



PROMOTION OF LEARNING IN AVIATION
TECHNOLOGY NETWORKS IN EUROPE



Common Curriculum for Transnational Training Activities in Selected EASA Training Modules

Project No.: 2018-1-DE02-KA202-005046

Intellectual Output No. 1



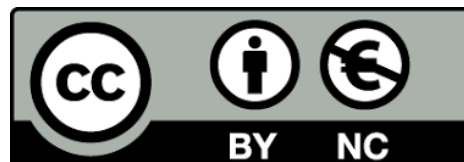
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Introduction: A Common Curriculum for Transnational Training Activities

Technical training in the context of aviation maintenance and repair within EASA member states is regulated by Part 66 of EASA related regulations. The respective curriculum defines contents to teach and train as well as examination structures and procedures. To guarantee equal standards and safety throughout EASA member organizations and companies, it is important to organize training and teaching efforts according to these regulations.

A very important aspect of the aviation maintenance and repair industry is the international context in which this fascinating vocation has its framework and responsibility. In many workshops and hangars multinational teams cooperate with each other in terms of facilitating the safety of planes and helicopters with their skills and competences.

However, training institutions in five European countries – Belgium, Finland, France, Germany and Italy – found that they were facing obstacles when implementing training activities within transnational mobility and exchange programs, e.g. organized under the umbrella of the ERASMUS+ program. Although there is the common EASA curriculum, there are different national interpretations of respective national aviation authorities with regard to their implementation. On the other hand, it makes sense to organize transnational training activities as an element of preparing trainees in aviation maintenance and repair for their international work reality.

Inspired by this challenge and dedicated to implement a solution for this aspect of training, a project was initiated with the title “Promotion of Learning in Aviation Training Networks (PLANE)”. It was funded by the ERASMUS+ program of the European Union within the framework of a strategic partnership of the participating training organizations. Four of these institutions are registered training organizations according to part 147 of EASA guidelines. The project consortium comprised

- Association pour la Formation aux Métiers de l’Aérien / France (FR.147.0023)
- Berufskolleg Alsdorf der StädteRegion Aachen / Germany (DE.147.0018)
- IIS Andrea Ponti Gallarate / Italy
- Kouvola Vocational College / Finland (FI.147.008)
- TECHNIFUTUR / Belgium (BE.147.003)

Coordinated by Berufskolleg Alsdorf, the project members firstly developed a common curriculum for six training modules of the EASA curriculum. This allows transnational training arrangements within EASA context of aviation technician training bearing the chance of mutual recognition of training outcomes by the respective national aviation authorities. Furthermore, 750 working days of training experts were deployed to develop training material of these six modules in the shape of up-to-date ebooks in English. These ebooks can be freely downloaded and used. They can be found on the project website: www.erasmusplusplane.eu.

A third element of project activities was a scientific study carried out by the “Chair and Institute of Industrial Engineering and Ergonomics of the RWTH Aachen University” in Germany. This study compared the didactical structure of EASA guidelines with requests and demands of Technical and Vocational Education and Training following the criteria of the European Qualification Framework (EQF). This study can also be found on the project website.

This document at hand documents the commonly developed curriculum in the context of this project. It was the basis for the elaboration of training material that can be used both in national training activities in EASA accredited training institutions as well as in transnational mobility and exchange programs between institutions according to part 147 of EASA guidelines. To be able to follow the structure and content of this pilot curriculum, the reader will find the respective extract from part 66 of EASA guidelines in the annex as well as an example of a national interpretation of these guidelines namely by the German aviation authority, the Luftfahrtbundesamt (LBA).

We do hope that the outcome of this ERASMUS+ funded project might be a contribution to the further development of training activities within aviation maintenance and repair. The context of the whole project including a video displaying the genesis and results can be found at the project website www.erasmusplusplane.eu.

Curriculum

| Subject Module | | CAT A1 | | | | | | | | | | | |
|----------------|--|------------|------------|--|------------|------------|--|------------|------------|--|------------|------------|--|
| | | CAT A1 | | | CAT A2 | | | CAT A3 | | | CAT A4 | | |
| | | Theory | Practice | Number of questions (MMC + Essay, if required) | Theory | Practice | Number of questions (MMC + Essay, if required) | Theory | Practice | Number of questions (MMC + Essay, if required) | Theory | Practice | Number of questions (MMC + Essay, if required) |
| | | Target (h) | Target (h) | | Target (h) | Target (h) | | Target (h) | Target (h) | | Target (h) | Target (h) | |
| No. | Description | | | | | | | | | | | | |
| 01 | Mathematics | | | | | | | | | | | | |
| | Total individual claim | 14 | 0 | 16 | 14 | 0 | 16 | 14 | 0 | 16 | 14 | 0 | 16 |
| | Total theory and practice | | 14 | | | 14 | | | 14 | | | 14 | |
| 02 | Physics | | | | | | | | | | | | |
| | Total individual claim | 29 | 0 | 32 | 29 | 0 | 32 | 29 | 0 | 32 | 29 | 0 | 32 |
| | Total theory and practice | | 29 | | | 29 | | | 29 | | | 29 | |
| 03 | Basics Electrics | | | | | | | | | | | | |
| | Total individual claim | 17 | 0 | 20 | 17 | 0 | 20 | 17 | 0 | 20 | 17 | 0 | 20 |
| | Total theory and practice | | 17 | | | 17 | | | 17 | | | 17 | |
| 04 | Basics Electronics | | | | | | | | | | | | |
| | Total individual claim | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Total theory and practice | | 0 | | | 0 | | | 0 | | | 0 | |
| 05 | Digital techniques and electronic instrument systems | | | | | | | | | | | | |
| | Total individual claim | 8 | 0 | 16 | 8 | 0 | 16 | 8 | 0 | 16 | 8 | 0 | 16 |
| | Total theory and practice | | 8 | | | 8 | | | 8 | | | 8 | |
| 06 | Materials and components | | | | | | | | | | | | |
| | Total individual claim | 36 | 0 | 52 | 36 | 0 | 52 | 36 | 0 | 52 | 36 | 0 | 52 |
| | Total theory and practice | | 36 | | | 36 | | | 36 | | | 36 | |
| 07 | Maintenance | | | | | | | | | | | | |
| | Total individual claim | 30 | 227 | 72+2 | 30 | 227 | 72+2 | 30 | 212 | 72+2 | 30 | 212 | 72+2 |
| | Total theory and practice | | 257 | | | 257 | | | 242 | | | 242 | |
| 08 | Basics of aerodynamics | | | | | | | | | | | | |
| | Total individual claim | 14 | 0 | 20 | 14 | 0 | 20 | 14 | 0 | 20 | 14 | 0 | 20 |
| | Total theory and practice | | 14 | | | 14 | | | 14 | | | 14 | |
| 09 | Human factors | | | | | | | | | | | | |
| | Total individual claim | 17 | 0 | 20+1 | 17 | 0 | 20+1 | 17 | 0 | 20+1 | 17 | 0 | 20+1 |
| | Total theory and practice | | 17 | | | 17 | | | 17 | | | 17 | |
| 10 | Aviation legislation | | | | | | | | | | | | |
| | Total individual claim | 20 | 0 | 32+1 | 20 | 0 | 32+1 | 20 | 0 | 32+1 | 20 | 0 | 32+1 |
| | Total theory and practice | | 20 | | | 20 | | | 20 | | | 20 | |
| 11a | Aerodynamics, structures and systems of aircraft with turbine engine | | | | | | | | | | | | |
| | Total individual claim | 63 | 224 | 108 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Total theory and practice | | 287 | | | 0 | | | 0 | | | 0 | |
| 11b | Aerodynamics, structures and systems of aircraft with piston engine | | | | | | | | | | | | |
| | Total individual claim | 0 | 0 | 0 | 74 | 213 | 108 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Total theory and practice | | 0 | | | 287 | | | 0 | | | 0 | |
| 12 | Aerodynamics, structures and systems of helicopters | | | | | | | | | | | | |
| | Total individual claim | 0 | 0 | 0 | 0 | 0 | 0 | 70 | 232 | 100 | 70 | 232 | 100 |
| | Total theory and practice | | 0 | | | 0 | | | 302 | | | 302 | |
| 15 | Gas turbine engine | | | | | | | | | | | | |
| | Total individual claim | 25 | 61 | 60 | 0 | 0 | 0 | 25 | 61 | 60 | 0 | 0 | 0 |
| | Total theory and practice | | 86 | | | 0 | | | 86 | | | 0 | |
| 16 | Piston engine | | | | | | | | | | | | |
| | Total individual claim | 0 | 0 | 0 | 25 | 61 | 52 | 0 | 0 | 0 | 25 | 61 | 52 |
| | Total theory and practice | | 0 | | | 86 | | | 0 | | | 86 | |
| 17 | Propeller | | | | | | | | | | | | |
| | Total individual claim | 7 | 8 | 20 | 7 | 8 | 20 | 7 | 8 | 20 | 7 | 8 | 20 |
| | Total theory and practice | | 15 | | | 15 | | | 15 | | | 15 | |
| | Total claim | | 800 | | | 800 | | | 800 | | | 800 | |

| Subject Module | | CAT B1 | | | | | | | | | | | |
|----------------|--|------------|------------|--|------------|------------|--|------------|------------|--|------------|------------|--|
| | | CAT B1.1 | | | CAT B1.2 | | | CAT B1.3 | | | CAT B1.4 | | |
| | | Theory | Practice | Number of questions (MMC + Essay, if required) | Theory | Practice | Number of questions (MMC + Essay, if required) | Theory | Practice | Number of questions (MMC + Essay, if required) | Theory | Practice | Number of questions (MMC + Essay, if required) |
| No. | Description | Target (h) | Target (h) | | Target (h) | Target (h) | | Target (h) | Target (h) | | Target (h) | Target (h) | |
| 01 | Mathematics | | | | | | | | | | | | |
| | Total individual claim | 23 | 17 | 32 | 23 | 17 | 32 | 23 | 17 | 32 | 23 | 17 | 32 |
| | Total theory and practice | | 40 | | | 40 | | | 40 | | | 40 | |
| 02 | Physics | | | | | | | | | | | | |
| | Total individual claim | 63 | 47 | 52 | 63 | 47 | 52 | 63 | 47 | 52 | 63 | 47 | 52 |
| | Total theory and practice | | 110 | | | 110 | | | 110 | | | 110 | |
| 03 | Basics Electrics | | | | | | | | | | | | |
| | Total individual claim | 61 | 49 | 52 | 61 | 49 | 52 | 61 | 49 | 52 | 61 | 49 | 52 |
| | Total theory and practice | | 110 | | | 110 | | | 110 | | | 110 | |
| 04 | Basics Electronics | | | | | | | | | | | | |
| | Total individual claim | 15 | 10 | 20 | 15 | 10 | 20 | 15 | 10 | 20 | 15 | 10 | 20 |
| | Total theory and practice | | 25 | | | 25 | | | 25 | | | 25 | |
| 05 | Digital techniques and electronic instrument systems | | | | | | | | | | | | |
| | Total individual claim | 37 | 28 | 40 | 37 | 28 | 40 | 37 | 28 | 40 | 37 | 28 | 40 |
| | Total theory and practice | | 65 | | | 65 | | | 65 | | | 65 | |
| 06 | Materials and components | | | | | | | | | | | | |
| | Total individual claim | 205 | 175 | 72 | 205 | 175 | 72 | 205 | 175 | 72 | 205 | 175 | 72 |
| | Total theory and practice | | 380 | | | 380 | | | 380 | | | 380 | |
| 07 | Maintenance | | | | | | | | | | | | |
| | Total individual claim | 370 | 305 | 80+2 | 370 | 305 | 80+2 | 370 | 305 | 80+2 | 370 | 305 | 80+2 |
| | Total theory and practice | | 675 | | | 675 | | | 675 | | | 675 | |
| 08 | Basics of aerodynamics | | | | | | | | | | | | |
| | Total individual claim | 36 | 14 | 20 | 36 | 14 | 20 | 36 | 14 | 20 | 36 | 14 | 20 |
| | Total theory and practice | | 50 | | | 50 | | | 50 | | | 50 | |
| 09 | Human factors | | | | | | | | | | | | |
| | Total individual claim | 19 | 6 | 20+2 | 19 | 6 | 20+1 | 19 | 6 | 20+1 | 19 | 6 | 20+1 |
| | Total theory and practice | | 25 | | | 25 | | | 25 | | | 25 | |
| 10 | Aviation legislation | | | | | | | | | | | | |
| | Total individual claim | 26 | 9 | 40+1 | 26 | 9 | 40+1 | 26 | 9 | 40+1 | 26 | 9 | 40+1 |
| | Total theory and practice | | 35 | | | 35 | | | 35 | | | 35 | |
| 11a | Aerodynamics, structures and systems of aircraft with turbine engine | | | | | | | | | | | | |
| | Total individual claim | 333 | 272 | 140 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Total theory and practice | | 605 | | | 0 | | | 0 | | | 0 | |
| 11b | Aerodynamics, structures and systems of aircraft with piston engine | | | | | | | | | | | | |
| | Total individual claim | 0 | 0 | 0 | 333 | 272 | 140 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Total theory and practice | | 0 | | | 605 | | | 0 | | | 0 | |
| 12 | Aerodynamics, structures and systems of helicopters | | | | | | | | | | | | |
| | Total individual claim | 0 | 0 | 0 | 0 | 0 | 0 | 338 | 282 | 115 | 338 | 282 | 115 |
| | Total theory and practice | | 0 | | | 0 | | | 620 | | | 620 | |
| 15 | Gas turbine engine | | | | | | | | | | | | |
| | Total individual claim | 130 | 110 | 92 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Total theory and practice | | 240 | | | 0 | | | 0 | | | 0 | |
| 16 | Piston engine | | | | | | | | | | | | |
| | Total individual claim | 0 | 0 | 0 | 130 | 110 | 72 | 130 | 110 | 92 | 130 | 110 | 72 |
| | Total theory and practice | | 0 | | | 240 | | | 240 | | | 240 | |
| 17 | Propeller | | | | | | | | | | | | |
| | Total individual claim | 23 | 17 | 32 | 23 | 17 | 32 | 23 | 17 | 32 | 23 | 17 | 32 |
| | Total theory and practice | | 40 | | | 40 | | | 40 | | | 40 | |
| | Total claim | | 2400 | | | 2400 | | | 2415 | | | 2415 | |

Annex I: EASA Curriculum Part 66

ANNEX III

(Part-66)

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66.1 Competent authority

(a) For the purpose of this Annex (Part-66), the competent authority shall be:

1. the authority designated by the Member State to whom a person first applies for the issuance of an aircraft maintenance licence; or
2. the authority designated by another Member State, in case it would be different, subject to agreement with the authority referred to in point 1. In that case, the licence referred to in point 1 shall be revoked, all the records mentioned in point 66.B.20 shall be transferred and a new licence shall be issued on the basis of these records.

(b) The Agency shall be responsible for defining:

1. the list of aircraft types; and
2. what airframe/engine combinations are included in each particular aircraft type rating.

SECTION A

TECHNICAL REQUIREMENTS

SUBPART A

AIRCRAFT MAINTENANCE LICENCE

66.A.1 Scope

This section defines the aircraft maintenance licence and establishes the requirements for application, issue and continuation of its validity.

66.A.3 Licence categories

(a) Aircraft maintenance licences include the following categories:

- Category A
- Category B1

- Category B2
 - Category B3
 - 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) Category B3 is applicable to piston-engine non-pressurised aeroplanes of 2 000 kg MTOM and below.

66.A.5 Aircraft groups

For the purpose of ratings on aircraft maintenance licences, aircraft shall be classified in the following groups:

1. Group 1: complex motor-powered aircraft as well as multiple engine helicopters, aeroplanes with maximum certified operating altitude exceeding FL290, aircraft equipped with fly-by-wire systems and other aircraft requiring an aircraft type rating when defined so by the Agency.
2. Group 2: aircraft other than those in Group 1 belonging to the following subgroups:
 - sub-group 2a: single turbo-propeller engine aeroplanes
 - sub-group 2b: single turbine engine helicopters
 - sub-group 2c: single piston engine helicopters.
3. Group 3: piston engine aeroplanes other than those in Group 1.

66.A.10 Application

- (a) An application for an aircraft maintenance licence or change to such licence shall be made on an EASA Form 19 (see Appendix V) in a manner established by the competent authority and submitted thereto.
- (b) An application for the change to an aircraft maintenance licence shall be made to the competent authority of the Member State that issued the aircraft maintenance licence.
- (c) In addition to the documents required in points 66.A.10(a), 66.A.10(b) and 66.B.105, as appropriate, the applicant for additional basic categories or subcategories to an aircraft maintenance licence shall submit his/her current original aircraft maintenance licence to the competent authority together with the EASA Form 19.
- (d) Where the applicant for change of the basic categories qualifies for such change via the procedure referred to in point 66.B.100 in a Member State other than the Member State which issued the license, the application shall be sent to the competent authority referred to in point 66.1.
- (e) Where the applicant for change of the basic categories qualifies for such change via the procedure referred to in point 66.B.105 in a Member State other than the Member State which issued the license, the maintenance organisation approved in accordance with Annex II (Part-145) shall send the aircraft maintenance licence together with the EASA Form 19 to the competent authority referred to in point 66.1 for stamp and signature of the change or reissue of the licence, as appropriate.
- (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 an aircraft maintenance licence shall be at least 18 years of age.

66.A.20 Privileges

(a) The following privileges shall apply:

1. A category A aircraft maintenance licence 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 point 145.A.35 of Annex II (Part-145). The certification privileges shall be restricted to work that the licence holder has personally performed in the maintenance organisation that issued the certification authorisation.
2. A category B1 aircraft maintenance licence shall permit the holder to issue certificates of release to service and to act as B1 support staff following:
 - maintenance performed on aircraft structure, powerplant and mechanical and electrical systems,
 - 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 aircraft maintenance licence shall permit the holder:

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

(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 point 145.A.35 of Annex II (Part-145). This certification privilege shall be restricted to work that the licence holder has personally performed in the maintenance organisation which issued the certification authorisation and limited to the ratings already endorsed in the B2 licence.

The category B2 licence does not include any A subcategory.

4. A category B3 aircraft maintenance licence shall permit the holder to issue certificates of release to service and to act as B3 support staff for:
 - maintenance performed on aeroplane structure, powerplant and mechanical and electrical systems,
 - work on avionic systems requiring only simple tests to prove their serviceability and not requiring troubleshooting.
5. A category C aircraft maintenance licence shall permit the holder to issue certificates of release to service following base maintenance on aircraft. The privileges apply to the aircraft in its entirety.

(b) The holder of an aircraft maintenance licence may not exercise its privileges unless:

1. in compliance with the applicable requirements of Annex I (Part-M) and Annex II (Part-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 aircraft maintenance licence 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 an aircraft maintenance licence, or the addition of a category or subcategory to such a licence, shall demonstrate by examination a level of knowledge in the appropriate subject modules in accordance with the Appendix I to Annex III (Part-66). The examination shall be conducted either by a training organisation appropriately approved in accordance with Annex IV (Part-147) or by the competent authority.

- (b) The training courses and examinations shall be passed within 10 years prior to the application for an aircraft maintenance licence or the addition of a category or subcategory to such aircraft maintenance licence. Should this not be the case, examination credits may however be obtained in accordance with point (c).
- (c) The applicant may apply to the competent authority 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 competent authority to be equivalent to the knowledge standard of Annex III (Part-66).Credits shall be granted in accordance with Subpart E of Section B of this Annex (Part-66).
- (d) Credits expire 10 years after they were granted to the applicant by the competent authority. The applicant may apply for new credits after expiration.

66.A.30 Basic experience requirements

- (a) An applicant for an aircraft maintenance licence shall have acquired:
 - 1. for category A, subcategories B1.2 and B1.4 and category B3:
 - (i) 3 years of practical maintenance experience on operating aircraft, if the applicant has no previous relevant technical training; or
 - (ii) 2 years of practical maintenance experience on operating aircraft and completion of training considered relevant by the competent authority as a skilled worker, in a technical trade; or
 - (iii) 1 year of practical maintenance experience on operating aircraft and completion of a basic training course approved in accordance with Annex IV (Part-147);
 - 2. for category B2 and subcategories B1.1 and B1.3:
 - (i) 5 years of practical maintenance experience on operating aircraft if the applicant has no previous relevant technical training; or
 - (ii) 3 years of practical maintenance experience on operating aircraft and completion of training considered relevant by the competent authority as a skilled worker, in a technical trade; or
 - (iii) 2 years of practical maintenance experience on operating aircraft and completion of a basic training course approved in accordance with Annex IV (Part-147);
 - 3. for category C with respect to large aircraft:
 - (i) 3 years of experience exercising category B1.1, B1.3 or B2 privileges on large aircraft or as support staff according to point 145.A.35, or, a combination of both; or
 - (ii) 5 years of experience exercising category B1.2 or B1.4 privileges on large aircraft or as support staff according to point 145.A.35, or a combination of both;
 - 4. for category C with respect to other than large aircraft: 3 years of experience exercising category B1 or B2 privileges on other than large aircraft or as support staff according to point 145.A.35(a), or a combination of both;
 - 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 competent authority, 3 years of experience working in a civil aircraft maintenance environment on a representative selection of tasks directly associated with aircraft maintenance including 6 months of observation of base maintenance tasks.
- (b) An applicant for an extension to an aircraft maintenance licence shall have a minimum civil aircraft maintenance experience requirement appropriate to the additional category or subcategory of licence applied for as defined in Appendix IV to this Annex (Part-66).

- (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 aircraft maintenance licence is sought. For subsequent category/subcategory additions to an existing aircraft maintenance licence, 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 licence category/subcategory held and applied for. Such additional experience shall be typical of the new licence category/subcategory sought.
- (e) Notwithstanding point (a), aircraft maintenance experience gained outside a civil aircraft maintenance environment shall be accepted when such maintenance is equivalent to that required by this Annex (Part-66) as established by the competent authority. Additional experience of civil aircraft maintenance shall, however, be required to ensure adequate understanding of the civil aircraft maintenance environment.
- (f) Experience shall have been acquired within the 10 years preceding the application for an aircraft maintenance licence or the addition of a category or subcategory to such a licence.

66.A.40 Continued validity of the aircraft maintenance licence

- (a) The aircraft maintenance licence becomes invalid 5 years after its last issue or change, unless the holder submits his/her aircraft maintenance licence to the competent authority that issued it, in order to verify that the information contained in the licence is the same as that contained in the competent authority records, pursuant to point 66.B.120.
- (b) The holder of an aircraft maintenance licence shall complete the relevant parts of EASA Form 19 (see Appendix V) and submit it with the holder's copy of the licence to the competent authority that issued the original aircraft maintenance licence, unless the holder works in a maintenance organisation approved in accordance with Annex II (Part-145) that has a procedure in its exposition whereby such organisation may submit the necessary documentation on behalf of the aircraft maintenance licence holder.
- (c) Any certification privilege based upon a aircraft maintenance licence becomes invalid as soon as the aircraft maintenance licence is invalid.
- (d) The aircraft maintenance licence is only valid (i) when issued and/or changed by the competent authority and (ii) when the holder has signed the document.

66.A.45 Endorsement with aircraft ratings

- (a) In order to be entitled to exercise certification privileges on a specific aircraft type, the holder of an aircraft maintenance licence need to have his/her licence endorsed with the relevant aircraft ratings.
 - For category B1, B2 or C the relevant aircraft ratings are the following:
 - 1. For group 1 aircraft, the appropriate aircraft type rating.
 - 2. For group 2 aircraft, the appropriate aircraft type rating, manufacturer sub-group rating or full sub-group rating.
 - 3. For group 3 aircraft, the appropriate aircraft type rating or full group rating.
 - For category B3, the relevant rating is 'piston-engine non-pressurised aeroplanes of 2 000 kg MTOM and below'.
 - For category A, no rating is required, subject to compliance with the requirements of point 145.A.35 of Annex II (Part-145).
- (b) The endorsement of aircraft type ratings requires the satisfactory completion of the relevant category B1, B2 or C aircraft type training.
- (c) In addition to the requirement of point (b), the endorsement of the first aircraft type rating within a given category/sub-category requires satisfactory completion of the corresponding On the Job Training, as described in Appendix III to Annex III (Part-66).

(d) By derogation from points (b) and (c), for group 2 and 3 aircraft, aircraft type ratings may also be granted after:

- satisfactory completion of the relevant category B1, B2 or C aircraft type examination described in Appendix III to this Annex (Part-66), and
- in the case of B1 and B2 category, demonstration of practical experience on the aircraft type. In that case, the practical experience shall include a representative cross section of maintenance activities relevant to the licence category.

In the case of a category C rating for a person qualified by holding an academic degree as specified in point 66.A.30(a)(5), the first relevant aircraft type examination shall be at the category B1 or B2 level.

(e) For group 2 aircraft:

1. the endorsement of manufacturer sub-group ratings for category B1 and C licence holders requires complying with the aircraft type rating requirements of at least two aircraft types from the same manufacturer which combined are representative of the applicable manufacturer sub-group;
2. the endorsement of full sub-group ratings for category B1 and C licence holders requires complying with the aircraft type rating requirements of at least three aircraft types from different manufacturers which combined are representative of the applicable sub-group;
3. the endorsement of manufacturer sub-groups and full sub-group ratings for category B2 licence holders requires demonstration of practical experience which shall include a representative cross section of maintenance activities relevant to the licence category and to the applicable aircraft sub-group.

(f) For group 3 aircraft:

1. the endorsement of the full group 3 rating for category B1, B2 and C licence holders requires demonstration of practical experience, which shall include a representative cross section of maintenance activities relevant to the licence category and to the group 3.
2. for category B1, unless the applicant provides evidence of appropriate experience, the group 3 rating shall be subject to the following limitations, which shall be endorsed on the licence:
 - pressurised aeroplanes
 - metal structure aeroplanes
 - composite structure aeroplanes
 - wooden structure aeroplanes
 - aeroplanes with metal tubing structure covered with fabric.

(g) For the B3 licence:

1. the endorsement of the rating 'piston-engine non-pressurised aeroplanes of 2 000 kg MTOM and below' requires demonstration of practical experience which shall include a representative cross-section of maintenance activities relevant to the licence category.
2. unless the applicant provides evidence of appropriate experience, the rating referred to in point 1 shall be subject to the following limitations, which shall be endorsed on the licence:
 - wooden structure aeroplanes
 - aeroplanes with metal tubing structure covered with fabric
 - metal structure aeroplanes
 - composite structure aeroplanes.

66.A.50 Limitations

- (a) Limitations introduced on an aircraft maintenance licence are exclusions from the certification privileges and affect the aircraft in its entirety.

- (b) For limitations referred to in point 66.A.45, limitations shall be removed upon:
 - 1. demonstration of appropriate experience; or
 - 2. after a satisfactory practical assessment performed by the competent authority.
- (c) For limitations referred to in point 66.A.70, limitations shall be removed upon satisfactory completion of examination on those modules/subjects defined in the applicable conversion report referred to in point 66.B.300.

66.A.55 Evidence of qualification

Personnel exercising certification privileges as well as support staff shall produce their licence, as evidence of qualification, within 24 hours upon request by an authorised person.

66.A.70 Conversion provisions

- (a) The holder of a certifying staff qualification valid in a Member State, prior to the date of entry into force of Annex III (Part-66) shall be issued an aircraft maintenance licence by the competent authority of this Member State without further examination subject to the conditions specified in Section B Subpart D.
- (b) A person undergoing a certifying staff qualification process valid in a Member State, prior to the date of entry into force of Annex III (Part-66) may continue to be qualified. The holder of a certifying staff qualification gained following such process shall be issued an aircraft maintenance licence by the competent authority of this Member State without further examination subject to the conditions specified in Section B Subpart D.
- (c) Where necessary, the aircraft maintenance licence shall contain limitations in accordance with point 66.A.50 to reflect the differences between (i) the scope of the certifying staff qualification valid in the Member State before the entry into force of Regulation (EC) No 2042/2003 and (ii) the basic knowledge requirements and the basic examination standards laid down in Appendix I and II to this Annex (Part-66).
- (d) By derogation to point (c) for aircraft not involved in commercial air transport other than large aircraft, the aircraft maintenance licence shall contain limitations in accordance with point 66.A.50 to ensure that the certifying staff privileges valid in the Member State before the entry into force of Regulation (EC) No 2042/2003 and the privileges of the converted Part-66 aircraft maintenance licence remain the same.

SECTION B

PROCEDURES FOR COMPETENT AUTHORITIES

SUBPART A

GENERAL

66.B.1 Scope

This section establishes the procedures including the administrative requirements to be followed by the competent authorities in charge of the implementation and the enforcement of Section A of this Annex (Part-66).

66.B.10 Competent authority

- (a) General

The Member State shall designate a competent authority with allocated responsibilities for the issuance, continuation, change, suspension or revocation of aircraft maintenance licences.

This competent authority shall establish an adequate organisational structure to ensure compliance with this Annex (Part-66).

(b) Resources

The competent authority shall be appropriately staffed to ensure the implementation of the requirements of this Annex (Part-66).

(c) Procedures

The competent authority shall establish documented procedures detailing how compliance with this Annex (Part-66) is accomplished. These procedures shall be reviewed and amended to ensure continued compliance.

66.B.20 Record-keeping

- (a) The competent authority shall establish a system of record-keeping that allows adequate traceability of the process to issue, revalidate, change, suspend or revoke each aircraft maintenance licence.
- (b) These records shall include for each licence:
 - 1. the application for an aircraft maintenance licence or change to that licence, including all supporting documentation;
 - 2. a copy of the aircraft maintenance licence including any changes;
 - 3. copies of all relevant correspondence;
 - 4. details of any exemption and enforcement actions;
 - 5. any report from other competent authorities relating to the aircraft maintenance licence holder;
 - 6. the records of examinations conducted by the competent authority;
 - 7. the applicable conversion report used for conversion;
 - 8. the applicable credit report used for crediting.
- (c) Records referred to in points 1 to 5 of point (b) shall be kept at least 5 years after the end of the licence validity.
- (d) Records referred to in points 6, 7 and 8 of point (b) shall be kept for an unlimited period.

66.B.25 Mutual exchange of information

- (a) In order to implement the requirement of this Regulation, the competent authorities shall participate in a mutual exchange of information in accordance with Article 15 of Regulation (EC) No 216/2008.
- (b) Without prejudice to the competencies of the Member States, in the case of a potential safety threat involving several Member States, the concerned competent authorities shall assist each other in carrying out the necessary oversight action.

66.B.30 Exemptions

All exemptions granted in accordance with Article 14.4 of Regulation (EC) No 216/2008 shall be recorded and retained by the competent authority.

SUBPART B

ISSUE OF AN AIRCRAFT MAINTENANCE LICENCE

This Subpart provides the procedures to be followed by the competent authority to issue, change or continue an aircraft maintenance licence.

66.B.100 Procedure for the issue of an aircraft maintenance licence by the competent authority

- (a) On receipt of EASA Form 19 and any supporting documentation, the competent authority shall verify EASA Form 19 for completeness and ensure that the experience claimed meets the requirement of this Annex (Part-66).
- (b) The competent authority 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 this Annex (Part-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 this Annex (Part-66), the competent authority shall issue the relevant aircraft maintenance licence to the applicant. The same information shall be kept on competent authority records.
- (d) In the case where aircraft types or groups are endorsed at the time of the issuance of the first aircraft maintenance licence, the competent authority shall verify compliance with point 66.B.115.

66.B.105 Procedure for the issue of an aircraft maintenance licence via a maintenance organisation approved in accordance with Annex II (Part-145)

- (a) A maintenance organisation approved in accordance with Annex II (Part-145), when authorised to carry out this activity by the competent authority, may (i) prepare the aircraft maintenance licence on behalf of the competent authority or (ii) make recommendations to the competent authority regarding the application from an individual for a aircraft maintenance licence so that the competent authority may prepare and issue such licence.
- (b) Maintenance organisations referred to in point (a) shall ensure compliance with points 66.B.100 (a) and (b).
- (c) In all cases, the aircraft maintenance licence can only be issued to the applicant by the competent authority.

66.B.110 Procedure for the change of an aircraft maintenance licence to include an additional basic category or subcategory

- (a) At the completion of the procedures specified in points 66.B.100 or 66.B.105, the competent authority shall endorse the additional basic category or subcategory on the aircraft maintenance licence by stamp and signature or reissue the licence.
- (b) The competent authority record system shall be changed accordingly.

66.B.115 Procedure for the change of an aircraft maintenance licence to include an aircraft rating or to remove limitations

- (a) On receipt of a satisfactory EASA Form 19 and any supporting documentation demonstrating compliance with the requirements of the applicable rating together with the accompanying aircraft maintenance licence, the competent authority shall either:
 - 1. endorse the applicant's aircraft maintenance licence with the applicable aircraft rating; or
 - 2. reissue the said licence to include the applicable aircraft rating; or
 - 3. remove the applicable limitations in accordance with point 66.A.50.

The competent authority record system shall be changed accordingly.

- (b) In the case where the complete type training is not conducted by maintenance training organisation appropriately approved in accordance with Annex IV (Part-147), the competent authority shall be satisfied that all type training requirements are complied with before the type rating is issued.

- (c) In the case where the On the Job Training is not required, the aircraft type rating shall be endorsed based on a Certificate of Recognition issued by a maintenance training organisation approved in accordance with Annex IV (part-147).
- (d) In the case where the aircraft type training is not covered by a single course, the competent authority shall be satisfied prior to the type rating endorsement that the content and length of the courses fully satisfy the scope of the licence category and that the interface areas have been appropriately addressed.
- (e) In the case of differences training, the competent authority shall be satisfied that (i) the applicant's previous qualification, supplemented by (ii) either a course approved in accordance with Annex IV (Part-147) or a course directly approved by the competent authority, are acceptable for type rating endorsement.
- (f) Compliance with the practical elements shall be demonstrated (i) by the provision of detailed practical training records or a logbook provided by a maintenance organisation appropriately approved in accordance with Annex II (Part-145) or, where available, (ii) by a training certificate covering the practical training element issued by a maintenance training organisation appropriately approved in accordance with Annex IV (part-147).
- (g) Aircraft type endorsement shall use the aircraft type ratings specified by the Agency.

66.B.120 Procedure for the renewal of an aircraft maintenance licence validity

- (a) The competent authority shall compare the holder's aircraft maintenance licence with the competent authority records and verify any pending revocation, suspension or change action pursuant to point 66.B.500. If the documents are identical and no action is pending pursuant to point 66.B.500, the holder's copy shall be renewed for 5 years and the file endorsed accordingly.
- (b) If the competent authority records are different from the aircraft maintenance licence held by the licence holder:
 - 1. the competent authority shall investigate the reasons for such differences and may choose not to renew the aircraft maintenance licence.
 - 2. the competent authority shall inform the licence holder and any known maintenance organisation approved in accordance with Annex I (Part-M) Subpart F or Annex II (Part-145) that may be directly affected of such fact.
 - 3. the competent authority shall, if necessary, take action in accordance with point 66.B.500 to revoke, suspend or change the licence in question.

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

- (a) Individual aircraft type ratings already endorsed on the aircraft maintenance licence referred to in point 4 of Article 5 shall remain on the licence and shall not be converted to new ratings unless the licence holder fully meets the requirements for endorsement defined in point 66.A.45 of this Annex (Part-66) for the corresponding group/sub-group ratings.
- (b) The conversion shall be performed in accordance with the following conversion table:
 - 1. for category B1 or C:
 - helicopter piston engine, full group: converted to 'full sub-group 2c' plus the aircraft type ratings for those single piston engine helicopters which are in group 1,
 - helicopter piston engine, manufacturer group: converted to the corresponding 'manufacturer sub-group 2c' plus the aircraft type ratings for those single piston engine helicopters of that manufacturer which are in group 1,
 - helicopter turbine engine, full group: converted to 'full sub-group 2b' plus the aircraft type ratings for those single turbine engine helicopters which are in group 1,
 - helicopter turbine engine, manufacturer group: converted to the corresponding 'manufacturer sub-group 2b' plus the aircraft type ratings for those single turbine engine helicopters of that manufacturer which are in group 1,

- aeroplane single piston engine — metal structure, either full group or manufacturer group: converted to 'full group 3'. For the B1 licence the following limitations shall be included: composite structure aeroplanes, wooden structure aeroplanes and metal tubing and fabric aeroplanes,
- aeroplane multiple piston engines — metal structure, either full group or manufacturer group: converted to 'full group 3'. For the B1 licence the following limitations shall be included: composite structure aeroplanes, wooden structure aeroplanes and metal tubing and fabric aeroplanes,
- aeroplane single piston engine — wooden structure, either full group or manufacturer group: converted to 'full group 3'. For the B1 licence the following limitations shall be included: metal structure aeroplanes, composite structure aeroplanes and metal tubing and fabric aeroplanes,
- aeroplane multiple piston engine — wooden structure, either full group or manufacturer group: converted to 'full group 3'. For the B1 licence the following limitations shall be included: metal structure aeroplanes, composite structure aeroplanes and metal tubing and fabric aeroplanes,
- aeroplane single piston engine — composite structure, either full group or manufacturer group: converted to 'full group 3'. For the B1 licence the following limitations shall be included: metal structure aeroplanes, wooden structure aeroplanes and metal tubing and fabric aeroplanes,
- aeroplane multiple piston engine — composite structure, either full group or manufacturer group: converted to 'full group 3'. For the B1 licence the following limitations shall be included: metal structure aeroplanes, wooden structure aeroplanes and metal tubing and fabric aeroplanes,
- aeroplane turbine — single engine, full group: converted to 'full sub-group 2a' plus the aircraft type ratings for those single turboprop aeroplanes which did not require an aircraft type rating in the previous system and are in group 1,
- aeroplane turbine — single engine, manufacturer group: converted to the corresponding 'manufacturer sub-group 2a' plus the aircraft type ratings for those single turboprop aeroplanes of that manufacturer which did not require an aircraft type rating in the previous system and are in group 1,
- aeroplane turbine — multiple engine, full group: converted to the aircraft type ratings for those multiple turboprop aeroplanes which did not require an aircraft type rating in the previous system;

2. for category B2:

- aeroplane: converted to 'full sub-group 2a' and 'full group 3', plus the aircraft type ratings for those aeroplanes which did not require an aircraft type rating in the previous system and are in group 1,
- helicopter: converted to 'full sub-groups 2b and 2c', plus the aircraft type ratings for those helicopters which did not require an aircraft type rating in the previous system and are in group 1;

3. for category C:

- aeroplane: converted to 'full sub-group 2a' and 'full group 3', plus the aircraft type ratings for those aeroplanes which did not require an aircraft type rating in the previous system and are in group 1,
- helicopter: converted to 'full sub-groups 2b and 2c', plus the aircraft type ratings for those helicopters which did not require an aircraft type rating in the previous system and are in group 1.

- (c) If the licence was subject to limitations following the conversion process referred to in point 66.A.70, these limitations shall remain on the licence, unless they are removed under the conditions defined in the relevant conversion report referred to in point 66.B.300.

66.B.130 Procedure for the direct approval of aircraft type training

The competent authority may approve aircraft type training not conducted by a maintenance training organisation approved in accordance with Annex IV (Part-147), pursuant to point 1 of Appendix III to this Annex (part-66). In such case the competent authority shall have a procedure to ensure the aircraft type training complies with Appendix III of this Annex (Part-66).

SUBPART C**EXAMINATIONS**

This Subpart provides the procedures to be followed for the examinations conducted by the competent authority.

66.B.200 Examination by the competent authority

- (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 competent authority 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 to this Annex (Part-66).
- (d) Type training examinations and type examinations shall follow the standard specified in Appendix III to this Annex (Part-66).
- (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) Apart from specific documentation needed for type examinations, 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.

SUBPART D**CONVERSION OF CERTIFYING STAFF QUALIFICATIONS**

This Subpart provides the procedures for the conversion of certifying staff qualifications referred to in point 66.A.70 to aircraft maintenance licences.

66.B.300 General

- (a) The competent authority may only convert qualifications (i) obtained in the Member State for which it is competent, without prejudice to bilateral agreements and (ii) valid prior to the entry into force of the applicable requirements of this Annex (Part-66).
- (b) The competent authority may only perform the conversion in accordance with a conversion report established pursuant to points 66.B.305 or 66.B.310, as applicable.
- (c) Conversion reports shall be either (i) developed by the competent authority or (ii) approved by the competent authority to ensure compliance with this Annex (Part-66).
- (d) Conversion reports together with any change of these shall be kept on record by the competent authority in accordance with point 66.B.20.

66.B.305 Conversion report for national qualifications

- (a) The conversion report for national certifying staff qualifications 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 aircraft maintenance licence it will be converted; and
 - 2. which limitations shall be added in accordance with points 66.A.70(c) or (d), as applicable; and
 - 3. the conditions to remove the limitations, specifying the module/subjects on which examination is needed to remove the limitations and obtain a full aircraft maintenance licence, or to include an additional (sub-) category. This shall include the modules defined in Appendix III to this Annex (Part-66) not covered by the national qualification.

66.B.310 Conversion report for approved maintenance organisations authorisations

- (a) For each approved maintenance organisation concerned, the conversion report shall describe the scope of each type of authorisation issued by the maintenance organisation and include a copy of the relevant approved maintenance organisation'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 authorisation referred to in point (a):
 - 1. to which aircraft maintenance licence it will be converted, and
 - 2. which limitations shall be added in accordance with points 66.A.70(c) or (d), as applicable, and
 - 3. the conditions to remove the limitations, specifying the module/subjects on which examination is needed to remove the limitations and obtain a full aircraft maintenance licence, or to include an additional (sub-) category. This shall include the modules defined in Appendix III to this Annex (Part-66) not covered by the national qualification.

SUBPART E

EXAMINATION CREDITS

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

66.B.400 General

- (a) The competent authority may only grant credit on the basis of a credit report prepared in accordance with point 66.B.405.
- (b) The credit report shall be either (i) developed by the competent authority or (ii) approved by the competent authority to ensure compliance with this Annex (Part-66).
- (c) Credit reports together with any change of these shall be dated and kept on record by the competent authority in accordance with point 66.B.20.

66.B.405 Examination credit report

- (a) The credit report shall include a comparison between:
 - (i) the modules, sub-modules, subjects and knowledge levels contained in Appendix I to this Annex (Part-66), as applicable; and
 - (ii) 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 Annex IV (Part-147), can only be granted by the competent authority of the Member State in which the qualification has been obtained, without prejudice to bilateral agreements.

- (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 competent authority shall check on a regular basis whether (i) the national qualification standard or (ii) Appendix I to this Annex (Part-66) have changed and assess if changes to the credit report are consequently required. Such changes shall be documented, dated and recorded.

66.B.410 **Examination credit validity**

- (a) The competent authority shall notify to the applicant in writing 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 competent authority 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 to this Annex (Part-66) have not been changed.

SUBPART F

CONTINUING OVERSIGHT

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

66.B.500 **Revocation, suspension or limitation of the aircraft maintenance licence**

The competent authority shall suspend, limit or revoke the aircraft maintenance licence 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:

1. obtaining the aircraft maintenance licence and/or the certification privileges by falsification of documentary evidence;
2. failing to carry out requested maintenance combined with failure to report such fact to the organisation or person who requested the maintenance;
3. failing to carry out required maintenance resulting from own inspection combined with failure to report such fact to the organisation or person for whom the maintenance was intended to be carried out;
4. negligent maintenance;
5. falsification of the maintenance record;
6. issuing a certificate of release to service knowing that the maintenance specified on the certificate of release to service has not been carried out or without verifying that such maintenance has been carried out;
7. carrying out maintenance or issuing a certificate of release to service when adversely affected by alcohol or drugs;
8. issuing certificate of release to service while not in compliance with Annex I (Part-M), Annex II (Part-145) or Annex III (Part-66).

Appendix I

Basic Knowledge Requirements**1. Knowledge levels for Category A, B1, B2, B3 and C Aircraft Maintenance Licence**

Basic knowledge for categories A, B1, B2 and B3 are indicated by knowledge levels (1, 2 or 3) against each applicable subject. Category C applicants shall meet either the category B1 or the category B2 basic knowledge levels.

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 aircraft maintenance licence 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 | B3 |
|----------------|-------------------------|------------------|--------------------------|------------------|----------|--|
| | Turbine engine(s) | Piston engine(s) | Turbine engine(s) | Piston engine(s) | Avionics | Piston-engine non-pressurised aeroplanes 2 000 kg MTOM and below |
| 1 | X | X | X | X | X | X |
| 2 | X | X | X | X | X | X |
| 3 | X | X | X | X | X | X |
| 4 | X | X | X | X | X | X |
| 5 | X | X | X | X | X | X |
| 6 | X | X | X | X | X | X |
| 7A | X | X | X | X | X | |
| 7B | | | | | | X |
| 8 | X | X | X | X | X | X |
| 9A | X | X | X | X | X | |
| 9B | | | | | | X |
| 10 | X | X | X | X | X | X |
| 11A | X | | | | | |
| 11B | | X | | | | |
| 11C | | | | | | X |
| 12 | | | X | X | | |
| 13 | | | | | X | |
| 14 | | | | | X | |
| 15 | X | | X | | | |
| 16 | | X | | X | | X |
| 17A | X | X | | | | |
| 17B | | | | | | X |

MODULE 1. MATHEMATICS

| | LEVEL | | | |
|---|-------|----|----|----|
| | A | B1 | B2 | B3 |
| 1.1 <i>Arithmetic</i> 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 | 2 |

| | LEVEL | | | |
|--|-------|----|----|----|
| | A | B1 | B2 | B3 |
| 1.2 <i>Algebra</i> | | | | |
| (a) Evaluating simple algebraic expressions, addition, subtraction, multiplication and division, use of brackets, simple algebraic fractions; | 1 | 2 | 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 |
| 1.3 <i>Geometry</i> | | | | |
| (a) Simple geometrical constructions; | — | 1 | 1 | 1 |
| (b) Graphical representation; nature and uses of graphs, graphs of equations/functions; | 2 | 2 | 2 | 2 |
| (c) Simple trigonometry; trigonometrical relationships, use of tables and rectangular and polar coordinates. | — | 2 | 2 | 2 |

MODULE 2. PHYSICS

| | LEVEL | | | |
|---|-------|----|----|----|
| | A | B1 | B2 | B3 |
| 2.1 <i>Matter</i> | 1 | 1 | 1 | 1 |
| Nature of matter: the chemical elements, structure of atoms, molecules; Chemical compounds; States: solid, liquid and gaseous; Changes between states. | | | | |
| 2.2 <i>Mechanics</i> | | | | |
| 2.2.1 <i>Statics</i> | 1 | 2 | 1 | 1 |
| Forces, moments and couples, representation as vectors; Centre of gravity; Elements of theory of stress, strain and elasticity: tension, compression, shear and torsion; Nature and properties of solid, fluid and gas; Pressure and buoyancy in liquids (barometers). | | | | |
| 2.2.2 <i>Kinetics</i> | 1 | 2 | 1 | 1 |
| 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. | | | | |
| 2.2.3 <i>Dynamics</i> | | | | |
| (a) Mass; Force, inertia, work, power, energy (potential, kinetic and total energy), heat, efficiency; | 1 | 2 | 1 | 1 |
| (b) Momentum, conservation of momentum; Impulse; Gyroscopic principles; Friction: nature and effects, coefficient of friction (rolling resistance). | 1 | 2 | 2 | 1 |

| | LEVEL | | | |
|--|-------|----|----|----|
| | A | B1 | B2 | B3 |
| 2.2.4 <i>Fluid dynamics</i> | | | | |
| (a) Specific gravity and density; | 2 | 2 | 2 | 2 |
| (b) Viscosity, fluid resistance, effects of streamlining; Effects of compressibility on fluids; Static, dynamic and total pressure: Bernoulli's Theorem, venturi. | 1 | 2 | 1 | 1 |
| 2.3 <i>Thermodynamics</i> | | | | |
| (a) Temperature: thermometers and temperature scales: Celsius, Fahrenheit and Kelvin; Heat definition; | 2 | 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 | 1 |
| 2.4 <i>Optics (Light)</i> | — | 2 | 2 | — |
| Nature of light; speed of light; Laws of reflection and refraction: reflection at plane surfaces, reflection by spherical mirrors, refraction, lenses; Fibre optics. | | | | |
| 2.5 <i>Wave Motion and Sound</i> | — | 2 | 2 | — |
| Wave motion: mechanical waves, sinusoidal wave motion, interference phenomena, standing waves; Sound: speed of sound, production of sound, intensity, pitch and quality, Doppler effect. | | | | |

MODULE 3. ELECTRICAL FUNDAMENTALS

| | LEVEL | | | |
|--|-------|----|----|----|
| | A | B1 | B2 | B3 |
| 3.1 <i>Electron Theory</i> | 1 | 1 | 1 | 1 |
| Structure and distribution of electrical charges within: atoms, molecules, ions, compounds; Molecular structure of conductors, semiconductors and insulators. | | | | |
| 3.2 <i>Static Electricity and Conduction</i> | 1 | 2 | 2 | 1 |
| 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. | | | | |
| 3.3 <i>Electrical Terminology</i> | 1 | 2 | 2 | 1 |
| The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow. | | | | |

| | | LEVEL | | | |
|-----|---|-------|----|----|----|
| | | A | B1 | B2 | B3 |
| 3.4 | <i>Generation of Electricity</i> Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion. | 1 | 1 | 1 | 1 |
| 3.5 | <i>DC Sources of Electricity</i> Construction and basic chemical action of: primary cells, secondary cells, lead acid cells, nickel cadmium cells, other alkaline cells; Cells connected in series and parallel; Internal resistance and its effect on a battery; Construction, materials and operation of thermocouples; Operation of photo-cells. | 1 | 2 | 2 | 2 |
| 3.6 | <i>DC Circuits</i> Ohms Law, Kirchoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage and current; Significance of the internal resistance of a supply. | — | 2 | 2 | 1 |
| 3.7 | <i>Resistance/Resistor</i> (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; (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. | — | 2 | 2 | 1 |
| 3.8 | <i>Power</i> Power, work and energy (kinetic and potential); Dissipation of power by a resistor; Power formula; Calculations involving power, work and energy. | — | 2 | 2 | 1 |
| 3.9 | <i>Capacitance/Capacitor</i> 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 | 1 |

| | | LEVEL | | | |
|------|---|-------|----|----|----|
| | | A | B1 | B2 | B3 |
| 3.10 | <i>Magnetism</i> | | | | |
| | (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 | 1 |
| | (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 | 1 |
| 3.11 | <i>Inductance/Inductor</i> | — | 2 | 2 | 1 |
| | 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. | | | | |
| 3.12 | <i>DC Motor/Generator Theory</i> | — | 2 | 2 | 1 |
| | Basic motor and generator theory; Construction and purpose of components in DC generator; Operation of, and factors affecting output and direction of current flow in DC generators; Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors; Series wound, shunt wound and compound motors; Starter Generator construction. | | | | |
| 3.13 | <i>AC Theory</i> | 1 | 2 | 2 | 1 |
| | 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. | | | | |

| | LEVEL | | | |
|--|-------|----|----|----|
| | A | B1 | B2 | B3 |
| 3.14 <i>Resistive (R), Capacitive (C) and Inductive (L) Circuits</i> 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 | 1 |
| 3.15 <i>Transformers</i> 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 | 1 |
| 3.16 <i>Filters</i> Operation, application and uses of the following filters: low pass, high pass, band pass, band stop. | — | 1 | 1 | — |
| 3.17 <i>AC Generators</i> 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 | 1 |
| 3.18 <i>AC Motors</i> 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 | 1 |

MODULE 4. ELECTRONIC FUNDAMENTALS

| | LEVEL | | | |
|---|-------|----|----|----|
| | A | B1 | B2 | B3 |
| 4.1 <i>Semiconductors</i> | | | | |
| 4.1.1 <i>Diodes</i> | | | | |
| (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 | 1 |

| | LEVEL | | | |
|---|-------|----|----|----|
| | A | B1 | B2 | B3 |
| <p>(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.</p> | — | — | 2 | — |
| 4.1.2 <i>Transistors</i> | | | | |
| <p>(a) Transistor symbols; Component description and orientation; Transistor characteristics and properties.</p> | — | 1 | 2 | 1 |
| <p>(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.</p> | — | — | 2 | — |
| 4.1.3 <i>Integrated Circuits</i> | | | | |
| <p>(a) Description and operation of logic circuits and linear circuits/operational amplifiers;</p> | — | 1 | — | 1 |
| <p>(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.</p> | — | — | 2 | — |
| 4.2 <i>Printed Circuit Boards</i> | — | 1 | 2 | — |
| Description and use of printed circuit boards. | | | | |
| 4.3 <i>Servomechanisms</i> | | | | |
| <p>(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;</p> | — | 1 | — | — |
| <p>(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.</p> | — | — | 2 | — |

MODULE 5. DIGITAL TECHNIQUES/ELECTRONIC INSTRUMENT SYSTEMS

| | LEVEL | | | | |
|--|--------|--------------|--------------|--------|--------|
| | A | B1-1 B1-3 | B1-2 B1-4 | B2 | B3 |
| 5.1 <i>Electronic Instrument Systems</i> Typical systems arrangements and cockpit layout of electronic instrument systems. | 1 | 2 | 2 | 3 | 1 |
| 5.2 <i>Numbering Systems</i> 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 <i>Data Conversion</i> 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 <i>Data Buses</i> Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications. Aircraft Network/Ethernet. | — | 2 | — | 2 | — |
| 5.5 <i>Logic Circuits</i> (a) Identification of common logic gate symbols, tables and equivalent circuits; Applications used for aircraft systems, schematic diagrams. (b) Interpretation of logic diagrams. | — — | 2 — | — — | 2 2 | 1 — |
| 5.6 <i>Basic Computer Structure</i> (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). (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 multiaddress instruction words; Memory associated terms; Operation of typical memory devices; Operation, advantages and disadvantages of the various data storage systems. | 1 — | 2 — | — — | — 2 | — — |
| 5.7 <i>Microprocessors</i> 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 <i>Integrated Circuits</i> Operation and use of encoders and decoders; Function of encoder types; Uses of medium, large and very large scale integration. | — | — | — | 2 | — |
| 5.9 <i>Multiplexing</i> Operation, application and identification in logic diagrams of multiplexers and demultiplexers. | — | — | — | 2 | — |

| | LEVEL | | | | |
|--|-------|--------------|--------------|----|----|
| | A | B1-1 B1-3 | B1-2 B1-4 | B2 | B3 |
| 5.10 <i>Fibre Optics</i> Advantages and disadvantages of fibre optic data transmission over electrical wire propagation; Fibre optic data bus; Fibre optic related terms; Terminations; Couplers, control terminals, remote terminals; Application of fibre optics in aircraft systems. | — | 1 | 1 | 2 | — |
| 5.11 <i>Electronic Displays</i> Principles of operation of common types of displays used in modern aircraft, including Cathode Ray Tubes, Light Emitting Diodes and Liquid Crystal Display. | — | 2 | 1 | 2 | 1 |
| 5.12 <i>Electrostatic Sensitive Devices</i> Special handling of components sensitive to electrostatic discharges; Awareness of risks and possible damage, component and personnel anti-static protection devices. | 1 | 2 | 2 | 2 | 1 |
| 5.13 <i>Software Management Control</i> Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes. | — | 2 | 1 | 2 | 1 |
| 5.14 <i>Electromagnetic Environment</i> Influence of the following phenomena on maintenance practices for electronic system: EMC-Electromagnetic Compatibility EMI-Electromagnetic Interference HIRF-High Intensity Radiated Field Lightning/lightning protection. | — | 2 | 2 | 2 | 1 |
| 5.15 <i>Typical Electronic/Digital Aircraft Systems</i> General arrangement of typical electronic/digital aircraft systems and associated BITE (Built In Test Equipment) such as: (a) For B1 and B2 only: 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; (b) For B1, B2 and B3: 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. | — | 2 | 2 | 2 | 1 |

MODULE 6. MATERIALS AND HARDWARE

| | | LEVEL | | | |
|-------|--|-------|----|----|----|
| | | A | B1 | B2 | B3 |
| 6.1 | <i>Aircraft Materials — Ferrous</i> | | | | |
| | (a) Characteristics, properties and identification of common alloy steels used in aircraft; Heat treatment and application of alloy steels. | 1 | 2 | 1 | 2 |
| | (b) Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance. | — | 1 | 1 | 1 |
| 6.2 | <i>Aircraft Materials — Non-Ferrous</i> | | | | |
| | (a) Characteristics, properties and identification of common non-ferrous materials used in aircraft; Heat treatment and application of non-ferrous materials; | 1 | 2 | 1 | 2 |
| | (b) Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance. | — | 1 | 1 | 1 |
| 6.3 | <i>Aircraft Materials — Composite and Non-Metallic</i> | | | | |
| 6.3.1 | <i>Composite and non-metallic other than wood and fabric</i> | | | | |
| | (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 | 2 |
| | (b) The detection of defects/deterioration in composite and non-metallic material; Repair of composite and non-metallic material. | 1 | 2 | — | 2 |
| 6.3.2 | <i>Wooden structures</i> | 1 | 2 | — | 2 |
| | Construction methods of wooden airframe structures; Characteristics, properties and types of wood and glue used in aeroplanes; Preservation and maintenance of wooden structure; Types of defects in wood material and wooden structures; The detection of defects in wooden structure; Repair of wooden structure. | | | | |
| 6.3.3 | <i>Fabric covering</i> | 1 | 2 | — | 2 |
| | Characteristics, properties and types of fabrics used in aeroplanes; Inspections methods for fabric; Types of defects in fabric; Repair of fabric covering. | | | | |
| 6.4 | <i>Corrosion</i> | | | | |
| | (a) Chemical fundamentals; Formation by, galvanic action process, microbiological, stress; | 1 | 1 | 1 | 1 |
| | (b) Types of corrosion and their identification; Causes of corrosion; Material types, susceptibility to corrosion. | 2 | 3 | 2 | 2 |
| 6.5 | <i>Fasteners</i> | | | | |
| 6.5.1 | <i>Screw threads</i> | 2 | 2 | 2 | 2 |
| | Screw nomenclature; Thread forms, dimensions and tolerances for standard threads used in aircraft; Measuring screw threads. | | | | |
| 6.5.2 | <i>Bolts, studs and screws</i> | 2 | 2 | 2 | 2 |
| | Bolt types: specification, identification and marking of aircraft bolts, international standards; Nuts: self locking, anchor, standard types; | | | | |

| | LEVEL | | | |
|--|--------|--------|--------|--------|
| | A | B1 | B2 | B3 |
| Machine screws: aircraft specifications; Studs: types and uses, insertion and removal; Self tapping screws, dowels. | | | | |
| 6.5.3 <i>Locking devices</i> Tab and spring washers, locking plates, split pins, pal-nuts, wire locking, quick release fasteners, keys, circlips, cotter pins. | 2 | 2 | 2 | 2 |
| 6.5.4 <i>Aircraft rivets</i> Types of solid and blind rivets: specifications and identification, heat treatment. | 1 | 2 | 1 | 2 |
| 6.6 <i>Pipes and Unions</i> (a) Identification of, and types of rigid and flexible pipes and their connectors used in aircraft; (b) Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes. | 2 2 | 2 2 | 2 1 | 2 2 |
| 6.7 <i>Springs</i> Types of springs, materials, characteristics and applications. | — | 2 | 1 | 1 |
| 6.8 <i>Bearings</i> Purpose of bearings, loads, material, construction; Types of bearings and their application. | 1 | 2 | 2 | 1 |
| 6.9 <i>Transmissions</i> 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 | 1 |
| 6.10 <i>Control Cables</i> Types of cables; End fittings, turnbuckles and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems. | 1 | 2 | 1 | 2 |
| 6.11 <i>Electrical Cables and Connectors</i> 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 | 2 |

MODULE 7A. MAINTENANCE PRACTICES

Note: This module does not apply to category B3. Relevant subject matters for category B3 are defined in module 7B.

| | LEVEL | | |
|--|-------|----|----|
| | A | B1 | B2 |
| 7.1 <i>Safety Precautions-Aircraft and Workshop</i> Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. | 3 | 3 | 3 |

| | | LEVEL | | |
|-----|--|-------|----|----|
| | | A | B1 | B2 |
| | 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. | | | |
| 7.2 | <i>Workshop Practices</i> 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 | <i>Tools</i> 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 | <i>Avionic General Test Equipment</i> Operation, function and use of avionic general test equipment. | — | 2 | 3 |
| 7.5 | <i>Engineering Drawings, Diagrams and Standards</i> Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information; Microfilm, microfiche and computerised presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams. | 1 | 2 | 2 |
| 7.6 | <i>Fits and Clearances</i> Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist and wear; Standard methods for checking shafts, bearings and other parts. | 1 | 2 | 1 |
| 7.7 | <i>Electrical Wiring Interconnection System (EWIS)</i> 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 | <i>Riveting</i> Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints. | 1 | 2 | — |

| | | LEVEL | | |
|--------|--|--------|--------|--------|
| | | A | B1 | B2 |
| 7.9 | <i>Pipes and Hoses</i> Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes. | 1 | 2 | — |
| 7.10 | <i>Springs</i> Inspection and testing of springs. | 1 | 2 | — |
| 7.11 | <i>Bearings</i> Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes. | 1 | 2 | — |
| 7.12 | <i>Transmissions</i> 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 | <i>Control Cables</i> Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems. | 1 | 2 | — |
| 7.14 | <i>Material handling</i> | | | |
| 7.14.1 | <i>Sheet Metal</i> Marking out and calculation of bend allowance; Sheet metal working, including bending and forming; Inspection of sheet metal work. | — | 2 | — |
| 7.14.2 | <i>Composite and non-metallic</i> Bonding practices; Environmental conditions; Inspection methods. | — | 2 | — |
| 7.15 | <i>Welding, Brazing, Soldering and Bonding</i> (a) Soldering methods; inspection of soldered joints. (b) Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints. | — — | 2 2 | 2 — |
| 7.16 | <i>Aircraft Weight and Balance</i> (a) Centre of Gravity/Balance limits calculation: use of relevant documents; (b) Preparation of aircraft for weighing; Aircraft weighing. | — — | 2 2 | 2 — |
| 7.17 | <i>Aircraft Handling and Storage</i> 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; | 2 | 2 | 2 |

| | | LEVEL | | |
|------|---|-------|----|----|
| | | A | B1 | B2 |
| | Electrical, hydraulic and pneumatic ground supplies. | | | |
| | Effects of environmental conditions on aircraft handling and operation. | | | |
| 7.18 | <i>Disassembly, Inspection, Repair and Assembly Techniques</i> | | | |
| | (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 | <i>Abnormal Events</i> | | | |
| | (a) Inspections following lightning strikes and HIRF penetration; | 2 | 2 | 2 |
| | (b) Inspections following abnormal events such as heavy landings and flight through turbulence. | 2 | 2 | — |
| 7.20 | <i>Maintenance Procedures</i> | 1 | 2 | 2 |
| | 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. | | | |

MODULE 7B. MAINTENANCE PRACTICES

Note: The scope of this module shall reflect the technology of aeroplanes relevant to the B3 category.

| | | LEVEL |
|-----|--|-------|
| | | B3 |
| 7.1 | <i>Safety Precautions-Aircraft and Workshop</i> | 3 |
| | 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. | |
| 7.2 | <i>Workshop Practices</i> | 3 |
| | Care of tools, control of tools, use of workshop materials; | |
| | Dimensions, allowances and tolerances, standards of workmanship; | |
| | Calibration of tools and equipment, calibration standards. | |
| 7.3 | <i>Tools</i> | 3 |
| | Common hand tool types; | |
| | Common power tool types; | |

| | | LEVEL |
|------|--|-------|
| | | B3 |
| | Operation and use of precision measuring tools; Lubrication equipment and methods; Operation, function and use of electrical general test equipment. | |
| 7.4 | <i>Avionic General Test Equipment</i> Operation, function and use of avionic general test equipment. | — |
| 7.5 | <i>Engineering Drawings, Diagrams and Standards</i> Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information; Microfilm, microfiche and computerised presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams. | 2 |
| 7.6 | <i>Fits and Clearances</i> 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. | 2 |
| 7.7 | <i>Electrical Cables and Connectors</i> 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; Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding. | 2 |
| 7.8 | <i>Riveting</i> Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints. | 2 |
| 7.9 | <i>Pipes and Hoses</i> Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes. | 2 |
| 7.10 | <i>Springs</i> Inspection and testing of springs. | 1 |
| 7.11 | <i>Bearings</i> Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes. | 2 |

| | | LEVEL |
|--------|--|-------------|
| | | B3 |
| 7.12 | <i>Transmissions</i> Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems. | 2 |
| 7.13 | <i>Control Cables</i> Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems. | 2 |
| 7.14 | <i>Material handling</i> | |
| 7.14.1 | <i>Sheet Metal</i> Marking out and calculation of bend allowance; Sheet metal working, including bending and forming; Inspection of sheet metal work. | 2 |
| 7.14.2 | <i>Composite and non-metallic</i> Bonding practices; Environmental conditions; Inspection methods. | 2 |
| 7.15 | <i>Welding, Brazing, Soldering and Bonding</i> (a) Soldering methods; inspection of soldered joints; (b) Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints. | 2 2 |
| 7.16 | <i>Aircraft Weight and Balance</i> (a) Centre of Gravity/Balance limits calculation: use of relevant documents; (b) Preparation of aircraft for weighing; Aircraft weighing. | 2 2 |
| 7.17 | <i>Aircraft Handling and Storage</i> 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 |
| 7.18 | <i>Disassembly, Inspection, Repair and Assembly Techniques</i> (a) Types of defects and visual inspection techniques; Corrosion removal, assessment and reprotection; (b) General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programmes; (c) Non-destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and boroscope methods; | 3 2 2 |

| | | LEVEL |
|------|---|-------|
| | | B3 |
| | (d) Disassembly and re-assembly techniques; | 2 |
| | (e) Trouble shooting techniques. | 2 |
| 7.19 | <i>Abnormal Events</i> | |
| | (a) Inspections following lightning strikes and HIRF penetration. | 2 |
| | (b) Inspections following abnormal events such as heavy landings and flight through turbulence. | 2 |
| 7.20 | <i>Maintenance Procedures</i> | 2 |
| | 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. | |

MODULE 8. BASIC AERODYNAMICS

| | | LEVEL | | | |
|-----|--|-------|----|----|----|
| | | A | B1 | B2 | B3 |
| 8.1 | <i>Physics of the Atmosphere</i> | 1 | 2 | 2 | 1 |
| | International Standard Atmosphere (ISA), application to aerodynamics. | | | | |
| 8.2 | <i>Aerodynamics</i> | 1 | 2 | 2 | 1 |
| | 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. | | | | |
| 8.3 | <i>Theory of Flight</i> | 1 | 2 | 2 | 1 |
| | 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. | | | | |
| 8.4 | <i>Flight Stability and Dynamics</i> | 1 | 2 | 2 | 1 |
| | Longitudinal, lateral and directional stability (active and passive). | | | | |

MODULE 9A. HUMAN FACTORS

Note: This module does not apply to category B3. Relevant subject matters for category B3 are defined in module 9B.

| | LEVEL | | |
|---|-------|----|----|
| | A | B1 | B2 |
| 9.1 <i>General</i> The need to take human factors into account; Incidents attributable to human factors/human error; 'Murphy's' law. | 1 | 2 | 2 |
| 9.2 <i>Human Performance and Limitations</i> Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access. | 1 | 2 | 2 |
| 9.3 <i>Social Psychology</i> Responsibility: individual and group; Motivation and de-motivation; Peer pressure; 'Culture' issues; Team working; Management, supervision and leadership. | 1 | 1 | 1 |
| 9.4 <i>Factors Affecting Performance</i> 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 |
| 9.5 <i>Physical Environment</i> Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment. | 1 | 1 | 1 |
| 9.6 <i>Tasks</i> Physical work; Repetitive tasks; Visual inspection; Complex systems. | 1 | 1 | 1 |
| 9.7 <i>Communication</i> Within and between teams; Work logging and recording; | 2 | 2 | 2 |

| | LEVEL | | |
|--|-------|----|----|
| | A | B1 | B2 |
| Keeping up to date, currency; Dissemination of information. 9.8 <i>Human Error</i> Error models and theories; Types of error in maintenance tasks; Implications of errors (i.e. accidents); Avoiding and managing errors. 9.9 <i>Hazards in the Workplace</i> Recognising and avoiding hazards; Dealing with emergencies. | 1 | 2 | 2 |

MODULE 9B. HUMAN FACTORS

Note: The scope of this module shall reflect the less demanding environment of maintenance for B3 licence holders.

| | LEVEL |
|---|-------|
| | B3 |
| 9.1 <i>General</i> The need to take human factors into account; Incidents attributable to human factors/human error; 'Murphy's' law. | 2 |
| 9.2 <i>Human Performance and Limitations</i> Vision; Hearing; Information processing; Attention and perception; Memory; Claustrophobia and physical access. | 2 |
| 9.3 <i>Social Psychology</i> Responsibility: individual and group; Motivation and de-motivation; Peer pressure; 'Culture' issues; Team working; Management, supervision and leadership. | 1 |
| 9.4 <i>Factors Affecting Performance</i> Fitness/health; Stress: domestic and work related; Time pressure and deadlines; Workload: overload and underload; Sleep and fatigue, shiftwork; Alcohol, medication, drug abuse. | 2 |
| 9.5 <i>Physical Environment</i> | 1 |

| | LEVEL |
|---|-------|
| | B3 |
| Noise and fumes; Illumination; Climate and temperature; Motion and vibration; Working environment. | |
| 9.6 <i>Tasks</i> Physical work; Repetitive tasks; Visual inspection; Complex systems. | 1 |
| 9.7 <i>Communication</i> Within and between teams; Work logging and recording; Keeping up to date, currency; Dissemination of information. | 2 |
| 9.8 <i>Human Error</i> Error models and theories; Types of error in maintenance tasks; Implications of errors (i.e. accidents); Avoiding and managing errors. | 2 |
| 9.9 <i>Hazards in the Workplace</i> Recognising and avoiding hazards; Dealing with emergencies. | 2 |

MODULE 10. AVIATION LEGISLATION

| | LEVEL | | | |
|---|-------|----|----|----|
| | A | B1 | B2 | B3 |
| 10.1 <i>Regulatory Framework</i> Role of the International Civil Aviation Organisation; Role of the European Commission; Role of EASA; Role of the Member States and National Aviation Authorities; Regulation (EC) No 216/2008 and its implementing rules Regulations (EU) No 748/2012 and (EU) No 1321/2014; Relationship between the various Annexes (Parts) such as Part-21, Part-M, Part-145, Part-66, Part-147 and Regulation (EU) No 965/2012. | 1 | 1 | 1 | 1 |
| 10.2 <i>Certifying Staff — Maintenance</i> Detailed understanding of Part-66. | 2 | 2 | 2 | 2 |
| 10.3 <i>Approved Maintenance Organisations</i> Detailed understanding of Part-145 and Part-M Subpart F. | 2 | 2 | 2 | 2 |
| 10.4 <i>Air operations</i> General understanding of Regulation (EU) No 965/2012. | 1 | 1 | 1 | 1 |

| | | LEVEL | | | |
|------|---|-------|----|----|----|
| | | A | B1 | B2 | B3 |
| | Air Operators Certificates; Operator's responsibilities, in particular regarding continuing airworthiness and maintenance; Aircraft Maintenance Programme; MEL//CDL; Documents to be carried on board; Aircraft placarding (markings). | | | | |
| 10.5 | <i>Certification of aircraft, parts and appliances</i> | | | | |
| | (a) General | — | 1 | 1 | 1 |
| | General understanding of Part-21 and EASA certification specifications CS-23, 25, 27, 29. | | | | |
| | (b) Documents | — | 2 | 2 | 2 |
| | Certificate of Airworthiness; restricted certificates of airworthiness and permit to fly; | | | | |
| | Certificate of Registration; | | | | |
| | Noise Certificate; | | | | |
| | Weight Schedule; | | | | |
| | Radio Station Licence and Approval. | | | | |
| 10.6 | <i>Continuing airworthiness</i> | 2 | 2 | 2 | 2 |
| | Detailed understanding of Part-21 provisions related to continuing airworthiness. | | | | |
| | Detailed understanding of Part-M. | | | | |
| 10.7 | <i>Applicable National and International Requirements for (if not superseded by EU requirements).</i> | | | | |
| | (a) Maintenance Programmes, Maintenance checks and inspections; | 1 | 2 | 2 | 2 |
| | Airworthiness Directives; | | | | |
| | Service Bulletins, manufacturers service information; | | | | |
| | Modifications and repairs; | | | | |
| | Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.; | | | | |
| | Only for A to B2 licences: | | | | |
| | Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists; | | | | |
| | (b) Continuing airworthiness; | — | 1 | 1 | 1 |
| | Minimum equipment requirements — Test flights; | | | | |
| | Only for B1 and B2 licences: | | | | |
| | ETOPS, maintenance and dispatch requirements; | | | | |
| | All Weather Operations, Category 2/3 operations. | | | | |

MODULE 11A. TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS

| | | LEVEL | |
|---------|--|-------|------|
| | | A1 | B1.1 |
| 11.1 | <i>Theory of Flight</i> | | |
| 11.1.1. | <i>Aeroplane Aerodynamics and Flight Controls</i> | 1 | 2 |
| | Operation and effect of: | — | — |
| | — roll control: ailerons and spoilers, | | |
| | — pitch control: elevators, stabilators, variable incidence stabilisers and canards, | | |
| | — yaw control, rudder limiters; | | |

| | | LEVEL | |
|---------|--|-------|------|
| | | A1 | B1.1 |
| | 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. | | |
| 11.1.2. | <i>High Speed Flight</i> Speed of sound, subsonic flight, transonic flight, supersonic flight; Mach number, critical Mach number, compressibility buffet, shock wave, aerodynamic heating, area rule; Factors affecting airflow in engine intakes of high speed aircraft; Effects of sweepback on critical Mach number. | 1 | 2 |
| 11.2 | <i>Airframe Structures — General Concepts</i> (a) Airworthiness requirements for structural strength; Structural classification, primary, secondary and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Lightning strike protection provision; Aircraft bonding. (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. | 2 | 2 |
| | | 1 | 2 |
| 11.3 | <i>Airframe Structures — Aeroplanes</i> | | |
| 11.3.1 | <i>Fuselage (ATA 52/53/56)</i> 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. | 1 | 2 |
| 11.3.2 | <i>Wings (ATA 57)</i> Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments. | 1 | 2 |
| 11.3.3 | <i>Stabilisers (ATA 55)</i> Construction; Control surface attachment. | 1 | 2 |

| | | LEVEL | |
|--------|--|--------|--------|
| | | A1 | B1.1 |
| 11.3.4 | <i>Flight Control Surfaces (ATA 55/57)</i> Construction and attachment; Balancing — mass and aerodynamic. | 1 | 2 |
| 11.3.5 | <i>Nacelles/Pylons (ATA 54)</i> Nacelles/Pylons: — Construction, — Firewalls, — Engine mounts. | 1 — | 2 — |
| 11.4 | <i>Air Conditioning and Cabin Pressurisation (ATA 21)</i> | | |
| 11.4.1 | <i>Air supply</i> Sources of air supply including engine bleed, APU and ground cart. | 1 | 2 |
| 11.4.2 | <i>Air Conditioning</i> Air conditioning systems; Air cycle and vapour cycle machines; Distribution systems; Flow, temperature and humidity control system. | 1 | 3 |
| 11.4.3 | <i>Pressurisation</i> Pressurisation systems; Control and indication including control and safety valves; Cabin pressure controllers. | 1 | 3 |
| 11.4.4 | <i>Safety and warning devices</i> Protection and warning devices. | 1 | 3 |
| 11.5 | <i>Instruments/Avionic Systems</i> | | |
| 11.5.1 | <i>Instrument Systems (ATA 31)</i> 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 | <i>Avionic Systems</i> Fundamentals of system lay-outs and operation of: — Auto Flight (ATA 22), — Communications (ATA 23), — Navigation Systems (ATA 34). | 1 — | 1 — |
| 11.6 | <i>Electrical Power (ATA 24)</i> Batteries Installation and Operation; DC power generation; | 1 | 3 |

| | | LEVEL | |
|-------|--|-------|------|
| | | A1 | B1.1 |
| 11.11 | <i>Hydraulic Power (ATA 29)</i> 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 | <i>Ice and Rain Protection (ATA 30)</i> 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 | <i>Landing Gear (ATA 32)</i> 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 | <i>Lights (ATA 33)</i> External: navigation, anti collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency. | 2 | 3 |
| 11.15 | <i>Oxygen (ATA 35)</i> System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings. | 1 | 3 |
| 11.16 | <i>Pneumatic/Vacuum (ATA 36)</i> System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; | 1 | 3 |

| | | LEVEL | |
|-------|---|-------------------------------------|-------------------------------------|
| | | A1 | B1.1 |
| | Indications and warnings; Interfaces with other systems. | | |
| 11.17 | <i>Water/Waste (ATA 38)</i> Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspects. | 2 | 3 |
| 11.18 | <i>On Board Maintenance Systems (ATA 45)</i> Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring). | 1 | 2 |
| 11.19 | <i>Integrated Modular Avionics (ATA42)</i> Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc. Core System; Network Components. | 1 | 2 |
| 11.20 | <i>Cabin Systems (ATA44)</i> The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). Includes voice, data, music and video transmissions. The Cabin Intercommunication Data System provides an interface between cockpit/cabin crew and cabin systems. These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels. The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems: — Data/Radio Communication, In-Flight Entertainment System. The Cabin Network Service may host functions such as: — Access to pre-departure/departure reports, — E-mail/intranet/Internet access, — Passenger database; Cabin Core System; In-flight Entertainment System; External Communication System; Cabin Mass Memory System; Cabin Monitoring System; Miscellaneous Cabin System. | 1 — — | 2 — — |

| | LEVEL | |
|--|-------|------|
| | A1 | B1.1 |
| <p>11.21 <i>Information Systems (ATA46)</i></p> <p>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.</p> <p>Typical examples include Air Traffic and Information Management Systems and Network Server Systems</p> <p>Aircraft General Information System;</p> <p>Flight Deck Information System;</p> <p>Maintenance Information System;</p> <p>Passenger Cabin Information System;</p> <p>Miscellaneous Information System.</p> | 1 | 2 |

MODULE 11B. PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS

Note 1: This module does not apply to category B3. Relevant subject matters for category B3 are defined in module 11C.

Note 2: The scope of this Module shall reflect the technology of aeroplanes pertinent to the A2 and B1.2 subcategory.

| | LEVEL | |
|---|-------|------|
| | A2 | B1.2 |
| 11.1 <i>Theory of Flight</i> | | |
| 11.1.1. <i>Aeroplane Aerodynamics and Flight Controls</i> | 1 | 2 |
| 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. | | |
| 11.1.2. <i>High Speed Flight — N/A</i> | — | — |
| 11.2 <i>Airframe Structures — General Concepts</i> | | |
| (a) Airworthiness requirements for structural strength; | 2 | 2 |
| 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. | | |

| | | LEVEL | |
|--------|--|--------|--------|
| | | A2 | B1.2 |
| | (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 | <i>Airframe Structures — Aeroplanes</i> | | |
| 11.3.1 | <i>Fuselage (ATA 52/53/56)</i> Construction and pressurisation sealing; Wing, tail-plane, pylon and undercarriage attachments; Seat installation; Doors and emergency exits: construction and operation; Windows and windscreen attachment. | 1 | 2 |
| 11.3.2 | <i>Wings (ATA 57)</i> Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments. | 1 | 2 |
| 11.3.3 | <i>Stabilisers (ATA 55)</i> Construction; Control surface attachment. | 1 | 2 |
| 11.3.4 | <i>Flight Control Surfaces (ATA 55/57)</i> Construction and attachment; Balancing — mass and aerodynamic. | 1 | 2 |
| 11.3.5 | <i>Nacelles/Pylons (ATA 54)</i> Nacelles/Pylons: — Construction, — Firewalls, — Engine mounts. | 1 — | 2 — |
| 11.4 | <i>Air Conditioning and Cabin Pressurisation (ATA 21)</i> Pressurisation and air conditioning systems; Cabin pressure controllers, protection and warning devices; Heating systems. | 1 | 3 |
| 11.5 | <i>Instruments/Avionic Systems</i> | | |
| 11.5.1 | <i>Instrument Systems (ATA 31)</i> 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 |

| | | LEVEL | |
|--------|--|--------|--------|
| | | A2 | B1.2 |
| 11.5.2 | <i>Avionic Systems</i> Fundamentals of system lay-outs and operation of: — Auto Flight (ATA 22), — Communications (ATA 23), — Navigation Systems (ATA 34). | 1 — | 1 — |
| 11.6 | <i>Electrical Power (ATA 24)</i> Batteries Installation and Operation; DC power generation; Voltage regulation; Power distribution; Circuit protection; Inverters, transformers. | 1 | 3 |
| 11.7 | <i>Equipment and Furnishings (ATA 25)</i> (a) Emergency equipment requirements; Seats, harnesses and belts; (b) Cabin lay-out; Equipment lay-out; Cabin Furnishing installation; Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment; Airstairs. | 2 1 | 2 1 |
| 11.8 | <i>Fire Protection (ATA 26)</i> (a) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests; (b) Portable fire extinguisher. | 1 1 | 3 3 |
| 11.9 | <i>Flight Controls (ATA 27)</i> 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 | <i>Fuel Systems (ATA 28)</i> System lay-out; Fuel tanks; Supply systems; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling. | 1 | 3 |

| | | LEVEL | |
|-------|--|-------|------|
| | | A2 | B1.2 |
| 11.11 | <i>Hydraulic Power (ATA 29)</i> 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 | <i>Ice and Rain Protection (ATA 30)</i> Ice formation, classification and detection; De-icing systems: electrical, hot air, pneumatic and chemical; Probe and drain heating; Wiper systems. | 1 | 3 |
| 11.13 | <i>Landing Gear (ATA 32)</i> 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 | <i>Lights (ATA 33)</i> External: navigation, anti collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency. | 2 | 3 |
| 11.15 | <i>Oxygen (ATA 35)</i> System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings. | 1 | 3 |
| 11.16 | <i>Pneumatic/Vacuum (ATA 36)</i> System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems. | 1 | 3 |
| 11.17 | <i>Water/Waste (ATA 38)</i> Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspects. | 2 | 3 |

| | | LEVEL |
|--------|---|-------------------|
| | | B3 |
| 11.1 | <p><i>Theory of Flight</i></p> <p><i>Aeroplane Aerodynamics and Flight Controls</i></p> <p>Operation and effect of:</p> <ul style="list-style-type: none"> — roll control: ailerons, — pitch control: elevators, stabilators, variable incidence stabilisers and canards, — yaw control, rudder limiters; <p>Control using elevons, ruddervators;</p> <p>High lift devices, slots, slats, flaps, flaperons;</p> <p>Drag inducing devices, lift dumpers, speed brakes;</p> <p>Effects of wing fences, saw tooth leading edges;</p> <p>Boundary layer control using, vortex generators, stall wedges or leading edge devices;</p> <p>Operation and effect of trim tabs, balance and anti-balance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels.</p> | <p>1</p> <p>—</p> |
| 11.2 | <p><i>Airframe Structures — General Concepts</i></p> <p>(a) Airworthiness requirements for structural strength;</p> <p>Structural classification, primary, secondary and tertiary;</p> <p>Fail safe, safe life, damage tolerance concepts;</p> <p>Zonal and station identification systems;</p> <p>Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue;</p> <p>Drains and ventilation provisions;</p> <p>System installation provisions;</p> <p>Lightning strike protection provision;</p> <p>Aircraft bonding;</p> <p>(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;</p> <p>Structure assembly techniques: riveting, bolting, bonding;</p> <p>Methods of surface protection, such as chromating, anodising, painting;</p> <p>Surface cleaning;</p> <p>Airframe symmetry: methods of alignment and symmetry checks.</p> | <p>2</p> <p>2</p> |
| 11.3 | <i>Airframe Structures — Aeroplanes</i> | |
| 11.3.1 | <p><i>Fuselage (ATA 52/53/56)</i></p> <p>Construction;</p> <p>Wing, tail-plane, pylon and undercarriage attachments;</p> <p>Seat installation;</p> <p>Doors and emergency exits: construction and operation;</p> <p>Window and windscreen attachment.</p> | 1 |
| 11.3.2 | <p><i>Wings (ATA 57)</i></p> <p>Construction;</p> <p>Fuel storage;</p> <p>Landing gear, pylon, control surface and high lift/drag attachments.</p> | 1 |
| 11.3.3 | <p><i>Stabilisers (ATA 55)</i></p> <p>Construction;</p> <p>Control surface attachment.</p> | 1 |

| | | LEVEL |
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| | | B3 |
| 11.3.4 | <i>Flight Control Surfaces (ATA 55/57)</i> Construction and attachment; Balancing — mass and aerodynamic. | 1 |
| 11.3.5 | <i>Nacelles/Pylons (ATA 54)</i> Nacelles/Pylons: — Construction, — Firewalls, — Engine mounts. | 1 |
| 11.4 | <i>Air Conditioning (ATA 21)</i> Heating and ventilation systems. | 1 |
| 11.5 | <i>Instruments/Avionic Systems</i> | |
| 11.5.1 | <i>Instrument Systems (ATA 31)</i> 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 |
| 11.5.2 | <i>Avionic Systems</i> Fundamentals of system lay-outs and operation of: — Auto Flight (ATA 22), — Communications (ATA 23), — Navigation Systems (ATA 34). | 1 — |
| 11.6 | <i>Electrical Power (ATA 24)</i> Batteries Installation and Operation; DC power generation; Voltage regulation; Power distribution; Circuit protection; Inverters, transformers. | 2 |
| 11.7 | <i>Equipment and Furnishings (ATA 25)</i> Emergency equipment requirements; Seats, harnesses and belts. | 2 |
| 11.8 | <i>Fire Protection (ATA 26)</i> Portable fire extinguisher. | 2 |
| 11.9 | <i>Flight Controls (ATA 27)</i> Primary controls: aileron, elevator, rudder; Trim tabs; High lift devices; System operation: manual; Gust locks; | 3 |

| | | LEVEL |
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| | | B3 |
| | Balancing and rigging; Stall warning system. | |
| 11.10 | <i>Fuel Systems (ATA 28)</i> System lay-out; Fuel tanks; Supply systems; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling. | 2 |
| 11.11 | <i>Hydraulic Power (ATA 29)</i> System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical; Filters; Pressure Control; Power distribution; Indication and warning systems. | 2 |
| 11.12 | <i>Ice and Rain Protection (ATA 30)</i> Ice formation, classification and detection; De-icing systems: electrical, hot air, pneumatic and chemical; Probe and drain heating; Wiper systems. | 1 |
| 11.13 | <i>Landing Gear (ATA 32)</i> Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and autobraking; Tyres; Steering. | 2 |
| 11.14 | <i>Lights (ATA 33)</i> External: navigation, anti collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency. | 2 |
| 11.15 | <i>Oxygen (ATA 35)</i> System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings. | 2 |

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| | | B3 |
| 11.16 | <i>Pneumatic/Vacuum (ATA 36)</i> System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure and vacuum pumps Pressure control; Distribution; Indications and warnings; Interfaces with other systems. | 2 |

MODULE 12. HELICOPTER AERODYNAMICS, STRUCTURES AND SYSTEMS

| | | LEVEL | |
|------|---|----------|--------------|
| | | A3 A4 | B1.3 B1.4 |
| 12.1 | <i>Theory of Flight — Rotary Wing Aerodynamics</i> 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 | <i>Flight Control Systems</i> Cyclic control; Collective control; Swashplate; Yaw control: Anti-Torque Control, Tail rotor, bleed air; Main Rotor Head: Design and Operation features; Blade Dampers: Function and construction; Rotor Blades: Main and tail rotor blade construction and attachment; Trim control, fixed and adjustable stabilisers; System operation: manual, hydraulic, electrical and fly-by-wire; Artificial feel; Balancing and rigging. | 2 | 3 |
| 12.3 | <i>Blade Tracking and Vibration Analysis</i> Rotor alignment; Main and tail rotor tracking; | 1 | 3 |

| | | LEVEL | |
|--------|--|----------|--------------|
| | | A3 A4 | B1.3 B1.4 |
| | Static and dynamic balancing; Vibration types, vibration reduction methods; Ground resonance. | | |
| 12.4 | <i>Transmission</i> 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 | <i>Airframe Structures</i> (a) Airworthiness requirements for structural strength; Structural classification, primary, secondary and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Lightning strike protection provision; | 2 | 2 |
| | (b) Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning and anti-corrosive protection. Pylon, stabiliser and undercarriage attachments; Seat installation; 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 | <i>Air Conditioning (ATA 21)</i> | | |
| 12.6.1 | <i>Air supply</i> Sources of air supply including engine bleed and ground cart. | 1 | 2 |
| 12.6.2 | <i>Air conditioning</i> Air conditioning systems; Distribution systems; Flow and temperature control systems; Protection and warning devices. | 1 | 3 |
| 12.7 | <i>Instruments/Avionic Systems</i> | | |
| 12.7.1 | <i>Instrument Systems (ATA 31)</i> 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; | 1 | 2 |

| | | LEVEL | |
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| | | A3 A4 | B1.3 B1.4 |
| | Compasses: direct reading, remote reading; Vibration indicating systems — HUMS; Glass cockpit; Other aircraft system indication. | | |
| 12.7.2 | <i>Avionic Systems</i> Fundamentals of system layouts and operation of: Auto Flight (ATA 22); Communications (ATA 23); Navigation Systems (ATA 34). | 1 | 1 |
| 12.8 | <i>Electrical Power (ATA 24)</i> Batteries Installation and Operation; DC power generation, AC power generation; Emergency power generation; Voltage regulation, Circuit protection. Power distribution; Inverters, transformers, rectifiers; External/Ground power. | 1 | 3 |
| 12.9 | <i>Equipment and Furnishings (ATA 25)</i> (a) Emergency equipment requirements; Seats, harnesses and belts; Lifting systems; (b) Emergency flotation systems; Cabin lay-out, cargo retention; Equipment lay-out; Cabin Furnishing Installation. | 2 1 | 2 1 |
| 12.10 | <i>Fire Protection (ATA 26)</i> Fire and smoke detection and warning systems; Fire extinguishing systems; System tests. | 1 | 3 |
| 12.11 | <i>Fuel Systems (ATA 28)</i> System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling. | 1 | 3 |
| 12.12 | <i>Hydraulic Power (ATA 29)</i> System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Filters; Pressure Control; | 1 | 3 |

| | | LEVEL | |
|-------|---|----------|--------------|
| | | A3 A4 | B1.3 B1.4 |
| | Power distribution; Indication and warning systems; Interface with other systems. | | |
| 12.13 | <i>Ice and Rain Protection (ATA 30)</i> 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 | <i>Landing Gear (ATA 32)</i> Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, Tyres, brakes; Steering; Air-ground sensing; Skids, floats. | 2 | 3 |
| 12.15 | <i>Lights (ATA 33)</i> External: navigation, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency. | 2 | 3 |
| 12.16 | <i>Pneumatic/Vacuum (ATA 36)</i> System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems. | 1 | 3 |
| 12.17 | <i>Integrated Modular Avionics (ATA42)</i> 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 |
| 12.18 | <i>On Board Maintenance Systems (ATA45)</i> Central maintenance computers; Data loading system; Electronic library system; | 1 | 2 |

| | | LEVEL | |
|-------|---|----------|--------------|
| | | A3 A4 | B1.3 B1.4 |
| 12.19 | <p>Printing;</p> <p>Structure monitoring (damage tolerance monitoring).</p> <p><i>Information Systems (ATA46)</i></p> <p>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.</p> <p>Typical examples include Air Traffic and Information Management Systems and Network Server Systems.</p> <p>Aircraft General Information System;</p> <p>Flight Deck Information System;</p> <p>Maintenance Information System;</p> <p>Passenger Cabin Information System;</p> <p>Miscellaneous Information System.</p> | 1 | 2 |

MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS

| | | LEVEL |
|------|---|-------------------------------------|
| | | B2 |
| 13.1 | <p><i>Theory of Flight</i></p> <p>(a) Aeroplane Aerodynamics and Flight Controls</p> <p>Operation and effect of:</p> <ul style="list-style-type: none"> — roll control: ailerons and spoilers, — pitch control: elevators, stabilators, variable incidence stabilisers and canards, — yaw control, rudder limiters; <p>Control using elevons, ruddervators;</p> <p>High lift devices: slots, slats, flaps;</p> <p>Drag inducing devices: spoilers, lift dumpers, speed brakes;</p> <p>Operation and effect of trim tabs, servo tabs, control surface bias;</p> <p>(b) High Speed Flight</p> <p>Speed of sound, subsonic flight, transonic flight, supersonic flight;</p> <p>Mach number, critical Mach number;</p> <p>(c) Rotary Wing Aerodynamics</p> <p>Terminology;</p> <p>Operation and effect of cyclic, collective and anti-torque controls.</p> | <p>1</p> <p>—</p> <p>1</p> <p>1</p> |
| 13.2 | <p><i>Structures — General Concepts</i></p> <p>(a) Fundamentals of structural systems;</p> <p>(b) Zonal and station identification systems;</p> <p>Electrical bonding;</p> <p>Lightning strike protection provision.</p> | <p>1</p> <p>2</p> |

| | | LEVEL |
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| | | B2 |
| 13.3 | <p><i>Autoflight (ATA 22)</i></p> <p>Fundamentals of automatic flight control including working principles and current terminology;</p> <p>Command signal processing;</p> <p>Modes of operation: roll, pitch and yaw channels;</p> <p>Yaw dampers;</p> <p>Stability Augmentation System in helicopters;</p> <p>Automatic trim control;</p> <p>Autopilot navigation aids interface;</p> <p>Autothrottle systems;</p> <p>Automatic Landing Systems: principles and categories, modes of operation, approach, glideslope, land, go-around, system monitors and failure conditions.</p> | 3 |
| 13.4 | <p><i>Communication/Navigation (ATA 23/34)</i></p> <p>Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver and transmitter;</p> <p>Working principles of following systems:</p> <ul style="list-style-type: none"> — Very High Frequency (VHF) communication, — High Frequency (HF) communication, — Audio, — Emergency Locator Transmitters, — Cockpit Voice Recorder, — Very High Frequency omnidirectional range (VOR), — Automatic Direction Finding (ADF), — Instrument Landing System (ILS), — Microwave Landing System (MLS), — Flight Director systems, Distance Measuring Equipment (DME), — Very Low Frequency and hyperbolic navigation (VLF/Omega), — Doppler navigation, — Area navigation, RNAV systems, — Flight Management Systems, — Global Positioning System (GPS), Global Navigation Satellite Systems (GNSS), — Inertial Navigation System, — Air Traffic Control transponder, secondary surveillance radar, — Traffic Alert and Collision Avoidance System (TCAS), — Weather avoidance radar, — Radio altimeter, — ARINC communication and reporting. | <p>3</p> <p>—</p> |
| 13.5 | <p><i>Electrical Power (ATA 24)</i></p> <p>Batteries Installation and Operation;</p> <p>DC power generation;</p> <p>AC power generation;</p> <p>Emergency power generation;</p> <p>Voltage regulation;</p> <p>Power distribution;</p> <p>Inverters, transformers, rectifiers;</p> <p>Circuit protection;</p> <p>External/Ground power.</p> | 3 |

| | | LEVEL |
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| | | B2 |
| 13.6 | <i>Equipment and Furnishings (ATA 25)</i> Electronic emergency equipment requirements; Cabin entertainment equipment. | 3 |
| 13.7 | <i>Flight Controls (ATA 27)</i> (a) Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control; High lift devices; Lift dump, speed brakes; System operation: manual, hydraulic, pneumatic; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks. Stall protection systems; (b) System operation: electrical, fly-by-wire. | 2 |
| 13.8 | <i>Instruments (ATA 31)</i> 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; 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; | 3 |

| | | LEVEL |
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| | | B2 |
| | Vibration measurement and indication; Glass cockpit. | |
| 13.9 | <i>Lights (ATA 33)</i> External: navigation, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency. | 3 |
| 13.10 | <i>On Board Maintenance Systems (ATA 45)</i> Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring). | 3 |
| 13.11 | <i>Air Conditioning and Cabin Pressurisation (ATA21)</i> | |
| 13.11.1. | <i>Air supply</i> Sources of air supply including engine bleed, APU and ground cart; | 2 |
| 13.11.2. | <i>Air Conditioning</i> Air conditioning systems; | 2 |
| | Air cycle and vapour cycle machines; | 3 |
| | Distribution systems; | 1 |
| | Flow, temperature and humidity control system. | 3 |
| 13.11.3. | <i>Pressurisation</i> Pressurisation systems; Control and indication including control and safety valves; Cabin pressure controllers. | 3 |
| 13.11.4. | <i>Safety and warning devices</i> Protection and warning devices. | 3 |
| 13.12 | <i>Fire Protection (ATA 26)</i> (a) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests; | 3 |
| | (b) Portable fire extinguisher. | 1 |
| 13.13 | <i>Fuel Systems (ATA 28)</i> System lay-out; | 1 |
| | Fuel tanks; | 1 |
| | Supply systems; | 1 |
| | Dumping, venting and draining; | 1 |
| | Cross-feed and transfer; | 2 |
| | Indications and warnings; | 3 |
| | Refuelling and defuelling; | 2 |
| | Longitudinal balance fuel systems. | 3 |

| | | LEVEL |
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| | | B2 |
| 13.14 | <i>Hydraulic Power (ATA 29)</i> | |
| | System lay-out; | 1 |
| | Hydraulic fluids; | 1 |
| | Hydraulic reservoirs and accumulators; | 1 |
| | Pressure generation: electrical, mechanical, pneumatic; | 3 |
| | Emergency pressure generation; | 3 |
| | Filters; | 1 |
| | Pressure control; | 3 |
| | Power distribution; | 1 |
| | Indication and warning systems; | 3 |
| | Interface with other systems. | 3 |
| 13.15 | <i>Ice and Rain Protection (ATA 30)</i> | |
| | Ice formation, classification and detection; | 2 |
| | Anti-icing systems: electrical, hot air and chemical; | 2 |
| | De-icing systems: electrical, hot air, pneumatic, chemical; | 3 |
| | Rain repellent; | 1 |
| | Probe and drain heating; | 3 |
| | Wiper Systems. | 1 |
| 13.16 | <i>Landing Gear (ATA 32)</i> | |
| | Construction, shock absorbing; | 1 |
| | Extension and retraction systems: normal and emergency; | 3 |
| | Indications and warnings; | 3 |
| | Wheels, brakes, antiskid and autobraking; | 3 |
| | Tyres; | 1 |
| | Steering; | 3 |
| | Air-ground sensing. | 3 |
| 13.17 | <i>Oxygen (ATA 35)</i> | |
| | System lay-out: cockpit, cabin; | 3 |
| | Sources, storage, charging and distribution; | 3 |
| | Supply regulation; | 3 |
| | Indications and warnings. | 3 |
| 13.18 | <i>Pneumatic/Vacuum (ATA 36)</i> | |
| | System lay-out; | 2 |
| | Sources: engine/APU, compressors, reservoirs, ground supply; | 2 |
| | Pressure control; | 3 |
| | Distribution; | 1 |
| | Indications and warnings; | 3 |
| | Interfaces with other systems. | 3 |
| 13.19 | <i>Water/Waste (ATA 38)</i> | 2 |
| | Water system lay-out, supply, distribution, servicing and draining; | |
| | Toilet system lay-out, flushing and servicing. | |

| | | LEVEL |
|-------|--|-------|
| | | B2 |
| 13.20 | <p><i>Integrated Modular Avionics (ATA42)</i></p> <p>Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others:</p> <p>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.;</p> <p>Core System;</p> <p>Network Components.</p> | 3 |
| 13.21 | <p><i>Cabin Systems (ATA44)</i></p> <p>The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). Includes voice, data, music and video transmissions.</p> <p>The Cabin Intercommunication Data System provides an interface between cockpit/cabin crew and cabin systems. These systems support data exchange of the different related LRU's and they are typically operated via Flight Attendant Panels.</p> <p>The Cabin Network Service typically consists on a server, typically interfacing with, among others, the following systems:</p> <ul style="list-style-type: none"> — Data/Radio Communication, In-Flight Entertainment System. <p>The Cabin Network Service may host functions such as:</p> <ul style="list-style-type: none"> — Access to pre-departure/departure reports, — E-mail/intranet/Internet access, — Passenger database; <p>Cabin Core System;</p> <p>In-flight Entertainment System;</p> <p>External Communication System;</p> <p>Cabin Mass Memory System;</p> <p>Cabin Monitoring System;</p> <p>Miscellaneous Cabin System.</p> | 3 |
| 13.22 | <p><i>Information Systems (ATA46)</i></p> <p>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.</p> <p>Typical examples include Air Traffic and Information Management Systems and Network Server Systems.</p> <p>Aircraft General Information System;</p> <p>Flight Deck Information System;</p> <p>Maintenance Information System;</p> <p>Passenger Cabin Information System;</p> <p>Miscellaneous Information System.</p> | 3 |

MODULE 14. PROPULSION

| | | LEVEL |
|------|---|--------|
| | | B2 |
| 14.1 | <i>Turbine Engines</i> (a) Constructional arrangement and operation of turbojet, turbofan, turboshaft and turbopropeller engines; (b) Electronic Engine control and fuel metering systems (FADEC). | 1 2 |
| 14.2 | <i>Engine Indicating Systems</i> 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 | <i>Starting and Ignition Systems</i> Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements. | 2 |

MODULE 15. GAS TURBINE ENGINE

| | | LEVEL | |
|------|---|-------|----|
| | | A | B1 |
| 15.1 | <i>Fundamentals</i> 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 | <i>Engine Performance</i> 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 | <i>Inlet</i> Compressor inlet ducts Effects of various inlet configurations; Ice protection. | 2 | 2 |
| 15.4 | <i>Compressors</i> Axial and centrifugal types; Constructional features and operating principles and applications; | 1 | 2 |

| | | LEVEL | |
|-------|--|-------|----|
| | | A | B1 |
| | 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. | | |
| 15.5 | <i>Combustion Section</i> Constructional features and principles of operation. | 1 | 2 |
| 15.6 | <i>Turbine Section</i> 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 | <i>Exhaust</i> Constructional features and principles of operation; Convergent, divergent and variable area nozzles; Engine noise reduction; Thrust reversers. | 1 | 2 |
| 15.8 | <i>Bearings and Seals</i> Constructional features and principles of operation. | — | 2 |
| 15.9 | <i>Lubricants and Fuels</i> Properties and specifications; Fuel additives; Safety precautions. | 1 | 2 |
| 15.10 | <i>Lubrication Systems</i> System operation/lay-out and components. | 1 | 2 |
| 15.11 | <i>Fuel Systems</i> Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components. | 1 | 2 |
| 15.12 | <i>Air Systems</i> Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services. | 1 | 2 |
| 15.13 | <i>Starting and Ignition Systems</i> Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements. | 1 | 2 |
| 15.14 | <i>Engine Indication Systems</i> 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; | 1 | 2 |

| | | LEVEL | |
|-------|---|-------|----|
| | | A | B1 |
| | Vibration measurement and indication; Torque; Power. | | |
| 15.15 | <i>Power Augmentation Systems</i> Operation and applications; Water injection, water methanol; Afterburner systems. | — | 1 |
| 15.16 | <i>Turbo-prop Engines</i> Gas coupled/free turbine and gear coupled turbines; Reduction gears; Integrated engine and propeller controls; Overspeed safety devices. | 1 | 2 |
| 15.17 | <i>Turbo-shaft Engines</i> Arrangements, drive systems, reduction gearing, couplings, control systems. | 1 | 2 |
| 15.18 | <i>Auxiliary Power Units (APUs)</i> Purpose, operation, protective systems. | 1 | 2 |
| 15.19 | <i>Powerplant Installation</i> 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 | <i>Fire Protection Systems</i> Operation of detection and extinguishing systems. | 1 | 2 |
| 15.21 | <i>Engine Monitoring and Ground Operation</i> 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 | <i>Engine Storage and Preservation</i> Preservation and depreservation for the engine and accessories/systems. | — | 2 |

MODULE 16. PISTON ENGINE

| | | LEVEL | | |
|------|--|-------|----|----|
| | | A | B1 | B3 |
| 16.1 | <i>Fundamentals</i> 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 | 2 |

| | | LEVEL | | |
|--------|--|-------|----|----|
| | | A | B1 | B3 |
| 16.2 | <i>Engine Performance</i> Power calculation and measurement; Factors affecting engine power; Mixtures/leaning, pre-ignition. | 1 | 2 | 2 |
| 16.3 | <i>Engine Construction</i> 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 | 2 |
| 16.4 | <i>Engine Fuel Systems</i> | | | |
| 16.4.1 | <i>Carburettors</i> Types, construction and principles of operation; Icing and heating. | 1 | 2 | 2 |
| 16.4.2 | <i>Fuel injection systems</i> Types, construction and principles of operation. | 1 | 2 | 2 |
| 16.4.3 | <i>Electronic engine control</i> Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components. | 1 | 2 | 2 |
| 16.5 | <i>Starting and Ignition Systems</i> Starting systems, pre-heat systems; Magneto types, construction and principles of operation; Ignition harnesses, spark plugs; Low and high tension systems. | 1 | 2 | 2 |
| 16.6 | <i>Induction, Exhaust and Cooling Systems</i> Construction and operation of: induction systems including alternate air systems; Exhaust systems, engine cooling systems — air and liquid. | 1 | 2 | 2 |
| 16.7 | <i>Supercharging/Turbocharging</i> 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 | 2 |
| 16.8 | <i>Lubricants and Fuels</i> Properties and specifications; Fuel additives; Safety precautions. | 1 | 2 | 2 |
| 16.9 | <i>Lubrication Systems</i> System operation/lay-out and components. | 1 | 2 | 2 |

| | | LEVEL | | |
|-------|---|-------|----|----|
| | | A | B1 | B3 |
| 16.10 | <i>Engine Indication Systems</i> Engine speed; Cylinder head temperature; Coolant temperature; Oil pressure and temperature; Exhaust Gas Temperature; Fuel pressure and flow; Manifold pressure. | 1 | 2 | 2 |
| 16.11 | <i>Powerplant Installation</i> 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 | 2 |
| 16.12 | <i>Engine Monitoring and Ground Operation</i> 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 | 2 |
| 16.13 | <i>Engine Storage and Preservation</i> Preservation and depreservation for the engine and accessories/systems. | — | 2 | 1 |

MODULE 17A. PROPELLER

Note: This module does not apply to category B3. Relevant subject matters for category B3 are defined in module 17B.

| | | LEVEL | |
|------|---|-------|----|
| | | A | B1 |
| 17.1 | <i>Fundamentals</i> 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 | <i>Propeller Construction</i> Construction methods and materials used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; Fixed pitch, controllable pitch, constant speeding propeller; Propeller/spinner installation. | 1 | 2 |
| 17.3 | <i>Propeller Pitch Control</i> Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Overspeed protection. | 1 | 2 |
| 17.4 | <i>Propeller Synchronising</i> Synchronising and synchrophasing equipment. | — | 2 |

| | | LEVEL | |
|------|--|-------|----|
| | | A | B1 |
| 17.5 | <i>Propeller Ice Protection</i> Fluid and electrical de-icing equipment. | 1 | 2 |
| 17.6 | <i>Propeller Maintenance</i> 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 | <i>Propeller Storage and Preservation</i> Propeller preservation and depreservation. | 1 | 2 |

MODULE 17B. PROPELLER

Note: The scope of this Module shall reflect the propeller technology of aeroplanes pertinent to the B3 category.

| | | LEVEL |
|------|--|-------|
| | | B3 |
| 17.1 | <i>Fundamentals</i> 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. | 2 |
| 17.2 | <i>Propeller Construction</i> Construction methods and material used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; Fixed pitch, controllable pitch, constant speeding propeller; Propeller/spinner installation. | 2 |
| 17.3 | <i>Propeller Pitch Control</i> Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Overspeed protection. | 2 |
| 17.4 | <i>Propeller Synchronising</i> Synchronising and synchrophasing equipment. | 2 |
| 17.5 | <i>Propeller Ice Protection</i> Fluid and electrical de-icing equipment. | 2 |
| 17.6 | <i>Propeller Maintenance</i> Static and dynamic balancing; Blade tracking; Assessment of blade damage, erosion, corrosion, impact damage, delamination; Propeller treatment/repair schemes; Propeller engine running. | 2 |
| 17.7 | <i>Propeller Storage and Preservation</i> Propeller preservation and depreservation. | 2 |

Annex II: LBA Guidelines

| Nr. | Fachmodul | 2400 Std. NEU (VO 2018/1142) | | | | Kredit II Cat. A | | | | Kredit V (1909 Std.) Cat. B2 vor VO 1149 | | | |
|-----|--|------------------------------|---------|--------|-----|------------------|---------|--------|-----|--|---------|--------|-----|
| | | Sgrad CAT B1 | Theorie | Praxis | MCQ | Sgrad CAT B1 | Theorie | Praxis | MCQ | Sgrad CAT B1 | Theorie | Praxis | MCQ |
| 01 | Mathematik | | | | | | | | | | | | |
| | 1.1 Arithmetik | 2 | 8 | | 6 | 2 | 4 | | 4 | 2 | | | |
| | 1.2 Algebra | | | | | | | | | | | | |
| | a) Bewertung einfacher algebraischer Ausdrücke, Grundrechenarten, Klammern, einfache Brüche | 2 | 8 | | 6 | 2 | 4 | | 4 | 2 | | | |
| | b) Lineargleichungen, Exponenten, Logarithmen, Gleichungen mit einer Unbekannten, Binär- vs. Zahlensysteme | 1 | 9 | | 7 | 1 | 9 | | 7 | 1 | | | |
| | 1.3 Geometrie | | | | | | | | | | | | |
| | a) Einfache geometrische Geometrie | 1 | 4 | | 4 | 1 | 4 | | 4 | 1 | | | |
| | b) Grafische Darstellung: Art und Anwendungen von Grafiken, Grafiken von Gleichungen/ Funktionen | 2 | 5 | | 4 | 2 | | | | 2 | | | |
| | c) Einf. Trigonometrie: Trigonometrie, Beziehungen, Anwendung von Tabellen und rechtwinkligen und Polarkoordinaten | 2 | | | 5 | 2 | | | 6 | 5 | | | |
| | Summe Einzelforderung | | 40 | 0 | 32 | | 27 | 0 | 24 | | 0 | 0 | 0 |
| | Summe Theorie und Praxis | | 40 | | | | 27 | | | | 0 | | |
| 02 | Physik | | | | | | | | | | | | |
| | 2.1 Materie | 1 | 2 | | 2 | 1 | | | | 1 | | | |
| | 2.2 Mechanik | | | | | | | | | | | | |
| | 2.2.1 Statik | 2 | 12 | | 5 | 2 | 6 | | 3 | 2 | | | |
| | 2.2.2 Kinetik | 2 | 15 | | 6 | 2 | 8 | | 4 | 2 | | | |
| | 2.2.3 Dynamik | | | | | | | | | | | | |
| | a) Gewicht: Kraft, Trägheit, Arbeit, Leistung, Energie, Wärme, Wirkungsgrad | 2 | 16 | | 8 | 2 | 9 | | 5 | 2 | | | |
| | 2.2.4 Flüssigkeitsdynamik | 2 | 12 | | 8 | 2 | 6 | | 4 | 2 | | | |
| | a) spezifisches Gewicht und spezifische Dichte | 2 | 1 | | 2 | 2 | | | | 2 | | | |
| | b) Viskosität, Flüssigkeitswiderstand, Auswirkung von Strömungsverhältnissen, Auswirkung von Kompressibilität auf Flüssigkeiten, statischer, dynamischer und Gesamtdruck: Bernoullische Theorie, Venturi | 2 | 9 | | 4 | 2 | 5 | | 2 | 2 | | | |
| | 2.3 Thermodynamik | | | | | | | | | | | | |
| | a) Temperatur, Thermometer und Temperaturskalen: Celsius, Fahrenheit und Kelvin; Wärmedefinition | 2 | 2 | | 3 | 2 | | | | 2 | | | |
| | b) Wärmekapazität, W.-übertragung, Volumen, Ausdehnung, 1. u. 2. Gesetz Thermodynamik, Gase, Isotherme | 2 | 12 | | 6 | 2 | 12 | | 6 | 2 | | | |
| | 2.4 Optik (Licht) | 2 | 6 | | 4 | 2 | 6 | | 4 | 2 | | | |
| | 2.5 Wellenbewegung und Lärm | 2 | | | 4 | 2 | | | 4 | 2 | | | |
| | Summe Einzelforderung | | 95 | 0 | 52 | | 58 | 0 | 32 | | 0 | 0 | 0 |
| | Summe Theorie und Praxis | | 95 | | | | 58 | | | | 0 | | |
| 03 | Grundlagen Elektrizität | | | | | | | | | | | | |
| | 3.1 Elektromagnetismus | 1 | 3 | | 2 | 1 | | | | 1 | | | |
| | 3.2 Statische Elektrizität und Leitung | 2 | 3 | | 2 | 2 | 2 | | 2 | 2 | | | |
| | 3.3 Elektrische Begriffe | 2 | 2 | | 2 | 2 | 1 | | 2 | 2 | | | |
| | 3.4 Stromerzeugung | 1 | 4 | | 2 | 1 | | | | 1 | | | |
| | 3.5 Gleichstromquellen | 2 | 4 | | 2 | 2 | 1 | | 2 | 2 | | | |
| | 3.6 Gleichstromkreise | 2 | 6 | | 3 | 2 | 8 | | 3 | 2 | | | |
| | 3.7 Widerstand | | | | | | | | | | | | |
| | a) Widerstand und Einflussfaktoren | 2 | 10 | | 3 | 2 | 10 | | 3 | 2 | | | |
| | b) Konduktanz pos. und neg. T.-koeffizient: Festwiderstände, Stellwiderstände, Potentiometer | 1 | 6 | | 2 | 1 | 6 | | 2 | 1 | | | |
| | 3.8 Leistung | 2 | 6 | | 3 | 2 | 6 | | 3 | 2 | | | |
| | 3.9 Kapazität/ Kondensator | 2 | 6 | | 3 | 2 | 6 | | 3 | 2 | | | |
| | 3.10 Magnetismus | | | | | | | | | | | | |
| | a) Theorie des Magnetismus | 2 | 6 | | 2 | 2 | 6 | | 2 | 2 | | | |
| | b) Magnetische Spannung, Feldstärke | 2 | 6 | | 2 | 2 | 6 | | 2 | 2 | | | |
| | 3.11 Induktion/ Induktor | 2 | 6 | | 3 | 2 | 6 | | 3 | 2 | | | |
| | 3.12 Theorie von Gleichstrommotor/ Generatortheorie | 2 | 10 | | 4 | 2 | 10 | | 4 | 2 | | | |
| | 3.13 Wechselstromtheorie | 2 | 9 | | 4 | 2 | 5 | | 4 | 2 | | | |
| | 3.14 Ohmsche, kapazitive und induktive Stromkreise | 2 | 12 | | 5 | 2 | 12 | | 5 | 2 | | | |
| | 3.15 Transformatoren | 2 | 4 | | 2 | 2 | 4 | | 2 | 2 | | | |
| | 3.16 Filter | 1 | 2 | | 2 | 1 | 2 | | 2 | 1 | | | |
| | 3.17 Wechselstromgeneratoren | 2 | 6 | | 2 | 2 | 6 | | 2 | 2 | | | |
| | 3.18 Wechselstrommotoren | 2 | 5 | | 2 | 2 | 5 | | 2 | 2 | | | |
| | Summe Einzelforderung | | 118 | 0 | 52 | | 102 | 0 | 48 | | 0 | 0 | 0 |
| | Summe Theorie und Praxis | | 118 | | | | 102 | | | | 0 | | |
| 04 | Grundlagen Elektronik | | | | | | | | | | | | |
| | 4.1 Halbleiter | | | | | | | | | | | | |
| | a) Diodensymbole | 2 | 6 | | 5 | 2 | 6 | | 5 | 2 | | | |
| | b) Werkstoffe... | | | | | | | | | | | | |
| | 4.1.2 Transistoren | | | | | | | | | | | | |
| | a) Transistorsymbole | 1 | 6 | | 3 | 1 | 6 | | 3 | 1 | | | |
| | b) Konstruktion und Arbeitsweise von PNP- und NPN-Transistoren | | | | | | | | | | | | |
| | 4.1.3 Integrierte Schaltungen | | | | | | | | | | | | |
| | a) Beschreibung und Arbeitsweise logischer und linearer Schaltungen/ Operationsverstärker | 1 | 6 | | 5 | 1 | 6 | | 5 | 1 | | | |
| | b) Beschreibung und Arbeitsweise logischer und linearer Schaltungen | | | | | | | | | | | | |
| | 4.2 Leiterplatten | 1 | 3 | | 4 | 1 | 3 | | 4 | 1 | | | |
| | 4.3 Servomechanismen | | | | | | | | | | | | |
| | a) Verleihen von Begriffen | 1 | 6 | | 3 | 1 | 6 | | 3 | 1 | | | |
| | b) Verleihen von Begriffen | | | | | | | | | | | | |
| | Summe Einzelforderung | | 27 | 0 | 20 | | 27 | 0 | 20 | | 0 | 0 | 0 |
| | Summe Theorie und Praxis | | 27 | | | | 27 | | | | 0 | | |
| 05 | Digitalelektronik und elektronische Instrumentensysteme | | | | | | | | | | | | |
| | 5.1 Elektronische Instrumentensysteme | 2 | 12 | | 5 | 2 | 6 | | 5 | 2 | | | |
| | 5.2 Nummernsysteme | 1 | 6 | | 3 | 1 | 6 | | 3 | 1 | | | |
| | 5.3 Datenumwandlung | 1 | 4 | | 1 | 1 | 4 | | 1 | 1 | | | |
| | 5.4 Datenbusse | 2 | 24 | | 7 | 2 | 24 | | 7 | 2 | | | |
| | 5.5 Logikschaltungen | | | | | | | | | | | | |
| | a) Identifikation von üblichen Verknüpfungssymbolen | 2 | 15 | | 5 | 2 | 15 | | 5 | 2 | | | |
| | b) Interpretation von logischen Schaltplänen | | | | | | | | | | | | |
| | 5.6 Computergrundstruktur | | | | | | | | | | | | |
| | a) Computerterminologie/ -technologie | 2 | 6 | | 2 | 2 | 3 | | 2 | 2 | | | |
| | b) In Verbindung mit Computern verwendete Technologie | | | | | | | | | | | | |
| | 5.7 Mikroprozessoren | | | | | | | | | | | | |
| | 5.8 Integrierte Schaltungen | | | | | | | | | | | | |
| | 5.9 Multiplexing | | | | | | | | | | | | |
| | 5.10 Faseroptik | 1 | 9 | | 2 | 1 | 9 | | 2 | 1 | | | |
| | 5.11 Elektronische Anzeigen | 2 | 9 | | 4 | 2 | 9 | | 4 | 2 | | | |
| | 5.12 Elektrostatisch empfindliche Komponenten | 2 | 3 | | 2 | 2 | 3 | | 2 | 2 | | | |
| | 5.13 Software- Management- Kontrolle | 2 | 3 | | 2 | 2 | 3 | | 2 | 2 | | | |
| | 5.14 Elektromagnetische Umgebung | 2 | 3 | | 2 | 2 | 3 | | 2 | 2 | | | |
| | 5.15 Typische elektronische/ digitale Luftfahrzeugsystem | 2 | 12 | | 5 | 2 | 12 | | 5 | 2 | | | |
| | Summe Einzelforderung | | 106 | 0 | 40 | | 96 | 0 | 40 | | 0 | 0 | 0 |
| | Summe Theorie und Praxis | | 106 | | | | 96 | | | | 0 | | |
| 06 | Werkstoffe und Komponenten | | | | | | | | | | | | |
| | 6.1 Luftfahrzeugwerkstoffe - eisenhaltig | | | | | | | | | | | | |
| | a) Merkmale, Eigenschaften und Kennzeichnung von in Lfz verwendeten üblichen legierten Stählen | 2 | 10 | | 3 | 2 | 8 | | 2 | 2 | 10 | | 3 |
| | b) Prüfen von Eisenwerkstoffen auf Härte, Zugfestigkeit, Dauerfestigkeit und Schlagbiegezugfestigkeit | 1 | 6 | | 2 | 1 | 6 | | 2 | 1 | 6 | | 2 |
| | 6.2 Luftfahrzeugwerkstoffe - nicht eisenhaltig | | | | | | | | | | | | |
| | a) Merkmale, Eigenschaften und Kennzeichnung von in Lfz verwendeten üblichen nicht eisenhaltigen Werkstoffen | 2 | 25 | | 5 | 2 | 20 | | 5 | 2 | 25 | | 5 |
| | b) Prüfen von nicht eisenhaltigen Werkstoffen auf Härte, Zugfestigkeit, Dauerfestigkeit und Schlagbiegezugfestigkeit | 1 | 6 | | 3 | 1 | 6 | | 3 | 1 | 6 | | 3 |
| | 6.3 Luftfahrzeugwerkstoffe - Verbund und nichtmetallische Werkstoffe | | | | | | | | | | | | |
| | a) Merkmale, Eigenschaften und Kennzeichnung von in Lfz verwendeten üblichen Verbund- und nichtmetallischen Werkstoffen, mit Ausnahme von Holz | 2 | 25 | | 5 | 2 | 20 | | 4 | 2 | 25 | | 5 |
| | b) Erkennung von Mängeln/ Beeinträchtigung von Verbund- und nichtmetallischen Werkstoffen | 2 | 25 | | 5 | 2 | 20 | | 4 | 2 | 25 | | 5 |
| | 6.3.2 Holzstrukturen | 2 | 3 | | 3 | 2 | 2 | | 2 | 2 | 3 | | 3 |
| | 6.3.3 Gewebeverkleidung | 2 | 3 | | 3 | 2 | 2 | | 2 | 2 | 3 | | 3 |
| | 6.4 Korrosion | | | | | | | | | | | | |
| | a) Chemische Grundlagen | 1 | 2 | | 2 | 1 | | | 1 | 2 | | | 2 |
| | b) Korrosionsarten und ihre Identifikation | 3 | 14 | | 6 | 3 | 11 | | 5 | 3 | 14 | | 6 |
| | 6.5 Verbindungselemente | | | | | | | | | | | | |
| | a) 5.1 Schraubengewinde | 2 | 1 | | 3 | 2 | | | 2 | 1 | | | 3 |
| | b) 5.2 Bolzen, Nieten, Schrauben | 2 | 2 | | 3 | 2 | | | 2 | 2 | | | 3 |
| | 6.5.3 Sperrvorrichtungen | 2 | 2 | | 3 | 2 | | | 2 | 2 | | | 3 |
| | 6.5.4 Luftfahrzeugnieten | 2 | 12 | | 4 | 2 | 10 | | 3 | 2 | 12 | | 4 |
| | 6.6 Rohre und Anschlüsse | | | | | | | | | | | | |
| | a) Kennzeichnung und Typen der starren und flexiblen Rohre und ihrer Verbindungen, die in Lfz verwendet werden | 2 | 1 | | 3 | 2 | | | 2 | 1 | | | 3 |
| | b) Standardreihenfolge für Luftfahrzeughydraulik-, Kraftstoff-, Öl-, Pneumatik- und Luftrohrsysteme | 2 | 2 | | 3 | 2 | | | 2 | 2 | | | 3 |
| | 6.7 Federn | 2 | 4 | | 3 | 2 | 4 | | 3 | 2 | 4 | | 3 |
| | 6.8 Lager | 2 | 6 | | 3 | 2 | 4 | | 2 | 2 | 6 | | 3 |
| | 6.9 Getriebe | 2 | 12 | | 4 | 2 | 10 | | 3 | 2 | 12 | | 4 |
| | 6.10 Steuerkabel | 2 | 5 | | 3 | 2 | 4 | | 2 | 2 | 5 | | 3 |
| | 6.11 Elektrokabel und -stecke | 2 | 6 | | 3 | 2 | 4 | | 2 | 2 | 6 | | 3 |
| | Summe Einzelforderung | | 172 | 0 | 72 | | 131 | 0 | 44 | | 172 | 0 | 72 |
| | Summe Theorie und Praxis | | 172 | | | | 131 | | | | 172 | | |

| Fachmodul | | 2400 Std. NEU (VO 2018/1142) | | | | Kredit II Cat. A | | | | Kredit V (1909 Std.) Cat. B2 vor VO 1149 | | | |
|--|--|------------------------------|---------|--------|-------|---------------------|---------|--------|-------|---|---------|--------|-------|
| Nr. | Bezeichnung | Sgrad CAT B1 | Theorie | Praxis | MCQ | Sgrad CAT B1 | Theorie | Praxis | MCQ | Sgrad CAT B1 | Theorie | Praxis | MCQ |
| 7A Instandhaltung | | | | | | | | | | | | | |
| 7.1 | Sicherheitsmaßnahmen - Luftfahrzeug und Werkstatt | 3 | 2 | 15 | 7 | 3 | | | | 3 | 2 | 15 | 7 |
| 7.2 | Werkstattverfahren | 3 | 2 | 25 | 7 | 3 | | | | 3 | 2 | 25 | 7 |
| 7.3 | Werkzeuge | 3 | 2 | 15 | 7 | 3 | | | | 3 | 2 | 15 | 7 |
| 7.4 | Allgemeine Avionikprüfgeräte | 2 | 9 | 20 | 3 | 2 | 9 | 20 | 3 | 2 | 9 | 20 | 3 |
| 7.5 | Technische Zeichnungen, Diagramme und Normen | 2 | 18 | 30 | 4 | 2 | 10 | 25 | 3 | 2 | 18 | 30 | 4 |
| 7.6 | Passungen und Abstände | 2 | 10 | 12 | 2 | 2 | 6 | 5 | 2 | 2 | 10 | 12 | 2 |
| 7.7 | Verbindungssystem zur elektrischen Verkabelung (EWIS) | 3 | 10 | 30 | 2 | 3 | 6 | 18 | 2 | 3 | 10 | 30 | 2 |
| 7.8 | Nietverbindungen | 2 | 18 | 60 | 2 | 2 | 10 | 32 | 2 | 2 | 18 | 60 | 2 |
| 7.9 | Rohre und Schläuche | 2 | 6 | 18 | 2 | 2 | 4 | 10 | 2 | 2 | 6 | 18 | 2 |
| 7.10 | Federn | 2 | 2 | 6 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 6 | 2 |
| 7.11 | Lager | 2 | 6 | 6 | 2 | 2 | 3 | 3 | 2 | 2 | 6 | 6 | 2 |
| 7.12 | Getriebe | 2 | 6 | 18 | 3 | 2 | 4 | 10 | 2 | 2 | 6 | 18 | 3 |
| 7.13 | Steuerkabel | 2 | 6 | 18 | 2 | 2 | 4 | 10 | 2 | 2 | 6 | 18 | 2 |
| 7.14 | Werkstoffbearbeitung | | | | | | | | | | | | |
| 7.14.1 | Blech | 2 | 10 | 48 | 2 | 2 | 10 | 48 | 2 | 2 | 10 | 48 | 2 |
| 7.14.2 | Verbund- und nichtmetallisches Material | 2 | 18 | 60 | 2 | 2 | 18 | 60 | 2 | 2 | 18 | 60 | 2 |
| 7.15 | Schweißen, Hartlöten und Verbinden | | | | | | | | | | | | |
| a) | Lötmethoden, Prüfung von Lötverbindungen | 2 | 6 | 12 | 2 | 2 | 6 | 12 | 2 | 2 | 6 | 12 | 2 |
| b) | Schweiß- und Hartlotverbindungen | 2 | 10 | 18 | 2 | 2 | 10 | 18 | 2 | 2 | 10 | 18 | 2 |
| 7.16 | Luftfahrzeuggewicht und -gleichgewicht | | | | | | | | | | | | |
| a) | Schwerpunkt- Gleichgewichtsbeziehung; Gebrauch von relevanten Dokumenten | 2 | 12 | 6 | 2 | 2 | 12 | 6 | 2 | 2 | 12 | 6 | 2 |
| b) | Vorbereitung des Lfz zur Wägung | 2 | 6 | 6 | 2 | 2 | 6 | 6 | 2 | 2 | 6 | 6 | 2 |
| 7.17 | Handhabung und Lagerung des Lfz | 2 | 2 | 15 | 2 | 2 | | | | 2 | 2 | 15 | 2 |
| 7.18 | Demontage-, Prüf-, Reparatur- und Montagetechniken | | | | | | | | | | | | |
| a) | Mängeltypen und Sichtprüfungstechniken | 3 | 12 | 30 | 6 | 3 | 8 | 25 | 5 | 3 | 12 | 30 | 6 |
| b) | Allgemeine Reparaturmethoden | 2 | 12 | 30 | 3 | 2 | 12 | 30 | 3 | 2 | 12 | 30 | 3 |
| c) | Zerstörungsfreie Prüftechniken | 2 | 12 | 18 | 2 | 2 | 12 | 18 | 2 | 2 | 12 | 18 | 2 |
| d) | Demontage- und Wiedermontageverfahren | 2 | 2 | 25 | 2 | 2 | | | | 2 | 2 | 25 | 2 |
| e) | Fehlerlokalisierungstechniken | 2 | 12 | 30 | 2 | 2 | 12 | 30 | 2 | 2 | 12 | 30 | 2 |
| 7.19 | Abnormale Ereignisse | | | | | | | | | | | | |
| a) | Prüfungen nach Blitzschlägen und HIRF | 2 | 1 | 5 | 2 | 2 | | | | 2 | 1 | 5 | 2 |
| b) | Prüfungen nach abnormen Ereignissen, wie harten Landungen, Flug durch Turbulenzen | 2 | 1 | 5 | 2 | 2 | | | | 2 | 1 | 5 | 2 |
| 7.20 | Instandhaltungsverfahren | 2 | 12 | 24 | 2 | 2 | 8 | 17 | 2 | 2 | 12 | 24 | 2 |
| | Summe Einzelforderung | | 225 | 605 | 80 | | 172 | 405 | 48 | | 225 | 605 | 80 |
| | Summe Theorie und Praxis | | 830 | | (+ 2) | | 577 | | (+ 2) | | 830 | | (+ 2) |
| 09 Grundlagen der Aerodynamik | | | | | | | | | | | | | |
| 9.1 | Atmosphärenphysik | 2 | 6 | | 4 | 2 | 4 | | 4 | 2 | | | |
| 9.2 | Aerodynamik | 2 | 16 | | 6 | 2 | 12 | | 6 | 2 | | | |
| 9.3 | Flugtheorie | 2 | 14 | | 6 | 2 | 10 | | 6 | 2 | | | |
| 9.4 | Flugstabilität und Dynamik | 2 | 9 | | 4 | 2 | 6 | | 4 | 2 | | | |
| | Summe Einzelforderung | | 45 | 0 | 20 | | 32 | 0 | 20 | | 0 | 0 | 0 |
| | Summe Theorie und Praxis | | 45 | | | | 32 | | | | 0 | | |
| 09A Menschliche Faktoren | | | | | | | | | | | | | |
| 9.1 | Allgemeines | 2 | 3 | | 2 | 2 | 2 | | 2 | 2 | | | |
| 9.2 | Menschliche Leistung und Einschränkungen | 2 | 5 | | 3 | 2 | 3 | | 3 | 2 | | | |
| 9.3 | Sozialpsychologie | 1 | 1 | | 2 | 1 | | | 2 | 1 | | | |
| 9.4 | Leistungsbeeinflussende Faktoren | 2 | 3 | | 2 | 2 | | | 2 | 2 | | | |
| 9.5 | Physikalische Umgebung | 1 | 2 | | 2 | 1 | | | 2 | 1 | | | |
| 9.6 | Aufgaben | 1 | 1 | | 2 | 1 | | | 2 | 1 | | | |
| 9.7 | Kommunikation | 2 | 3 | | 2 | 2 | | | 2 | 2 | | | |
| 9.8 | Menschliche Fehler | 2 | 4 | | 3 | 2 | | | 3 | 2 | | | |
| 9.9 | Gefahren am Arbeitsplatz | 2 | 3 | | 2 | 2 | | | 3 | 2 | | | |
| | Summe Einzelforderung | | 25 | 0 | 20 | | 11 | 0 | 20 | | 0 | 0 | 0 |
| | Summe Theorie und Praxis | | 25 | | (+1) | | 11 | | (+1) | | 0 | | (+1) |
| 10 Luftfahrzeugzulassung | | | | | | | | | | | | | |
| 10.1 | Rechtsvorschriften | 1 | 2 | | 4 | 1 | 1 | | 4 | 1 | | | |
| 10.2 | Freigabeberechtigtes Personal - Instandhaltung | 2 | 5 | | 5 | 2 | 3 | | 5 | 2 | | | |
| 10.3 | Genehmigter Instandhaltungsbetrieb | 2 | 5 | | 5 | 2 | 2 | | 5 | 2 | | | |
| 10.4 | Flugbetrieb | 1 | 1 | | 4 | 1 | 1 | | 4 | 1 | | | |
| 10.5 | Luftfahrzeugzulassung | | | | | | | | | | | | |
| a) | Allgemeines | 1 | 2 | | 4 | 1 | 2 | | 4 | 1 | | | |
| b) | Dokumente | 2 | 4 | | 4 | 2 | 4 | | 4 | 2 | | | |
| 10.6 | Aufrechterhaltung der Lufttüchtigkeit | 2 | 6 | | 5 | 2 | 3 | | 5 | 2 | | | |
| 10.7 | Geltende nationale und internationale Anforderungen für (wenn nicht ersetzt...) | | | | | | | | | | | | |
| a) | Instandhaltungsprogramme, Lufttüchtigkeitsanforderungen... | 2 | 5 | | 5 | 2 | 3 | | 5 | 2 | | | |
| b) | Aufrechterhaltung der Lufttüchtigkeit, Testflüge, ETOPS, Altwetterbetrie | 1 | 5 | | 4 | 1 | 5 | | 4 | 1 | | | |
| | Summe Einzelforderung | | 35 | 0 | 40 | | 24 | 0 | 40 | | 0 | 0 | 0 |
| | Summe Theorie und Praxis | | 35 | | (+1) | | 24 | | (+1) | | 0 | | (+1) |
| 11A Aerodynamik, Strukturen und Systeme von Flugzeugen mit Turbinenriebwerk | | | | | | | | | | | | | |
| 11.1 | Flugtheorie | | | | | | | | | | | | |
| 11.1.1 | Flugzeugaerodynamik und Flugsteuerung | 2 | 5 | | 2 | 2 | 3 | | 2 | 2 | 5 | | 2 |
| 11.1.2 | Hochgeschwindigkeitsflug | 2 | 2 | | 2 | 2 | 1 | | 2 | 2 | 2 | | 2 |
| 11.2 | Luftfahrzeugzellenstrukturen - allgemeine Begriffe | | | | | | | | | | | | |
| a) | Lufttüchtigkeitsfaktoren für Zellenfestigkeit | 2 | 2 | 2 | 2 | 2 | | | 2 | 2 | 2 | 2 | 2 |
| b) | Konstruktionsmethoden von: Rumpf in Schalenbauweise, Stringern, Längsträgern, Spanten... | 2 | 3 | 4 | 2 | 2 | 1 | 4 | 2 | 2 | 3 | 4 | 2 |
| 11.3 | Luftfahrzeugzellenstrukturen - Flugzeuge | | | | | | | | | | | | |
| 11.3.1 | Rumpf (ATA 52/53/56) | 2 | 4 | 12 | 4 | 2 | 2 | 12 | 2 | 2 | 4 | 12 | 4 |
| 11.3.2 | Flügel (ATA 57) | 2 | 2 | 4 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 4 | 2 |
| 11.3.3 | Höhenflüssen (ATA 55) | 2 | 2 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 2 |
| 11.3.4 | Steuerflächen (ATA 55/57) | 2 | 2 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 2 |
| 11.3.5 | Gondeln/ Ausleger (ATA 54) | 2 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 3 | 1 |
| 11.4 | Klima- und Druckbeaufschlagungsanlage (ATA 21) | | | | | | | | | | | | |
| 11.4.1 | Luftversorgung | 2 | 2 | 3 | 3 | 2 | 1 | 2 | 3 | 2 | 2 | 3 | 3 |
| 11.4.2 | Klimaanlage | 3 | 12 | 18 | 8 | 3 | 8 | 12 | 6 | 3 | 12 | 18 | 8 |
| 11.4.3 | Druckbeaufschlagung | 3 | 6 | 8 | 6 | 3 | 4 | 6 | 4 | 3 | 6 | 8 | 6 |
| 11.4.4 | Sicherheits- und Warnsysteme | 3 | 4 | 6 | 4 | 3 | 3 | 4 | 3 | 3 | 4 | 6 | 4 |
| 11.5 | Instrumenten-/ Avioniksysteme | | | | | | | | | | | | |
| 11.5.1 | Instrumentensysteme (ATA 31) | 2 | 22 | 24 | 8 | 2 | 15 | 20 | 6 | 2 | 22 | 24 | 8 |
| 11.5.2 | Avioniksysteme | 1 | 18 | 19 | 6 | 1 | | | | 1 | 18 | 19 | 6 |
| 11.6 | Elektrische Leistung (ATA 24) | 3 | 18 | 15 | 6 | 3 | 12 | 10 | 4 | 3 | 18 | 15 | 6 |
| 11.7 | Geräte und Ausstattungen (ATA 25) | | | | | | | | | | | | |
| a) | Anforderungen an Notausstattung, Sitze, Sicherheitsgurte und Gurte | 2 | 2 | 10 | 3 | 2 | | | | 2 | 2 | 10 | 3 |
| b) | Kabinenlayout, Gerätesystem, Kabinenausstattung | 1 | 1 | 5 | 2 | 1 | | | | 1 | 1 | 5 | 2 |
| 11.8 | Brandschutz (ATA 26) | | | | | | | | | | | | |
| a) | Feuer- und Raucherkennungs- und Warnsysteme | 3 | 9 | 9 | 4 | 3 | 7 | 8 | 3 | 3 | 9 | 9 | 4 |
| b) | Tragbare Feuerlöscher | 2 | 1 | 1 | 1 | 1 | | | | 1 | 1 | 1 | 1 |
| 11.9 | Flugsteuerung (ATA 27) | 3 | 24 | 40 | 12 | 3 | 20 | 34 | 8 | 3 | 24 | 40 | 12 |
| 11.10 | Kraftstoffanlage (ATA 28) | 3 | 12 | 22 | 8 | 3 | 10 | 18 | 4 | 3 | 12 | 22 | 8 |
| 11.11 | Hydraulik (ATA 29) | 3 | 12 | 24 | 8 | 3 | 10 | 18 | 4 | 3 | 12 | 24 | 8 |
| 11.12 | Eis- und Regenschutz | 3 | 6 | 10 | 4 | 3 | 5 | 8 | 3 | 3 | 6 | 10 | 4 |
| 11.13 | Fahrwerk (ATA 32) | 3 | 24 | 40 | 11 | 3 | 12 | 20 | 7 | 3 | 24 | 40 | 11 |
| 11.14 | Lampen (ATA 33) | 3 | 4 | 8 | 4 | 3 | 3 | 6 | 3 | 3 | 4 | 8 | 4 |
| 11.15 | Sauerstoff (ATA 35) | 3 | 6 | 6 | 4 | 3 | 5 | 5 | 3 | 3 | 6 | 6 | 4 |
| 11.16 | Pneumatische Unterdruck (ATA 36) | 3 | 12 | 12 | 6 | 3 | 10 | 10 | 4 | 3 | 12 | 12 | 6 |
| 11.17 | Wasser/ Abfall (ATA 38) | 3 | 6 | 6 | 4 | 3 | 4 | 3 | 3 | 3 | 6 | 6 | 4 |
| 11.18 | Bordinstandhaltungssysteme (ATA 45) | 2 | 3 | 6 | 3 | 2 | 2 | 4 | 3 | 2 | 3 | 6 | 3 |
| 11.19 | Integrierte modulare Avionik (ATA 42) | 2 | 2 | | 2 | 2 | | | 2 | 2 | | | 2 |
| 11.20 | Kabinensysteme (ATA44) | 2 | 2 | | 2 | 2 | | | 2 | 2 | | | 2 |
| 11.21 | Informationssysteme (ATA 46) | 2 | 2 | | 2 | 2 | | | 2 | 2 | | | 2 |
| | Summe Einzelforderung | | 236 | 323 | 140 | | 150 | 210 | 92 | | 236 | 323 | 140 |
| | Summe Theorie und Praxis | | 559 | | | | 360 | | | | 559 | | |

| Fachmodul | | 2400 Std. NEU (VO 2018/1142) | | | | Kredit II Cat. A | | | | Kredit V (1909 Std.) Cat. B2 vor VO 1149 | | | |
|--------------------------------|--|------------------------------|-------------|--------|-----|---------------------|-------------|--------|-----|---|-------------|--------|-----|
| Nr. | Bezeichnung | Sgrad CAT B1 | Theorie | Praxis | MCQ | Sgrad CAT B1 | Theorie | Praxis | MCQ | Sgrad CAT B1 | Theorie | Praxis | MCQ |
| 15 Gasturbinentriebwerk | | | | | | | | | | | | | |
| 15.1 | Grundlagen | 2 | 12 | | 5 | 2 | 7 | | 3 | 2 | 12 | | 5 |
| 15.2 | Triebwerksleistung | 2 | 9 | | 4 | 2 | 9 | | 4 | 2 | 9 | | 4 |
| 15.3 | Einlass | 2 | 1 | 1 | 4 | 2 | | | | 2 | 1 | 1 | 4 |
| 15.4 | Verdichter | 2 | 12 | 6 | 5 | 2 | 7 | 4 | 3 | 2 | 12 | 6 | 5 |
| 15.5 | Verbrennungsbereich | 2 | 3 | 1 | 4 | 2 | 2 | 1 | 3 | 2 | 3 | 1 | 4 |
| 15.6 | Turbinenabschnitt | 2 | 2 | 1 | 5 | 2 | | | | 2 | 2 | 1 | 5 |
| 15.7 | Auslass | 2 | 6 | 6 | 4 | 2 | 4 | 4 | 3 | 2 | 6 | 6 | 4 |
| 15.8 | Lager und Dichtungen | 2 | 3 | 3 | 4 | 2 | 3 | 3 | 4 | 2 | 3 | 3 | 4 |
| 15.9 | Schmiermittel und Kraftstoffe | 2 | 3 | 5 | 4 | 2 | 2 | 3 | 2 | 2 | 3 | 5 | 4 |
| 15.10 | Schmiersysteme | 2 | 6 | 12 | 4 | 2 | 4 | 8 | 3 | 2 | 6 | 12 | 4 |
| 15.11 | Kraftstoffanlage | 2 | 12 | 15 | 5 | 2 | 7 | 8 | 4 | 2 | 12 | 15 | 5 |
| 15.12 | Luftsyste | 2 | 9 | 6 | 4 | 2 | 6 | 4 | 3 | 2 | 9 | 6 | 4 |
| 15.13 | Anlass- und Zündsysteme | 2 | 9 | 12 | 4 | 2 | 6 | 8 | 3 | 2 | 9 | 12 | 4 |
| 15.14 | Triebwerksanzeigesysteme | 2 | 6 | 6 | 4 | 2 | 4 | 4 | 3 | 2 | 6 | 6 | 4 |
| 15.15 | Leistungserhöhungssysteme | 1 | 6 | | 2 | 1 | 6 | | 2 | 1 | 6 | | 2 |
| 15.16 | Turboproptriebwerke | 2 | 12 | 10 | 4 | 2 | 8 | 6 | 3 | 2 | 12 | 10 | 4 |
| 15.17 | Weitenleistungtriebwerke | 2 | 6 | 6 | 4 | 2 | 4 | 4 | 3 | 2 | 6 | 6 | 4 |
| 15.18 | Hilfstriebwerke (APUs) | 2 | 6 | 6 | 4 | 2 | 4 | 4 | 3 | 2 | 6 | 6 | 4 |
| 15.19 | Triebwerkeinbau | 2 | 3 | 22 | 4 | 2 | 2 | 14 | 3 | 2 | 3 | 22 | 4 |
| 15.20 | Brandschutzsysteme | 2 | 6 | 6 | 4 | 2 | 4 | 4 | 3 | 2 | 6 | 6 | 4 |
| 15.21 | Triebwerksüberwachung und Bodenbetrieb | 3 | 18 | 25 | 6 | 3 | 15 | 20 | 5 | 3 | 18 | 25 | 6 |
| 15.22 | Lagerung und Konservierung des Triebwerk | 2 | 3 | 6 | 4 | 2 | 3 | 6 | 4 | 2 | 3 | 6 | 4 |
| Summe Einzellforderung | | | 153 | 155 | 92 | | 107 | 105 | 64 | | 153 | 155 | 92 |
| Summe Theorie und Praxis | | | 306 | | | | 212 | | | | 306 | | |
| 17A Propeller | | | | | | | | | | | | | |
| 17.1 | Grundlagen | 2 | 5 | | 5 | 2 | 4 | | 5 | 2 | 5 | | 5 |
| 17.2 | Propellerkonstruktion | 2 | 3 | 2 | 4 | 2 | 2 | 2 | 4 | 2 | 3 | 2 | 4 |
| 17.3 | Propellerverstellereinrichtung | 2 | 5 | 2 | 5 | 2 | 3 | 2 | 5 | 2 | 5 | 2 | 5 |
| 17.4 | Propellersynchronisierung | 2 | 3 | 2 | 4 | 2 | 3 | 2 | 4 | 2 | 3 | 2 | 4 |
| 17.5 | Propellervereisungsschutz | 2 | 2 | 2 | 4 | 2 | 2 | 2 | 4 | 2 | 2 | 2 | 4 |
| 17.6 | Propellerinstandhaltung | 3 | 6 | 4 | 6 | 3 | 5 | 4 | 6 | 3 | 6 | 4 | 6 |
| 17.7 | Lagerung und Konservierung des Propeller | 2 | 2 | 2 | 4 | 2 | 2 | 2 | 4 | 2 | 2 | 2 | 4 |
| Summe Einzellforderung | | | 26 | 14 | 32 | | 21 | 14 | 32 | | 26 | 14 | 32 |
| Summe Theorie und Praxis | | | 40 | | | | 35 | | | | 40 | | |
| Gesamt CAT B 1.1 | | | 2400 | | | | 1692 | | | | 1909 | | |