. The privileges apply to the aircraft in its entirety.

6. Categories A, B1 and B2 MAMLs can have extensions (EMAR 66.A.52) to address one or more of the military-specific topics included in Appendix I (Modules 50 - 55). These shall permit the holder to issue certificates of release to service and act as support staff appropriate to the basic knowledge gained from all modules and as approved by the NMAA for maintenance performed on armament, rescue and escape systems and other military-specific systems.

(b) The holder of a MAML shall not exercise its privileges unless[1]:

1. in compliance with the applicable requirements of EMAR M and EMAR 145; and

2. in the preceding 2-year period he/she has, either had 6 months of maintenance experience in accordance with the privileges granted by the MAML or, met the provision for the issue of the appropriate privileges; and

3. he/she has the adequate competence to certify maintenance on the corresponding aircraft; and

4. he/she is able to read, write and communicate to an understandable level in the language(s) in which the technical documentation and procedures necessary to support the issue of the certificate of release to service are written.

66.A.25 Basic knowledge requirements

(a) An applicant for a MAML, the extension to a MAML or the addition of a category or subcategory to such a MAML, shall demonstrate by examination a level of knowledge

[1] The holder of a Category A MAML may only exercise certification privileges on a specific aircraft type following the satisfactory completion of the relevant Category A aircraft task training carried out by an organisation appropriately approved in accordance with EMAR 145 or EMAR 147. This training shall include practical hands-on training and theoretical training as appropriate for each task authorised. Satisfactory completion of training shall be demonstrated by an examination or by workplace assessment carried out by the EMAR 145 AMO or EMAR 147 MTO.

The holder of a Category B2 MAML may only exercise the certification privileges described in EMAR 66.A.20(a)(3)(ii) following the satisfactory completion of:

(i) the relevant Category A aircraft task training; and

(ii) 6 months of documented practical experience covering the scope of the authorisation that will be issued.

The task training shall include practical hands-on training and theoretical training as appropriate for each task authorised. Satisfactory completion of training shall be demonstrated by an examination or by workplace assessment. Task training and examination/assessment shall be carried out by the EMAR 145 AMO issuing the certifying staff authorization or EMAR 147 MTO. The practical experience shall be obtained within the same EMAR 145 AMO.

in the appropriate subject modules in accordance with Appendix I. The examination shall be conducted either by an MTO appropriately approved in accordance with EMAR 147 or by the NMAA.

(b) The training courses and examinations shall be passed within 10 years prior to the application for a MAML, the extension to a MAML or the addition of a category or subcategory to such a MAML. Should this not be the case, examination credits may however be obtained in accordance with point (c).

(c) The applicant may apply to the NMAA for full or partial examination credit to the basic knowledge requirements for:

1. basic knowledge examinations that do not meet the requirement described in point (b) above; and

2. any other technical qualification considered by the NMAA to be equivalent to the knowledge standard of this EMAR. If the applicant holds an EASA Part 66 licence, the NMAA may accept the EASA licence as a basis, only requiring additional training to cover the differences between the EASA licence and the MAML requirements.

Credits shall be granted in accordance with Subpart E of Section B of this EMAR.

(d) Credits expire 10 years after they were granted to the applicant by the NMAA. The applicant may apply for new credits after expiration.

(e) Modules 50-55 shall be used to provide extensions to a MAML for military-specific systems. Module 53 includes sub-modules that can also be used to provide extensions to a MAML for military-specific systems.

66.A.30 Basic experience requirements

(a) An applicant for a MAML shall have acquired:

1A. for Category A:

(i) 3 years of practical maintenance experience on operating military aircraft, if the applicant has no previous relevant technical training; or

(ii) 2 years of practical maintenance experience on operating military aircraft and completion of training considered relevant by the NMAA as a skilled worker, in a technical trade; or

(iii) 6 months of practical maintenance experience on operating military aircraft and completion of a basic training course providing the minimum practical training (as detailed in Column 4 of EMAR 147 Appendix I) approved in accordance with EMAR 147; or

(iv) 1 years of practical maintenance experience on operating military aircraft and completion of a basic training course that does not provide the recommended minimum practical training (as defined in Column 4 of EMAR 147 Appendix I) approved in accordance with EMAR-147.

1B. for Subcategories B1.2 and B1.4:

(i) 3 years of practical maintenance experience on operating military aircraft, if the applicant has no previous relevant technical training; or

(ii) 2 years of practical maintenance experience on operating military aircraft and completion of training considered relevant by the NMAA as a skilled worker, in a technical trade; or

(iii) 1 year of practical maintenance experience on operating military aircraft and completion of a basic training course providing the minimum practical training (as detailed in Column 4 of EMAR 147 Appendix I) approved in accordance with EMAR 147; or

(iv) 2 years of practical maintenance experience on operating military aircraft and completion of a basic training course that does not provide the recommended minimum practical training (as defined in Column 4 of EMAR 147 Appendix I) approved in accordance with EMAR-147.

The 2 years of practical maintenance experience can be reduced by the duration of the practical training given during the basic training course with a maximum reduction of 1 year. (Note: as a reference 20 hours of practical training will be considered as being equivalent to a duration of 1 week.)

2. for Categories B2 and Subcategories B1.1 and B1.3:

(i) 5 years of practical maintenance experience on operating military aircraft if the applicant has no previous relevant technical training; or

(ii) 3 years of practical maintenance experience on operating military aircraft and completion of training considered relevant by the NMAA as a skilled worker, in a technical trade; or

(iii) 2 years of practical maintenance experience on operating military aircraft and completion of a basic training course providing the minimum practical training (as detailed in Column 4 of EMAR 147 Appendix I) approved in accordance with EMAR 147; or

(iv) 3 years of practical maintenance experience on operating military aircraft and completion of a basic training course that does not provide the recommended minimum practical training (as defined in Column 4 of EMAR 147 Appendix I) approved in accordance with EMAR 147.

The 3 years of practical maintenance experience can be reduced by the duration of the practical training given during the basic training course with a maximum reduction of 1 year. (Note: as a reference 20 hours of practical training will be considered as being equivalent to a duration of 1 week.)

3. for Category C:

(i) 3 years of experience exercising Category B1.1, B1.3 or B2 privileges or as support staff according to EMAR 145.A.35, or a combination of both; or

(ii) 5 years of experience exercising Category B1.2 or B1.4 privileges or as support staff according to EMAR 145.A.35, or a combination of both.

4. NOT APPLICABLE.

5. for Category C obtained through the academic route: an applicant holding an academic degree in a technical discipline, from a university or other higher educational institution, recognised by the NMAA, plus:

(i) 3 years of experience working in a military aircraft maintenance environment on a representative selection of tasks directly associated with military aircraft maintenance including 6 months of observation of base maintenance tasks; or

(ii) experience as detailed by the NMAA but not less than 6 months of observation of base maintenance tasks.

(b) An applicant for an additional category or subcategory to a MAML shall have a minimum aircraft maintenance experience requirement appropriate to the additional category or subcategory of MAML applied for as defined in Appendix IV of this EMAR.

(c) The experience shall be practical and involve a representative cross section of maintenance tasks on aircraft.

(d) At least 1 year of the required experience shall be recent maintenance experience on aircraft of the category/subcategory for which the initial MAML is sought. For subsequent category/subcategory additions to an existing MAML, 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 MAML category/subcategory held and applied for. Such additional experience shall be typical of the new MAML category/subcategory sought.

(e) Notwithstanding paragraph (a), aircraft maintenance experience gained outside a military aircraft maintenance environment may be accepted when such maintenance is equivalent to that required by this EMAR as established by the NMAA. Additional experience of military aircraft maintenance shall, however, be required to ensure adequate understanding of the military aircraft maintenance environment.

(f) Experience shall have been acquired within the 10 years preceding the application for a MAML or the addition of a category or subcategory to such a MAML.

66.A.40 Continued validity of the Military Aircraft Maintenance Licence

(a) The MAML shall be issued for an unlimited duration. It shall remain valid subject to the holder remaining in compliance with the requirements in this EMAR and the MAML not being suspended, surrendered or revoked.

(b) Upon suspension, surrendering or revocation the MAML shall be returned to the NMAA.

(c) Any certification privilege based upon a MAML becomes invalid as soon as the MAML is invalid.

(d) The MAML is only valid:

(1) when issued and/or changed by the NMAA; and

(2) when the holder has signed the document.

(e) If the MAML holder's name, service number or state ID number change, the MAML shall be resubmitted to the NMAA within 30 days.

66.A.45 Military Aircraft Type Ratings

(a) In order to be entitled to exercise certification privileges on a specific aircraft type, the holder of a MAML shall have his/her MAML endorsed with the relevant Military Aircraft Type Ratings, following satisfactory completion of the relevant Military Aircraft Type Training within an EMAR 147 approved MTO.

For Category A, no Military Aircraft Type Rating is required, subject to compliance with the task training requirements of EMAR 145.A.35.

(b) The issuing of a Military Aircraft Type Rating requires the satisfactory completion of the relevant Category B1, B2 or C Military Aircraft Type Training. Where relevant, the NMAA may accept an appropriate EASA aircraft type rating as evidence of having undertaken a partial or full equivalent to Military Aircraft Type Training.

(c) In addition to the requirement of point (b), the issuing of the first Military Aircraft Type Rating within a given category/sub-category requires satisfactory completion of the corresponding On the Job Training, as described in Appendix III to EMAR 66. Any subsequent Military Aircraft Type Rating within a given category/sub-category may require further On the Job Training as defined by the NMAA.

(d) NOT APPLICABLE.

(e) NOT APPLICABLE.

(f) NOT APPLICABLE.

(g) NOT APPLICABLE.

66.A.50 Limitations

(a) Limitations introduced on a MAML are exclusions from the certification privileges. If a new Military Aircraft Type Rating is gained, the MAML limitation(s) shall continue to apply to the new Military Aircraft Type Rating.

(b) NOT APPLICABLE.

(c) Any limitation shall be removed upon satisfactory completion of the relevant requirements of EMAR 66 or as defined in the applicable conversion report referred to in EMAR 66.B.300.

66.A.52 Extensions

Extensions introduced on a MAML may allow additional certification privileges.

66.A.55 Evidence of qualification

Personnel exercising certification privileges as well as support staff shall produce their MAML, as evidence of qualification, within 72 hours upon request by an official of the NMAA.

66.A.70 Conversion provisions

The holder of a licence or other qualification for the maintenance of aircraft gained prior to, or an individual undergoing a process to gain such a licence or other qualification prior to, a date established in national regulation shall follow the procedures for conversion into a MAML established by the NMAA according to EMAR 66 Section B Subpart D.

(a) NOT APPLICABLE.

(b) NOT APPLICABLE.

(c) NOT APPLICABLE.

(d) NOT APPLICABLE.

SECTION B

PROCEDURES FOR NATIONAL MILITARY AIRWORTHINESS AUTHORITIES

SUBPART A - GENERAL

66.B.1 Scope

This section establishes the procedures including the administrative requirements to be followed by the NMAA in charge of the implementation and the enforcement of Section A of EMAR 66.

66.B.10 National Military Airworthiness Authority

(a) General

The pMS shall designate their NMAA with allocated responsibilities for the issuance, continuation, change, suspension or revocation of MAMLs.

This NMAA shall establish an adequate organisational structure to ensure compliance with EMAR 66.

(b) Resources

The NMAA shall be appropriately staffed to ensure the implementation of the requirements of EMAR 66.

(c) Procedures

The NMAA shall establish documented procedures detailing how compliance with EMAR 66 is accomplished. These procedures shall be reviewed and amended to ensure continued compliance.

66.B.15 Delegation of licensing activities to another organisation

(a) The NMAA may delegate licensing activities to a suitable alternative entity to act on its behalf.

(b) Such an entity may carry out all the functions as described in this Section on behalf of the NMAA, subject to adequate assurance and oversight by the NMAA.

(c) The NMAA remains responsible for assuring that all the requirements of this Section are met.

66.B.20 Record-keeping

(a) The NMAA shall establish a system of record-keeping that allows adequate traceability of the process to issue, change, suspend or revoke each MAML.

(b) These records shall include for each MAML:

1. the application for a MAML or change to that MAML, including all supporting documentation;

2. a copy of the MAML including any changes;

3. copies of all relevant correspondence;

4. details of any exemption and enforcement actions;

5. any relevant report from other NMAAs or authorities relating to the MAML holder;

6. the records of examinations conducted by the NMAA;

7. the applicable conversion report used for conversion;

8. the applicable credit report used for crediting.

(c) NOT APPLICABLE.

(d) Records referred to in points 1 through 8 of point (b) shall be kept for a minimum period of 50 years.

66.B.25 Mutual exchange of information

Mutual exchange of information shall follow the provisions of EMAD R.

(a) NOT APPLICABLE.

(b) NOT APPLICABLE.

66.B.30 Exemptions

All exemptions granted by the NMAA shall be recorded and retained by the NMAA.

SUBPART B - ISSUE OF A MILITARY AIRCRAFT MAINTENANCE LICENCE

This Subpart provides the procedures to be followed by the NMAA to issue or change a MAML.

66.B.100 Procedure for the issue of a MAML by the NMAA

(a) On receipt of an EMAR Form 19 and any supporting documentation, the NMAA shall verify it for completeness and ensure that the experience claimed meets the requirement of EMAR 66.

(b) The NMAA shall verify an applicant's examination status and/or confirm the validity of any credits to ensure that all required modules of Appendix I have been met as required by EMAR 66.

(c) When having verified the identity and date of birth of the applicant and being satisfied that the applicant meets the standards of knowledge and experience required by EMAR 66, the NMAA shall issue the relevant MAML to the applicant. The same information shall be kept on NMAA records.

(d) In the case where aircraft types are endorsed at the time of the issuance of the first MAML, the NMAA shall verify compliance with EMAR 66.B.115.

66.B.105 Preparation for the issue of a MAML via a Maintenance Organisation approved in accordance with EMAR 145

(a) A Maintenance Organisation approved in accordance with EMAR 145, when authorised to carry out this activity by the NMAA, may

(1) prepare the MAML on behalf of the NMAA; or

(2) make recommendations to the NMAA regarding the application from an individual for a MAML so that the NMAA may prepare and issue such MAML.

(b) Maintenance Organisations referred to in point (a) shall ensure compliance with EMAR 66.B.100 (a) and (b).

(c) In all cases, the MAML can only be issued to the applicant by the NMAA.

66.B.110 Procedure for the change of a MAML to include an additional basic category or subcategory

(a) At the completion of the procedures specified in EMAR 66.B.100 or EMAR 66.B.105, the NMAA shall endorse the additional basic category or subcategory by stamp and signature or reissue the licence.

(b) The NMAA record system shall be changed accordingly.

66.B.115 Procedure for the change of a MAML to include a Military Aircraft Type Rating or to remove limitations

(a) On receipt of a satisfactory EMAR Form 19 and any supporting documentation demonstrating compliance with the requirements of the applicable Military Aircraft Type Rating together with the accompanying MAML, the NMAA shall either:

1. endorse the applicant's MAML with the applicable Military Aircraft Type Rating; or

2. reissue the MAML to include the applicable Military Aircraft Type Rating; or

3. remove the applicable limitations in accordance with EMAR 66.A.50.

The NMAA's corresponding records shall be changed accordingly.

(b) NOT APPLICABLE.

(c) NOT APPLICABLE.

(d) In the case where the Military Aircraft Type Training is not covered by a single course, the NMAA shall be satisfied prior to the Military Aircraft Type Rating endorsement that the content and length of the courses fully satisfy the scope of the MAML category and that the interface areas have been appropriately addressed.

(e) In the case of differences training, the NMAA shall be satisfied that the applicant's previous qualification, supplemented by a course approved in accordance with EMAR 147, is acceptable for Military Aircraft Type Rating endorsement.

(f) Compliance with the practical elements shall be demonstrated by the provision of detailed practical training records or a logbook provided by an EMAR 145 AMO or, where available, by a training certificate covering the practical training element issued by an EMAR 147 MTO.

(g) Military Aircraft Type Rating endorsement shall use the Military Aircraft Type Ratings specified by the NMAA. The NMAA shall provide details of all the aircraft types/variants that are covered by each Military Aircraft Type Rating.

66.B.116 Procedure for the change of a MAML to include extensions

(a) When granting an extension, the NMAA shall ensure that the extension on a MAML results in a level of safety equal to that of the full MAML category. In particular, the NMAA shall define and document which education and training is required for any extension.

(b) On receipt of a satisfactory EMAR Form 19 and any supporting documentation, the NMAA shall endorse the extension by stamp and signature or reissue the licence.

(c) The NMAA record system shall be changed accordingly.

66.B.120 Procedure for the renewal of a MAML validity

NOT APPLICABLE.

66.B.125 Procedure for the conversion of MAMLs including group ratings

NOT APPLICABLE.

66.B.130 Procedure for the direct approval of Military Aircraft Type Training

The NMAA may accept Military Aircraft Type Training conducted by a Maintenance Training Organisation approved in accordance with EASA Part 147, following comparison of relevant syllabi against EMAR 66 App III knowledge requirements.

SUBPART C – EXAMINATIONS

This Subpart provides the procedures to be followed for the conduct of examinations.

66.B.200 Examination Standard

(a) All examination questions shall be kept in a secure manner prior to an examination, to ensure that candidates will not know which particular questions will form the basis of the examination.

(b) The NMAA shall nominate:

1. persons who control the questions to be used for each examination;

2. examiners who shall be present during all examinations to ensure the integrity of the examination.

(c) Basic examinations shall follow the standard specified in Appendix I and II.

(d) Military Aircraft Type Training examinations shall follow the standard specified in Appendix III.

(e) New essay questions shall be raised at least every 6 months and questions already used withdrawn or rested from use. A record of the questions used shall be retained in the records for reference.

(f) All examination papers shall be handed out at the start of the examination to the candidate and handed back to the examiner at the end of the allotted examination time period. No examination paper may be removed from the examination room during the allotted examination time period.

(g) Only the examination paper may be available to the candidate during the examination.

(h) Examination candidates shall be separated from each other so that they cannot read each other's examination papers. They may not speak to any person other than the examiner.

(i) Candidates who are proven to be cheating shall be banned from taking any further examination within 12 months of the date of the examination in which they were found cheating, unless the NMAA approves otherwise.

SUBPART D – CONVERSION OF LICENCES OR OTHER QUALIFICATIONS INTO A MILITARY AIRCRAFT MAINTENANCE LICENCE

This Subpart provides the procedures for the conversion of military certifying staff qualifications referred to in EMAR 66.A.70 into MAMLs.

66.B.300 General

(a) The NMAA may only convert its own national licences or other military qualifications, without prejudice to bilateral agreements, considered valid prior to the entry into national regulation of the applicable requirements of EMAR 66.

(b) The NMAA may only perform the conversion in accordance with a conversion report established pursuant to EMAR 66.B.305 or EMAR 66.B.310, as applicable.

(c) Conversion reports shall be either developed by the NMAA or approved by the NMAA to ensure compliance with EMAR 66.

(d) Conversion reports together with any change of these shall be kept on record by the NMAA in accordance with EMAR 66.B.20.

66.B.305 Conversion report for licences or other qualifications

(a) The conversion report for licences or other qualifications into a MAML shall describe the scope of each type of qualification, including the associated national licence, if any, the associated privileges and include a copy of the relevant national regulations defining these.

(b) The conversion report shall show for each type of qualification referred to in point (a):

1. to which MAML it will be converted; and

2. which limitations/extensions shall be added; and

3. the conditions to remove the limitations, specifying the Appendix I module/subjects on which examination is needed to remove the limitations and obtain a full MAML, or to include an additional (sub-) category. This shall include the modules defined in Appendix III not covered by the national qualification.

66.B.310 Conversion report for Approved Maintenance Organisations authorisations

This paragraph applies to the issuance of a MAML to maintenance personnel who hold an AMO authorisation allowing them to certify aircraft work but who do not hold a formal national qualification as described in EMAR 66.B.305.

(a) For each AMO concerned, the conversion report shall describe the scope of each type of authorisation issued and include a copy of the relevant AMO's procedures for the qualification and the authorisation of certifying staff on which the conversion process is based.

(b) The conversion report shall show for each type of qualification referred to in point (a):

1. to which MAML it will be converted; and

2. which limitations/extensions shall be added; and

3. the conditions to remove the limitations, specifying the Appendix I module/subjects on which examination is needed to remove the limitations and obtain a full MAML, or to include an additional (sub-) category. This shall include the modules defined in Appendix III not covered by the national qualification.

SUBPART E – EXAMINATION CREDITS

This Subpart provides the procedures for granting examination credits referred to in EMAR 66.A.25(c).

66.B.400 General

(a) The NMAA may only grant credit on the basis of a credit report prepared in accordance with EMAR 66.B.405.

(b) The credit report shall be either developed by the NMAA or approved by the NMAA to ensure compliance with EMAR 66.

(c) Credit reports together with any change of these shall be dated and kept on record by the NMAA in accordance with EMAR 66.B.20.

66.B.405 Examination credit report

(a) The credit report shall include a comparison between:

(1) the modules, sub-modules, subjects and knowledge levels contained in Appendix I, as applicable; and

(2) the syllabus of the technical qualification concerned relevant to the particular category being sought.

This comparison shall state if compliance is demonstrated and contain the justifications for each statement.

(b) Credit for examinations, other than basic knowledge examinations carried out in Maintenance Training Organisations approved in accordance with EMAR 147, can only be granted by the NMAA.

(c) No credit can be granted unless there is a statement of compliance against each module and sub-module, stating where, in the technical qualification, the equivalent standard can be found.

(d) The NMAA shall check on a regular basis if changes to the credit report are required due to changes to the national qualification standard or Appendix I. Such changes shall be documented, dated and recorded.

66.B.410 Examination credit validity

(a) The NMAA shall notify the applicant in writing of any credits granted together with the reference to the credit report used.

(b) Credits shall expire 10 years after they are granted.

(c) Upon expiration of the credits, the applicant may apply for new credits. The NMAA shall continue the validity of the credits for an additional period of 10 years without further consideration if basic knowledge requirements defined in Appendix I have not been changed.

SUBPART F – CONTINUING OVERSIGHT

This Subpart describes the procedures for the continuing oversight of the MAML and in particular for the revocation, suspension or limitation of the MAML.

66.B.500 Revocation, suspension or limitation of the MAML

The NMAA shall suspend, limit or revoke the MAML where it has identified a safety issue or if it has clear evidence that the person has carried out or been involved in one or more of the following activities:

(a) obtaining the MAML and/or the certification privileges by falsification of documentary evidence;

(b) failing to carry out requested maintenance combined with failure to report such fact to the organisation or person who requested the maintenance;

(c) failing to carry out required maintenance resulting from own inspection combined with failure to report such fact to the organisation for which the maintenance was intended to be carried out;

(d) negligent maintenance;

(e) falsification of the maintenance record;

(f) issuing a certificate of release to service for aircraft / components knowing that the maintenance specified on the certificate of release to service for aircraft / components has not been carried out or without verifying that such maintenance has been carried out;

(g) carrying out maintenance or issuing a certificate of release to service for aircraft / components when adversely affected by alcohol or drugs;

(h) issuing a certificate of release to service for aircraft / components while not in compliance with EMAR M, EMAR145 or EMAR 66.

Appendix I - Basic Knowledge Requirements

1. Knowledge levels for Category A, B1, B2 and C Military Aircraft Maintenance Licence

Basic knowledge for Categories A, B1 and B2 are indicated by knowledge levels (1, 2 or 3) against each applicable subject. Except for the Category C obtained by the academic route (EMAR 66.A.30(a)5 refers), Category C applicants shall meet either the Category B1 or the Category B2 basic knowledge levels.

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

- *LEVEL 1: A familiarisation with the principal elements of the subject.*

Objectives:

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

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

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

- *LEVEL 2: A general knowledge of the theoretical and practical aspects of the subject and an ability to apply that knowledge.*

Objectives:

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

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

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

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

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

- *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:

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

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

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

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

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

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

2. Modularisation

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

Subject module	A or B1 aeroplane with:		A or B1 helicopter with:		B2
	Turbine engine(s)	Piston engine(s)	Turbine engine(s)	Piston engine(s)	Avionics
1 Mathematics	X	X	X	X	X
2 Physics	X	X	X	X	X
3 Electrical Fundamentals	X	X	X	X	X
4 Electronic Fundamentals	X	X	X	X	X
5 Digital Techniques/Electronic Instrument Systems	X	X	X	X	X
6 Materials and Hardware	X	X	X	X	X
7 Maintenance Practices	X	X	X	X	X
8 Basic Aerodynamics	X	X	X	X	X
9 Human Factors	X	X	X	X	X
10 Aviation Legislation	X	X	X	X	X

11a Turbine Aeroplane Aerodynamics, Structures and Systems	X				
11b Piston Aeroplane Aerodynamics, Structures and Systems		X			
12 Helicopter Aerodynamics, Structures and Systems			X	X	
13 Aircraft Aerodynamics, Structures and Systems					X
14 Propulsion					X
15 Gas Turbine Engine	X		X		
16 Piston Engine		X		X	
17 Propeller	X	X			
50 Essential Principles of Armament	*	*	*	*	*
51 Weapon Stores System	*	*	*	*	*
52 Operational Attack Systems	*	*	*	*	*
53 Surveillance and Electronic Warfare	*	*	*	*	*
54 Crew Safety	*	*	*	*	*
55 Military Communication Systems					*

* - see EMAR 66.A.25(e) for qualification requirements on Modules 50-55 (military-specific systems)

MODULE 1. MATHEMATICS

	Level		
	A	B1	B2
1.1 Arithmetic Arithmetical terms and signs, methods of multiplication and division, fractions and decimals, factors and multiples, weights, measures and conversion factors, ratio and proportion, averages and percentages, areas and volumes, squares, cubes, square and cube roots.	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

	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	1
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	1
2.2.3 Dynamics (a) Mass; Force, inertia, work, power, energy (potential, kinetic and total energy), heat, efficiency;	1	2	1

	Level		
	A	B1	B2
(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 effect.	1	2	1
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 volume and constant pressure, work done by expanding gas; Isothermal, adiabatic expansion and compression, engine cycles, constant volume and constant pressure, refrigerators and heat pumps; Latent heats of fusion and evaporation, thermal energy, heat of combustion.	-	2	2
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

	Level		
	A	B1	B2
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

	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, Li-ion 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

	Level		
	A	B1	B2
3.6 DC Circuits Ohms Law, Kirchoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage and current; Significance of the internal resistance of a supply.	1	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; Variable resistors, thermistors, voltage dependent resistors; Construction of potentiometers and rheostats; Construction of Wheatstone Bridge.	-	1	1
3.8 Power Power, work and energy (kinetic and potential); Dissipation of power by a resistor; Power formula; Calculations involving power, work and energy.	-	2	2

	Level		
	A	B1	B2
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

	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

	Level		
	A	B1	B2
3.13 AC Theory Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power; Triangular/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.	-	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
3.16 Filters Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.	-	1	1

	Level		
	A	B1	B2
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

	Level		
	A	B1	B2
4.1 Semiconductors *4.1.1 Diodes* (a) Diode symbols; Diode characteristics and properties; Diodes in series and parallel; Main characteristics and use of silicon controlled rectifiers (thyristors), light emitting diode, photo conductive diode, varistor, rectifier diodes; Functional testing of diodes;	-	2	2
(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 and 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

	Level		
	A	B1	B2
4.1.2 Transistors (a) Transistor symbols; Component description and orientation; Transistor characteristics and properties;	-	1	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 and stabilisation; Multistage circuit principles: cascades, push-pull, oscillators, multivibrators, flip-flop circuits.	-	-	2
4.1.3 Integrated Circuits (a) Description and operation of logic circuits and linear circuits/operational amplifiers;	-	1	-
(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
4.2 Printed Circuit Boards Description and use of printed circuit boards.	-	1	2

	Level		
	A	B1	B2
4.3 Servomechanisms (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	-
(b) Understanding of the following terms: Open and 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

MODULE 5. DIGITAL TECHNIQUES/ELECTRONIC INSTRUMENT SYSTEMS

	Level		
	A	B1	B2
5.1 Electronic Instrument Systems Typical systems arrangements and cockpit layout of electronic instrument systems.	1	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

	Level		
	A	B1	B2
5.6 Basic Computer Structure (a) Computer terminology (including bit, byte, software, hardware, CPU, IC, and various memory devices such as RAM, ROM, PROM); Computer technology (as applied in aircraft systems);	1	2	-
(b) Computer related terminology; Operation, layout and interface of the major components in a micro-computer including their associated bus systems; Information contained in single and multi-address 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
5.9 Multiplexing Operation, application and identification in logic diagrams of multiplexers and demultiplexers.	-	-	2

	Level		
	A	B1	B2
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	2
5.11 Electronic Displays Principles of operation of common types of displays used in modern aircraft, including Cathode Ray Tubes, Light Emitting Diodes and 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
5.13 Software Management Control Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes.	-	2	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

	Level		
	A	B1	B2
5.15 Typical Electronic/Digital Aircraft Systems			
General arrangement of typical electronic/digital aircraft systems and associated BITE (Built In Test Equipment) such as:			
ACARS-ARINC Communication and Addressing and Reporting System			
EICAS-Engine Indication and Crew Alerting System			
FBW-Fly-by-Wire			
FMS-Flight Management System			
IRS-Inertial Reference System	-	2	2
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 Systems.			

MODULE 6. MATERIALS AND HARDWARE

	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 and types of wood and glue used in aeroplanes; Preservation and maintenance of wooden structure; Types of defects in wood material and wooden structures; The detection of defects in wooden structure; Repair of wooden structure.	-	-	-

	Level		
	A	B1	B2
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.	-	-	-
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 and tolerances for standard threads used in aircraft; Measuring screw threads.	2	2	2
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

	Level		
	A	B1	B2
6.5.4 Aircraft rivets Types of solid and blind rivets: specifications and 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.	1	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

	Level		
	A	B1	B2
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

	Level		
	A	B1	B2
7.1 Safety Precautions-Aircraft and Workshop Aspects of safe 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

	Level		
	A	B1	B2
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; Specification S1000D; 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

	Level		
	A	B1	B2
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 and damage tolerance; Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding; EWIS installations, inspection, repair, maintenance and cleanliness standards.	1	3	3
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	-

	Level		
	A	B1	B2
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	-

	Level		
	A	B1	B2
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	-
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	-

	Level		
	A	B1	B2
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
7.21 Armament Safety Safety principles and elements with armed aircraft, ammunitions; Safety aspects of canopy, ejection seat and other pyrotechnic devices.	2	2	2

MODULE 8. BASIC AERODYNAMICS

	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

	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.	1	2	2
9.2 Human Performance and Limitations Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access.	1	2	2
9.3 Social Psychology Responsibility: individual and group; Motivation and de-motivation; Peer pressure; "Culture" issues; Team working; Management, supervision and leadership; Military environment and other military factors.	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, shiftwork; Alcohol, medication, drug abuse.	2	2	2

	Level		
	A	B1	B2
9.5 Physical Environment Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Military Working environments.	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.	1	2	2
9.9 Hazards in the Workplace Recognising and avoiding hazards; Dealing with emergencies.	2	2	2

MODULE 10. AVIATION LEGISLATION

	Level		
	A	B1	B2
10.1 Regulatory Framework Military/State Organisation: Role of the National Military Airworthiness Authority; Introduction to the national military airworthiness regulations.	1	1	1
10.2 Certifying Staff — Maintenance Understanding of MAML and Certifying staff regulation.	2	2	2
10.3 Approved Maintenance Organisations Understanding of EMAR 145.	2	2	2
10.4 Air operations Operating Authority's responsibilities, in particular regarding continuing airworthiness and maintenance; Aircraft Maintenance Programme; MEL/CDL or National equivalent; Documents to be carried on board; Aircraft placarding (markings).	1	2	2
10.5 Certification of aircraft, parts and appliances (a) General; General understanding of EMAR 21 and airworthiness codes/criteria;	-	1	1
(b) Documents; Military Type-Certificates; Military Restricted Type-Certificates; Military Supplemental Type-Certificates; Military Certificates Of Airworthiness; Military Restricted Certificates Of Airworthiness; Military Permit To Fly; National Certificate of Registration; Weight & Balance;	-	1	1
National Noise Certificate if required.	-	1	1

	Level		
	A	B1	B2
10.6 Continuing airworthiness Understanding of EMAR 21 provisions related to continuing airworthiness;	1	1	1
Understanding of EMAR M.	2	2	2
10.7 Applicable 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 and Dispatch Deviation Lists or National equivalent;	1	2	2
(b) Continuing airworthiness; Minimum equipment requirements — Test flights; Maintenance and dispatch requirements.	-	1	1

MODULE 11A. TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS

	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; Effects of external stores;	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; Effects of external stores.	1	2

	Level	
	A1	B1.1
11.2 Airframe Structures — General Concepts (a) Airworthiness requirements for structural strength/integrity; 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 (System 52/53/56)* Construction and pressurisation sealing; Wing, stabiliser, pylon and undercarriage attachments; Seat installation and cargo loading system; Doors and emergency exits: construction, mechanisms, operation and safety devices; Windows and windscreen construction and mechanisms; Canopy construction and mechanism;	1	2

	Level	
	A1	B1.1
11.3.2 Wings (System 57) Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments;	1	2
11.3.3 Stabilisers (System 55) Construction; Control surface attachment ;	1	2
11.3.4 Flight Control Surfaces (System 55/57) Construction and attachment; Balancing — mass and aerodynamic;	1	2
11.3.5 Nacelles/Pylons (System 54) Nacelles/Pylons: — Construction, — Firewalls, — Engine mounts.	1	2
11.4 Air Conditioning and Cabin Pressurisation (System 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

	Level	
	A1	B1.1
11.4.3 Pressurisation Pressurisation systems; Control and indication including control and safety valves; Cabin pressure controllers;	1	3
Canopy seal, anti-g system;	1	2
11.4.4 Safety and warning devices Protection and warning devices.	1	3
11.5 Instruments/Avionic Systems *11.5.1 Instrument Systems (System 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; Angle of attack indication, stall warning systems; Glass cockpit; Other aircraft system indication.	1	2
11.5.2 Avionic Systems Fundamentals of system lay-outs and operation of: — Auto Flight (System 22), — Communications (System 23), — Navigation Systems (System 34).	1	1

	Level	
	A1	B1.1
11.6 Electrical Power (System 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 (System 25) (a) Emergency equipment requirements; Seats, harnesses and belts;	2	2
(b) Cabin lay-out; Equipment lay-out; Cabin Furnishing installation; Cargo handling and retention equipment; Airstairs.	1	1
11.8 Fire Protection (System 26) (a) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests;	1	3
(b) Portable fire extinguisher.	1	1

	Level	
	A1	B1.1
11.9 Flight Controls (System 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 lock systems; Balancing and rigging; Stall protection/warning system.	1	3
11.10 Fuel Systems (System 28) System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defueling including Air to Air Refueling (AAR); Longitudinal balance fuel systems including during AAR.	1	3

	Level	
	A1	B1.1
11.11 Hydraulic Power (System 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Filters; Pressure Control; Power distribution; Indication and warning systems; Interface with other systems.	1	3
11.12 Ice and Rain Protection (System 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 (System 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

	Level	
	A1	B1.1
Drag-chute and Arresting hook/landing assistance equipment.	1	1
11.14 Lights (System 33) External: navigation, anti collision, landing, taxiing, ice, formation; Internal: cabin, cockpit, cargo, Night Vision Devices; Emergency.	2	3
11.15 Oxygen (System 35) System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings.	1	3
11.16 Pneumatic/Vacuum (System 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 (System 38) Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspects.	-	-

	Level	
	A1	B1.1
11.18 On Board Maintenance Systems (System 45) Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).	1	2
11.19 Integrated Modular Avionics (System 42) 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

	Level	
	A1	B1.1
11.20 Cabin Systems (System 44) The units and components which provide a means of communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). Includes voice, data, 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 Crew Panels. The Cabin Network Service typically consists of a server, typically interfacing with, among others, the Data/Radio Communication System; The Cabin Network Service may host functions such as access to pre-departure/departure reports; Cabin Core System; External Communication System; Cabin Monitoring System; Miscellaneous Cabin System.	1	2
11.21 Information Systems (System 46) The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. 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 System.	1	2

MODULE 11B. PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS

	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; Effects of external stores;	1	2
11.1.2. High Speed Flight – N/A	-	-

	Level	
	A2	B1.2
11.2 Airframe Structures — General Concepts (a) Airworthiness requirements for structural strength/integrity; 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 (System 52/53/56)* Construction and pressurisation sealing; Wing, tail-plane, pylon and undercarriage attachments; Seat installation; Doors and emergency exits: construction and operation; Windows and windscreen attachment; Canopy construction and mechanism.	1	2

	Level	
	A2	B1.2
11.3.2 Wings (System 57) Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.	1	2
11.3.3 Stabilisers (System 55) Construction; Control surface attachment.	1	2
11.3.4 Flight Control Surfaces (System 55/57) Construction and attachment; Balancing — mass and aerodynamic;	1	2
11.3.5 Nacelles/Pylons (System 54) Nacelles/Pylons: — Construction, — Firewalls, — Engine mounts.	1	2
11.4 Air Conditioning and Cabin Pressurisation (System 21) Pressurisation and air conditioning systems; Cabin pressure controllers, protection and warning devices; Heating systems**.**	1	3

	Level	
	A2	B1.2
11.5 Instruments/Avionic Systems *11.5.1 Instrument Systems (System 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; Angle of attack indication, stall warning systems; Glass cockpit; Other aircraft system indication.	1	2
11.5.2 Avionic Systems Fundamentals of system lay-outs and operation of: — Auto Flight (*System* 22), — Communications (*System* 23), — Navigation Systems (*System* 34).	1	1
11.6 Electrical Power (System 24) Batteries Installation and Operation; DC power generation; Voltage regulation; Power distribution; Circuit protection; Inverters, transformers.	1	3
11.7 Equipment and Furnishings (System 25) (a) Emergency equipment requirements; Seats, harnesses and belts;	2	2
(b) Cargo handling and retention equipment; Airstairs.	1	1

	Level	
	A2	B1.2
11.8 Fire Protection (System 26) (a) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests;	1	3
(b) Portable fire extinguisher.	1	3
11.9 Flight Controls (System 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 (System 28) System lay-out; Fuel tanks; Supply systems; Cross-feed and transfer; Indications and warnings; Refuelling and defueling.	1	3

	Level	
	A2	B1.2
11.11 Hydraulic Power (System 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical; Filters; Pressure Control; Power distribution; Indication and warning systems.	1	3
11.12 Ice and Rain Protection (System 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 (System 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 (System 33) External: navigation, anti collision, landing, taxiing, ice, formation; Internal: cabin, cockpit, cargo; Emergency.	2	3

	Level	
	A2	B1.2
11.15 Oxygen (System 35) System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings.	1	3
11.16 Pneumatic/Vacuum (System 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 (System 38) Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspects.	-	-

MODULE 12. HELICOPTER AERODYNAMICS, STRUCTURES AND SYSTEMS

	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

	Level	
	A3 A4	B1.3 B1.4
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 Transmission 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/integrity; 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

	Level	
	A3 A4	B1.3 B1.4
(b) Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning and anti-corrosive protection; Pylon, stabiliser and undercarriage attachments; Seat installation; Doors: construction, mechanisms, operation and safety devices; Windows and windscreen construction; Fuel storage; Firewalls; Engine mounts; Structure assembly techniques: riveting, bolting, bonding; Methods of surface protection, such as chromating, anodising, painting; Surface cleaning; Airframe symmetry: methods of alignment and symmetry checks.	1	2
12.6 Air Conditioning (System 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

	Level	
	A3 A4	B1.3 B1.4
12.7 Instruments/Avionic Systems *12.7.1 Instrument Systems (System 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 Fundamentals of system layouts and operation of: Auto Flight (System 22); Communications (System 23); Navigation Systems (System 34).	1	1
12.8 Electrical Power (System 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

	Level	
	A3 A4	B1.3 B1.4
12.9 Equipment and Furnishings (System 25) (a) Emergency equipment requirements; Seats, harnesses and belts; Lifting systems;	2	2
(b) Emergency flotation systems; Cargo handling and retention equipment.	1	1
12.10 Fire Protection (System 26) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	1	3
12.11 Fuel Systems (System 28) System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling.	1	3

	Level	
	A3 A4	B1.3 B1.4
12.12 Hydraulic Power (System 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Filters; Pressure Control; Power distribution; Indication and warning systems; Interface with other systems.	1	3
12.13 Ice and Rain Protection (System 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 (System 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, Tyres, brakes; Steering; Air-ground sensing; Skids, floats.	2	3

	Level	
	A3 A4	B1.3 B1.4
12.15 Lights (System 33) External: navigation, landing, taxiing, ice, formation; Internal: cabin, cockpit, cargo, Night Vision Devices' Lighting; Emergency.	2	3
12.16 Pneumatic/Vacuum (System 36) System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.	1	3
12.17 Integrated Modular Avionics (System 42) 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

	Level	
	A3 A4	B1.3 B1.4
12.18 On Board Maintenance Systems (System 45) Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).	1	2
12.19 Information Systems (System 46) The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. 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 System.	1	2

MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS

	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 (System 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 (System 23/34) (a) Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver and transmitter;	3

(b) Working principles of following systems: — Very High Frequency (VHF) communication, — High Frequency (HF) communication, — Audio, — Emergency Locator Transmitters (ELT), — Cockpit Voice Recorder (CVR), — Very High Frequency omnidirectional range (VOR), — Tactical air navigation system (TACAN), — Automatic Direction Finding (ADF), — Instrument Landing System (ILS), — Flight Director systems, Distance Measuring Equipment (DME), — Doppler navigation, — Area navigation, RNAV systems, — Flight Management Systems(FMS), — Global Positioning System (GPS), Global Navigation Satellite Systems (GNSS), GNSS Landing System (GLS), Transponder Landing System (TLS), — Inertial Navigation System (INS), — Air Traffic Control transponder, secondary surveillance radar, — Traffic Alert and Collision Avoidance System (TCAS), — Weather avoidance radar, — Radio altimeter, — Data-link communication and reporting;	3
— Microwave Landing System (MLS), — Very Low Frequency and hyperbolic navigation (VLF/Omega).	-

13.5 Electrical Power (System 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 (System 25) (a) Electronic emergency equipment requirements;	3
(b) Cabin entertainment equipment.	-
13.7 Flight Controls (System 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;	2
(b) System operation: electrical, fly-by-wire.	3

13.8 Instruments (System 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; Directional gyros; Ground Proximity Warning Systems/Terrain Awareness 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.	3
13.9 Lights (System 33) External: navigation, landing, taxiing, ice, formation; Internal: cabin, cockpit, cargo, Night Vision Devices' Lighting; Emergency.	3

13.10 On Board Maintenance Systems (System 45) Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).	3
13.11 Air Conditioning and Cabin Pressurisation (System 21) *13.11.1. Air supply* Sources of air supply including engine bleed, APU and ground cart;	2
13.11.2. Air Conditioning Distribution systems;	1
Air conditioning systems;	2
Air cycle and vapour cycle machines; Flow, temperature and humidity control system;	3
13.11.3. Pressurisation Pressurisation systems; Control and indication including control and safety valves; Cabin pressure controllers;	3
Canopy seal and anti-g system;	1
13.11.4. Safety and warning devices Protection and warning devices.	3
13.12 Fire Protection (System 26) (a) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests;	3
(b) Portable fire extinguisher.	1

13.13 Fuel Systems (System 28) (a) System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining;	1
(b) Cross-feed and transfer; Refuelling and defuelling including AAR;	2
(c) Longitudinal balance fuel systems; Indications and warnings.	3
13.14 Hydraulic Power (System 29) (a) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Filters; Power distribution;	1
(b) Pressure control; Pressure generation: electrical, mechanical, pneumatic; Emergency pressure generation; Indication and warning systems; Interface with other systems.	3
13.15 Ice and Rain Protection (System 30) (a) Rain repellent; Wiper Systems;	1
(b) Ice formation, classification and detection; Anti-icing systems: electrical, hot air and chemical;	2
(c) De-icing systems: electrical, hot air, pneumatic, chemical; Probe and drain heating.	3

13.16 Landing Gear (System 32) (a) Construction, shock absorbing; Tyres;	1
(b) Extension and retraction systems: normal and emergency; Indications and warnings; Wheels, brakes, antiskid and autobraking; Steering; Air-ground sensing.	3
13.17 Oxygen (System 35) System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings.	3
13.18 Pneumatic/Vacuum (System 36) (a) Distribution;	1
(b) System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply;	2
(c) Pressure control; Indications and warnings; Interfaces with other systems.	3
13.19 Water/Waste (System 38) Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing.	-

13.20 Integrated Modular Avionics (System 42) 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.	3
13.21 Cabin Systems (System 44) The units and components which provide a means of communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). Includes voice, data 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 Crew Panels. The Cabin Network Service typically consists of a server, typically interfacing with, among others, the Data/Radio Communication System; The Cabin Network Service may host functions such as access to pre-departure/departure reports; Cabin Core System; External Communication System; Cabin Monitoring System; Miscellaneous Cabin System.	3

13.22 Information Systems (System 46) The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. 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 System.	3

MODULE 14. PROPULSION

	Level
	B2
14.1 Turbine Engines (a) Constructional arrangement and operation of turbojet, turbofan, turboshaft and turbopropeller engines;	1
(b) Operation of engine control and fuel metering systems including Full Authority Digital Engine (or Electronics) Control (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

	Level	
	A1 A3	B1.1 B1.3
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.	1	2
15.9 Lubricants and Fuels Properties and specifications; Fuel additives; Safety precautions.	1	2
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 Full Authority Digital Engine (or Electronics) 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	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
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.	-	2

MODULE 16. PISTON ENGINE

	Level	
	A2 A4	B1.2 B1.4
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 Full Authority Digital Engine (or Electronics) 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
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.	-	2

MODULE 17. PROPELLER

	Level	
	A1 A2	B1.1 B1.2
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 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

MODULES 50 – 55 : MILITARY-SPECIFIC SYSTEMS

MODULE 50. PRINCIPLES OF ARMAMENT

	Level		
	A	B1	B2
50.1 Essential principles of Armament (a) Propellants and explosives; Pyrotechnics (including Flares); Stores loading / unloading (to include chaff and flares) including hang-up and misfire; Ammunitions transportation; Air-to-air missile; Air-to-ground missile; Air-to-sea missile; Aerial torpedo; Bombs (freefall and guided);	1	1	1
(b) Missile guidance methods: radar, infrared, electro-optical, passive anti-radiation; Missile warheads and detonation mechanisms; Guided weapon (missiles) aerodynamics and flight controls;	1	1	1
(c) Storage, de-stocking and ammunitions assembly; Documents for storage, release and transportation of explosive items and firearms and explosive regulations.	1	1	1

MODULE 51. WEAPONS SYSTEMS

	Level		
	A	B1	B2
51.1 Weapons stores system (System 94) (a) Weapon and stores release, fire and jettison stores; Weapon suspension system; Interconnecting equipment to transport and release/fire weapons; Gunnery;	2	3	3
(b) Weapon control, designating and acquiring a target.	1	2	3

MODULE 52. OPERATIONAL ATTACK SYSTEMS

	Level		
	A	B1	B2
52.1 Attack System Management (System 39) Architecture, management; Attack system functions; General rules of man-machine communication; Digital Networks, hardware and software, other information networks, network for video signals, network for blanking signals, MIL-STD-1553B (STANAG 3838 and STANAG 3910), MIL-STD-1773; Stores management hardware and software; Attack system resources, contributing resources; Role during mission phases.	-	2	3
52.2 Operational attack functions (System 40) Air-to-air functions: fire control functions, bullet gun firing, short range, medium range or beyond visual range missiles firing, air-to-air management after weapons launch, management of onboard guidance; Air-to-surface functions, Air-to-sea functions; Information exchange and cooperation; Navigational functions, localisation, flight management, approach and landing management; Nap of the earth flight: terrain following and obstacle avoidance management; Self protection: defensive manoeuvers and tactics elaboration against threats; Identification: aerial and surface objects identification based on autonomous and external identification means.	-	2	3

52.3 Cross-technical attack functions (System 42) Tactical situation awareness; Aircraft Mission preparation and restitution, hardware and software; Cautions and warnings management; Mission system control and management; Trajectory management; Attack system compatibilities management, electromagnetic compatibility between all the transmitters and receivers.	-	2	3

MODULE 53. SURVEILLANCE AND ELECTRONIC WARFARE

	Level		
	A	B1	B2
53.1 Surveillance (System 93) Data processing; Data display; Recording; Identification; Infra-red and laser sensors; Surveillance radar; Magnetic sensors; Sonar sensors (active and passive).	1	2	3
53.2 Image recording (System 97) (a) Optical systems;	1	2	2
(b) Specificities of aerial photography; Cameras.	1	1	1
53.3 Electronic warfare (System 99) Active electromagnetic; Passive electromagnetic; ELINT; Infrared and Laser systems; Electromagnetic countermeasures.	-	2	3

MODULE 54. CREW SAFETY

	Level		
	A	B1	B2
54.1 Crew escape and safety (System 95) Ejection seats; Escape hatches/canopy, Miniature Detonating Cord (MDC); Global survival kits; Impact protection.	2	3	2

MODULE 55. MILITARY COMMUNICATION SYSTEMS

	Level		
	A	B1	B2
55.1 Military communication systems Tactical Data Links: Link 11, Link 16, Link 22; Tactical communications systems.	-	-	3

Appendix II - Basic Examination Standard

1. 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 Each multi-choice question shall have at least 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.

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

1.4 Suitable essay questions shall be drafted and evaluated using the knowledge syllabus in Appendix I Modules 7, 9 and 10.

1.5 Each essay question will have a model answer drafted for it, which will also include any known alternative answers that may be relevant for other sub-modules.

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

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

1.8 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.

1.9 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.

1.10 Penalty marking systems shall not be used.

1.11 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 maintenance training organisation approved in accordance with EMAR 147 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, unless approved otherwise by the NMAA.

1.12 The time periods required by EMAR 66.A.25 apply to each individual module examination, with the exception of those module examinations which were passed as part of another category licence, where the licence has already been issued.

1.13 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, unless approved by the NMAA.

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

2. Number of questions per module

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.

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.

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.

MODULE 4 — ELECTRONIC FUNDAMENTALS

Category B1: 20 multi-choice and 0 essay questions. Time allowed 25 minutes.
Category B2: 40 multi-choice and 0 essay questions. Time allowed 50 minutes.

MODULE 5 — DIGITAL TECHNIQUES/ELECTRONIC INSTRUMENT SYSTEMS

Category A: 16 multi-choice and 0 essay questions. Time allowed 20 minutes.
Category B1: 40 multi-choice and 0 essay questions. Time allowed 50 minutes.
Category B2: 72 multi-choice and 0 essay questions. Time allowed 90 minutes.

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.

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.

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.

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.

MODULE 10 — AVIATION LEGISLATION

Category A: 32 multi-choice and 1 essay question. Time allowed 40 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.

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.

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.

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.

MODULE 13 — AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS

Category B2: 180 multi-choice and 0 essay questions. Time allowed 225 minutes. Questions and time allowed may be split into two examinations as appropriate.

MODULE 14 — PROPULSION

Category B2: 24 multi-choice and 0 essay questions. Time allowed 30 minutes.

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.

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.

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.

MODULE 50 — PRINCIPLES OF ARMAMENT

Category A: 12 multi-choice and 0 essay question. Time allowed 15 minutes.
Category B1: 12 multi-choice and 0 essay question. Time allowed 15 minutes.
Category B2: 12 multi-choice and 0 essay question. Time allowed 15 minutes.

MODULE 51 — WEAPONS SYSTEMS

Category A: 24 multi-choice and 0 essay question. Time allowed 30 minutes.
Category B1: 28 multi-choice and 0 essay question. Time allowed 35 minutes.
Category B2: 32 multi-choice and 0 essay question. Time allowed 40 minutes.

MODULE 52 — OPERATIONAL ATTACK SYSTEMS

Category B1: 48 multi-choice and 0 essay question. Time allowed 60 minutes.
Category B2: 80 multi-choice and 0 essay question. Time allowed 100 minutes.

MODULE 53 — SURVEILLANCE AND ELECTRONIC WARFARE

Category A: 12 multi-choice and 0 essay question. Time allowed 15 minutes.
Category B1: 32 multi-choice and 0 essay question. Time allowed 40 minutes.
Category B2: 48 multi-choice and 0 essay question. Time allowed 60 minutes.

MODULE 54 — CREW SAFETY

Category A: 16 multi-choice and 0 essay question. Time allowed 20 minutes.
Category B1: 20 multi-choice and 0 essay question. Time allowed 25 minutes.
Category B2: 16 multi-choice and 0 essay question. Time allowed 20 minutes.

MODULE 55 — MILITARY COMMUNICATION SYSTEMS

Category B2: 16 multi-choice and 0 essay question. Time allowed 20 minutes.

Appendix III - Military Aircraft Type Training and Examination Standard, and On-the-Job Training (OJT)

1. General

Military Aircraft Type Training shall consist of theoretical training and examination, and, except for the Category C ratings, practical training and assessment. Where Military Aircraft Type Training includes military-specific systems, the prerequisite is that the student shall have gained the relevant 50-series modules (or sub-modules) of EMAR 66 Appendix I.

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

(i) Shall be conducted by an MTO appropriately approved in accordance with EMAR 147 or an organisation recognised by the NMAA in accordance with EMAR 66.B.130.

(ii) Shall comply with the standard described in paragraph 3.1 and 4 of this Appendix III, except as permitted by the differences training described below.

(iii) In the case of a Category C person qualified by holding an academic degree as specified in EMAR 66.A.30(a)(5), the first relevant aircraft type theoretical training shall be at the Category B1 or B2 level or at a level recognised by the NMAA.

(iv) Shall have been started and completed within the 3 years preceding the application for a Military Aircraft Type Rating endorsement.

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

(i) Shall be conducted by an MTO appropriately approved in accordance with EMAR 147 or an organisation recognised by the NMAA in accordance with EMAR 66.B.130.

(ii) Shall comply with the standard described in paragraph 3.2 and 4 of this Appendix III, except as permitted by the differences training described below.

(iii) Shall include a representative cross section of maintenance activities relevant to the aircraft type.

(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 Military Aircraft Type Rating endorsement.

(c) Differences training

(i) Differences training is the training required in order to cover the differences between two different Military Aircraft Type Ratings of the same manufacturer as determined by the NMAA.

(ii) Differences training has to be defined on a case-by-case basis taking into account the requirements contained in this Appendix III in respect of both theoretical and practical elements of Military Aircraft Type Rating training.

(iii) A Military Aircraft Type Rating shall only be endorsed on a MAML after differences training when the applicant also complies with one of the following conditions:

- having already endorsed on the MAML the Military Aircraft Type Rating from which the differences are being identified, or

- having completed the Military Aircraft Type Training requirements for the aircraft from which the differences are being identified.

2. Military Aircraft Type Training levels

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

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 Continuing 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.

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, systems and armaments;

(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 on aircraft systems;

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

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

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, interpretation and application of 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 specific to aircraft type.

3. Military Aircraft Type Training standard

Although Military Aircraft Type Training includes both theoretical and practical elements, courses can be approved for the theoretical element, the practical element or for a combination of both.

3.1 Theoretical element

(a) Objective:

On completion of a theoretical training course the student shall be able to demonstrate, to the levels identified in the Appendix III 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.

(b) Level of training:

Training levels are those levels defined in point 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 level 3.

(c) Duration:

NOT APPLICABLE.

(d) Justification of course duration:

Training courses carried out in an MTO shall justify their hour duration and the coverage of the full syllabus by a training needs analysis based on:

- the design of the aircraft type, its maintenance needs and the types of operation,

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

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

Course duration shall be approved by the NMAA.

Similarly, tuition hours of differences courses or other training course combinations (such as combined B1/B2 courses), and in cases of theoretical Military Aircraft Type Training courses, these shall be justified by the training needs analysis as described above.

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

- The minimum attendance required by the student, in order to meet the objectives of the course.

- 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, the certificate of recognition shall not be issued. Additional training may be provided by the MTO in order to meet the minimum attendance time.

(e) Content:

As a minimum, the elements in the Syllabus (see table 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.

Chapters	Aeroplanes turbine		Aeroplanes piston		Helicopters turbine		Helicopters piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
Introduction module:									
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
14 Product loading and off loading	1	1	1	1	1	1	1	1	1
20 Standard practices including armament safety — only type particular	1	1	1	1	1	1	1	1	1
Helicopters									
18 Vibration and Noise Analysis (Blade tracking)	-	-	-	-	3	1	3	1	-
25 Emergency Flotation Equipment	-	-	-	-	3	1	3	1	1
53 Airframe Structure (Helicopter)	-	-	-	-	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	-

Chapters	Aeroplanes turbine		Aeroplanes piston		Helicopters turbine		Helicopters piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
Airframe structures									
27A Flight Control Surfaces (All)	3	1	3	1	-	-	-	-	1
51 Standard practices and structures (damage classification, assessment and repair)	3	1	3	1	-	-	-	-	1
52 Doors	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 and canopies	3	1	3	1	-	-	-	-	1
57 Wings	3	1	3	1	-	-	-	-	1
06 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
29A Hydraulic Power — Monitoring and indicating	3	1	3	1	3	1	3	1	3

Chapters	Aeroplanes turbine		Aeroplanes piston		Helicopters turbine		Helicopters piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
30 Ice and Rain Protection	3	1	3	1	3	1	3	1	3
31 Indicating/Recording Systems	3	1	3	1	3	1	3	1	3
31A Instrument Systems	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
40 Operational attack functions	2	1	2	1	2	1	-	-	3
42 Integrated modular avionics	2	1	2	1	2	1	2	1	3
42A Cross-technical attack functions	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
48 In-Flight refueling tanker	3	1	-	-	3	1	-	-	2
48A In-Flight refueling tanker – Monitoring and Indicating	3	1	-	-	3	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
71 Powerplant	3	1	-	-	3	1	-	-	1

Chapters	Aeroplanes turbine		Aeroplanes piston		Helicopters turbine		Helicopters piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
72 Engine Turbine/Turbo Prop/Ducted Fan/Unducted fan	3	1	-	-	3	1	-	-	1
73 Engine Fuel and Control	3	1	-	-	3	1	-	-	1
73A FADEC	3	1	-	-	3	1	-	-	3
74 Ignition	3	1	-	-	3	1	-	-	3
75 Air	3	1	-	-	3	1	-	-	1
76 Engine controls	3	1	-	-	3	1	-	-	1
77 Engine Indicating Systems	3	1	-	-	3	1	-	-	3
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
Auxiliary Power Units (APUs)									
49 Auxiliary Power Units (APUs)	3	1	-	-	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
73A FADEC	-	-	3	1	-	-	3	1	3
74 Ignition	-	-	3	1	-	-	3	1	3
76 Engine Control	-	-	3	1	-	-	3	1	1
77 Engine Indication Systems	-	-	3	1	-	-	3	1	3
79 Oil	-	-	3	1	-	-	3	1	1
80 Starting	-	-	3	1	-	-	3	1	1

Chapters	Aeroplanes turbine		Aeroplanes piston		Helicopters turbine		Helicopters piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
81 Turbines	-	-	3	1	-	-	3	1	1
82 Water Injection	-	-	3	1	-	-	3	1	1
83 Accessory Gear boxes	-	-	3	1	-	-	3	1	1
84 Propulsion Augmentation	-	-	3	1	-	-	3	1	1
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	3	1	3	1	-	-	-	-	3
61E Propeller Ice Protection	3	1	3	1	-	-	-	-	-
61F Propeller Maintenance	3	1	3	1	-	-	-	-	1
Military-Specific Systems									
92 Radar	2	1	2	1	2	1	-	-	3
93 Surveillance	2	1	2	1	2	1	-	-	3
94 Weapon System	2	1	2	1	2	1	-	-	3
95 Crew Escape and Safety (partially covered by 25 for Helicopters)	3	1	3	1	3	1	3	1	2
97 Image Recording	2	1	2	1	2	1	-	-	2
99 Electronic Warfare	2	1	2	1	2	1	-	-	3

(f) 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 the NMAA approving the training course.

3.2 Practical element

(a) 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, 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.

(b) 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 is 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:											
05 Time limits/maintenance checks	X/X	-	-	-	-	-	-	-	-	-	-
06 Dimensions/Areas (MTOM, etc.)	X/X	-	-	-	-	-	-	-	-	-	-
07 Lifting and Shoring	X/X	-	-	-	-	-	-	-	-	-	-
08 Levelling and weighing	X/X	-	X	-	-	-	-	X	-	-	-
09 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	-	-	-
14 Product loading and off loading	X/X	-	X	-	-	-	-	X	-	-	-
20 Standard practices including armament safety — only type particular	X/X	-	X	-	-	-	-	X	-	-	-
Helicopters:											
18 Vibration and Noise Analysis (Blade tracking)	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											
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	-	-	-	-	-
Airframe structures:											
27A Flight Control Surfaces	X/-	-	-	-	-	X	-	-	-	-	-
51 Standard Practices and Structures (damage classification, assessment and repair)											
52 Doors	X/X	X	X	-	-	-	-	X	-	-	-
53 Fuselage	X/-	-	-	-	-	X	-	-	-	-	-
54 Nacelles/Pylons	X/-	-	-	-	-	-	-	-	-	-	-
55 Stabilisers	X/-	-	-	-	-	-	-	-	-	-	-
56 Windows and canopies	X/-	-	-	-	-	X	-	-	-	-	-
57 Wings	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

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
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
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	-
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
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	-
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	-	-	-
40 Operational attack functions	X/X	-	-	-	-	-	X	X	X	X	X
42 Integrated modular avionics	X/X	-	-	-	-	-	X	X	X	X	X
42A Cross-technical attack functions	X/X	X	-	-	-	-	X	X	X	X	X
44 Cabin Systems	X/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
48 In-Flight refueling tanker	X/X	X	X	X	X	X	X	X	-	X	-
48A In-Flight refueling tanker – Monitoring and Indicating	X/X	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
50 Cargo and Accessory Compartments	X/X	-	X	-	-	-	-	-	-	-	-
Turbine 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	-	-	-
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	-	-	-	-	-

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
71 Power Plant	X/-	X	X	-	-	-	-	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	-	-	-	-
76 Engine Controls	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 Gearboxes	X/-	-	X	X	-	-	-	-	-	-	-
84 Propulsion Augmentation	X/-	X	-	-	-	-	-	-	-	-	-
Propellers:											
60A 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
Military-Specific Systems											
92 Radar	X/X	X	X	X	X	-	X	X	X	X	X
93 Surveillance	X/X	X	X	X	X	-	X	X	X	X	X
94 Weapon system	X/X	X	X	X	X	-	X	X	X	X	X
95 Crew escape and Safety	X/X	X	X	X	X	X	X	X	X	X	-
97 Image recording	X/X	X	X	X	X	-	X	X	X	X	X
99 Electronic Warfare	X/X	X	X	X	X	-	X	X	X	X	X

4. Military Aircraft Type Training examination and assessment standard

4.1 Theoretical element examination standard

After the theoretical portion of the Military 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 at least 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 point 2 "Military Aircraft Type Training levels". 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:

- the effective training hours spent teaching at that chapter and level,

- the learning objectives as given by the training needs analysis.

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

(g) The minimum examination pass mark is 75 %. When the Military Aircraft 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 point 4, a "chapter" means each one of the rows preceded by a number in the table contained in point 3.1(e).

4.2 Practical element assessment standard

After the practical element of the Military Aircraft Type Training has been completed, an assessment must be performed, which must comply with the following:

(a) The assessment shall be performed by designated assessors appropriately qualified.

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

5. Type examination standard

NOT APPLICABLE.

6. On the Job Training

On the Job Training (OJT) shall be approved by the NMAA who has issued the MAML.

It 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 designated assessors appropriately qualified.

It shall have been started and completed within the 3 years preceding the application for a Military Aircraft Type Rating endorsement.

(a) Objective:

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

(b) Content:

OJT shall cover a cross section of tasks acceptable to the NMAA. 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.

Each task shall be signed off by the student and countersigned by a designated supervisor. The tasks listed shall refer to an actual job card/work sheet, etc.

The final assessment of the completed OJT is mandatory and shall be performed by a designated assessor, appropriately qualified.

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

1. Name of Trainee;

2. Date of Birth;

3. Service Number or Employee Number

4. Approved Maintenance Organisation;

5. Location;

6. Name of supervisor(s) and assessor, (including MAML number if applicable);

7. Date of task completion;

8. Description of task and job card/work order/tech log, etc.;

9. Aircraft type and aircraft registration;

10. Military Aircraft Type Rating applied for.

In order to facilitate the verification by the NMAA, demonstration of the OJT shall consist of:

(i) detailed worksheets/logbook and

(ii) a compliance report demonstrating how the OJT meets the requirement of EMAR 66.

Appendix IV Experience requirements for an addition to an EMAR 66 Military Aircraft Maintenance Licence

The table below shows the experience requirements for adding a new category or subcategory to an existing EMAR 66 MAML including military-specific modules.

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

The experience requirement will be reduced by 50% if the applicant has completed an approved EMAR 147 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	None	6 months	6 months	6 months	—	6 months	6 months	6 months	1 year
B1.2	6 months	None	6 months	6 months	2 years	—	2 years	6 months	2 years
B1.3	6 months	6 months	None	6 months	6 months	6 months	—	6 months	1 year
B1.4	6 months	6 months	6 months	None	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	—

Appendix V - Application Form – EMAR Form 19

EMAR Form 19 is contained in the EMAR Forms document.

Appendix VI - Military Aircraft Maintenance Licence (MAML) – EMAR Form 26

EMAR Form 26 is contained in the EMAR Forms document.