CAR – 66 ISSUE II R4

LICENSING OF AIRCRAFT MAINTENANCE ENGINEERS

DIRECTORATE GENERAL OF CIVIL AVIATION

TECHNICAL CENTRE, OPP SAFDURJUNG AIRPORT, NEW DELHI

Salient Features of the CAR-66

The CAR-66

- has been drafted in line with the current Rule 61 and to harmonise the aircraft maintenance personnel licensing system with EASA Part 66 (General).
- details, requirements for qualifying an individual to obtain an Aircraft Maintenance Engineer's Licence and extension of such licence [CAR-66]
- eliminates the system of obtaining Airframe, Engine, Electrical, Instrument and Radio System Licences separately [66.A.03]
- redefines the syllabus for basic knowledge examination in modular pattern [66.A.25]
- provides for endorsement of an AME licence after successful completion of type training and the type training examination/type examination which shall consist of both theoretical and practical examinations [66.A.45 (c)]
- lists the details of practical tasks to qualify an individual to obtain a type rating [Appendix II to AMC]
- provides for acquiring group type rating of aircraft and certification privileges [66.A.45 (a)]
- has a provision to convert the existing AME licence to CAR 66 licence [66.A.70] with or without limitation.

GENERAL

In order to harmonize Indian requirements for licensing of aircraft maintenance engineers with international requirements; CAR-66 Rev.0 dated 11th November 2011, was introduced.

This CAR is issued on the basis of amended Rule 61***(6th amendment)*** of the Aircraft Rules, 1937 as notified vide GSR 1001(E) dated 22ndDecember 2010.

This CAR is effective from 01.01.2012. However the existing requirements of CAR Section -2 Series L will also continue till the date notified by the Director General for facilitating smooth transition of aircraft maintenance engineer licensing system into CAR 66 pattern.

The CAR-66 is applicable to all personnel / Organizations engaged in maintenance and/or certification of aircraft registered in India.

The Section A of CAR-66 establishes the requirements for the issue and extension of an aircraft maintenance engineer's license, conditions of its validity and use. It also has a provision for converting the aircraft maintenance engineer's (AME) license issued prior to the CAR-66 coming into force. The requirements are followed by Acceptable means of compliance (AMC) and Guidance Material (GM)

The AME licenses in CAR 66 pattern will be available in two different ways:
a) After conversion of existing AME licenses with applicable limitation.
b) Issue of fresh license after passing of applicable modules of Basic Knowledge Exam to be conducted by CEO.

Record of Revisions

Initial Issue (Revision 0) 11th November 2011

This CAR 66 provides requirements for the issue of an aircraft maintenance engineer's licence and conditions of its validity and use for aeroplanes and helicopters.

Revision 1, 23rd April 2015

The Revision-01 to CAR 66 was issued to revise conversion of licences issued prior to CAR-66 and examination credits. The revision also revises the License format.

CAR 66 Issue II

The CAR 66 Issue II is being issued to amend the training, examination, knowledge and experience requirements for the issuance of aircraft maintenance licences

Salient features of the CAR 66 Issue II are:

1. The training, examination, knowledge and experience requirements for the issuance of aircraft maintenance licences and to adapt these requirements to the complexity of the different categories of aircraft amended
2. The AMCs and GMs related to a point have been brought together for easy reference purposes.
3. Provision for aircraft grouping added (66.A.5)
4. Requirements for completing all the module for basic knowledge within 10 year (66.A.25 (b)) added
5. Heading of (66.A.45) is changed from type /task training to Endorsement with aircraft rating. Related AMC and GM amended.
6. Point 66. A. 50 and related AMC added to make a provision for introducing or removal of limitation from the license
7. Existing AMCs and GMs are suitable amended.
8. Appendix -1- Basic knowledge requirements amended to revise the syllabus for knowledge examination
9. Appendix -2 -Basic examination standard have been revised
10. Appendix-3- Type examination standard have been amended, minimum standard and duration for type training, course curriculum have been introduced, practical elements requirements to be covered during type training added, type training examinations and assessment standard have been revised, relevant AMC and GM have been also amended/added

11. Appendix-III to AMC of CAR 66 for competency assessment of assessors added.

12. Procedures for CAR -66 (Section –B) is removed from this CAR and shall be part of Airworthiness Procedures Manual (Chapter- 17)

CAR Issue II Revision 1

The Revision-01 to CAR 66 Issue II is proposed to be issued to incorporate amendments made in Rule 61 of the Aircraft Rules, 1937 published vide GSR 911 (E) dated 16-9-2016. Salient revision in the CAR as follows:-

1. CAR 66.A.3 In the existing AME licence category, category B3 is introduced for certifying unpressurised piston engine aircraft below 2000kgs MTOW.
2. Provision has been made for issue of Category A licence without type rating
3. 66. A. 20 privileges of AME licence has been replaced with new one in line with rule 61.
4. 66.A.30 Aircraft Maintenance Experience requirements of issue of Category A, B1.2 and B 1.4 has been revised to 3 years.
5. Related paragraph in this CAR revised to include new category B3 where ever required.
6. 66.A.45 endorsement on AME licence for aircraft ratings has been revised suitably to include category B3 requirement.
7. Appendix –I Basic knowledge requirement has been revised to include syllabus for category B3.
8. Requirements for certifying staff engaged in certification of aircraft components are detailed in Subpart C (Component).
9. Application and format are separated from the main CAR and published in the form section on DGCA website.

CAR Issue II Revision 2

The salient features of this revision are as follows:

1. 66.A.35 amended to replace skill test requirement with demonstration of skill.
2. 66.A.215 (b) amended to include AME Course.
3. Appendix –II (Basic Examination Standard) para 1.5 amended to make provision for appearing in failed module related to limitation papers from 90 days to 30 days.
4. GM 66.A.35 (Skill Test Requirements) – Deleted.
5. Appendix-I (Appendices to AMC for CAR 66) amended to add a note on Type rating endorsement covering several models/ variant. Group 1 Helicopter Table amended in line with EASA guidelines.

CAR Issue II Revision 3

The salient features of this revision are as follows:

1. Appendix 1 to AMC published separately.

CAR Issue II Revision 4

The salient features of this revision are as follows:

1. AMC 66.A.30(a) amended to incorporate amendment to Rule 61 of the Aircraft Rules, 1937 published vide GSR 1066(E) dated 25-10-2018.

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Appendices

Acceptable Means of Compliance (AMC) and Guidance Material to SECTION A of CAR 66

SECTION A

Technical Requirements

SUBPART A

AIRCRAFT MAINTENANCE ENGINEER'S LICENCE AEROPLANES AND HELICOPTERS

66. A.01 Scope

This section defines the aircraft maintenance engineer's licence and establishes the requirements for application, issue and conditions of its validity

66. A.03 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. The 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 2000 kg MTOM and below.

66. A.05 Aircraft groups

For the purpose of ratings on aircraft maintenance engineers 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 DGCA

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 engineer's licence or change to such licence shall be made on CA Form 19-01/02 (Refer Appendix-V) with necessary documents and fees to DGCA.

b) *Reserved*.

c) In addition to the documents required in points 66.A.10 (a) as appropriate, the applicant for additional categories or sub-categories to an aircraft maintenance engineer's licence shall submit his/her current original aircraft maintenance engineer's licence to the DGCA together with CA Form 19-02.

d) *Reserved*

e) Reserved

(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

a) The applicant must have passed 10+2 examination in Physics, Chemistry and Mathematics from a recognized board or university or its equivalent

b) An applicant for an aircraft maintenance engineer's licence shall be at least 18 years of age.

66. A.20 Privileges

a) Subject to the compliance with paragraph (b), the following privileges shall apply:

1. Category A licence holder to issue certificates for release to service after minor scheduled line maintenance and simple defect rectification within the limits of maintenance tasks specifically endorsed on the authorisation issued by a maintenance organisation approved under rule 133B for the broad category of aircraft endorsed on the licence and the certification privileges shall be restricted to the work carried out by the licence holder himself in the maintenance organization that issues the authorisation.

2. Category B1 licence holder to issue certificates for release to service and act as support staff following the maintenance performed on aircraft structure, power-plant, mechanical and electrical systems, work on avionics system requiring simple tests to prove their serviceability and not requiring trouble shooting, in respect of an aircraft type endorsed on the licence.

NOTE:-(a) Category B1 shall include the appropriate sub-category of Category A;

3 Category B2 licence holder to issue —

(a) certificates of release to service after maintenance on avionic and electrical systems, avionics and electrical system within engine and mechanical systems requiring only simple tests to prove their serviceability of aircraft type endorsed on the licence;

(b) certificates of release to service after minor scheduled line maintenance and simple defect rectification within the limits of tasks specifically endorsed on the certification authorisation issued by an approved maintenance organisation of aircraft type endorsed on the licence and 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 rating already endorsed on the licence.

4. Category B3 licence holders to issue certificates of release to service after maintenance on aeroplane structure, engine and mechanical and electrical systems, work on avionic systems requiring only simple tests to prove their serviceability and not requiring troubleshooting of 'piston-engine non-pressurised aeroplanes of 2000 kg Maximum Take-off Mass and below'

5 Category C licence holders to issue certificates of release to service after base maintenance in respect of an aircraft of the type endorsed on the licence. The privileges apply to the aircraft in its entirety including all systems.

NOTE—Simple test means a test described in approved maintenance data and such in nature that aircraft system serviceability is verified through aircraft controls, switches, Built-in Test Equipment (BITE), Central Maintenance Computer (CMC) or external test equipment not requiring special training." ;

b) The holder of Aircraft Maintenance Engineer license may not exercise certification privileges unless:

1. *in compliance with the applicable requirements of CAR M and/or CAR 145* ; and

2. in the preceding two year period he/she has either acquired six months of maintenance experience in accordance with the privileges granted by the Aircraft Maintenance Engineer's Licence or met the provision for the issue of 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 engineer's licence or the addition of a category or subcategory to such an aircraft maintenance engineer's licence shall demonstrate by examination, a level of knowledge in the appropriate subject modules in accordance with Appendix I to this CAR. The basic knowledge examination shall be conducted by Central Examination Organization of DGCA.

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 DGCA 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 DGCA to be equivalent to the knowledge standard of CAR -66

Credits shall be granted in accordance with APM Chapter 17.

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

66. A.30 Basic Experience requirements:

a) An applicant for an aircraft maintenance engineer's licence shall have acquired:

1. for category A, sub categories B1.2 and B1.4 and category B3 three years of practical aircraft maintenance experience on operating aircraft .

2. for category B2 and sub-categories B1.1 and B1.3 five years of practical aircraft maintenance experience on operating aircraft.

3. for Category C with respect to large aircraft:

i. three years of experience exercising category B1.1 or B1.3 or B2 privileges on large aircraft or as CAR 145 B1.1, B1.3 or B2 support staff, or, a combination of both; or

ii. five years of experience exercising category B1.2 or B1.4 privileges on large aircraft or as CAR 145 B1.2 or B1.4 support staff, or a combination of both; or

4. for category C with respect to non large aircraft:

Three years of experience exercising category B1 or B2 privileges on non large aircraft or as CAR 145 B1 or B2 support staff, or a combination of both.

b) An applicant for an extension to an aircraft maintenance engineer's licence shall have a minimum civil aircraft maintenance experience requirement appropriate to the additional category or sub-category of licence applied for as defined in Appendix IV to this CAR.

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

d) At least one year of the required experience shall be recent maintenance experience on aircraft of the category/subcategory for which the initial aircraft maintenance engineer's licence is sought. For subsequent category /subcategory additions to an existing aircraft maintenance engineer's licence, the additional recent maintenance experience required may be less than one year, but shall be at least three months. The required experience shall be dependent upon the difference between the licence category/subcategory held and applied for. Such additional experience must be typical of the new licence category/subcategory sought.

e) Twelve years of practical aircraft maintenance experience, gained outside a civil aircraft maintenance environment shall be accepted as equivalent to the requirements laid down in (1) and (2) of Paragraph (a) above, in the relevant category supplemented by at least one year of recent experience in 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. Notwithstanding to this, the aircraft maintenance experience gained in defense environment in the preceding fifteen years shall be acceptable.

66. A. 35 Demonstration of Skill

An applicant for grant or extension of Aircraft Maintenance Engineer's licence shall demonstrate his aircraft maintenance skill in respect of each category or sub-category of license or specific type of aircraft in accordance with CAR 66.A.45 for which the application has been made to the Director General

66. A.40 Continued validity of the aircraft maintenance engineer's licence

(a) The aircraft maintenance engineer's licence becomes invalid after five years of its last issue or renewal, unless the holder submits his/her aircraft maintenance engineer's licence to the DGCA, in order to verify the information contained in the licence is the same as that contained in the DGCA records, pursuant to point 66. B. 120.

(b) The holder of an aircraft maintenance engineer's licence shall complete the CA Form 19-03 (Refer Appendix-V) and submit it with the holder's copy of the licence to the DGCA, unless the holder works in a maintenance organization approved in accordance with CAR 145 that has a procedure in its exposition where by such organisation may submit the necessary documentation on behalf of the aircraft maintenance engineer's licence holder.

(c) Any certification privileges based upon an aircraft maintenance engineer's licence becomes invalid as soon as the aircraft maintenance engineer's licence is invalid.

(d) The aircraft maintenance engineer's licence is only valid when issued and/or changed by DGCA and 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 engineer 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 subgroup 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 2000 kg MTOM and below.

— For category A, no rating is required, subject to compliance with the require ments of paragraph 145.A.35 of CAR-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 CAR-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 and B2 or C aircraft type examination described in Appendix III to this Annex (CAR-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.

(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 2000 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 DGCA.

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 APM Chapter 17

66. A.55 Evidence of qualification

Personnel exercising certification privileges as well as support staff must produce their licence as evidence of qualification, if required by an authorized person of DGCA, within 24 hours.

66. A.70 Conversion provisions-

a) The holder of a valid Aircraft Maintenance Engineer's Licence on the date of coming into force of this CAR may continue to exercise the privileges of his licence and shall be issued, with or without limitation and without further examination, an Aircraft Maintenance Engineer's Licence in the appropriate category subject to such conditions specified in Airworthiness Procedures Manual Chapter 17

b) A person undergoing a qualification process, prior to the GSR No. 1001(E) dated 22.12.2010 regarding the Rule 61 of the Aircraft Rules, 1937 shall continue to be qualified till date as specified by the Director General. The holder of a qualification gained following such qualification process may be issued an aircraft maintenance engineer's licence subject to the conditions specified in Airworthiness Procedures Manual Chapter 17

c) Where necessary, the aircraft maintenance engineer's licence shall contain limitations in accordance with point 66. A.50 to reflect the differences between (i) the scope of the certifying staff qualification (ii) the basic knowledge requirements and the basic examination standards laid down in Appendix I and II to this CAR 66.

d) Aircraft Maintenance Engineer's Licences issued prior to this CAR coming into force in category "A" to cover Gliders, Balloons and in category "B", "D" and "X" to cover Aircraft, Engine, propeller and items of equipment to carryout maintenance and issue 'Certificate of Release to Service' that could not be transferred to CAR-66 licence 'Type

Rating' shall be transferred to the CAR-66 licence section XIV (a) without altering the privileges hitherto exercised by the holder.

SUBPART B

AIRCRAFT OTHER THAN AEROPLANES AND HELICOPTERS

66. A.100 General

Microlight, light sport aircraft, glider, balloon or an airship shall be certified by an aircraft maintenance engineer holding a licence in Category A or Category B1 or Category B3 or an authorised person subject to meeting the requirements as specified in the relevant CAR.

SUBPART C

COMPONENTS

66. A. 200 General

This subpart lays down the minimum requirements in respect of knowledge, training, experience, examination and procedure for issue of authorisation by CAR -145 / CAR M Subpart-F approved organisations to certifying staff employed in their organisation for maintenance and certification of components /aircraft maintenance as per manufacturer maintenance data.

66. A.205 Requirements

Candidate for grant of authorization to carryout and certify overhaul, major repairs of aircraft, power plants, components and accessories thereof, shall meet the following requirements:

(a) He shall not be less than 21 years of age.
(b) Knowledge:- The applicant shall have passed 10+2 with Physics, Chemistry and Mathematics or equivalent and
(c) should hold CAR 66 licence in appropriate category or
i) passed 3 years basic AME training course/Diploma / Degree in Engineering in the appropriate branch and must have passed relevant portions of modules of CAR 66 knowledge examination approved by the DGCA for the purpose in the MOE and examination conducted by the approved organisation in association with DGCA or eligible for grant of suitable credit for particular module.

Note 1: Depending on the scope of authorization required, the CAR 145 / CAR M- Sub Part F approved organization shall documents the module(s) of examination required to be passed by the applicant in the organisations expositions.

(d) Training:

The applicant must have undergone a training programme conducted by:

Manufacturer of the equipment;
OR
An organization approved to impart such training;
OR
Trained by a person having specific approval covering the activity for a period of 2 years.

(e) Experience: Applicants meeting the knowledge requirements shall have the following experience:

i) For persons holding CAR 66 Aircraft Engineers' License: one year experience in overhaul, major repairs, modifications of the system components and accessories, including three months recent experience.

ii) For persons holding Diploma/ Degree in Engineering: two years' experience in overhaul, major repairs, modifications of the system components and accessories, including six months recent experience.

iii) Candidate for certification of structural repair/ modification should have minimum two years relevant field experience, and produce evidence that he has performed similar structural repairs at least twice under the supervision of an approved person in the preceding six months.

(f) Medical Fitness

The applicant should have been assessed medically fit by a registered medical practitioner to perform the scope of work applied for.

(g) Competency check :-

Before grant of authorization the competency of the candidate shall be assessed by the organization, following procedures documented in the organization exposition.

(h) Organizations desirous of using the provisions of this CAR shall detail their training programme, activities requiring certification authorisation, education, experience, on job training requirements and assessment procedure in their Maintenance Organization Exposition.

66. A.210 Extension to Scope of Authorization

Candidate seeking extension to their scope of authorization of a particular stream (Mechanical or Avionics) , in addition to meeting the training requirements of para 66.A.205 (c) of this CAR ,shall have additional six months experience on the type of components for which certification authorisation is required. When the authorization is required to be granted for additional stream, the applicant shall have 24 months maintenance experience out of which 6 months must be recent experience.

Before grant of extension of authorization, the competency of the candidate shall be assessed by the organization, following procedures as mentioned in 66.A.205 (g).

66. A.215 Privileges

The privileges of component certifying staff shall cover ;-

a) Holder of certification authorization on the basis of CAR 66 AME Licence: Issuance of Certificate of Maintenance (CRS) for shops and systems of aircraft/ engine (when at shop level and not fitted on the aircraft)

Note: CRS on aircraft and/ or engine shall be done provided the Approval holder has AME licence in relevant Category.

b) Holder of certification authorization on the basis of AME Course/Diploma in Engineering/ Degree in Engineering: Certify work carried out as endorsed on the certification authorization

Note 1: Such a certification authorization *shall be limited only to shop level work and shall not include major maintenance of aircraft and/or engine*

Note 2: Persons already holding approvals with CRS privileges may continue to be permitted to issue CRS on being permitted under the CAR 145 / CAR M Subpart F approval even if they are not meeting the requirement of this CAR. Such persons may also be considered for grant of additional certification authorization subject to meeting the requirements

66. A.220 Validity of Certification Authorization

a) The Certification Authorization shall be valid for a period of one year and may be renewed by the Quality Manager subject to the condition that that the person

i) Has exercised the privileges of the authorization for a minimum period of three months in the preceding 12 months;

ii) Has undergone refresher course in the preceding 24 months;

iii) Has been assessed medically fit; and

iv) Continues to remain in the employment or employment contract of the organization.

66. A.225 Suspensions, Cancellation and Return of Certification Authorization

(a) A Certification Authorization may be withdrawn where an enquiry conducted by the approved organization or DGCA establishes that :-

i) the holder of such an authorization has performed work or granted a certificate in respect of work which has not been performed in a careful and competent manner, or

ii) the holder of such an authorization has signed a certificate in respect of any matter which he is not authorized to deal with, or

iii) it is undesirable for any other reason that the holder of such authorization should continue to exercise the functions of an approval holder.

iv) Authorization of a person withdrawn as a result of an enquiry shall not be restored without approval of the DGCA (Regional Airworthiness Office). Such person shall also not be granted other Authorization without the concurrence of the DGCA (Regional Airworthiness Office).

v) All disciplinary actions taken against approved persons shall be immediately intimated to the DGCA (Regional Airworthiness Office). Copies of warnings/ memoranda issued to the approved persons shall also be forwarded to the DGCA (Regional Airworthiness Office).

(B S BHULLAR)

Director General of Civil Aviation

Appendix I - Basic Knowledge Requirements

1. KNOWLEDGE LEVELS - CATEGORY A, B1, B2, B3 AND C AIRCRAFT MAINTENANCE ENGINEER's LICENCE

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

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

LEVEL 1

Familiarization 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 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 interrelation ship 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 CAR 66 aircraft maintenance engineer's licence category or subcategory should be in accordance with the following matrix. Applicable subjects are indicated by an 'X':

Subject Modules	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	Not Applicable					
2	Not Applicable					
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

MODULES & SYLLABUS	LEVEL			
	A	B1	B2	B3
MODULE 1. Reserved	-	-	-	
MODULE 2. Reserved	-	-	-	

MODULE 3. ELECTRICAL FUNDAMENTALS	LEVEL			
	A	B1	B2	B3
3.1 Electron Theory Structure and distribution of electrical charges within: atoms, molecules, ions, compounds; Molecular structure of conductors, semiconductors and insulators.	**1**	**1**	**1**	**1**
3.2 Static Electricity and Conduction Static electricity and distribution of electrostatic charges; Electrostatic laws of attraction and repulsion; Units of charge, Coulomb's Law; Conduction of electricity in solids, liquids, gases and a vacuum.	**1**	**2**	**2**	**1**
3.3 Electrical Terminology The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.	**1**	**2**	**2**	**1**
3.4 Generation of Electricity Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.	**1**	**1**	**1**	**1**
3.5 DC Sources of Electricity Construction and basic chemical action of: primary cells, secondary cells, lead acid cells, nickel cadmium cells, other alkaline cells; Cells connected in series and parallel; Internal resistance and its effect on a battery; Construction, materials and operation of thermocouples; Operation of photo-cells.	**1**	**2**	**2**	**2**
3.6 DC Circuits Ohms Law, Kirchoff's Voltage and Current Laws; Calculations using the above laws to find resistance, voltage and current; Significance of the internal resistance of a supply.	**-**	**2**	**2**	**1**
3.7 Resistance/Resistor (a) Resistance and affecting factors; Specific resistance; Resistor colour code, values and tolerances, preferred values, wattage ratings;	-	2	2	1

MODULE 3. ELECTRICAL FUNDAMENTALS	LEVEL			
	A	B1	B2	B3
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;	-	1	1	-
3.8 Power Power, work and energy (kinetic and potential); Dissipation of power by a resistor; Power formula; Calculations involving power, work and energy.	**-**	**2**	**2**	**1**
3.9 Capacitance/Capacitor Operation and function of a capacitor; Factors affecting capacitance area of plates, distance between plates, number of plates, dielectric and dielectric constant, working voltage, voltage rating; Capacitor types, construction and function; Capacitor colour coding; Calculations of capacitance and voltage in series and parallel circuits; Exponential charge and discharge of a capacitor, time constants; Testing of capacitors.	**-**	**2**	**2**	**1**
3.10 Magnetism				
(a) Theory of magnetism; Properties of a magnet Action of a magnet suspended in the Earth's magnetic field; Magnetisation and demagnetisation; Magnetic shielding; Various types of magnetic material; Electromagnets construction and principles of operation; Hand clasp rules to determine: magnetic field around current carrying conductor.	-	2	2	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

MODULE 3. ELECTRICAL FUNDAMENTALS	LEVEL			
	A	B1	B2	B3
3.11 Inductance/Inductor Faraday's Law; Action of inducing a voltage in a conductor moving in a magnetic field; Induction principles; Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductor turns; Mutual induction; The effect the rate of change of primary current and mutual inductance has on induced voltage; Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other; Lenz's Law and polarity determining rules; Back emf, self induction; Saturation point; Principle uses of inductors;	-	2	2	1
3.12 DC Motor/Generator Theory Basic motor and generator theory; Construction and purpose of components in DC generator; Operation of, and factors affecting output and direction of current flow in DC generators; Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors; Series wound, shunt wound and compound motors; Starter Generator construction.	-	2	2	1
3.13 AC Theory Sinusoidal waveform: phase, period, frequency, cycle; Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power Triangular/Square waves; Single/3 phase principles.	1	2	2	1
3.14 Resistive (R), Capacitive (C) and Inductive (L) Circuits Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel; Power dissipation in L, C and R circuits; Impedance, phase angle, power factor and current calculations; True power, apparent power and reactive power calculations.	-	2	2	1
3.15 Transformers Transformer construction principles and operation; Transformer losses and methods for overcoming them; Transformer action under load and no-load conditions; Power transfer, efficiency, polarity markings;	-	2	2	1

MODULE 3. ELECTRICAL FUNDAMENTALS	LEVEL			
	A	B1	B2	B3
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.				
3.16 Filters Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.	**-**	**1**	**1**	**-**
3.17 AC Generators Rotation of loop in a magnetic field and waveform produced; Operation and construction of revolving armature and revolving field type AC generators; Single phase, two phase and three phase alternators; Three phase star and delta connections advantages and uses; Permanent Magnet Generators.	**-**	**2**	**2**	**1**
3.18 AC Motors Construction, principles of operation and characteristics of: AC synchronous and induction motors both single and polyphase; Methods of speed control and direction of rotation; Methods of producing a rotating field: capacitor, inductor, shaded or split pole.	**-**	**2**	**2**	**1**

MODULE 4. ELECTRONIC FUNDAMENTALS	LEVEL			
	A	B1	B2	B3
4.1 Semiconductors				
4.1.1 Diodes				
(a) Diode symbols; Diode characteristics and properties; Diodes in series and parallel; Main characteristics and use of silicon controlled rectifiers (thyristors), light emitting diode, photo conductive diode, varistor, rectifier diodes; Functional testing of diodes.	-	2	2	1
(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; Operation and function of diodes in the following circuits: clippers, clampers, full and half wave rectifiers, bridge rectifiers, voltage doublers and triplers;	-	-	2	-

MODULE 4. ELECTRONIC FUNDAMENTALS	LEVEL			
	A	**B1**	**B2**	**B3**
Detailed operation and characteristics of the following devices: silicon controlled rectifier (thyristor), light emitting diode, Shottky diode, photo conductive diode, varactor diode, varistor, rectifier diodes, Zener diode.				
4.1.2 Transistors				
(a)	-	1	2	1
Transistor symbols;				
Component description and orientation;				
Transistor characteristics and properties.				
(b)	-	-	2	-
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.				
4.1.3 Integrated Circuits				
(a)	-	1	-	1
Description and operation of logic circuits and linear circuits/operational amplifiers.				
(b)	-	-	2	-
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.				
4.2 Printed Circuit Boards	**-**	**1**	**2**	**-**
Description and use of printed circuit boards.				
4.3 Servomechanisms				
(a)	-	1	-	-
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.				

MODULE 4. ELECTRONIC FUNDAMENTALS	LEVEL			
	A	**B1**	**B2**	**B3**
(b) Understanding of the following terms: Open and closed loop, follow up, servomechanism, analogue, transducer, null, damping, feedback, deadband; Construction operation and use of the following synchro system components: resolvers, differential, control and torque, E and I transformers, inductance transmitters, capacitance transmitters, synchronous transmitters; Servomechanism defects, reversal of synchro leads, hunting.	-	-	2	-

MODULE 5. DIGITAL TECHNIQUES ELECTRONIC INSTRUMENT SYSTEMS	LEVEL				
	A	**B1.1 B1.3**	**B1.2 B1.4**	**B2**	**B3**
5.1 Electronic Instrument Systems Typical systems arrangements and cockpit layout of electronic instrument systems.	**1**	**2**	**2**	**3**	**1**
5.2 Numbering Systems Numbering systems: binary, octal and hexadecimal; Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa.	**-**	**1**	**-**	**2**	**-**
5.3 Data Conversion Analogue Data, Digital Data; Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.	**-**	**1**	**-**	**2**	**-**
5.4 Data Buses Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications.	**-**	**2**	**-**	**2**	**-**
5.5 Logic Circuits					
(a) Identification of common logic gate symbols, tables and equivalent circuits; Applications used for aircraft systems, schematic diagrams.	-	2	-	2	1
(b)Interpretation of logic diagrams.	-	-	-	2	-
5.6 Basic Computer Structure					
(a) Computer terminology (including bit, byte, software, hardware, CPU, IC, and various memory devices such as RAM, ROM, PROM); Computer technology (as applied in aircraft systems).	1	2	-	-	-
(b) Computer related terminology; Operation, layout and interface of the major components in a micro computer including their associated bus systems; Information contained in single and multi address instruction words;	-	-	-	2	-

MODULE 5. DIGITAL TECHNIQUES ELECTRONIC INSTRUMENT SYSTEMS	LEVEL				
	A	B1.1 B1.3	B1.2 B1.4	B2	B3
Memory associated terms; Operation of typical memory devices; Operation, advantages and disadvantages of the various data storage systems.					
5.7 Microprocessors Functions performed and overall operation of a microprocessor; Basic operation of each of the following microprocessor elements: control and processing unit, clock, register, arithmetic logic unit.	-	-	-	2	-
5.8 Integrated Circuits Operation and use of encoders and decoders Function of encoder types Uses of medium, large and very large scale integration.	-	-	-	2	-
5.9 Multiplexing Operation, application and identification in logic diagrams of multiplexers and demultiplexers.	-	-	-	2	-
5.10 Fibre Optics Advantages and disadvantages of fibre optic data transmission over electrical wire propagation; Fibre optic data bus; Fibre optic related terms; Terminations; Couplers, control terminals, remote terminals; Application of fibre optics in aircraft systems.	-	1	1	2	-
5.11 Electronic Displays Principles of operation of common types of displays used in modern aircraft, including Cathode Ray Tubes, Light Emitting Diodes and Liquid Crystal Display.	-	2	1	2	1
5.12 Electrostatic Sensitive Devices Special handling of components sensitive to electrostatic discharges; Awareness of risks and possible damage, component and personnel anti-static protection devices.	1	2	2	2	1
5.13 Software Management Control Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes.	-	2	1	2	1

MODULE 5. DIGITAL TECHNIQUES ELECTRONIC INSTRUMENT SYSTEMS	LEVEL				
	A	B1.1 B1.3	B1.2 B1.4	B2	B3
5.14 Electromagnetic Environment	**-**	**2**	**2**	**2**	**1**
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					
5.15 Typical Electronic/Digital Aircraft Systems General arrangement of typical electronic/digital aircraft systems and associated BITE(Built In Test Equipment) testing such as: (a) For B1 and B2 only: ACARS-ARINC Communication 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 Collission Avoidance system Integrated modular Avionica Cabin System Information system	**-**	**2**	**2**	**2**	**1**

MODULE 6. MATERIALS AND HARDWARE	LEVEL			
	A	B1	B2	B3
6.1 Aircraft Materials — Ferrous				
(a) Characteristics, properties and identification of common alloy steels used in aircraft; Heat treatment and application of alloy steels;	1	2	1	2
(b) Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance.	-	1	1	1
6.2 Aircraft Materials — Non-Ferrous				
(a) Characteristics, properties and identification of common non-ferrous materials used in aircraft; Heat treatment and application of non-ferrous materials;	1	2	1	2
(b) Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance.	-	1	1	1

MODULE 6. MATERIALS AND HARDWARE	LEVEL			
	A	B1	B2	B3
6.3 Aircraft Materials - Composite and Non- Metallic				
6.3.1 Composite and non-metallic other than wood and fabric (a) Characteristics, properties and identification of common composite and non-metallic materials, other than wood, used in aircraft; Sealant and bonding agents.	1	2	2	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 Wooden structures Construction methods of wooden airframe structures; Characteristics, properties and types of wood and glue used in aeroplanes; Preservation and maintenance of wooden structure; Types of defects in wood material and wooden structures; The detection of defects in wooden structure; Repair of wooden structure.	**1**	**2**	**-**	**2**
6.3.3 Fabric covering Characteristics, properties and types of fabrics used in aeroplanes; Inspections methods for fabric; Types of defects in fabric; Repair of fabric covering.	**1**	**2**	**-**	**2**
6.4 Corrosion				
(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 Fasteners				
6.5.1 Screw threads Screw nomenclature; Thread forms, dimensions and tolerances for standard threads used in aircraft; Measuring screw threads;	**2**	**2**	**2**	**2**

MODULE 6. MATERIALS AND HARDWARE	LEVEL			
	A	B1	B2	B3
6.5.2 Bolts, studs and screws Bolt types: specification, identification and marking of aircraft bolts, international standards; Nuts: self locking, anchor, standard types; Machine screws: aircraft specifications; Studs: types and uses, insertion and removal; Self tapping screws, dowels.	**2**	**2**	**2**	**2**
6.5.3 Locking devices Tab and spring washers, locking plates, split pins, palnuts, wire locking, quick release fasteners, keys, circlips, cotter pins.	**2**	**2**	**2**	**2**
6.5.4 Aircraft rivets Types of solid and blind rivets: specifications and identification, heat treatment.	**1**	**2**	**1**	**2**
6.6 Pipes and Unions				
(a) Identification of, and types of rigid and flexible pipes and their connectors used in aircraft;	2	2	2	2
(b) Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.	2	2	1	2
6.7 Springs Types of springs, materials, characteristics and applications.	**-**	**2**	**1**	**1**
6.8 Bearings Purpose of bearings, loads, material, construction; Types of bearings and their application.	**1**	**2**	**2**	**1**
6.9 Transmissions Gear types and their application; Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns; Belts and pulleys, chains and sprockets.	**1**	**2**	**2**	**1**
6.10 Control Cables Types of cables; End fittings, turnbuckles and compensation devices; Pulleys and cable system components; Bowden cables; Aircraft flexible control systems.	**1**	**2**	**1**	**2**
6.11 Electrical Cables and Connectors Cable types, construction and characteristics; High tension and co-axial cables;	**1**	**2**	**2**	**2**

MODULE 6. MATERIALS AND HARDWARE	LEVEL			
	A	B1	B2	B3
Crimping; Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes.				

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 Safety Precautions-Aircraft and Workshop Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. Also, instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.	3	3	3
7.2 Workshop Practices Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards.	3	3	3
7.3 Tools Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods. Operation, function and use of electrical general test equipment;	3	3	3
7.4 Avionic General Test Equipment Operation, function and use of avionic general test equipment.	-	2	3
7.5 Engineering Drawings, Diagrams and Standards Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information Microfilm, microfiche and computerised presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams.	1	2	2
7.6 Fits and Clearances Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines;	1	2	1

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
Limits for bow, twist and wear; Standard methods for checking shafts, bearings and other parts.			
7.7 Electrical Wiring Interconnection System (EWIS) Continuity, insulation and bonding techniques and testing; Use of crimp tools: hand and hydraulic operated; Testing of crimp joints; Connector pin removal and insertion; Co-axial cables: testing and installation precautions; Identification of wire types, their inspection criteria and damage tolerance. Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding. EWIS installations, inspection, repair, maintenance and cleanliness standards.	**1**	**3**	**3**
7.8 Riveting Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints.	**1**	**2**	**-**
7.9 Pipes and Hoses Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes.	**1**	**2**	**-**
7.10 Springs Inspection and testing of springs.	**1**	**2**	**-**
7.11 Bearings Testing, cleaning and inspection of bearings; Lubrication requirements of bearings; Defects in bearings and their causes.	**1**	**2**	**-**
7.12 Transmissions Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems.	**1**	**2**	**-**
7.13 Control Cables Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems.	**1**	**2**	**-**
7.14 Material handling			
7.14.1 Sheet Metal	**-**	**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
Marking out and calculation of bend allowance; Sheet metal working, including bending and forming; Inspection of sheet metal work.			
7.14.2 Composite and non-metallic Bonding practices; Environmental conditions Inspection methods	**-**	**2**	**-**
7.15 Welding, Brazing, Soldering and Bonding			
(a) Soldering methods; inspection of soldered joints.	-	2	2
(b) Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints.	-	2	-
7.16 Aircraft Weight and Balance			
(a) Centre of Gravity/Balance limits calculation: use of relevant documents;	-	2	2
(b) Preparation of aircraft for weighing; Aircraft weighing;	-	2	-
7.17 Aircraft Handling and Storage Aircraft taxiing/towing and associated safety precautions; Aircraft jacking, chocking, securing and associated safety precautions; Aircraft storage methods; Refuelling/defuelling procedures; De-icing/anti-icing procedures; Electrical, hydraulic and pneumatic ground supplies. Effects of environmental conditions on aircraft handling and operation.	**2**	**2**	**2**
7.18 Disassembly, Inspection, Repair and Assembly Techniques			
(a) Types of defects and visual inspection techniques. Corrosion removal, assessment and reprotection.	2	3	3
(b) General repair methods, Structural Repair Manual; Ageing, fatigue and corrosion control programmes;	-	2	-
(c) Non destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and boroscope methods.	-	2	1

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
(d) Disassembly and re-assembly techniques.	2	2	2
(e) Trouble shooting techniques	-	2	2
7.19 Abnormal Events			
(a) Inspections following lightning strikes and HIRF penetration.	2	2	2
(b) Inspections following abnormal events such as heavy landings and flight through turbulence.	2	2	-
7.20 Maintenance Procedures Maintenance planning; Modification procedures; Stores procedures; Certification/release procedures; Interface with aircraft operation; Maintenance Inspection/Quality Control/Quality Assurance; Additional maintenance procedures. Control of life limited components	**1**	**2**	**2**

MODULE 7B. MAINTENANCE PRACTICES *Note:* The scope of this module shall reflect the technology of aeroplanes relevant to the B3 category.	LEVEL
	B3
7.1 Safety Precautions-Aircraft and Workshop Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals. Also, instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards including knowledge on extinguishing agents.	**3**
7.2 Workshop Practices Care of tools, control of tools, use of workshop materials; Dimensions, allowances and tolerances, standards of workmanship; Calibration of tools and equipment, calibration standards.	**3**
7.3 Tools Common hand tool types; Common power tool types; Operation and use of precision measuring tools; Lubrication equipment and methods. Operation, function and use of electrical general test equipment;	**3**
7.4 Avionic General Test Equipment Operation, function and use of avionic general test equipment.	**-**

MODULE 7B. MAINTENANCE PRACTICES *Note:* The scope of this module shall reflect the technology of aeroplanes relevant to the B3 category.	LEVEL B3
7.5 Engineering Drawings, Diagrams and Standards Drawing types and diagrams, their symbols, dimensions, tolerances and projections; Identifying title block information Microfilm, microfiche and computerised presentations; Specification 100 of the Air Transport Association (ATA) of America; Aeronautical and other applicable standards including ISO, AN, MS, NAS and MIL; Wiring diagrams and schematic diagrams.	2
7.6 Fits and Clearances Drill sizes for bolt holes, classes of fits; Common system of fits and clearances; Schedule of fits and clearances for aircraft and engines; Limits for bow, twist and wear; Standard methods for checking shafts, bearings and other parts.	2
7.7 Electrical Wiring Interconnection System (EWIS) Continuity, insulation and bonding techniques and testing; Use of crimp tools: hand and hydraulic operated; Testing of crimp joints; Connector pin removal and insertion; Co-axial cables: testing and installation precautions; Identification of wire types, their inspection criteria and damage tolerance. Wiring protection techniques: Cable looming and loom support, cable clamps, protective sleeving techniques including heat shrink wrapping, shielding. EWIS installations, inspection, repair, maintenance and cleanliness standards.	2
7.8 Riveting Riveted joints, rivet spacing and pitch; Tools used for riveting and dimpling; Inspection of riveted joints.	2
7.9 Pipes and Hoses Bending and belling/flaring aircraft pipes; Inspection and testing of aircraft pipes and hoses; Installation and clamping of pipes.	2
7.10 Springs Inspection and testing of springs.	1
7.11 Bearings Testing, cleaning and inspection of bearings;	2

MODULE 7B. MAINTENANCE PRACTICES *Note:* The scope of this module shall reflect the technology of aeroplanes relevant to the B3 category.	LEVEL B3
Lubrication requirements of bearings; Defects in bearings and their causes.	
7.12 Transmissions Inspection of gears, backlash; Inspection of belts and pulleys, chains and sprockets; Inspection of screw jacks, lever devices, push-pull rod systems.	2
7.13 Control Cables Swaging of end fittings; Inspection and testing of control cables; Bowden cables; aircraft flexible control systems.	2
7.14 Material handling	
7.14.1 Sheet Metal Marking out and calculation of bend allowance; Sheet metal working, including bending and forming; Inspection of sheet metal work.	2
7.14.2 Composite and non-metallic Bonding practices; Environmental conditions Inspection methods	2
7.15 Welding, Brazing, Soldering and Bonding	
(a) Soldering methods; inspection of soldered joints.	2
(b) Welding and brazing methods; Inspection of welded and brazed joints; Bonding methods and inspection of bonded joints.	2
7.16 Aircraft Weight and Balance	
(a) Centre of Gravity/Balance limits calculation: use of relevant documents;	2
(b) Preparation of aircraft for weighing; Aircraft weighing;	2
7.17 Aircraft Handling and Storage Aircraft taxiing/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.	2

MODULE 7B. MAINTENANCE PRACTICES *Note:* The scope of this module shall reflect the technology of aeroplanes relevant to the B3 category.	LEVEL B3
Effects of environmental conditions on aircraft handling and operation.	
7.18 Disassembly, Inspection, Repair and Assembly Techniques	
(a)	3
Types of defects and visual inspection techniques.	
Corrosion removal, assessment and reprotection.	
(b)	2
General repair methods, Structural Repair Manual;	
Ageing, fatigue and corrosion control programmes;	
(c)	2
Non destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and boroscope methods.	
(d)	2
Disassembly and re-assembly techniques.	
(e)	2
Trouble shooting techniques	
7.19 Abnormal Events	
(a)	2
Inspections following lightning strikes and HIRF penetration.	
(b)	2
Inspections following abnormal events such as heavy landings and flight through turbulence.	
7.20 Maintenance Procedures	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 Physics of the Atmosphere	1	2	2	1
International Standard Atmosphere (ISA), application to aerodynamics.				
8.2 Aerodynamics	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 Theory of Flight	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 Flight Stability and Dynamics	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 General	1	2	2
The need to take human factors into account;			
Incidents attributable to human factors/human error;			
'Murphy's' law.			
9.2 Human Performance and Limitations	1	2	2
Vision;			
Hearing;			
Information processing;			
Attention and perception;			
Memory;			
Claustrophobia and physical access.			
9.3 Social Psychology	1	1	1
Responsibility: individual and group;			
Motivation and de-motivation;			

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

MODULE 10. AVIATION LEGISLATION	LEVEL			
	A	**B1**	**B2**	**B3**
10.1 Regulatory Framework Role of International Civil Aviation Organisation; The Aircraft Act and Rules made there under Role of the DGCA; Relationship between CAR-21, CAR-M, CAR-145, CAR-66, CAR 147 The Aircraft Rules (Applicable to Aircraft Maintenance and Release) Aeronautical Information Circulars (Applicable to Aircraft Maintenance and Release) CAR Sections 1 and 2	**1**	**1**	**1**	**1**
10.2 CAR-66 Certifying Staff - Maintenance Detailed understanding of CAR-66.	**2**	**2**	**2**	**2**
10.3 CAR-145 — Approved Maintenance Organisations Detailed understanding of CAR-145 and CAR M Subpart F	**2**	**2**	**2**	**2**
10.4 Aircraft Operations Commercial Air Transport/Commercial Operations Air Operators Certificates; Operators Responsibilities, in particular regarding continuing airworthiness and maintenance; Documents to be carried on board; Aircraft Placarding (Markings);	**1**	**1**	**1**	**1**
10.5 Aircraft Certification				
(a) General Certification rules: such as FAA & EACS 23/25/27/29; Type Certification; Supplemental Type Certification;	-	1	1	1

MODULE 10. AVIATION LEGISLATION	LEVEL			
	A	B1	B2	B3
CAR-21 Design/Production Organisation Approvals. Aircraft Modifications and repairs approval and certification Permit to fly requirements				
(b) Documents Certificate of Airworthiness; Certificate of Registration; Noise Certificate; Weight Schedule; Radio Station Licence and Approval.	-	2	2	2
10.6 CAR-M Detail understanding of CAR M provisions related to Continuing Airworthiness Detailed understanding of CAR-M.	**2**	**2**	**2**	**2**
10.7 Applicable National and International Requirements (a) Maintenance Programme, Maintenance checks and inspections; Master Minimum Equipment Lists, Minimum Equipment List, Dispatch Deviation Lists; Airworthiness Directives; Service Bulletins, manufacturers service information; Modifications and repairs; Maintenance documentation: maintenance manuals, structural repair manual, illustrated parts catalogue, etc.;	1	2	2	2
(b) Continuing airworthiness; Test flights; ETOPS /EDTO , maintenance and dispatch requirements; RVSM, maintenance and dispatch requirements RNP, MNPS Operations All Weather Operations, Category 2/3 operations and minimum equipment requirements.	-	1	1	1
10.8 Safety Management System State Safety Programme Basic Safety Concepts Hazards & Safety Risks SMS Operation SMS Safety performance Safety Assurance	**2**	**2**	**2**	
10.9 Fuel Tank Safety Special Federal Aviation Regulations (SFARs) from 14 CFR SFAR 88 of the FAA and of JAA TGL 47 Concept of CDCCL, Airworthiness Limitations Items (ALI)	2	2	2	

MODULE 11A. TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A1	B1.1
11.1 Theory of Flight		
11.1.1 Aeroplane Aerodynamics and Flight Controls Operation and effect of: — roll control: ailerons and spoilers; — pitch control: elevators, stabilators, variable incidence stabilisers and canards; — yaw control, rudder limiters; Control using elevons, ruddervators; High lift devices, slots, slats, flaps, flaperons; Drag inducing devices, spoilers, lift dumpers, speed brakes; Effects of wing fences, saw tooth leading edges; Boundary layer control using, vortex generators, stall wedges or leading edge devices; Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;	1	2
11.1.2 High Speed Flight Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number, compressibility buffet, shock wave, aerodynamic heating, area rule; Factors affecting airflow in engine intakes of high speed aircraft; Effects of sweepback on critical Mach number.	1	2
11.2 Airframe Structures — General Concepts		
(a) Airworthiness requirements for structural strength; Structural classification, primary, secondary and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Lightning strike protection provision. Aircraft bonding	2	2
(b) Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning, anti-corrosive protection, wing, empennage and engine attachments; Structure assembly techniques: riveting, bolting, bonding Methods of surface protection, such as chromating, anodising, painting; Surface cleaning. Airframe symmetry: methods of alignment and symmetry checks.	1	2

MODULE 11A. TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A1	B1.1
11.3 Airframe Structures — Aeroplanes		
11.3.1 Fuselage (ATA 52/53/56) Construction and pressurisation sealing; Wing, stabiliser, pylon and undercarriage attachments; Seat installation and cargo loading system; Doors and emergency exits: construction, mechanisms, operation and safety devices; Windows and windscreen construction and mechanisms.	1	2
11.3.2 Wings (ATA 57) Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.	1	2
11.3.3 Stabilisers (ATA 55) Construction; Control surface attachment.	1	2
11.3.4 Flight Control Surfaces (ATA 55/57) Construction and attachment; Balancing — mass and aerodynamic.	1	2
11.3.5 Nacelles/Pylons (ATA 54) Construction; Firewalls; Engine mounts.	1	2
11.4 Air Conditioning and Cabin Pressurisation (ATA 21)		
11.4.1 Air supply Sources of air supply including engine bleed, APU and ground cart;	1	2
11.4.2 Air Conditioning Air conditioning systems; Air cycle and vapour cycle machines Distribution systems; Flow, temperature and humidity control system.	1	3
11.4.3 Pressurisation Pressurisation systems; Control and indication including control and safety valves; Cabin pressure controllers.	1	3
11.4.4 Safety and warning devices	1	3

MODULE 11A. TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A1	B1.1
Protection and warning devices.		
11.5 Instruments/Avionic Systems		
11.5.1 Instrument Systems (ATA 31) Pitot static: altimeter, air speed indicator, vertical speed indicator; Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn coordinator; Compasses: direct reading, remote reading; Angle of attack indication, stall warning systems; Glass Cockpit Other aircraft system indication.	1	2
11.5.2 Avionic Systems Fundamentals of system lay-outs and operation of; Auto Flight (ATA 22); Communications (ATA 23); Navigation Systems (ATA 34).	1	1
11.6 Electrical Power (ATA 24) Batteries Installation and Operation; DC power generation; AC power generation; Emergency power generation; Voltage regulation; Power distribution; Inverters, transformers, rectifiers; Circuit protection. External/Ground power;	1	3
11.7 Equipment and Furnishings (ATA 25)		
(a) Emergency equipment requirements; Seats, harnesses and belts.	2	2
(b) Cabin lay-out; Equipment lay-out; Cabin Furnishing Installation; Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment; Airstairs.	1	1
11.8 Fire Protection (ATA 26)		

MODULE 11A. TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A1	B1.1
(a) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	1	3
(b) Portable fire extinguisher	1	1
11.9 Flight Controls (ATA 27) Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control; High lift devices; Lift dump, speed brakes; System operation: manual, hydraulic, pneumatic, electrical, fly-by-wire; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks systems; Balancing and rigging; Stall protection/warning system.	1	3
11.10 Fuel Systems (ATA 28) System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling; Longitudinal balance fuel systems.	1	3
11.11 Hydraulic Power (ATA 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Filters Pressure Control; Power distribution; Indication and warning systems; Interface with other systems.	1	3
11.12 Ice and Rain Protection (ATA 30) Ice formation, classification and detection; Anti-icing systems: electrical, hot air and chemical; De-icing systems: electrical, hot air, pneumatic and chemical; Rain repellant;	1	3

MODULE 11A. TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A1	B1.1
Probe and drain heating. Wiper systems		
11.13 Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and autobraking; Tyres; Steering. Air-ground sensing	2	3
11.14 Lights (ATA 33) External: navigation, anti-collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	2	3
11.15 Oxygen (ATA 35) System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings;	1	3
11.16 Pneumatic/Vacuum (ATA 36) System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.	1	3
11.17 Water/Waste (ATA 38) Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspects.	2	3
11.18 On Board Maintenance Systems (ATA 45) Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).	1	2
11.19 Integrated Modular Avionics (ATA42)	1	2

MODULE 11A. TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A1	B1.1
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.		
11.20 Cabin Systems (ATA44)	1	2
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.		
11.21 Information Systems (ATA46)	1	2
The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display. Typical examples include Air Traffic and Information Management Systems and Network Server Systems Aircraft General Information System; Flight Deck Information System; Maintenance Information System; Passenger Cabin Information System;		

MODULE 11A. TURBINE AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A1	B1.1
Miscellaneous Information System.		

MODULE 11B. PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A2	B1.2
Note 1: This module does not apply to category B3. Relevant subject matters for category B3 are defined in module 11C. Note: The scope of this Module should reflect the technology of aeroplanes pertinent to the A2 and B1.2 subcategory.		
11.1 Theory of Flight		
11.1.1 Aeroplane Aerodynamics and Flight Controls Operation and effect of: — roll control: ailerons and spoilers; — pitch control: elevators, stabilators, variable incidence stabilisers and canards; — yaw control, rudder limiters; Control using elevons, ruddervators; High lift devices, slots, slats, flaps, flaperons; Drag inducing devices, spoilers, lift dumpers, speed brakes; Effects of wing fences, saw tooth leading edges; Boundary layer control using, vortex generators, stall wedges or leading edge devices; Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;	**1**	**2**
11.1.2 High Speed Flight — N/A —	**-**	**-**
11.2 Airframe Structures — General Concepts		
(a) Airworthiness requirements for structural strength; Structural classification, primary, secondary and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Lightning strike protection provision. Aircraft bonding	2	2
(b)	1	2

MODULE 11B. PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A2	B1.2
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.		
11.3 Airframe Structures — Aeroplanes		
11.3.1 Fuselage (ATA 52/53/56) Construction and pressurisation sealing; Wing, tail-plane pylon and undercarriage attachments; Seat installation; Doors and emergency exits: construction and operation; Window and windscreen attachment.	**1**	**2**
11.3.2 Wings (ATA 57) Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.	**1**	**2**
11.3.3 Stabilisers (ATA 55) Construction; Control surface attachment.	**1**	**2**
11.3.4 Flight Control Surfaces (ATA 55/57) Construction and attachment; Balancing — mass and aerodynamic.	**1**	**2**
11.3.5 Nacelles/Pylons (ATA 54) Nacelles/Pylons: — Construction; — Firewalls; — Engine mounts.	1	2
11.4 Air Conditioning and Cabin Pressurisation (ATA 21) Pressurisation and air conditioning systems; Cabin pressure controllers, protection and warning devices Heating Systems	**1**	**3**
11.5 Instruments/Avionic Systems		

MODULE 11B. PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A2	B1.2
11.5.1 Instrument Systems (ATA 31)	**1**	**2**
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.		
11.5.2 Avionic Systems	**1**	**1**
Fundamentals of system lay-outs and operation of: — Auto Flight (ATA 22); — Communications (ATA 23); — Navigation Systems (ATA 34).		
11.6 Electrical Power (ATA 24)	**1**	**3**
Batteries Installation and Operation; DC power generation; Voltage regulation; Power distribution; Circuit protection; Inverters, transformers.		
11.7 Equipment and Furnishings (ATA 25)		
(a)	2	2
Emergency equipment requirements; Seats, harnesses and belts.		
(b)	1	1
Cabin lay-out; Equipment lay-out; Cabin Furnishing Installation (level 2); Cabin entertainment equipment; Galley installation; Cargo handling and retention equipment; Airstairs.		
11.8 Fire Protection (ATA 26)		
(a)	1	3
Fire extinguishing systems; Fire and smoke detection and warning systems; System tests.		
(b)	1	3
Portable fire extinguisher.		
11.9 Flight Controls (ATA 27)	**1**	**3**

MODULE 11B. PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A2	B1.2
Primary controls: aileron, elevator, rudder; Trim tabs; High lift devices; System operation: manual; Gust locks; Balancing and rigging; Stall warning system.		
11.10 Fuel Systems (ATA 28) System lay-out; Fuel tanks; Supply systems; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling.	**1**	**3**
11.11 Hydraulic Power (ATA 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical; Filters Pressure Control; Power distribution; Indication and warning systems.	**1**	**3**
11.12 Ice and Rain Protection (ATA 30) Ice formation, classification and detection; De-icing systems: electrical, hot air, pneumatic and chemical; Probe and drain heating; Wiper systems.	**1**	**3**
11.13 Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and auto braking; Tyres; Steering. Air-ground sensing	**2**	**3**
11.14 Lights (ATA 33) External: navigation, anti collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	**2**	**3**

MODULE 11B. PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A2	B1.2
11.15 Oxygen (ATA 35) System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings;	1	3
11.16 Pneumatic/Vacuum (ATA 36) System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.	1	3
11.17 Water/Waste (ATA 38) Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing; Corrosion aspects.	2	3

MODULE 11C. PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL
	B3
Note: The scope of this module shall reflect the technology of aeroplanes pertinent to the B3 category.	
11.1 Theory of Flight	
11.1.1 Aeroplane Aerodynamics and Flight Controls Operation and effect of: — roll control: ailerons and spoilers; — pitch control: elevators, stabilators, variable incidence stabilisers and canards; — yaw control, rudder limiters; Control using elevons, ruddervators; High lift devices, slots, slats, flaps, flaperons; Drag inducing devices, spoilers, lift dumpers, speed brakes; Effects of wing fences, saw tooth leading edges; Boundary layer control using, vortex generators, stall wedges or leading edge devices; Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels;	1
11.2 Airframe Structures — General Concepts	
(a)	2

MODULE 11C. PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL
	B3
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)	2
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.	
11.3 Airframe Structures — Aeroplanes	
11.3.1 Fuselage (ATA 52/53/56) Construction and pressurisation sealing; Wing, tail-plane pylon and undercarriage attachments; Seat installation; Doors and emergency exits: construction and operation; Window and windscreen attachment.	**1**
11.3.2 Wings (ATA 57) Construction; Fuel storage; Landing gear, pylon, control surface and high lift/drag attachments.	**1**
11.3.3 Stabilisers (ATA 55) Construction; Control surface attachment.	**1**
11.3.4 Flight Control Surfaces (ATA 55/57) Construction and attachment; Balancing — mass and aerodynamic.	**1**
11.3.5 Nacelles/Pylons (ATA 54)	1
Nacelles/Pylons:	

MODULE 11C. PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL
	B3
— Construction; — Firewalls; — Engine mounts.	
11.4 Air Conditioning (ATA 21) Heating and ventilation Systems	1
11.5 Instruments/Avionic Systems	
11.5.1 Instrument Systems (ATA 31) Pitot static: altimeter, air speed indicator, vertical speed indicator; Gyroscopic: artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn coordinator; Compasses: direct reading, remote reading; Angle of attack indication, stall warning systems. Glass cockpit; Other aircraft system indication.	1
11.5.2 Avionic Systems Fundamentals of system lay-outs and operation of: — Auto Flight (ATA 22); — Communications (ATA 23); — Navigation Systems (ATA 34).	1
11.6 Electrical Power (ATA 24) Batteries Installation and Operation; DC power generation; Voltage regulation; Power distribution; Circuit protection; Inverters, transformers.	2
11.7 Equipment and Furnishings (ATA 25) Emergency equipment requirements; Seats, harnesses and belts.	2
11.8 Fire Protection (ATA 26) Portable fire extinguisher.	2
11.9 Flight Controls (ATA 27) Primary controls: aileron, elevator, rudder; Trim tabs; High lift devices; System operation: manual; Gust locks; Balancing and rigging;	3

MODULE 11C. PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL
	B3
Stall warning system.	
11.10 Fuel Systems (ATA 28) System lay-out; Fuel tanks; Supply systems; Cross-feed and transfer; Indications and warnings; Refuelling and defuelling.	**2**
11.11 Hydraulic Power (ATA 29) 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 Ice and Rain Protection (ATA 30) Ice formation, classification and detection; De-icing systems: electrical, hot air, pneumatic and chemical; Probe and drain heating; Wiper systems.	**1**
11.13 Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, brakes, antiskid and auto braking; Tyres; Steering.	**2**
11.14 Lights (ATA 33) External: navigation, anti collision, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	**2**
11.15 Oxygen (ATA 35) System lay-out: cockpit, cabin; Sources, storage, charging and distribution; Supply regulation; Indications and warnings;	**2**

MODULE 11C. PISTON AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL
	B3
11.16 Pneumatic/Vacuum (ATA 36) System lay-out; Sources: engine/APU, compressors, reservoirs, ground supply; Pressure and vaccum 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 Theory of Flight — Rotary Wing Aerodynamics Terminology; Effects of gyroscopic precession; Torque reaction and directional control; Dissymmetry of lift, Blade tip stall; Translating tendency and its correction; Coriolis effect and compensation; Vortex ring state, power settling, overpitching; Auto-rotation; Ground effect.	**1**	**2**
12.2 Flight Control Systems Cyclic control; Collective control; Swashplate; Yaw control: Anti-Torque Control, Tail rotor, bleed air; Main Rotor Head: Design and Operation features; Blade Dampers: Function and construction; Rotor Blades: Main and tail rotor blade construction and attachment; Trim control, fixed and adjustable stabilisers; System operation: manual, hydraulic, electrical and flyby-wire; Artificial feel; Balancing and Rigging.	**2**	**3**
12.3 Blade Tracking and Vibration Analysis Rotor alignment; Main and tail rotor tracking; Static and dynamic balancing; Vibration types, vibration reduction methods; Ground resonance.	**1**	**3**
12.4 Transmissions	**1**	**3**

MODULE 12. HELICOPTER AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A3 A4	B1.3 B1.4
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		
12.5 Airframe Structures		
(a) Airworthiness requirements for structural strength; Structural classification, primary, secondary and tertiary; Fail safe, safe life, damage tolerance concepts; Zonal and station identification systems; Stress, strain, bending, compression, shear, torsion, tension, hoop stress, fatigue; Drains and ventilation provisions; System installation provisions; Lightning strike protection provision.	2	2
(b) Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beams, floor structures, reinforcement, methods of skinning and anti-corrosive protection. Pylon, stabiliser and undercarriage attachments; Seat installation; Doors: construction, mechanisms, operation and safety devices; Windows and windscreen construction; Fuel storage; Firewalls; Engine mounts; Structure assembly techniques: riveting, bolting, bonding; Methods of surface protection, such as chromating, anodising, painting; Surface cleaning. Airframe symmetry: methods of alignment and symmetry checks.	1	2
12.6 Air Conditioning (ATA 21)		
12.6.1 Air supply Sources of air supply including engine bleed and ground cart;	**1**	**2**
12.6.2 Air Conditioning Air conditioning systems; Distribution systems; Flow and temperature control systems; Protection and warning devices.	**1**	**3**
12.7 Instruments/Avionic Systems		
12.7.1 Instrument Systems (ATA 31) Pitot static:altimeter, air speed indicator, vertical speed indicator;	**1**	**2**

MODULE 12. HELICOPTER AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL A3 A4	LEVEL B1.3 B1.4
Gyroscopic:artificial horizon, attitude director, direction indicator, horizontal situation indicator, turn and slip indicator, turn coordinator; Compasses: direct reading, remote reading; Vibration indicating systems — HUMS; Glass Cockpit Other aircraft system indication.		
12.7.2 Avionic Systems Fundamentals of system layouts and operation of: Auto Flight (ATA 22); Communications (ATA 23); Navigation Systems (ATA 34).	**1**	**1**
12.8 Electrical Power (ATA 24) Batteries Installation and Operation; DC power generation, AC power generation; Emergency power generation; Voltage regulation, Circuit protection. Power distribution; Inverters, transformers, rectifiers; External/Ground power.	**1**	**3**
12.9 Equipment and Furnishings (ATA 25)		
(a) Emergency equipment requirements; Seats, harnesses and belts; Lifting systems.	2	2
(b) Emergency flotation systems; Cabin lay-out, cargo retention; Equipment lay-out; Cabin Furnishing Installation.	1	1
12.10 Fire Protection (ATA 26) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests.	**1**	**3**
12.11 Fuel Systems (ATA 28) System lay-out; Fuel tanks; Supply systems; Dumping, venting and draining; Cross-feed and transfer; Indications and warnings;	**1**	**3**

MODULE 12. HELICOPTER AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A3 A4	B1.3 B1.4
Refuelling and defuelling.		
12.12 Hydraulic Power (ATA 29) System lay-out; Hydraulic fluids; Hydraulic reservoirs and accumulators; Pressure generation: electric, mechanical, pneumatic; Emergency pressure generation; Filters Pressure Control; Power distribution; Indication and warning systems; Interface with other systems.	1	3
12.13 Ice and Rain Protection (ATA 30) Ice formation, classification and detection; Anti-icing and de-icing systems: electrical, hot air and chemical; Rain repellant and removal; Probe and drain heating. Wiper system	**1**	**3**
12.14 Landing Gear (ATA 32) Construction, shock absorbing; Extension and retraction systems: normal and emergency; Indications and warning; Wheels, tyres, brakes; Steering; Air-ground sensing Skids, floats.	**2**	**3**
12.15 Lights (ATA 33) External: navigation, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	**2**	**3**
12.16 Pneumatic/Vacuum (ATA 36) System lay-out; Sources: engine, compressors, reservoirs, ground supply.; Pressure control; Distribution; Indications and warnings; Interfaces with other systems.	**1**	**3**
12.17 Integrated Modular Avionics (ATA42)	**1**	**2**

MODULE 12. HELICOPTER AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL	
	A3 A4	B1.3 B1.4
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.		
12.18 On Board Maintenance Systems (ATA45)	**1**	**2**
Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).		
12.19 Information Systems (ATA46) The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display. Typical examples include Air Traffic and Information Management Systems and Network Server Systems. Aircraft General Information System; Flight Deck Information System; Maintenance Information System; Passenger Cabin Information System; Miscellaneous Information System.	**1**	**2**

MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL
	B2
13.1 Theory of Flight (a) Aeroplane Aerodynamics and Flight Controls Operation and effect of: — roll control: ailerons and spoilers, — pitch control: elevators, stabilators, variable incidence stabilisers and canards, — yaw control, rudder limiters; Control using elevons, ruddervators; High lift devices: slots, slats, flaps;	**1**

MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL
	B2
Drag inducing devices: spoilers, lift dumpers, speed brakes; Operation and effect of trim tabs, servo tabs, control surface bias;	
(b) High Speed Flight Speed of sound, subsonic flight, transonic flight, supersonic flight; Mach number, critical Mach number;	1
(c) Rotary Wing Aerodynamics Terminology; Operation and effect of cyclic, collective and anti-torque controls.	1
13.2 Structures — General Concepts	
(a) Fundamentals of structural systems;	1
(b) Zonal and station identification systems; Electrical bonding; Lightning strike protection provision.	2
13.3 Autoflight (ATA 22) Fundamentals of automatic flight control including working principles and current terminology; Command signal processing; Modes of operation: roll, pitch and yaw channels; Yaw dampers; Stability Augmentation System in helicopters; Automatic trim control; Autopilot navigation aids interface; Autothrottle systems; Automatic Landing Systems: principles and categories, modes of operation, approach, glideslope, land, go-around, system monitors and failure conditions.	**3**
13.4 Communication/Navigation (ATA 23/34)	3
Fundamentals of radio wave propagation, antennas, transmission lines, communication, receiver and transmitter; Working principles of following systems: — Very High Frequency (VHF) communication, — High Frequency (HF) communication, — Audio, — Emergency Locator Transmitters, — Cockpit Voice Recorder, — Very High Frequency omnidirectional range (VOR), — Automatic Direction Finding (ADF), — Instrument Landing System (ILS), — Microwave Landing System (MLS),	

MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL
	B2
— 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.	
13.5 Electrical Power (ATA 24) Batteries Installation and Operation; DC power generation; AC power generation; Emergency power generation; Voltage regulation; Power distribution; Inverters, transformers, rectifiers; Circuit protection; External/Ground power.	3
13.6 Equipment and Furnishings (ATA 25) Electronic emergency equipment requirements; Cabin entertainment equipment.	3
13.7 Flight Controls (ATA 27) (a) Primary controls: aileron, elevator, rudder, spoiler; Trim control; Active load control; High lift devices; Lift dump, speed brakes; System operation: manual, hydraulic, pneumatic; Artificial feel, Yaw damper, Mach trim, rudder limiter, gust locks. Stall protection systems;	2
(b) System operation: electrical, fly-by-wire.	3
13.8 Instruments (ATA 31) Classification; Atmosphere; Terminology; Pressure measuring devices and systems; Pitot static systems;	3

MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL
	B2
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; Vibration measurement and indication; Glass cockpit	
13.9 Lights (ATA 33) External: navigation, landing, taxiing, ice; Internal: cabin, cockpit, cargo; Emergency.	**3**
13.10 On Board Maintenance Systems (ATA 45) Central maintenance computers; Data loading system; Electronic library system; Printing; Structure monitoring (damage tolerance monitoring).	3
13.11 Air Conditioning and Cabin Pressurisation (ATA21)	
1) Air supply Sources of air supply including engine bleed, APU and ground cart;	2
2) Air Conditioning	
Air conditioning systems;	2
Air cycle and vapour cycle machines;	3
Distribution systems;	1
Flow, temperature and humidity control system.	3
3) Pressurisation Pressurisation systems;	3

MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL
	B2
Control and indication including control and safety valves; Cabin pressure controllers.	
4) Safety and warning devices Protection and warning devices.	3
13.12 Fire Protection (ATA 26)	**3**
(a) Fire and smoke detection and warning systems; Fire extinguishing systems; System tests;	
(b) Portable fire extinguisher	1
13.13 Fuel Systems (ATA 28)	
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
13.14 Hydraulic Power (ATA 29)	
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 Ice and Rain Protection (ATA 30)	
Ice formation, classification and detection;	2
Anti-icing systems: electrical, hot air and chemical;	2
De-icing systems: electrical, hot air, pneumatic, chemical;	3
Rain repellent;	1
Probe and drain heating;	3
Wiper Systems.	1
13.16 Landing Gear (ATA 32)	
Construction, shock absorbing;	1
Extension and retraction systems: normal and emergency;	3
Indications and warnings;	3
Wheels, brakes, antiskid and autobraking;	3

MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL
	B2
Tyres;	1
Steering;	3
Air-ground sensing.	3
13.17 Oxygen (ATA 35)	
System lay-out: cockpit, cabin;	3
Sources, storage, charging and distribution;	3
Supply regulation;	3
Indications and warnings.	3
13.18 Pneumatic/Vacuum (ATA 36)	
System lay-out;	2
Sources: engine/APU, compressors, reservoirs, ground supply;	2
Pressure control;	3
Distribution;	1
Indications and warnings;	3
Interfaces with other systems.	3
13.19 Water/Waste (ATA 38) Water system lay-out, supply, distribution, servicing and draining; Toilet system lay-out, flushing and servicing.	**2**
13.20 Integrated Modular Avionics (ATA42) Functions that may be typically integrated in the Integrated Modular Avionic (IMA) modules are, among others: Bleed Management, Air Pressure Control, Air Ventilation and Control, Avionics and Cockpit Ventilation Control, Temperature Control, Air Traffic Communication, Avionics Communication Router, Electrical Load Management, Circuit Breaker Monitoring, Electrical System BITE, Fuel Management, Braking Control, Steering Control, Landing Gear Extension and Retraction, Tyre Pressure Indication, Oleo Pressure Indication, Brake Temperature Monitoring, etc.; Core System; Network Components.	3
13.21 Cabin Systems (ATA44) The units and components which furnish a means of entertaining the passengers and providing communication within the aircraft (Cabin Intercommunication Data System) and between the aircraft cabin and ground stations (Cabin Network Service). 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:	3

MODULE 13. AIRCRAFT AERODYNAMICS, STRUCTURES AND SYSTEMS	LEVEL B2
— 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.	
13.22 Information Systems (ATA46) The units and components which furnish a means of storing, updating and retrieving digital information traditionally provided on paper, microfilm or microfiche. Includes units that are dedicated to the information storage and retrieval function such as the electronic library mass storage and controller. Does not include units or components installed for other uses and shared with other systems, such as flight deck printer or general use display. Typical examples include Air Traffic and Information Management Systems and Network Server Systems. Aircraft General Information System; Flight Deck Information System; Maintenance Information System; Passenger Cabin Information System; Miscellaneous Information System.	3

MODULE 14. PROPULSION	LEVEL B2
14.1 Turbine Engines	
(a) Constructional arrangement and operation of turbojet, turbofan, turbo shaft and turbo propeller engines;	1
(b) Electronic Engine control and fuel metering systems (FADEC).	2
14.2 Engine Indicating Systems Exhaust gas temperature/Interstage turbine temperature systems; Engine speed; Engine Thrust Indication: Engine Pressure Ratio, engine turbine discharge pressure or jet pipe pressure systems; Oil pressure and temperature; Fuel pressure, temperature and flow; Manifold pressure; Engine torque; Propeller speed.	**2** 2

14.3 Starting and Ignition Systems Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements	

MODULE 15. GAS TURBINE ENGINE	LEVEL	
	A	B1
15.1 Fundamentals Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle; The relationship between force, work, power, energy, velocity, acceleration; Constructional arrangement and operation of turbojet, turbofan, turbo shaft, turboprop.	**1**	**2**
15.2 Engine Performance Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption; Engine efficiencies; By-pass ratio and engine pressure ratio; Pressure, temperature and velocity of the gas flow; Engine ratings, static thrust, influence of speed, altitude and hot climate, flat rating, limitations.	**-**	**2**
15.3 Inlet Compressor inlet ducts Effects of various inlet configurations; Ice protection.	**2**	**2**
15.4 Compressors Axial and centrifugal types; Constructional features and operating principles and applications; Fan balancing; Operation: Causes and effects of compressor stall and surge; Methods of air flow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades; Compressor ratio.	**1**	**2**
15.5 Combustion Section Constructional features and principles of operation.	**1**	**2**
15.6 Turbine Section Operation and characteristics of different turbine blade types; Blade to disk attachment; Nozzle guide vanes; Causes and effects of turbine blade stress and creep.	**2**	**2**
15.7 Exhaust	**1**	**2**

MODULE 15. GAS TURBINE ENGINE	LEVEL	
	A	B1
Constructional features and principles of operation; Convergent, divergent and variable area nozzles; Engine noise reduction; Thrust reversers.		
15.8 Bearings and Seals Constructional features and principles of operation.	-	2
15.9 Lubricants and Fuels Properties and specifications; Fuel additives; Safety precautions.	1	2
15.10 Lubrication Systems System operation/lay-out and components.	1	2
15.11 Fuel Systems Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components.	1	2
15.12 Air Systems Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services.	1	2
15.13 Starting and Ignition Systems Operation of engine start systems and components; Ignition systems and components; Maintenance safety requirements.	1	2
15.14 Engine Indication Systems Exhaust Gas Temperature/Interstage Turbine Temperature; Engine Thrust Indication: Engine Pressure Ratio, engine turbine discharge pressure or jet pipe pressure systems; Oil pressure and temperature; Fuel pressure and flow; Engine speed; Vibration measurement and indication; Torque; Power.	1	2
15.15 Power Augmentation Systems Operation and applications; Water injection, water methanol; Afterburner systems.	-	1

MODULE 15. GAS TURBINE ENGINE	LEVEL	
	A	B1
15.16 Turbo-prop Engines Gas coupled/free turbine and gear coupled turbines; Reduction gears; Integrated engine and propeller controls; Overspeed safety devices.	1	2
15.17 Turbo-shaft engines Arrangements, drive systems, reduction gearing, couplings, control systems.	1	2
15.18 Auxiliary Power Units (APUs) Purpose, operation, protective systems.	1	2
15.19 Power plant Installation Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.	1	2
15.20 Fire Protection Systems Operation of detection and extinguishing systems.	1	2
15.21 Engine Monitoring and Ground Operation Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Trend (including oil analysis, vibration and boroscope) monitoring; Inspection of engine and components to criteria, tolerances and data specified by engine manufacturer; Compressor washing/cleaning; Foreign Object Damage.	1	3
15.22 Engine Storage and Preservation Preservation and depreservation for the engine and accessories/ systems.	-	2

MODULE 16. PISTON ENGINE	LEVEL		
	A	B1	B3
16.1 Fundamentals Mechanical, thermal and volumetric efficiencies; Operating principles — 2 stroke, 4 stroke, Otto and Diesel; Piston displacement and compression ratio; Engine configuration and firing order.	1	2	2
16.2 Engine Performance Power calculation and measurement;	1	2	2

MODULE 16. PISTON ENGINE	LEVEL		
	A	B1	B3
Factors affecting engine power; Mixtures/leaning, pre-ignition.			
16.3 Engine Construction Crank case, crank shaft, cam shafts, sumps; Accessory gearbox; Cylinder and piston assemblies; Connecting rods, inlet and exhaust manifolds; Valve mechanisms; Propeller reduction gearboxes.	**1**	**2**	**2**
16.4 Engine Fuel Systems			
16.4.1 Carburetors Types, construction and principles of operation; Icing and heating.	**1**	**2**	**2**
16.4.2 Fuel injection systems Types, construction and principles of operation.	**1**	**2**	**2**
16.4.3 Electronic engine control Operation of engine control and fuel metering systems including electronic engine control (FADEC); Systems lay-out and components.	**1**	**2**	**2**
16.5 Starting and Ignition Systems Starting systems, pre-heat systems; Magneto types, construction and principles of operation; Ignition harnesses, spark plugs; Low and high tension systems.	**1**	**2**	**2**
16.6 Induction, Exhaust and Cooling Systems Construction and operation of: induction systems including alternate air systems; Exhaust systems, engine cooling systems — air and liquid.	**1**	**2**	**2**
16.7 Supercharging/Turbocharging Principles and purpose of supercharging and its effects on engine parameters; Construction and operation of supercharging/turbocharging systems; System terminology; Control systems; System protection.	**1**	**2**	**2**
16.8 Lubricants and Fuels Properties and specifications; Fuel additives; Safety precautions.	**1**	**2**	**2**

MODULE 16. PISTON ENGINE	LEVEL		
	A	B1	B3
16.9 Lubrication Systems System operation/lay-out and components.	1	2	2
16.10 Engine Indication Systems Engine speed; Cylinder head temperature; Coolant temperature; Oil pressure and temperature; Exhaust Gas Temperature; Fuel pressure and flow; Manifold pressure.	1	2	2
16.11 Powerplant Installation Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.	1	2	2
16.12 Engine Monitoring and Ground Operation Procedures for starting and ground run-up; Interpretation of engine power output and parameters; Inspection of engine and components: criteria, tolerances, and data specified by engine manufacturer.	1	3	2
16.13 Engine Storage and Preservation 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 Fundamentals Blade element theory; High/low blade angle, reverse angle, angle of attack, rotational speed; Propeller slip; Aerodynamic, centrifugal, and thrust forces; Torque; Relative airflow on blade angle of attack; Vibration and resonance.	1	2
17.2 Propeller Construction Construction methods and materials used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; Fixed pitch, controllable pitch, constant speeding propeller; Propeller/spinner installation.	1	2

17.3 Propeller Pitch Control Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Overspeed protection.	**1**	**2**
17.4 Propeller Synchronising Synchronising and synchrophasing equipment.	**-**	**2**
17.5 Propeller Ice Protection Fluid and electrical de-icing equipment.	**1**	**2**
17.6 Propeller Maintenance Static and dynamic balancing; Blade tracking; Assessment of blade damage, erosion, corrosion, impact damage, delamination; Propeller treatment/repair schemes; Propeller engine running.	**1**	**3**
17.7 Propeller Storage and Preservation Propeller preservation and depreservation	**1**	**2**

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 Fundamentals Blade element theory; High/low blade angle, reverse angle, angle of attack, rotational speed; Propeller slip; Aerodynamic, centrifugal, and thrust forces; Torque; Relative airflow on blade angle of attack; Vibration and resonance.	**2**
17.2 Propeller Construction Construction methods and materials used in wooden, composite and metal propellers; Blade station, blade face, blade shank, blade back and hub assembly; Fixed pitch, controllable pitch, constant speeding propeller; Propeller/spinner installation.	**2**
17.3 Propeller Pitch Control Speed control and pitch change methods, mechanical and electrical/electronic; Feathering and reverse pitch; Overspeed protection.	**2**
17.4 Propeller Synchronising Synchronising and synchrophasing equipment.	**2**

17.5 Propeller Ice Protection Fluid and electrical de-icing equipment.	**2**
17.6 Propeller Maintenance Static and dynamic balancing; Blade tracking; Assessment of blade damage, erosion, corrosion, impact damage, delamination; Propeller treatment/repair schemes; Propeller engine running.	**2**
17.7 Propeller Storage and Preservation Propeller preservation and depreservation	**2**

Appendix II –Basic Examination Standard

1. General

1.1 All basic examinations must be carried out using the multiple choice question.

1.2 Each multiple choice questions must have more than two alternative answers of which only one must be the correct answer and the candidate shall be allowed a time per module which is based upon a nominal average of 75 seconds per question.

1.3 The pass mark for CAR-66 module and sub-module multiple choice part of the examination is 75%.

1.4 Penalty marking systems is not used to determine whether a candidate has passed.

1.5 A failed module may not be retaken for at least 90 days following the date of the failed module examination except in the case of an approved maintenance training organisation which conducts a course of retraining tailored to the failed subjects in the particular module. In such case, the failed module may be retaken after 30 days. Further, in case of failed module related to limitation papers, such modules may be retaken after 30days.

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

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

1.8 The applicant shall confirm in writing to the DGCA for an examination, the number and dates of attempts during the last year where these attempts took place.

2. Question Numbers and Examination Duration for the CAR-66 Appendix I Modules

Module		Category	Multiple choice Questions	Time allowed (Minutes)
No.	Subject			
1	Mathematics	All Categories	Not Applicable	
2	Physics	All Categories	Not Applicable	
3	Electrical Fundamentals	A	20	25
		B1	52	65
		B2	52	65
		B3	24	30
4	Electronic Fundamentals	A	Not Applicable	
		B1	20	25
		B2	40	50
		B3	8	10
5	Digital Techniques/Electronic Instrument Systems	A	16	20
		B1.1, B1.3	40	50
		B1.2,B1.4	20	25
		B2	72	90
		B3	16	20
6	Materials and Hardware	A	52	65
		B1	72	90
		B2	60	75
		B3	60	75
7A	Maintenance Practices	A	72	90
		B1	80	100
		B2	60	75
7B	Maintenance Practices	B3	60	75

Module No.	Module Subject	Category	Multiple choice Questions	Time allowed (Minutes)
8	Basic Aerodynamics	A	20	25
		B1	20	25
		B2	20	25
		B3	20	25
9A	Human factors	A	20	25
		B1	20	25
		B2	20	25
9B	Human factors	B3	16	20
10	Aviation Legislation	A	32	40
		B1	40	50
		B2	40	50
		B3	32	40
11A	Turbine Aeroplane Aerodynamics, Structures and Systems	A	108	135
		B1	140	175
		B2	0	0
11B	Piston Aeroplane Aerodynamics, Structures and Systems	A	72	90
		B1	100	125
		B2	0	0
11C	Piston Aeroplane Aerodynamics, Structures and Systems	B3	60	75
12	Helicopter Aerodynamics, Structures and Systems	A	100	125
		B1	128	160
		B2	0	0
13	Aircraft Aerodynamics, Structures and Systems	A	0	0
		B1	0	0
		B2	180	225
14	Propulsion	A	0	0
		B1	0	0
		B2	24	30

Module		Category	Multiple choice Questions	Time allowed (Minutes)
No.	Subject			
15	Gas Turbine Engine	A	60	75
		B1	92	115
		B2	0	0
16	Piston Engine	A	52	65
		B1	72	90
		B2	0	0
		B3	68	85
17A	Propeller	A	20	25
		B1	32	40
		B2	0	0
17B	Propeller	B3	28	35

3. ISSUANCE OF CERTIFICATE

Applicants who have passed all basic knowledge examination modules in respect of a particular category/ sub-category of AME licence may apply to CEO, DGCA on Form CA 19-11 for the issuance of Basic Knowledge Examination Certificate.

Appendix III - Type training and Examination Standard

On the job training

1. General

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

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

(i) Shall be conducted by a maintenance training organisation appropriately approved in accordance with CAR-147 or, when conducted by other organisations, as directly approved by the DGCA.

(ii) Shall comply, except as permitted by the differences training described in point (c), with:

- the relevant elements defined in the mandatory part of the operational suitability data established in accordance with CAR 66 or the standard described in point 3.1 of this Appendix, and

- the type training examination standard described in point 4.1 of this Appendix.

(iii) Reserved

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

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

(i) Shall be conducted by a maintenance training organisation appropriately approved in accordance with CAR- 147 or, when conducted by other organisations, as directly approved by the DGCA.

(ii) Shall comply, except as permitted by the differences training described in point (c), with:

- the relevant elements defined in the mandatory part of the operational suitability data established or, the standard described in point 3.2 of this Appendix, and

- the type training assessment standard described in point 4.2 of this Appendix.

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

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

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

(c) Differences training

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

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

(iii) A type rating shall only be endorsed on a licence after differences training when the applicant also complies with one of the following conditions:
— having already endorsed on the licence the aircraft type rating from which the differences are being identified, or
— having completed the type training requirements for the aircraft from which the differences are being identified.

2. Aircraft Type training levels

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

Level 1

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

Course objectives: Upon completion of the course, the student will be able to:

a) provide a simple description of the whole subject, using common words and examples, using typical terms and identify safety precautions related to the airframe, its systems and powerplant;
b) identify aircraft manuals, maintenance practices important to the airframe, its systems and powerplant;
c) define the general layout of the aircraft's major systems;
d) define the general layout and characteristics of the powerplant;
e) identify special tooling and test equipment used with the aircraft

Level 2

Basic system overview of controls, indicators, principal components including their

location and purpose, servicing and minor troubleshooting. General knowledge of the theoretical and practical aspects of the subject

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

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

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

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

(d) identify the locations of the principal components;

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

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

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

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

Level 3

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

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

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

(b) Perform system, power plant, component and functional checks as specified in the maintenance manual.

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

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

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

3. Aircraft Type training standard

Although aircraft type training includes both theoretical and practical elements, courses can be approved for the theoretical element, the practical element or for a combination of both.

3.1 Theoretical element

(a) Objective

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

(b) Level of training:

Training levels are those levels defined in point 2 above. After the first type course for category C certifying staff all subsequent courses need only be to level 1. During a level 3 theoretical training, level 1 and 2 training material may be used to teach the full scope of the chapter if required. However, during the training the majority of the course material and training time shall be at the higher level

(c) Duration:

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

Category	Hours
Aeroplanes with a maximum take-off mass above 30 000 kg:	
B1.1	150
B1.2	120
B2	100
C	30
Aeroplanes with a maximum take-off mass equal or less than 30 000 kg and above 5 700 kg:	
B1.1	120
B1.2	100
B2	100
C	25
Aeroplanes with a maximum take-off mass of 5 700 kg and below(	
B1.1	80
B1.2	60
B2	60
C	15
Helicopters(2)	
B1.3	120
B1.4	100
B2	100
C	25
(1) For non-pressurised piston engine aeroplanes below 2 000 kg MTOM the minimum duration can be reduced by 50 %. (2) For helicopters in group 2 (as defined in point 66.A.42) the minimum duration can be reduced by 30 %.	

For the purpose of the table above, a tuition hour means 60 minutes of teaching and exclude any breaks, examination, revision, preparation and aircraft visit. These hours apply only to theoretical courses for complete aircraft/engine combinations according to the type rating as defined by the DGCA.

(d) Justification of course duration:

Training courses carried out in a maintenance training organisation approved in accordance with CAR-147 and courses directly approved by the DGCA shall justify their hour duration and the coverage of the full syllabus by a training needs analysis based on:

— the design of the aircraft type, its maintenance needs and the types of operation,
— detailed analysis of applicable chapters
— see contents table in point 3.1(e) below,
— detailed competency analysis showing that the objectives as stated in point 3.1(a) above are fully met.

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

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

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

— The minimum attendance required to the trainee, in order to meet the objectives of the course.

— The maximum number of hours of training per day, taking into account pedagogical and human factors principles.

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

(e) Content:

As a minimum, the elements in the Syllabus below that are specific to the aircraft type shall be covered. Additional elements introduced due to type variations, technological changes, etc. shall also be included. The training syllabus shall be focused on mechanical and electrical aspects for B1 personnel, and electrical and avionic aspects for B2.

Level Chapters	Aeroplanes Turbine		Aeroplane Piston		Helicopter turbine		Helicopter Piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
Introduction module:									
05 Time limits/maintenance checks	1	1	1	1	1	1	1	1	1
06 Dimensions/Areas (MTOM, etc.)	1	1	1	1	1	1	1	1	1
07 Lifting and Shoring	1	1	1	1	1	1	1	1	1
08 Levelling and weighing	1	1	1	1	1	1	1	1	1
09 Towing and taxiing	1	1	1	1	1	1	1	1	1
10 Parking/mooring, Storing and Return to Service	1	1	1	1	1	1	1	1	1
11 Placards and Markings	1	1	1	1	1	1	1	1	1
12 Servicing	1	1	1	1	1	1	1	1	1
20 Standard practices — only type particular	1	1	1	1	1	1	1	1	1

Level Chapters	Aeroplanes Turbine		Aeroplane Piston		Helicopter turbine		Helicopter Piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
Helicopters									
18. Vibration and Noise Analysis(Blade tracking)	–	--	–	–	3	1	3	1	–
60 Standard Practices Rotor	-	-	-	-	3	1	3	1	-
62 Rotors	–	–	–	–	3	1	3	1	1
62A Rotors — Monitoring and indicating	–	–	–	–	3	1	3	1	3
63 Rotor Drives	--	--	--	--	3	1	3	1	1
63A Rotor Drives — Monitoring and indicating	--	--	--	--	3	1	3	1	3
64 Tail Rotor	–	–	–	–	3	1	3	1	1
64A Tail rotor — Monitoring and indicating	--	--	--	--	3	1	3	1	3
65 Tail Rotor Drive	--	–	–	–	3	1	3	1	1
65A Tail Rotor Drive — Monitoring and indicating	--	--	--	--	3	1	3	1	3
66 Folding Blades/Pylon	–	–	–	–	3	1	3	1	–
67 Rotors Flight Control	--	--	--	--	3	1	3	1	--
53 Airframe Structure (Helicopter)	--	--	--	--	3	1	3	1	--
25 Emergency Flotation Equipment	--	--	--	--	3	1	3	1	1
Airframe Structure									
51 Standard practices and structures (damage classification, assessment and repair)	3	1	3	1	–	–	–	–	1
53 Fuselage	3	1	3	1	–	–	–	–	1
54 Nacelles/Pylons	3	1	3	1	–	–	–	–	1
55 Stabilizers	3	1	3	1	–	–	–	–	1
56 Windows	3	1	3	1	–	–	–	–	1
57 Wings	3	1	3	1	–	–	–	–	1
27A Flight Control Surfaces (All)	3	1	3	1	–	–	–	–	1
52 Doors	3	1	3	1	–	–	–	–	1
Zonal & Station Identification Systems	1	1	1	1	1	1	1	1	1

Level Chapters	Aeroplanes Turbine		Aeroplane Piston		Helicopter turbine		Helicopter Piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
Airframe Systems									
21 Air Conditioning	3	1	3	1	3	1	3	1	3
21A Air Supply	3	1	3	1	1	3	3	1	2
21B Pressurization	3	1	3	1	3	1	3	1	3
21C Safety & Warning Devices	3	1	3	1	3	1	3	1	3
22 Autoflights	2	1	2	1	2	1	2	1	3
23 Communication	2	1	2	1	2	1	2	1	3
24 Electrical Power	3	1	3	1	3	1	3	1	3
25 Equipment & Furnishings	3	1	3	1	3	1	3	1	1
25A Electronic Emergency Equip. & Cabin Entertainment Equipment	1	1	1	1	1	1	1	1	3
26 Fire Protection	3	1	3	1	3	1	3	1	3
27 Flight Controls	3	1	3	1	3	1	3	1	2
27A Sys. Operation: Electrical/Fly-by-Wire	3	1	–	–	–	–	–	–	3
28 Fuel Systems	3	1	3	1	3	1	3	1	2
28A Fuel Systems — Monitoring and indication	3	1	3	1	3	1	3	1	3
29 Hydraulic Power	3	1	3	1	3	1	3	1	2
29A Hydraulic Power — Monitoring and indicating	3	1	3	1	3	1	3	1	3
30 Ice & Rain Protection	3	1	3	1	3	1	3	1	3
31 Indicating/Recording Systems	3	1	3	1	3	1	3	1	3
31A Instrument Systems	3	1	3	1	3	1	3	1	3
32 Landing Gear	3	1	3	1	3	1	3	1	2
32A Landing Gear — Monitoring and indicating	3	1	3	1	3	1	3	1	3
33 Lights	3	1	3	1	3	1	3	1	3
34 Navigation	2	1	2	1	2	1	2	1	3
35 Oxygen	3	1	3	1	–	–	–	–	2
36 Pneumatic	3	1	3	1	3	1	3	1	2
36A Pneumatic — Monitoring and indicating	3	1	3	1	3	1	3	1	3
37 Vacuum	3	1	3	1	3	1	3	1	2
38 Water/Waste	3	1	3	1	--	--	--	--	2
41 Water Ballast	3	1	3	1	--	--	--	--	1

Level Chapters	Aeroplanes Turbine		Aeroplane Piston		Helicopter turbine		Helicopter Piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
42 Integrated modular avionics	2	1	2	1	2	1	2	1	3
44 Cabin Systems	2	1	2	1	2	1	2	1	3
45 On-board Maintenance Systems	3	1	3	1	3	1	–	–	3
46 Information Systems	2	1	2	1	2	1	2	1	3
50 Cargo and Accessory Compartments	3	1	3	1	3	1	3	1	1
Turbine Engines:									
70 Standard Practices — Engines,	3	1	–	–	3	1	–	–	1
70A constructional arrangement and operation (Installation Inlet, Compressors, Combustion Section, Turbine Section, Bearings and Seals, Lubrication Systems).	3	1	--	--	3	1	--	--	1
70B Engine Performance	3	1	–	–	3	1	–	–	1
71 Powerplant	3	1	–	–	3	1	–	–	1
72 Engine Turbine/Turbo Prop/Ducted Fan/Unducted fan	3	1	--	--	3	1	--	--	1
73 Engine Fuel and Control	3	1	–	–	3	1	–	–	1
75 Air	3	1	–	–	3	1	–	–	1
76 Engine controls	3	1	–	–	3	1	–	–	1
78 Exhaust	3	1	–	–	3	1	–	–	1
79 Oil	3	1	–	–	3	1	–	–	1
80 Starting	3	1	–	–	3	1	–	–	1
82 water injection	3	1	–	–	3	1	–	–	1
83 Accessory Gear Boxes	3	1	–	–	3	1	–	–	1
84 Propulsion Augmentation	3	1	–	–	3	1	–	–	1
73A FADEC	2	1	–	–	2	1	–	–	3
74 Ignition	3	1	–	–	3	1	–	–	3
77 Engine Indicating Systems	3	1	–	–	3	1	–	–	3
49 Auxiliary Power Units (APUs)	3	1	–	–	--	--	–	–	2
Piston Engines:									

Level Chapters	Aeroplanes Turbine		Aeroplane Piston		Helicopter turbine		Helicopter Piston		Avionics
	B1	C	B1	C	B1	C	B1	C	B2
70 Standard Practices — Engines	--	--	3	1	–	–	3	1	1
70A Constructional arrangement and operation (Installation, Carburettors, Fuel injection systems, Induction, Exhaust and Cooling Systems, Supercharging/ Turbocharging, Lubrication Systems).	–	–	3	1	--	--	3	1	1
70B Engine Performance	_	_	3	1	--	--	3	1	1
71 Powerplant	–	–	3	1	–	–	3	1	1
73 Engine Fuel and Control	–	–	3	1	–	–	3	1	1
76 Engine Control	–	–	3	1	–	–	3	1	1
79 Oil	–	–	3	1	–	–	3	1	1
80 Starting	–	–	3	1	–	–	3	1	1
81 Turbine	--	--	3	1	--	--	3	1	1
82 Water Injections	–	–	3	1	–	–	3	1	1
83 Accessory Gear Boxes	–	–	3	1	–	–	3	1	1
84 Propulsion Augmentation	–	–	3	1	–	–	3	1	1
73A FADEC	–	–	3	1	–	–	3	1	3
74 Ignition	–	–	3	1	–	–	3	1	3
77 Engine Indication Systems	–	–	3	1	–	–	3	1	3
Propellers:									
60A Standard Practices — Propeller	3	1	3	1	–	–	–	–	1
61 Propellers/Propulsion	3	1	3	1	–	–	–	–	1
61A Propeller Construction	3	1	3	1	--	--	--	--	1
61B Propeller Pitch Control	3	1	3	1	–	–	–	–	–
61C Propeller Synchronizing	3	1	3	1	–	–	–	–	1
61D Propeller Electronic control	2	1	2	1	–	–	–	–	3
61E Propeller Ice Protection	3	1	3	1	–	–	–	–	–
61F Propeller Maintenance	3	1	3	1	–	–	–	–	1

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

3. 2 Practical element

a) Objective:

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

b) Content:

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

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

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

Glossary of table: LOC: Location; FOT: Functional / Operation Test; SGH: Service and Ground; Handling; R/I: Removal / Installation; MEL: Minimum Equipment List; TS: Trouble Shooting

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
Introduction module:											
05 Time limits/maintenance checks	X/X	--	--	--	--	--	--	--	--	--	-
06 Dimensions/Areas (MTOM, etc.)	X/X	--	--	--	--	--	--	--	--	--	-
07 Lifting and Shoring	X/X	--	--	--	--	--	--	--	--	--	-
08 Levelling and weighing	X/X	--	X	--	--	--	--	X	--	--	-
09 Towing and Taxing	X/X	--	X	--	--	--	--	X	--	--	-
10 Parking/Mooring storing and return to service	X/X	--	X	--	--	--	--	X	--	--	-

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
11 Playcard and marking	X/X	--	--	--	--	--	--	--	--	--	-
12 Servicing	X/X	--	X	--	--	--	--	X	--	--	-
20 Standard practices –only type particular	X/X	--	X	--	--	--	--	X	--	--	-
Helicopters:											
18 Vibration and Noise Analysis (Blade tracking)	X/--	--	--	--	--	X	--	--	--	--	-
60 Standard Practices Rotor — only type specific	X/X	--	X	--	--	--	--	X	--	--	-
62 Rotors	X/--	--	X	X	--	X	--	--	--	--	-
62A Rotors — Monitoring and indicating	X/X	X	X	X	X	X	--	--	X	--	x
63 Rotor Drives	X/--	X	--	--	--	X	--	--	--	--	-
63A Rotor Drives — Monitoring and indicating	X/X	X	--	X	X	X	--	--	X	--	X
64 Tail Rotor	X/--	--	X	--	--	X	--	--	--	--	-
64A Tail rotor -Monitoring and indicating	X/X	X	--	X	X	X	--	--	X	--	X
65 Tail Rotor Drive	X/--	X	--	--	--	X	--	--	--	--	-
65A Tail Rotor Drive — Monitoring and indicating	X/X	X	--	X	X	X	--	--	X	--	X
66 Folding Blades/Pylon	X/--	X	X	--	--	X	--	--	--	--	-
67 Rotors Flight Control	X/--	X	X	--	X	X	--	--	--	--	-
53 Airframe Structure (Helicopter) Note: covered under Airframe structures											
25 Emergency Flotation Equipment	X/X	X	X	X	X	X	X	X	--	--	-
Airframe structures:											
51 Standard Practices and Structures (damage classification, assessment and repair											
53 Fuselage	X/--	--	--	--	--	X	--	--	--	--	-
54 Nacelles/Pylons	X/--	--	--	--	--	--	--	--	--	--	-
55 Stabilisers	X/--	--	--	--	--	--	--	--	--	--	-
56 Windows	X/--	--	--	--	--	X	--	--	--	--	-
57 Wings	X/--	--	--	--	--	--	--	--	--	--	-

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
27A Flight Control Surfaces	X/--	--	--	--	--	X	--	--	--	--	-
52 Doors	X/X	X	X	--	--	--	--	X	--	--	-
Airframe systems:											
21 Air Conditioning	X/X	X	X	--	X	X	X	X	--	X	X
21A Air Supply	X/X	X	--	--	--	--	X	--	--	--	-
21B Pressurisation	X/X	X	--	--	X	X	X	--	--	X	X
21C Safety and warning Devices	X/X	--	X	--	--	--	--	X	--	--	-
22 Autoflight	X/X	--	--	--	X	--	X	X	X	X	X
23 Communications	X/X	--	X	--	X	--	X	X	X	X	X
24 Electrical Power	X/X	X	X	X	X	X	X	X	X	X	X
25 Equipment and Furnishings	X/X	X	X	X	--	--	X	X	X	--	-
25A Electronic Equipment including emergency equipment	X/X	X	X	X	--	--	X	X	X	--	-
26 Fire Protection	X/X	X	X	X	X	X	X	X	X	X	X
27 Flight Controls	X/X	X	X	X	X	X	X	--	--	--	-
27A Sys. Operation: Electrical/Fly-by-Wire	X/X	X	X	X	X	--	X	--	X	--	X
28 Fuel Systems	X/X	X	X	X	X	X	X	X	--	X	-
28A Fuel Systems — Monitoring and indicating	X/X	X	--	--	--	--	X	--	X	--	X
29 Hydraulic Power	X/X	X	X	X	X	X	X	X	--	X	-
29A Hydraulic Power — Monitoring and indicating	X/X	X	--	X	X	X	X	--	X	X	X
30 Ice and Rain Protection	X/X	X	X	--	X	X	X	X	--	X	X
31 Indicating/Recording Systems X	X/X	X	X	X	X	X	X	X	X	X	X
31A Instrument Systems	X/X	X	X	X	X	X	X	X	X	X	X
32 Landing Gear	X/X	X	X	X	X	X	X	X	X	X	-
32A Landing Gear — Monitoring and indicating	X/X	X	--	X	X	X	X	--	X	X	X

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
33 Lights	X/X	X	X	--	X	--	X	X	X	X	-
34 Navigation	X/X	--	X	--	X	--	X	X	X	X	X
35 Oxygen	X/--	X	X	X	--	--	X	X	--	--	-
36 Pneumatic	X/--	X	--	X	X	X	X	--	X	X	X
36A Pneumatic — Monitoring and indicating	X/X	X	X	X	X	X	X	X	X	X	X
37 Vacuum	X/--	X	--	X	X	X	--	--	--	--	-
38 Water/Waste	X/--	X	X	--	--	--	X	X	--	--	-
41 Water Ballast	X/--	--	--	--	--	--	--	--	--	--	-
42 Integrated modular avionics	X/X	--	--	--	--	--	X	X	X	X	X
44 Cabin Systems	X/X	--	--	--	--	--	X	X	X	X	X
45 On-Board Maintenance System (or covered in 31)	X/X	X	X	X	X	X	X	X	X	X	X
46 Information Systems	X/X	--	--	--	--	--	X	--	X	X	X
50 Cargo and Accessory Compartments	X/X	--	X	--	--	--	--	--	--	--	-
Turbine/Piston Engine Module:											
70 Standard Practices — Engines — only type particular	---	--	X	--	--	--	--	X	--	--	-
70A Constructional arrangement and operation (Installation Inlet, Compressors, Combustion Section, Turbine Section, Bearings and Seals, Lubrication Systems)	X/X	--	--	--	--	--	--	--	--	-	-
Turbine engines:											
70B Engine Performance	--	--	--	--	--	X	--	--	--	--	-
71 Power Plant	X/--	X	X	--	--	--	--	X	--	--	-
72 Engine Turbine/Turbo Prop/Ducted Fan/ Unducted fan	X/--	--	--	--	--	--	--	--	--	--	-
73 Engine Fuel and Control	X/X	X	--	--	--	--	--	--	--	--	-
73A FADEC Systems	X/X	X	--	X	X	X	X	--	X	X	X
74 Ignition	X/X	X	--	--	--	--	X	--	--	--	-
75 Air	X/--	--	--	X	--	X	--	--	--	--	-

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

Chapters	B1/B2	B1					B2				
	LOC	FOT	SGH	R/I	MEL	TS	FOT	SGH	R/I	MEL	TS
83 Accessory Gearboxes	X/--	--	X	X	--	--	--	--	--	--	-
84 Propulsion Augmentation	X/--	X	--	--	--	--	--	--	--	--	-
Propellers:											
60A Standard Practices — Propeller	--	--	--	X	--	--	--	--	--	--	-
61 Propellers/Propulsion	X/X	X	X	--	X	X	--	--	--	--	-
61A Propeller Construction	X/--	--	X	--	--	--	--	--	--	--	-
61B Propeller Pitch Control	X/--	X	--	X	X	X	--	--	--	--	-
61C Propeller Synchronising	X/--	X	--	--	--	X	--	--	--	X	-
61D Propeller Electronic control	X/X	X	X	X	X	X	X	X	X	X	X
61E Propeller Ice Protection	X/--	X	--	X	X	X	--	--	--	--	-
61F Propeller Maintenance	X/X	X	X	X	X	X	X	X	X	X	X

4. Type training examination and assessment standard

4.1. Theoretical element examination standard

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

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

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

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

(d) The level of examination for each chapter (1) shall be the one defined in point 2 'Aircraft type training levels'. However, the use of a limited number of questions at a

lower level is acceptable.

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

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

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

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

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

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

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

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

4.2. Practical element assessment standard.

After the practical element of the aircraft type training has been completed, an assessment must be performed, which must comply with the following:

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

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

5. Type examination standard

Type examination shall be conducted by training organisations appropriately approved under CAR-147 or by the DGCA

The examination shall be oral, written and or practical assessment based, or a combination thereof and it shall comply with the following requirements:

(a) Oral examination questions shall be open.

(b) Written examination questions shall be essay type or multi-choice questions.

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

(d) Examinations shall be on a sample of chapters (1) drawn from point 3 type training/examination syllabus, at the indicated level.

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

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

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

1. Properly discuss with confidence the aircraft and its systems.

2. Ensure safe performance of maintenance, inspections and routine work according to the maintenance manual and other relevant instructions and tasks as appropriate for the type of aircraft, for example troubleshooting, repairs, adjustments, replacements, rigging and functional checks such as engine run, etc., if required.

3. Correctly use all technical literature and documentation for the aircraft.

4. Correctly use specialist/special tooling and test equipment, perform removal and replacement of components and modules unique to type, including any on-wing maintenance activity

(h) The following conditions apply to the examination:

1. The maximum number of consecutive attempts is three. Further sets of three attempts are allowed with a 1 year waiting period between sets. A waiting period of 30 days is required after the first failed attempt within one set, and a waiting period of 60 days is required after the second failed attempt.

The applicant shall confirm in writing to the DGCA the number and dates of attempts during the last year.. DGCA is responsible for checking the number of attempts within the applicable timeframes.

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

the aircraft maintenance licence.

3. Type examination shall be performed with at least one examiner present. The examiner(s) shall not have been involved in the applicant's training.

(i) A written and signed report shall be made by the examiner(s) to explain why the candidate has passed or failed.

6. On the Job Training

On the Job Training (OJT) shall be approved by the DGCA.

It shall be conducted at and under the control of a maintenance organisation appropriately approved for the maintenance of the particular aircraft type and shall be assessed by designated assessors appropriately qualified.

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

(a) Objective:

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

Content:

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

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

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

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

1. Name of Trainee;
2. Date of Birth;
3. Approved Maintenance Organisation;
4. Location;
5. Name of supervisor(s) and assessor, (including licence number if applicable);

6. Date of task completion;
7. Description of task and job card/work order/tech log, etc.;
8. Aircraft type and aircraft registration;
9. Aircraft rating applied for.

In order to facilitate the verification by the DGCA, demonstration of the OJT shall consist of i) detailed worksheets/logbook and (ii) a compliance report demonstrating how the OJT meets the requirement of this Part.

Appendix IV - Experience requirements for extending a CAR-66 Aircraft Maintenance Engineer's Licence

The table below shows the experience requirements for adding a new category or subcategory to an existing CAR-66 licence.

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

The experience is to be signed by the post holder only and this procedure is to be reflected in MOE

The experience requirement will be reduced by 50 % if the applicant has completed an approved CAR-147 course relevant to the subcategory

To:	**A1**	**A2**	**A3**	**A4**	**B1.1**	**B1.2**	**B1.3**	**B1.4**	**B2**	**B3**
From	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
A1	X		6 months	6 months	2 years	6 months	2 years	1 year	2 years	6 months
A2	6 months	X	6 months	6 months	2 years	6 months	2 years	1 year	2 years	6 months
A3	6 months	6 months	X	6 months	2 years	1 year	2 years	6 months	2 years	1 year
A4	6 months	6 months	6 months	X	2 years	1 years	2 years	6 months	2 years	1 year
B1.1	NONE	6 months	6 months	6 months	X	6 months	6 months	6 months	1 year	6 months
B1.2	6 months	NONE	6 months	6 months	2 years	X	2 years	6 months	2 years	NONE
B1.3	6 months	6 months	NONE	6 months	6 months	6 months	X	6 months	1 year	6 months
B1.4	6 months	6 months	6 months	NONE	2 years	6 months	2 years	X	2 years	6 months
B2	6 months	6 months	6 months	6 months	1 year	1 year	1 year	1 year	X	1 year
B3	6 months	NONE	6 months	6 months	2 years	6 months	2 years	1 year	2 years	--

Appendix V- Applications and Formats

Application forms
(published in DGCA Website dgca.nic.in)

Appendix VI - Aircraft Maintenance Engineer's Licence referred to in Rule 61 of the Aircraft Rules, 1937-CA Form 26

CA 26

GOVERNMENT OF INDIA

DIRECTORATE GENERAL OF CIVIL AVIATION

CAR-66

AIRCRAFT MAINTENANCE ENGINEER's LICENCE

I	**INDIA**			**IX. CONDITIONS**
II.	**Aircraft Maintenance Engineer's Licence**			a. Certified that holder is authorized to exercise the privileges of the licence as given in Rule 61 of the Aircraft Rules, 1937. b. Endorsement of aircraft types at section XII (b) titled AIRCRAFT TYPE RATING means the holder is qualified to issue a certificate of release to service for such aircraft from the date of endorsement with a valid authorization issued by approved maintenance organization. c. Holder of this licence shall not exercise the privileges of the licence and related ratings at any time when he/she is aware of any decrease in medical fitness which might render him/her unable to safely and properly exercise these privileges. d. This licence is not valid unless it bears the signature of the holder. e. This licence remains current until the expiry date specified at section XIV whilst in compliance with the Aircraft Rule 61 and CAR 66 unless previously suspended or revoked. f. This licence when endorsed with an aircraft type rating meets the intent of ICAO Annex 1. g. Entry, endorsement or alteration in the licence shall be made by person authorized for this purpose by the Director General.
III.	Licence number		STAMP SIZE PHOTO	
IV.	Name of holder in full			
IVa	Date of birth			
V.	Address of holder			
VI.	Nationality			
VII.	Signature of Holder			
VIII.	Issued in accordance with the provisions of the Aircraft Act 1934, and Aircraft Rules 1937.			
X	Signature of Issuing Authority	…… (for the Director General of Civil Aviation)		
	Date of Issue:			
XI.	Stamp of the Issuing Authority			
1				**III. LIC No. 2**

XII (a). LICENCE (SUB) CATEGORIES							**XII (b). AIRCARFT TYPE RATING**		
CATEGORIES	A	B1	B2	B3	C	DATE	AIRCRAFT TYPE OR GROUP	CATEGORY	STAMP & DATE
AEROPLANES TURBINE			n/a	n/a	n/a				
AEROPLANES PISTON			n/a	n/a	n/a				
HELICOPTERS TURBINE			n/a	n/a	n/a				
HELICOPTERS PISTON			n/a	n/a	n/a				
AVIONICS	n/a	n/a		n/a	n/a				
AIRCRAFT	n/a	n/a	n/a	n/a					
PISTON-ENGINE NON-PRESSURISED AEROPLANES OF 2000KG MTOM AND BELOW	n/a	n/a	n/a		n/a				
III. LIC No. 3							**III. LIC No. 4**		

XIII. LIMITATIONS				**XIV. LICENCE VALIDITY**		
AIRCRAFT TYPE OR GROUP	CATEGORY	LIMITATION CODE	SIGNATURE WITH DATE (REMOVAL OF LIMITATION)	DATE OF EXPIRY	SIGNATURE WITH DATE	SEAL
III. LIC No. 5				**III. LIC No 6**		

LICENCE ENDORSEMENTS INHERITED FROM THE AME LICENCE HELD PRIOR TO CAR-66 LICENCE			**(b). REMARKS**
RATING	CATEGORY	SIGNATURE WITH DATE	
III. LIC No. 7			**III. LIC No. 8**

1. The aircraft maintenance engineer's licence once issued is required to be kept by the person to whom it applies in good condition and who shall remain accountable for ensuring that no unauthorized entries are made.

2. Failure to comply with paragraph 1 may invalidate the document and could lead to the holder not being permitted to hold any CAR -145 certification authorization.

3. Failure to comply with paragraph 1 may also result in prosecution under relevant Indian Penal Code.

4. Each page issued shall be in this format and contain the specified information for that page.

5. If there are no limitations applicable, the LIMITATIONS page will be issued stating 'No limitations'.

Acceptable Means of Compliance (AMC) / Guidance Material (GM) to SECTION A of CAR-66

This chapter contains Acceptable Means of Compliance (AMC) and Guidance Material (GM) to CAR - 66 Section A– Technical Requirements. Acceptable Means of Compliance (AMC) illustrate a means, or several alternative means, but not necessarily the only possible means by which a requirement can be met.

SECTION A
TECHNICAL REQUIREMENTS

GM 66.A.03 Licence categories

Individual aircraft maintenance licence holders need not be restricted to a single category. Provided that each qualification requirement is satisfied, any combination of categories may be granted.

AMC 66.A.10 Application

1. Maintenance experience should be written in a manner that the reader has a reasonable understanding of where, when and what maintenance constitutes the experience. A task by task account is not necessary but at the same time a blank statement "X year's maintenance experience completed" is not acceptable. A log book of maintenance experience is desirable and be kept. It is acceptable to cross refer in the CA Form 19-01 to other documents containing information on maintenance.

2. Applicants claiming the maximum reduction in 66.A.30 (a) total experience based upon having successfully completed approved basic training should include the certificate of approval with its validity schedule of the training establishment.

3. Applicants claiming reduction in 66.A.30 (a) total experience based upon having successfully completed technical training in an organization or institute recognized by DGCA as a competent organization or institute should include the relevant certificate of successful completion of training.

AMC 66.A.15 (a) Eligibility

Diploma in Aeronautical, Mechanical, Electrical and Electronics engineering recognized by state technical education board shall be considered as equivalent qualification**.**

To prove the equivalence to 10 +2, the applicant is required to submit a certificate from a competent authority such as Association of Indian Universities (AIU).

GM 66.A.20 (a) Privileges

1. The following definitions apply:

   Electrical system means the aircraft electrical power supply source, plus the distribution system to the different components contained in the aircraft and relevant connectors. Lighting systems are also included in this definition. When working on cables and connectors which are part of these electrical systems, the following typical practices are included in the privileges:

   - Continuity, insulation and bonding techniques and testing;
   - Crimping and testing of crimped joints;
   - Connector pin removal and insertion;
   - Wiring protection techniques.

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

   - Autoflight;
   - Communication, Radar and Navigation;
   - Instruments (see NOTE below);
   - In-Flight Entertainment Systems;
   - Integrated Modular Avionics (IMA);
   - On-Board Maintenance Systems;
   - Information Systems;
   - Fly-by-Wire Systems (related to ATA27 "Flight Controls");
   - Fibre Optic Control Systems.

NOTE: Instruments are formally included in the privileges of the B2 licence holders. However, maintenance on electromechanical and pitot-static components may also be released by a B1 license holder.

Simple test means a test described in approved maintenance data and meeting all the following criteria:

- The serviceability of the system can be verified using aircraft controls, switches, Built-in Test Equipment (BITE), Central Maintenance Computer (CMC) or external test equipment not involving special training.

- The outcome of the test is a unique go–no go indication or parameter, which can be a single value or a value within an interval tolerance. No interpretation of the test result or interdependence of different values is allowed.

- The test does not involve more than 10 actions as described in the approved maintenance data (not including those required to configure the aircraft prior to the test, i.e. jacking, flaps down, etc., or to return the aircraft to its initial configuration). Pushing a control, switch or button, and reading the corresponding outcome may be considered as a single step even if the maintenance data shows them separated.

Troubleshooting means the procedures and actions necessary using approved maintenance data, in order to identify the root cause of a defect or malfunction. It may include the use of BITE or external test equipment.

Line maintenance means any maintenance that is carried out before flight to ensure that the aircraft is fit for the intended flight. It may include:

- trouble shooting;
- defect rectification;
- component replacement with the use of external test equipment, if required. Component replacement may include components such as engines and propellers;
- scheduled maintenance and/or checks including visual inspections that will detect obvious unsatisfactory conditions/discrepancies but do not require extensive in-depth inspection. It may also include internal structure, systems and power plant items which are visible through quick opening access panels/doors;
- minor repairs and modifications which do not require extensive disassembly and can be accomplished by simple means;
- for temporary or occasional cases (Airworthiness Directives, hereinafter AD; service bulletins, hereinafter SB) the quality manager may accept base maintenance tasks to be performed by a line maintenance organisation provided all requirements are fulfilled. The DGCA will prescribe the conditions under which these tasks may be performed.

Base Maintenance means any task falling outside the criteria are given above for Line Maintenance.

NOTE:

Aircraft maintained in accordance with "progressive" type programmes need to be individually assessed in relation to this paragraph. In principle, the decision to allow some "progressive" checks to be carried out is determined by the assessment that all tasks within the particular check can be carried out safely to the required standards at the designated line maintenance station.

2. The category B3 licence does not include any A subcategory. Nevertheless, this does not prevent the B3 licence holder from releasing maintenance tasks typical of the A1.2 subcategory for piston-engine non-pressurized aeroplanes of 2000 kg MTOM and below, within the limitations contained in the B3 licence.

3. The category C licence permits certification of scheduled base maintenance by the issue of a single certificate of release to service for the complete aircraft after the completion of all such maintenance. The basis for this certification is that the maintenance has been carried out by competent mechanics and category B1, B2 and B3 support staff, as appropriate, have signed for the maintenance tasks under their respective specialization. The principal function of the category C certifying staff is to ensure that all required maintenance has been called up and signed off by the

category B1, B2 and B3 support staff, as appropriate, before issue of the certificate of release to service. Only category C personnel who also hold category B1, B2 or B3 qualifications may perform both roles in base maintenance.

AMC 66.A.20 (b) (2) Privileges

The 6 months maintenance experience in 2 years should be understood as consisting of two elements, duration and nature of the experience. The minimum to meet the requirements for these elements may vary depending on the size and complexity of the aircraft and type of operation and maintenance.

1. Duration:

Within an approved maintenance organization:

- 6 months continuous employment within the same organisation; or
- 6 months split up into different blocks, employed within the same or in different organisations.

The 6 months period can be replaced by 100 days of maintenance experience in accordance with the privileges, whether these have been performed within an approved organisation or as independent certifying staff according to M.A.801 (b) 2 or as a combination thereof.

When licence holder maintains and releases aircraft in accordance with M.A.801 (b) 2, in certain circumstances this number of days may even be reduced by 50% when agreed in advance by the DGCA. These circumstances consider the cases where the holder of a CAR-66 licence happens to be the owner of an aircraft and carries out maintenance on his own aircraft, or where a licence holder maintains an aircraft operated for low utilization, that does not allow the licence holder to accumulate the required experience. This reduction should not be combined with the 20% reduction permitted when carrying out technical support, or maintenance planning, continuing airworthiness management or engineering activities. To avoid a too long period without experience, the working days should be spread over the intended 6 months period.

2. Nature of the experience:

Depending on the category of the aircraft maintenance engineer's licence, the following activities are considered relevant for maintenance experience:

- Servicing;

- Inspection;

- Operational and functional testing;

- Trouble-shooting;

- Repairing;

- Modifying;

- Changing component;

- Supervising these activities;

- Releasing aircraft to service.

For category A licence holder, the experience should include exercising the privileges, by means of performing tasks related to the authorization on at least one aircraft type for each licence subcategory. This means tasks as mentioned in AMC 145.A.30 (g), including servicing, component changes and simple defect rectifications.

For category B1, B2 and B3, for every aircraft type rating included in the authorization the experience should be on that particular aircraft or on a similar aircraft within the same licence (sub) category. Two aircraft can be considered as similar when they have similar technology, construction and comparable systems, which means equally equipped with the following (as applicable to the licence category):

(a) Propulsion systems (piston or turboprop or turbofan or turboshaft or jet-engine or push propellers); and

(b) Flight control systems (only mechanical controls or hydro-mechanically powered controls or electro-mechanically powered controls); and

(c) Avionic systems (analog systems or digital systems); and

(d) Structure (manufactured of metal or composite or wood).

For licenses endorsed with (sub) group ratings:

- In the case of B1 licence endorsed with (sub) group ratings (either manufacturer sub group or full (sub) group) as defined in 66.A.45 the holder may show experience on at least one aircraft type per (sub) group and per aircraft structure (metal, composite, wood).

- In the case of a B2 licence endorsed with (sub) group ratings (either manufacturer group or full (sub) group) as defined in 66.A.45 the holder may show experience on at least one aircraft type per (sub) group.

- In the case of a B3 licence endorsed with the rating 'piston-engine non-pressurized aeroplanes of 2000kg MTOM and below' as defined in 66.A.45, the holder should show experience on at least one aircraft type per aircraft structure (metal, composite, wooden).

For category C, the experience should cover at least one of the aircraft types endorsed on the licence.

For a combination of categories, the experience should include some activities of the nature shown in paragraph 2 in each category.

A maximum of 20% of the experience duration required may be replaced by the following relevant activities on an aircraft type of similar technology, construction and with comparable systems:

- Aircraft maintenance related training as an instructor/assessor or as a student;
- Maintenance technical support/engineering;
- Maintenance management/planning.

The experience should be documented in an individual log book or in any other recording system (which may be an automated one) containing the following data:

(a) Date and time;

(b) Aircraft type;

(c) Aircraft identification i.e. registration;

(d) ATA chapter;

(e) Operation performed i.e. 100 FH check, MLG wheel change, engine oil check and complement, SB embodiment, trouble shooting, structural repair, STC embodiment…;

(f) Type of maintenance i.e. base, line;

(g) Type of activity i.e. perform, supervise, release;

(h) Category used A, B1, B2, B3 or C.

(i) Duration in days or partial-days.

GM 66.A.20 (b) 2 Privileges

The sentence "met the provision for the issue of the appropriate privileges" included in 66.A.20(b)2 means that during the previous 2 years the person has met all the requirements for the endorsement of the corresponding aircraft rating (for example, in the case of aircraft in Group 1, theoretical plus practical element plus, if applicable, on-the-job training). This supersedes the need for 6 months of experience for the first 2 years. However, the requirement of 6 months of experience in the preceding 2 years will need to be met after the second year.

AMC 66.A.20 (b) 3 Privileges

The wording "has the adequate competence to certify maintenance on the corresponding aircraft" means that the licence holder and, if applicable, the organisation where he/she is contracted/employed, should ensure that he/she has acquired the appropriate knowledge, skills, attitude and experience to release the aircraft being maintained. This is essential because some systems and technology present in the

particular aircraft being maintained may not have been covered by the training/examination/experience required to obtain the licence and ratings.

This is typically the case, among others, in the following situations:

- Type ratings which have been endorsed on a licence in accordance with Appendix I to AMC to CAR-66 "List of Type Ratings" after attending type training/on-the-job training which did not cover all the models/variants included in such rating. For example, a licence endorsed with the rating Airbus A318/A319/A320/A321 (CFM56) after attending type training/on-the-job training covering only the Airbus 320 (CFM56).

- Type ratings which have been endorsed on a licence in accordance with Appendix I to AMC to CAR-66 "List of Type Ratings" after a new variant has been added to the rating in Appendix I, without performing difference training. For example, a licence endorsed with the rating Boeing 737-600/700/800/900 for a person who already had the rating Boeing 737-600/700/800, without performing any difference training for the 737-900.

- Work being carried out on a model/variant for which the technical design and maintenance techniques have significantly evolved from the original model used in the type training/on-the-job training.

- Specific technology and options selected by each customer which may not have been covered by the type training/on-the-job training.

- Changes in the basic knowledge requirements of Appendix I to CAR -66 not requiring reexamination of existing licence holders (grandfathered privileges).

- The endorsement of group/subgroup ratings based on experience on a representative number of tasks/aircraft or based on type training/examination on a representative number of aircraft.

- Persons meeting the requirements of 6 months of experience every 2 years only on certain similar aircraft types as allowed by AMC 66.A.20(b)2.

- Persons holding a CAR-66 licence with limitations, obtained through conversion of pre-existing qualifications (66.A.70), where such limitations are going to be lifted after performing the corresponding basic knowledge examinations. In this case, the type ratings endorsed in the licence may have been obtained without covering all the aircraft systems (because of the previous limitations) and there will be need to assess and, if applicable, to train this person on the missing systems.

Additional information is provided in AMC 145.A.35 (a).

GM 66. A. 20 (b) 4 Privileges

1. Holders of a CAR-66 aircraft maintenance licence may not exercise certification privileges unless they have a general knowledge of the language used within the maintenance environment including knowledge of common aeronautical terms in the language. The level of knowledge should be such that the licence holder is able to:

   - read and understand the instructions and technical manuals in use within the organisation;
   - make written technical entries and any maintenance documentation entries, which can be understood by those with whom they are normally required to communicate;
   - read and understand the maintenance organisation procedures;
   - communicate at such a level as to prevent any misunderstanding when exercising certification privileges.

2. In all cases, the level of understanding should be compatible with the level of certification privileges exercised.

GM 66.A.25 (a) Basic knowledge requirements

The levels of knowledge for each licence (sub) category are directly related to the complexity of the certifications related to the corresponding licence (sub)category, which means that category A should demonstrate a limited but adequate level of knowledge, whereas category B1, B2 and B3 should demonstrate a complete level of knowledge in the appropriate subject module.

AMC 66.A.30 (a) Experience requirements

1. Provided that the experience requirement specified at 66.A.30.a.(1) and (2) shall be reduced by one year in case of an applicant who has satisfactorily completed training in any training organization approved under rule 133B or who has acquired a Degree in an allied field of Engineering from a recognized University;

1(A) Provided further that the experience requirement specified at 66.A.30.a.(1) and (2) shall be reduced by two years and three years, respectively in case of an applicant who has successfully completed training in an approved maintenance organisation as a part of the syllabi of the course he has passed from a training organisation approved under rule 133B for imparting basic aircraft maintenance training.

Explanation.— For the purpose of this proviso, the "Approved Maintenance Organisation" means an aircraft maintenance organisation approved under rule 133B of the Aircraft Rules, 1937.

2. While an applicant to a CAR-66 Category C licence may be qualified by having 3 years' experience as category B1 or B2 certifying staff only in line maintenance, it is however rrecommended that any applicant for a category C holding a B1 or B2 licence demonstrate at least 12 months experience as a B1 or B2 base maintenance support staff.

3. A skilled worker is a person who has successfully completed a training acceptable to the DGCA and involving the manufacture, repair, overhaul or inspection of mechanical, electrical or electronic equipment. The training would include the use of tools and measuring devices.

4. Maintenance **experience** on operating aircraft:

- Means the experience of being involved in maintenance tasks on aircraft which are being operated by airlines, air taxi organisations, owners, etc.;

- Should cover a wide range of tasks in length, complexity and variety;

- Aims at gaining sufficient experience in the real environment of maintenance as opposed to only the training school environment;

- May be gained within different types of maintenance organisations (CAR-145, M.A. Subpart F etc.) or under the supervision of independent certifying staff;

- May be combined with CAR-147 approved training so that periods of training can be intermixed with periods of experience, similar to an apprenticeship

AMC 66.A.30 (d) Experience requirements

To be considered as recent experience; at least 50% of the required 12 month experience should be gained within the 12 month period prior to the date of application for the CAR-66 aircraft maintenance license. The remainder of the experience should have been gained within the **7** year period prior to application. It must be noted that the rest of the basic experience required by 66.A.30 must be obtained within the 10 years prior to the application as required by 66.A.30 (f).

AMC 66.A.30 (e) Experience requirements

1. For category A the additional experience of civil aircraft maintenance should be a minimum of 6 months. For category B1, B2 or B3, the additional experience of civil aircraft maintenance should be a minimum of 12 months.

2. Aircraft maintenance experience gained outside a civil aircraft maintenance environment can include aircraft maintenance experience gained in armed forces, coast guards, police etc. or in aircraft manufacturing.

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

Validity of the CAR-66 aircraft maintenance licence is not affected by recency of maintenance experience whereas the validity of the 66.A.20 privileges is affected by maintenance experience as specified in 66.A.20 (a).

GM 66.A.45 (b) Endorsement with aircraft ratings

An aircraft type rating includes all the aircraft models/variants listed in column 2 of Appendix I to AMC to CAR-66.

When a person already holds a type rating on the licence and such type rating is amended in the Appendix I to AMC to CAR-66 in order to include additional models/variants, there is no need for additional type training for the purpose of amending the type rating in the licence. The rating should be amended to include the new variants, upon request by the applicant, without additional requirements. However, it is the responsibility of the licence holder and, if applicable, the maintenance organisation where he/she is employed to comply with 66.A.20(b)3, 145.A.35(a) and M.A.607(a), as applicable, before he/she exercises certification privileges.

Similarly, type training courses covering certain, but not all the models/variants included in a type rating, are valid for the purpose of endorsing the full type rating

AMC 66.A.45 (e) Endorsement with aircraft ratings

1. For the granting of manufacturer subgroup ratings for Group 2 aircraft, for B1 and C licence holders, the sentence "at least two aircraft types from the same manufacturer which combined are representative of the applicable manufacturer subgroup" means that the selected aircraft types should cover all the technologies relevant to the manufacturer subgroup in the following areas:

   - Flight control systems (mechanical controls/hydro mechanically powered controls/electromechanically powered controls); and

   - Avionic systems (analogue systems/digital systems); and

   - Structure (manufactured of metal/composite/wood).

   In cases where there are very different aircraft types within the same manufacturer subgroup, it may be necessary to cover more than two aircraft types to ensure adequate representation.

   For this purpose it may be possible to use aircraft types from the same manufacturer classified in Group 1 as long as the selected aircraft belong to the same licence sub category for which the rating will be endorsed.

2. For the granting of full subgroup ratings for Group 2 aircraft, for B1 and C licence holders, the sentence "at least three aircraft types from different manufacturers which combined are representative of the applicable subgroup" means that the

selected aircraft types should cover all the technologies relevant to the manufacturer subgroup in the following areas:

- Flight control systems (mechanical controls/hydro mechanically powered controls/electromechanically powered controls); and

- Avionic systems (analogue systems/digital systems); and

- Structure (manufactured of metal/composite/wood).

In cases where there are very different aircraft types within the same subgroup, it may be necessary to cover more than three aircraft types to ensure adequate representation. For this purpose it may be possible to use aircraft types from different manufacturers classified in Group 1 as long as the selected aircraft belong to the same licence subcategory for which the rating will be endorsed.

3. For manufacturer subgroup ratings, the term "manufacturer" means the TC holder defined in the certification data sheet, which is reflected in the list of type ratings in Appendix I to AMC to CAR-66.

In the case of an aircraft rating where the type rating refers to a TC holder made of a Combination of two manufacturers which produce a similar aircraft (i.e. AGUSTA/BELLELICOPTER TEXTRON or any case of aircraft similarly built by another manufacturer), this combination should be considered as one manufacturer.

As a consequence:

- When a licence holder gets a manufacturer type or a manufacturer subgroup rating made of a combination of manufacturers, it covers the combination of such manufacturers.

- When a licence holder who intends to endorse a full subgroup rating selects three aircraft from different manufacturers, this means from different combinations of manufacturers as applicable.

AMC 66.A.45 (d), (e) 3, (f) 1 and (g) 1 Endorsement with aircraft ratings

1 The "practical experience" should cover a representative cross section including at least 50 % of tasks contained in Appendix II to AMC relevant to the licence category and to the applicable aircraft type ratings or aircraft (sub) group ratings being endorsed. This experience should cover tasks from each paragraph of the Appendix II list. Other tasks than those in the Appendix II may be considered as a replacement when they are relevant. In the case of (sub)group ratings, this experience may be shown by covering one or several aircraft types of the applicable (sub)group and may include experience on aircraft classified in group 1, 2 and/or 3 as long as the experience is relevant. The practical experience should be obtained under the supervision of authorised certifying staff.

2 In the case of endorsement of individual type ratings for Group 2 and Group 3 aircraft, for the second aircraft type of each manufacturer (sub) group the practical experience should be reduced to 30 % of the tasks contained in Appendix II to AMC relevant to the licence category and to the applicable aircraft type. For subsequent aircraft types of each manufacturer (sub) group this should be reduced to 20 %.

3. Practical experience should be demonstrated by the submission of records or a logbook showing the Appendix II tasks performed by the applicant. Typical data to be recorded are similar to those described in AMC 66.A.20 (b) 2.

GM 66.A.45 Endorsement with aircraft ratings

The following table shows a summary of the aircraft rating requirements contained in 66.A.45, 66.A.50 and Appendix III to CAR-66.

The table contains the following:

- The different aircraft groups;

- For each licence (sub)category, which ratings are possible (at the choice of the applicant)

  o Individual type ratings;

  o Full and/or Manufacturer (sub)group ratings;

- For each rating option, which are the qualification options;

- For the B1.2 licence (Group 3 aircraft) and for the B3 licence (piston-engine non-pressurized aeroplanes of 2000 kg MTOM and below) which are the possible limitations to be included in the licence if not sufficient experience can be demonstrated in those areas.

Note: OJT means “On-the-Job Training” (Appendix III to CAR-66, Section 6) and is only required for the first aircraft rating in the licence (sub) category.

Aircraft rating requirements			
Aircraft Groups	**B1/B3 Licence**	**B2 licence**	**C licence**
Group 1 · Complex motor powered aircraft. · Multiple engine helicopters. · Aeroplanes certified above FL290. · Aircraft equipped with fly-by-wire. · Other aircraft when defined DGCA	**(For B1)** **Individual TYPE RATING** Type training: - Theory + examination - Practical + assessment **PLUS** OJT (for first aircraft in licence subcategory	**Individual TYPE RATING** Type training: - Theory + examination - Practical + assessment **PLUS** OJT (for first aircraft in licence category	**Individual TYPE RATING** Type training: - Theory + examination
Group 2: **Subgroups:** **2a: single turboprop aeroplanes** (*) **2b: single turbine engine helicopters** (*) **2c: single piston-engine helicopters** (*) (*) Except those classified in Group 1.	**(For B1.1, B1.3, B1.4)** **Individual TYPE RATING** (type training + OJT) **or** (type examination + practical experience) **Full SUBGROUP RATING** (type training + OJT) **or** (type examination + practical experience) on at least 3 aircraft representative of that subgroup **Manufacturer SUBGROUP RATING** (type training + OJT) **or** (type examination + practical experience) on at least 2 aircraft representative of that manufacturer subgroup	**Individual TYPE RATING** (type training + OJT) **or** (type examination + practical experience) **Full SUBGROUP RATING** based on demonstration of practical experience **Manufacturer SUBGROUP RATING** based on demonstration of practical experience	**Individual TYPE RATING** type training **or** type examination **Full SUBGROUP RATING** type training **or** type examination on at least 3 aircraft representative of that subgroup **Manufacturer SUBGROUP RATING** type training **or** type examination on at least 2 aircraft representative of that manufacturer subgroup
Group 3 **Piston-engine aeroplanes** (except those classified in Group 1.	**(For B1.2)** **Individual TYPE RATING** (type training + OJT) **or** (type examination + practical experience) **Full GROUP 3 RATING** based on demonstration of practical experience **Limitations:** · Pressurised aeroplanes · Metal aeroplanes · Composite aeroplanes · Wooden aeroplanes · Metal tubing & fabric aeroplanes	**Individual TYPE RATING** (type training + OJT) **or** (type examination + practical experience) **Full GROUP 3 RATING** based on demonstration of practical experience	**Individual TYPE RATING** type training **or** type examination **Full GROUP 3 RATING** based on demonstration of practical experience
Piston-engine nonpressurized aeroplanes of 2 000 kg MTOM and below	**(For B3)** **FULL RATING "Piston-engine non-pressurized aeroplanes of 2 000 kg MTOM and below"** based on demonstration of practical experience **Limitations:** ▪ Metal aeroplanes	**Not applicable**	**Not applicable**

	▪ Composite aeroplanes ▪ Wooden aeroplanes ▪ Metal tubing & fabric aeroplanes		

AMC 66.A.50 (b) Limitations

1. The appropriate experience required to remove the limitations referred to in 66.A.45 (f) and (g) should consist of the performance of a variety of tasks appropriate to the limitations under the supervision of authorised certifying staff. This should include the tasks required by a scheduled annual inspection. Alternatively, this experience may also be gained, if agreed by the DGCA, by theoretical and practical training provided by the manufacturer, as long as an assessment is further carried out and recorded by this manufacturer.

2. It may be acceptable to have this experience on just one aircraft type, provided that this type is representative of the (sub) group in relation to the limitation being removed.

3. The application for the limitation removal should be supported by a record of experience signed by the authorised certifying staff or by an assessment signed by the manufacturer after completion of the applicable theoretical and practical training.

GM 66.A.70 Conversion provisions

1. As described in point 66.A.70, the conversion provisions apply to the holder of a AME Licence prior to the date of entry into force of CAR-66. .

2. The conversion applies to "certifying staff qualifications" such as, for example:

- Holding a AME licence (or completed the process to obtain such a licence;)

This does not mean that in order to be entitled to a conversion process, the applicant has to be exercising certification privileges. A person may hold a "certifying staff qualification" while not having certification privileges (or while exercising very limited certification privileges below his/her qualification) for different reasons such as, for example, the following:

- The person is working as "support staff" in the base maintenance environment;

- The person has been authorised only for a very limited range of tasks (lower than what he/she would be entitled if his/her qualification is considered) since the person is working in a line station where the scope of tasks is very limited;

- The person holds a licence with a wider scope than the scope of the organisation where he/she is employed;

- The person is working outside the aviation industry or is temporarily on leave due to different reasons (medical, personal, etc.).

These persons are entitled to have the conversion performed in accordance with the full scope of their qualification and the full privileges that they would be entitled to hold on the basis of such qualification.

3. As described in point 66.A.70, certifying staff qualifications eligible for conversion are those valid "prior to the date of entry into force of CAR-66.

4. Although only those certifying staff qualifications gained as indicated above are eligible for conversion, this does not mean that the application for conversion has to be submitted prior to those dates. The applicant is entitled to have the conversion performed irrespective of when he/she applies for conversion.

5. A certifying staff qualification can be subject to more than one conversion process and can also be converted to more than one licence (with any applicable limitations). This could be the case, for example, for a person who already had the certifying staff qualification converted to a B1.2 licence with limitations linked to some missing elements of the CAR-66 Appendix I and II standard (following 66.A.70(c)). This person would be entitled to apply and have his/her certifying staff qualification converted to a B1.2 or a B3 licence on the basis of 66.A.70(d), which would mean that there is no need to compare with the CAR-66 Appendix I and II standard, introducing only those limitations required to maintain the existing privileges.

GM 66.A.70(c) Conversion provisions

For example, a limitation could be where a person holds a pre-existing certifying staff qualification which covered, to the standard of CAR-66 Appendix I and II, all the modules/subjects corresponding to the B1 licence except for electrical power systems. This person would receive a CAR-66 aircraft maintenance licence in the B1 category with a limitation (exclusion) on electrical power systems.

For removal of limitations, refer to 66.A.50(c).

GM 66.A.70 (d) Conversion provisions

In the case of aircraft not involved in commercial air transport other than large aircraft, an example of limitations could be where a person holds a pre CAR-66 qualification which covered privileges to release work performed on aircraft structures, power plant, mechanical and electrical systems but excluded privileges on aircraft equipped with

turbine engine, aircraft above 2 000 kg MTOM, pressurised aircraft and aircraft equipped with retractable landing gear. This person would receive a CAR-66 aircraft maintenance licence in the B1.2 or B3 (sub) category with the following limitations (exclusions):

- Aircraft involved in commercial air transport (this limitation always exists);
- Aircraft above 2 000 kg MTOM;
- Pressurized aircraft;
- Aircraft equipped with retractable landing gear.

Another example of limitations could be where a pilot-owner holds a pre CAR-66 qualification which covered privileges to release work performed on aircraft structures, power plant, mechanical and electrical systems but limited to his/her own aircraft and to a particular aircraft type (for example, a Cessna 172). This pilot-owner would receive a CAR-66 aircraft maintenance licence in the B1.2 or B3 (sub) category with the following limitations (exclusions):

- Aircraft involved in commercial air transport (this limitation always exists);
- Aircraft other than a Cessna 172;
- Aircraft not owned by the licence holder.

The essential aspect is that the limitations are established in order to maintain the privileges of the pre CAR-66 qualification, without comparing the previous qualification with the standard of CAR-66 Appendix I and II.

For removal of limitations, refer to 66.A.50(c).

AMC to Section 1 of Appendix III to CAR-66 "Aircraft Type Training and Examination Standard. On-the-Job Training"

Aircraft type training

1. Aircraft type training may be subdivided in airframe and/or power plant and/or avionics/electrical systems type training courses

   i. Airframe type training course means a type training course including all relevant aircraft structure and electrical and mechanical systems excluding the power plant.

   ii. Power plant type training course means a type training course on the bare engine, including the build-up to a quick engine change unit.

   iii. The interface of the engine/airframe systems should be addressed by either airframe or power plant type training course. In some cases, such as for general aviation, it may be more appropriate to cover the interface during the airframe

course due to the large variety of aircraft that can have the same engine type installed.

iv. Avionics/electrical systems type training course means type training on avionics and electrical systems covered by but not necessarily limited to ATA (Air Transport Association) Chapters 22, 23, 24, 25, 27, 31, 33, 34, 42, 44, 45, 46, 73 and 77 or equivalent.

2. Practical training may be performed either following or integrated with the theoretical elements. However, it should not be performed before theoretical training.

3. The content of the theoretical and practical training should:

i. address the different parts of the aircraft which are representative of the structure, the systems/components installed and the cabin; and

ii. include training on the use of technical manuals, maintenance procedures and the interface with the operation of the aircraft.

iii. Therefore, it should be based on the following elements:

a. Type design including relevant type design variants, new technology and techniques;

b. Feedback from in-service difficulties, occurrence reporting, etc.;

c. Significant applicable airworthiness directives and service bulletins;

d. Known human factor issues associated with the particular aircraft type;

e. Use of common and specific documentation, (when applicable, such as MMEL, AMM,MPD, TSM, SRM, WD, AFM, tool handbook), philosophy of the troubleshooting, etc.;

f. Knowledge of the maintenance on-board reporting systems and ETOPS maintenance conditions, when applicable;

g. Use of special tooling and test equipment and specific maintenance practices including critical safety items and safety precautions;

h. Significant and critical tasks/aspects from the MMEL, CDL, Fuel Tank Safety (FTS), airworthiness limitation items (ALI) including Critical Design Configuration Control Limitations (CDCCL), CMR and all ICA documentation such as MRB, MPD, SRM, AMM, etc., when applicable.

i. Maintenance actions and procedures to be followed as a consequence of specific certification requirements, such as, but not limited to, RVSM (Reduced Vertical Separation Minimum) and NVIS (Night Vision Imaging Systems);

j. Knowledge of relevant inspections and limitations as applicable to the effects of environmental factors or operational procedures such as cold and hot climates, wind, moisture, sand, de-icing/anti-icing, etc.

The type training does not necessarily need to include all possible customer options, corresponding to the type rating described in the Appendix I to AMC to CAR-66.

4. Limited avionic system training should be included in the category B1 type training as the B1 privileges include work on avionics systems requiring simple tests to prove their serviceability.

5. Electrical systems should be included in both categories of B1 and B2 type training.

6. The theoretical and practical training should be complementary and may be:

i. Integrated or split;

ii. Supported by the use of training aids, such as, trainers, virtual aircraft, aircraft components, synthetic training devices (STD), computer-based training devices (CBT), etc.

AMC to Paragraph 3.1(d) of Appendix III to CAR-66 "Aircraft Type Training and Examination Standard. On-the-Job Training"

<u>Training Needs Analysis for the theoretical element of the aircraft type training</u>

1. The minimum duration for the theoretical element of the type rating training course, as described in Appendix III to CAR-66, has been determined based on:

i. generic categories of aircraft and minimum standard equipment fit;
ii. the estimated average duration of standard courses imparted.

2. The purpose of the Training Needs Analysis (TNA) is to adapt and justify the duration of the course for a specific aircraft type. This means that the TNA is the main driver for determining the duration of the course, regardless of whether it is above or below the minimum duration described in Appendix III to CAR-66.

   In the particular case of type training courses approved on the basis of the requirements valid before this CAR is applicable and having a duration for the theoretical element equal to or above the minimum duration contained in paragraph 3.1(c) of Appendix III to CAR-66, it is acceptable that the TNA only covers the differences introduced by this CAR in paragraph 3.1(e) "Content" and the criteria introduced in paragraph 3.1(d) "Justification of course duration" related to the

minimum attendance and the maximum number of training hours per day. This TNA may result in a change in the duration of the theoretical element.

3. The content and the duration deriving from the TNA may be supported by an analysis from the Type Certificate holder.

4. In order to approve a reduction of such minimum duration, the evaluation done by the DGCA should be performed on a case-by-case basis appropriate to the aircraft type. For example, while it would be exceptional for a theoretical course for a large transport category aircraft such as an A330 or B757 to be below the minimum duration shown, it would not necessarily be exceptional in the case of a General Aviation (GA) business aircraft such as a Learjet 45 or similar. Typically, the TNA for a GA aircraft course would demonstrate that a course of a shorter duration satisfies the requirements.

5. When developing the TNA, the following should be considered:

a) The TNA should include an analysis identifying all the areas and elements where there is a need for training as well as the associated learning objectives, considering the design philosophy of the aircraft type, the operational environment, the type of operations and the operational experience. This analysis should be written in a manner which provides a reasonable understanding of which areas and elements constitute the course to meet the learning objectives.

b) As a minimum, the Training Need Analysis (TNA) should take into account all the applicable elements contained in paragraph 3.1 of CAR-66 Appendix III and associated AMCs.

c) The TNA should set up the course content considering the Appendix III objectives for each level of training and the prescribed topics in the theoretical element table contained in paragraph 3.1 of CAR-66 Appendix III.

d) For each Chapter described in the theoretical element table contained in paragraph 3.1 of CAR-66 Appendix III, the corresponding training time should be recorded

e) Typical documents to be used to identify the areas and elements where there is a need for training typically include, among others, the Aircraft Maintenance Manual, MRB report, CMRs, airworthiness limitations, Troubleshooting Manual, Structural Repair Manual, Illustrated Parts Catalogue, Airworthiness Directives and Service Bulletins.

f) During the analysis of these documents:

i) Consideration should be given to the following typical activities:

1. Activation/reactivation;
2. Removal/installation;
3. Testing;
4. Servicing;
5. Inspection, check and repairs;
6. Troubleshooting/diagnosis.

ii) For the purpose of identifying the specific elements constituting the training course, it is acceptable to use a filtering method based on criteria such as:

1. Frequency of the task;
2. Human factor issues associated to the task;
3. Difficulty of the task;
4. Criticality and safety impact of the task;
5. In-service experience;
6. Novel or unusual design features (not covered by CAR-66 Appendix I);
7. Similarities with other aircraft types;
8. Special tests and tools/equipment.

iii) It is acceptable to follow an approach based on:

1. Tasks or groups of tasks; or
2. Systems or subsystems or components.

g) The TNA should:

i. Identify the learning objectives for each task, group of tasks, system, subsystem or component;

ii. Associate the identified tasks to be trained to the regulatory requirements (table in paragraph 3.1 of Appendix III to CAR-66);

iii. Organise the training into modules in a logical sequence (adequate combination of chapters as defined in Appendix III of CAR-66);

iv. Determine the sequence of learning (within a lesson and for the whole syllabus);

v. Identify the scope of information and level of detail with regard to the minimum standard to which the topics of the TNA should be taught according to the set-up objectives.

vi. Address the following:

1. Description of each system/component including the structure (where applicable);
2. System/component operation taking into account:

   a. Complexity of the system (e.g. the need of further breakdown into sub systems, etc.);

   b. Design specifics which may require more detailed presentation or may contribute to maintenance errors;

   c. Normal and emergency functioning;

   d. Troubleshooting;

e. Interpretation of indicators and malfunctions.

f. Use of maintenance publications;

g. Identification of special tools and equipment required for servicing and maintaining the aircraft;

h. Maintenance Practices;

i. Routine inspections, functional or operational tests, rigging/adjustment, etc.

vii. Describe the following:

1. The instructional methods and equipment, teaching methods and blending of the teaching methods to ensure the effectiveness of the training;
2. The maintenance training documentation/material to be delivered to the student; Facilitated discussions, questioning session, additional practice-oriented training, etc.;
3. The homework, if developed;
4. The training provider's resources available to the learner.

h) It is acceptable to differentiate between issues which have to be led by an instructor and issues which may be delivered through interactive simulation training devices and/or covered by web-based elements. Overall time of the course will be allocated accordingly.

i) The maximum number of training hours per day for the theoretical element of type training should not be more than 6 hours. A training hour means 60 minutes of tuition excluding any breaks, examination, revision, preparation and aircraft visit. In exceptional cases, the DGCA may allow deviation from this standard when it is properly justified that the proposed number of hours follows pedagogical and human factors principles. These principles are especially important in those cases where:

i. Theoretical and practical training are performed at the same time;
ii. Training and normal maintenance duty/apprenticeship are performed at the same time.

j) The minimum participation time for the trainee to meet the objectives of the course should not be less than 90 % of the tuition hours of the theoretical training course. Additional training may be provided by the training organisation in order to meet the minimum participation time. If the minimum participation defined for the course is not met, a certificate of recognition should not be issued.

k) The TNA is a living process and should be reviewed/updated based on operation feedback, maintenance occurrences, Airworthiness Directives, major service bulletins impacting maintenance activities or requiring new competencies for mechanics, alert service bulletins, feedback from trainees or customer satisfaction, evolution of the maintenance documentation such as MRBs, MPDs, MMs, etc. The

frequency at which the TNA should be reviewed/updated is left to the discretion of the organisation conducting the course.

NOTE: The examination is not part of the TNA. However, it should be prepared in accordance with the learning objectives described in the TNA.

AMC to Paragraphs 1(b), 3.2 and 4.2 of Appendix III to CAR-66 "Aircraft Type Training and Examination Standard. On-the-Job Training"

Practical element of the aircraft type training

1. The practical training may include instruction in a classroom or in simulators but part of the practical training should be conducted in a real maintenance or manufacturer environment.

2. The tasks should be selected because of their frequency, complexity, variety, safety, criticality, novelty, etc. The selected tasks should cover all the chapters described in the table contained in paragraph 3.2 of Appendix III to CAR-66.

3. The duration of the practical training should ensure that the content of training required by paragraph 3.2 of Appendix III to CAR-66 is completed. Nevertheless, for aeroplanes with a MTOM equal or above 30 000 kg, the duration for the practical element of a type rating training course should not be less than two weeks, unless a shorter duration meeting the objectives of the training and taking into account pedagogical aspects (maximum duration per day) is justified to the DGCA.

4. The organisation providing the practical element of the type training should provide trainees with a schedule or plan indicating the list of tasks to be performed under instruction or supervision. A record of the tasks completed should be entered into a logbook which should be designed such that each task or group of tasks may be countersigned by the designated assessor. The logbook format and its use should be clearly defined.

5. In paragraph 4.2 of Appendix III to CAR-66, the term "designated assessors appropriately qualified" means that the assessors should demonstrate training and experience on the assessment process being undertaken and be authorised to do so by the organisation.

Further guidance about the assessment and the designated assessors is provided in Appendix III to AMC to CAR-66.

6. The practical element (for power plant and avionic systems) of the Type Rating Training may be subcontracted by the approved CAR-147 organisation under its quality system according to the provisions of 147.A.145 (d) 3 and the corresponding Guidance Material.

AMC to Paragraph 1(c) of Appendix III to CAR-66 "Aircraft Type Training and Examination Standard. On-the-Job Training"

Differences training

Approved difference training is not required for different variants within the same aircraft type rating (as specified in Appendix I to AMC to CAR-66) for the purpose of type rating endorsement on the aircraft maintenance licence.

However, this does not necessarily mean that no training is required before a certifying staff authorization can be issued by the maintenance organisation (refer to AMC 66.A.20 (b) 3).

AMC to Section 5 of Appendix III to CAR-66 "Aircraft Type Training and Examination Standard. On-the-Job Training"

Type Examination Standard

This Section 5 "Type Examination Standard" does not apply to the examination performed as part of type training. This Section only applies to those cases where type examination is performed as a substitute for type training.

AMC to Section 6 of Appendix III to CAR-66 "Aircraft Type Training and Examination Standard. On-the-Job Training"

On-the-Job Training (OJT)

1. "A maintenance organisation appropriately approved for the maintenance of the particular aircraft type" means a CAR-145 or M.A. Subpart F approved maintenance organisation holding an A rating for such aircraft.

2. The OJT should include one-to-one supervision and should involve actual work task performance on aircraft/components, covering line and/or base maintenance tasks.

3. The use of simulators for OJT should not be allowed.

4. The OJT should cover at least 50 % of the tasks contained in Appendix II to AMC to CAR-66. Some tasks should be selected from each paragraph of the Appendix II list. Tasks should be selected among those applicable to the type of aircraft and licence (sub) category applied for. Other tasks than those in the Appendix II may be considered as a replacement when they are relevant. Typically, in addition to the variety and the complexity, the OJT tasks should be selected because of their frequency, safety, novelty, etc.

5. Up to 50 % of the required OJT may be undertaken before the aircraft theoretical type training starts.

6. The organisation providing the on-the-job training should provide trainees a schedule or plan indicating the list of tasks to be performed under supervision. A record of the tasks completed should be entered into a logbook which should be designed such that each task or group of tasks is countersigned by the corresponding supervisor. The logbook format and its use should be clearly defined.

7. Regarding the day-to-day supervision of the OJT programme in the approved maintenance organisation and the role of the supervisor(s), the following should be considered:

i. It is sufficient that the completion of individual OJT tasks is confirmed by the direct supervisor(s), without being necessary the direct evaluation of the assessor.

ii. During the day-to-day OJT performance, the supervision aims at overseeing the complete process, including task completion, use of manuals and procedures, observance of safety measures, warnings and recommendations and adequate behavior in the maintenance environment.

iii. The supervisor(s) should personally observe the work being performed to ensure the safe completeness and should be readily available for consultation, if needed during the OJT performance.

iv. The supervisor(s) should countersign the tasks and release the maintenance tasks as the trainee is still not qualified to do so.

v. The supervisor(s) should therefore:

a) have certifying staff or support staff privileges relevant to the OJT tasks;

b) be competent for the selected tasks;

c) be safety-orientated;

d) be capable to coach (setting objectives, giving training, performing supervision, evaluating, handling trainee's reactions and cultural issues, managing objectively and positively debriefing sessions, determining the need for extra training or reorientate the training, reporting, etc.);

e) be designated by the approved maintenance organisation to carry out the supervision.

8. Regarding the assessor, the following should be considered:

a) The function of the assessor, as described in Section 6 of Appendix III to CAR-66, is to conduct the final assessment of the completed OJT. This assessment should include confirmation of the completion of the required diversity and quantity of OJT and should be based on the supervisor(s) reports and feedback.

b) In Section 6 of Appendix III to CAR-66, the term "designated assessor appropriately qualified" means that the assessor should demonstrate training and experience on the assessment process being undertaken and should be authorised to do so by the organisation.

Further guidance about the assessment and the designated assessors is provided in Appendix III to AMC to CAR-66.

9 The procedures for OJT should be included into the Exposition Manual of the ap proved maintenance organisation (Chapter 3.15, as indicated in AMC 145.A.70 (a)).

These procedures in the Exposition Manual are approved by the DGCA, and providing training is not one of the privileges of a maintenance organisation, they can only be used when the licencing authority is the DGCA. In other cases, it is up to the licencing authority to decide whether it accepts such procedures for the purpose of approving the OJT (refer to AMC 66.B.115).

AMC to Appendix III to CAR-66 "Aircraft Type Training and Examination Standard. On-the-Job Training"

Aircraft type training and On-the-Job Training

The theoretical and practical training providers, as well as the OJT provider, may contract the services of a language translator in the case where training is imparted to students not conversant in the language of the training material. Nevertheless, it remains essential that the students understand all the relevant maintenance documentation. During the performance of examinations and assessments, the assistance of the translator should be limited to the translation of the questions, but should not provide clarifications or help in relation to those questions.

SUBPART C

AMC 66.A.205 (c) Requirements

Must have passed relevant modules of CAR 66 approved by the DGCA means modules appropriate for the knowledge required for the maintenance of class of components for which certification authorization is required.

AMC 66.A.205 (g) Requirements.

For the grant of certification authorization the competency of the candidate shall be assessed by the organization, following procedures documented in the organization exposition. Guidelines for competency check is detailed in AMC and GM of CAR 145-30(e).

APPENDICES to AMC for CAR-66

Appendix I

AIRCRAFT TYPE RATINGS

FOR CAR-66 AIRCRAFT MAINTENANCE ENGINEER'S LICENCE

(Published Separately on DGCA Website)

Appendix-II to AMC to CAR-66

Aircraft type practical experience and On-the-Job Training

list of tasks

I **Time limits/Maintenance checks (ATA 05)**
- a. 100 hour check (general aviation aircraft).
- b. B or C Check (transport category aircraft)
- c. Assist carrying out a scheduled maintenance check i.a.w. AMM
- d. Review aircraft maintenance log for correct completion
- e. Review records for compliance with airworthiness directives.
- f. Review records for compliance with component life limits.
- g. Procedure for Inspection following heavy landing.
- h. Procedure for Inspection following lightning strike.

II **Dimensions/Areas(ATA 06)**
- a. Locate component(s) by station number.
- b. Perform symmetry check.

III **Lifting and Shoring(ATA 07)**

Assist in :
- a. Jack aircraft nose or tail wheel.
- b. Jack complete aircraft.
- c. Sling or trestle major component.

IV **Leveling /Weighing(ATA 08)**
- a. Level aircraft.
- b. Weigh aircraft.
- c. Prepare weight and balance amendment.
- d. Check aircraft against equipment list.

V **Towing and Taxiing(ATA 09)**
- a. Prepare for aircraft towing
- b. Tow aircraft
- c. Be part of aircraft towing team.

VI **Parking and mooring(ATA 10)**
- a. Tie down aircraft.
- b. Park, secure and cover aircraft.
- c. Position aircraft in dock.
- d. Secure rotor blades.

VII **Placards and Marking (ATA11)**
- a. Check aircraft for correct placards.
- b. Check aircraft for correct markings.

VII **Servicing (ATA 12)**
- a. Refuel aircraft.
- b. Defuel aircraft
- c. Carry out tank to tank fuel transfer
- d. Check / adjust tire pressures.
- e. Check / replenish oil level.
- f. Check/ replenish hydraulic fluid level.
- g. Check/ replenish accumulator pressure.
- h. Charge pneumatic system.
- i. Grease aircraft.
- j. Connect ground power.
- k. Service toilet/water system
- l. Perform pre-flight/daily check

IX **Vibration and Noise Analysis (ATA 18)**
- a. Analyze helicopter vibration problem.
- b. Analyze noise spectrum.
- c. Analyse engine vibration.

X **Air Conditioning (ATA 21)**
- a. Replace combustion heater.
- b. Replace flow control valve.
- c. Replace outflow valve.
- d. Replace safety valve.
- e. Replace vapour cycle unit.
- f. Replace air cycle unit.
- g. Replace cabin blower.
- h. Replace heat exchanger.
- i. Replace pressurization controller.
- j. Clean outflow valves.
- k. Deactivate/reactivate cargo isolation valve.
- l. Deactivate/reactivate avionics ventilation components
- m. Check operation of air conditioning/heating system
- n. Check operation of pressurization system
- o. Troubleshoot faulty system

XI **Auto flight (ATA 22)**
- a. Install servos.
- b. Rig bridle cables
- c. Replace controller.

d. Replace amplifier.

e. Replacement of the auto flight system LRUs in case of fly- by -wire aircraft
f. Check operation of auto-pilot.
g. Check operation of auto-throttle / auto thrust.
h. Check operation of yaw damper.
i. Check and adjust servo clutch.
j. Perform autopilot gain adjustments.
k. Perform mach trim functional check.
l. Troubleshoot faulty system.
m. Check auto land system
n. Check flight management systems
o. Check stability augmentation system

XII **Communications (ATA 23)**

a. Replace VHF com unit.
b. Replace HF com unit.
c. Replace existing antenna.
d. Replace static discharge wicks.
e. Check operation of radios.
f. Perform antenna VSWR check.
g. Perform Selcal operational check.
h. Perform operational check of passenger address system.
i. Functionally check audio integrating system.
j. Repair co-axial cable.
k. Troubleshoot faulty system

XIII **Electrical Power (ATA 24)**

a. Charge lead/acid battery.
b. Charge Ni-Cd battery.
c. Check battery capacity.
d. Deep-cycle Ni-Cd battery.
e. Replace Integrated drive/generator/alternator.
f. Replace switches.
g. Replace circuit breakers.
h. Adjust voltage regulator.
i. Amend electrical load analysis report.
j. Repair/replace electrical feeder cable.
k. Perform functional check of IDG / Generator / Alternator
l. Perform functional check of voltage regulator.
m. Perform functional check of emergency generation system.
n. Troubleshoot faulty system

XIV **Equipment/Furnishings (ATA 25)**

a. Replace carpets
b. Replace crew seats.
c. Replace passenger seats.
d. Check inertia reels.
e. Check seats/belts for security.
f. Check emergency equipment.
g. Check ELT for compliance with regulations.
h. Repair toilet waste container.
i. Repair upholstery.
j. Change cabin configuration.
k. Replace escape slides/ropes
l. Replace cargo loading system actuator.
m. Test cargo loading system.

XV **Fire protection (ATA 26)**

a. Check fire bottle contents.
b. Check / test operation of fire / smoke detection and warning system.
c. Check cabin fire extinguisher contents.
d. Check lavatory smoke detector system.
e. Check cargo panel sealing.
f. Install new fire bottle.
g. Replace fire bottle squib.
h. Troubleshoot faulty system.
i. Inspect engine fire wire detection systems.

XVI **Flight Controls (ATA 27)**

a. Inspect primary flight controls and related components i.a.w. AMM.
b. Extending/retracting flaps & slats.
c. Replace horizontal stabilizer.
d. Replace spoiler/lift damper.
e. Replace elevator.
f. Deactivation/reactivation of aileron servo control.
g. Replace aileron.
h. Replace rudder.
i. Replace trim tabs.
j. Install control cable and fittings.
k. Replace slats.
l. Replace flaps.
m. Replace powered flying control unit.
n. Replace flap actuator
o. Adjust trim tab.
p. Adjust control cable tension.
q. Check control range and direction of movement.
r. Check for correct assembly and locking.
s. Troubleshoot faulty system.

t. Functional test of primary flight controls.
u. Functional test of flap system.
v. Operational test of the side stick assembly.
w. Operational test of the THS.
x. THS system wear check.

XVII **Fuel (ATA 28)**

a. Water drain system (operation).
b. Replace booster pump.
c. Replace fuel selector.
d. Replace fuel tank cells.
e. Replace/test fuel control valves.
f. Replace magnetic fuel level indicators.
g. Replace water drain valve.
h. Check filters.
i. Flow check system.
j. Check calibration of fuel quantity gauges.
k. Check operation feed/selectors
l. Check operation of fuel dump/jettison system.
m. Fuel transfer between tanks.
n. Pressure defuel. Pressure refuel (manual control).
o. Troubleshoot faulty system.

XVIII **Hydraulics (ATA 29)**

a. Replace engine driven pump.
b. Check/replace case drain filter.
c. Replace hydraulic motor pump/generator.
d. Replace standby pump.
e. Replace accumulator.
f. Check operation of shut off valve.
g. Check filters / Clog indicators.
h. Check indicating systems.
i. Perform functional checks.
j. Pressurisation/depressurisation of the hydraulic system.
k. Power Transfer Unit (PTU) operation
l. Replacement of PTU.
m. Troubleshoot faulty system.

XIX **Ice and rain protection (ATA 30)**

a. Replace pump.
b. Replace timer.
c. Inspect repair propeller deice boot.
d. Test propeller de-icing system.
e. Inspect/test wing leading edge de-icer boot.
f. Replace anti-ice/deice valve.
g. Install wiper motor.
h. Check operation of systems.
i. Operational test of the pitot-probe ice protection.
j. Operational test of the TAT ice protection.
k. Operational test of the wing ice protection system.
l. Assistance to the operational test of the engine air-intake ice protection (with engines operating)
m. Troubleshoot faulty system.

XX **Indicating/recording systems (ATA 31)**

a. Replace flight data recorder.
b. Replace cockpit voice recorder.
c. Replace clock.
d. Replace master caution unit.
e. Replace FDR.
f. Perform FDR data retrieval.
g. Troubleshoot faulty system.
h. Implement ESDS procedures
i. Inspect for HIRF requirements
j. Start/stop EIS procedure.
k. Bite test of the CFDIU.
l. Ground scanning of the central warning system.

XXI **Landing Gear (ATA 32)**

a. Build up wheel.
b. Replace main wheel.
c. Replace nose wheel.
d. Replace steering actuator.
e. Replace truck tilt actuator.
f. Replace gear retraction actuator.
g. Replace uplock/downlock assembly.
h. Replace shimmy damper.
i. Rig nose wheel steering.
j. Replace shock strut seals.
k. Servicing of shock strut.
l. Replace brake unit.
m. Replace brake control valve.
n. Bleed brakes.
o. Replace brake fan.
p. Test anti-skid unit.
q. Test gear retraction.
r. Change bungees.
s. Adjust micro switches/sensors.
t. Charge struts with oil and air.
u. Troubleshoot faulty system.
v. Test auto-brake system.
w. Replace rotorcraft skids.
x. Replace rotorcraft skid shoes.
y. Pack and check floats.
z. Flotation equipment.

aa. Check/test emergency blowdown (emergency landing gear extension).
bb. Operational test of the landing gear doors.

XXII **Lights (ATA 33)**

a. Repair/replace rotating beacon.
b. Repair/replace landing lights.
c. Repair/replace navigation lights.
d. Repair/replace interior lights.
e. Replace ice inspection lights.
f. Repair/replace logo lights.
g. Repair/replace emergency lighting system.
h. Perform emergency lighting system checks.
i. Troubleshoot faulty system

XXIII **Navigation (ATA 34)**

a. Calibrate magnetic direction indicator.
b. Replace airspeed indicator.
c. Replace altimeter.
d. Replace air data computer.
e. Replace VOR unit.
f. Replace ADI.
g. Replace HSI.
h. Check pitot static system for leaks.
i. Check operation of directional gyro.
j. Functional check weather radar.
k. Functional check Doppler.
l. Functional check TCAS.
m. Functional check DME.
n. Functional check ATC Transponder.
o. Functional check flight director system.
p. Functional check inertial nav system.
q. Complete quadrantal error correction of ADF system.
r. Update flight management system database.
s. Check calibration of pitot static instruments.
t. Check calibration of pressure altitude reporting system.
u. Troubleshoot faulty system.
v. Check marker systems.
w. Compass replacement direct/indirect.
x. Check Satcom.
y. Check GPS.
z. Test AVM.

XXIV **Oxygen (ATA 35)**

a. Inspect on board oxygen equipment.
b. Purge and recharge oxygen system.
c. Replace regulator.
d. Replace oxygen generator.
e. Test crew oxygen system.
f. Perform auto oxygen system deployment check.
g. Troubleshoot faulty system.

XXV **Pneumatic systems (ATA 36)**

a. Replace filter.
b. Replace air shut off valve.
c. Replace pressure regulating valve.
d. Replace compressor.
e. Recharge dessicators.
f. Adjust regulator.
g. Check for leaks.
h. Troubleshoot faulty system.

XXVI **Vacuum systems (ATA 37)**

a. Inspect the vacuum system i.a.w. AMM.
b. Replace vacuum pump.
c. Check/replace filters.
d. Adjust regulator.
e. Troubleshoot faulty system.

XXVII **Water/Waste (ATA 38)**

a. Replace water pump.
b. Replace tap.
c. Replace toilet pump.
d. Perform water heater functional check.
e. Troubleshoot faulty system.
f. Inspect waste bin flap closure.

XXVIII **Central Maintenance System (ATA45)**

a. Retrieve data from CMU.
b. Replace CMU.
c. Perform Bite check.
d. Troubleshoot faulty system.

XXIX **Airborne Auxiliary power (ATA 49)**

a. Removal /Installation of APU.
b. Removal/installation of the inlet guide-vane actuator.
c. Operational test of the APU emergency shut-down test.
d. Operational test of APU.

XXX **Structures (ATA 51)**

a. Assessment of damage.

b. Sheet metal repair.
c. Fibre glass repair.
d. Wooden repair.

XXXI **Fabric repair (ATA 51)**

a. Recover fabric control surface.
b. Treat corrosion.
c. Apply protective treatment.

XXXI **Doors (ATA 52)**

a. Inspect passenger door i.a.w. AMM.
b. Rig/adjust locking mechanism.
c. Adjust air stair system.
d. Check operation of emergency exits.
e. Test door warning system.
f. Troubleshoot faulty system.
g. Remove and install passenger door i.a.w. AMM.
h. Remove and install emergency exit i.a.w. AMM.
i. Inspect cargo door i.a.w. AMM.

XXXII **Windows (ATA 56)**

a. Replace windshield.
b. Replace direct vision window.
c. Replace cabin window
d. Repair transparency.

XXXIII **Wings (ATA 57)**

e. Skin repair.
f. Recover fabric wing.
g. Replace tip.
h. Replace rib.
i. Replace integral fuel tank panel.
j. Check incidence/rig.

XXXIV **Propeller (ATA 61)**

a. Assemble prop after transportation.
b. Replace propeller.
c. Replace governor.
d. Adjust governor.
e. Perform static functional checks.
f. Check operation during ground run.
g. Check track.
h. Check setting of micro switches.
i. Dress out blade damage.
j. Dynamically balance prop.
k. Troubleshoot faulty system.

XXXV **Main Rotors (ATA 62)**

a. Replace blades.
b. Replace damper assembly.
c. Check track.
d. Check static balance.
e. Check dynamic balance.
f. Troubleshoot.

XXXVI **Rotor Drive (ATA 63)**

a. Replace mast.
b. Replace drive coupling.
c. Replace clutch/freewheel unit
d. Replace drive belt.
e. Install main gearbox.
f. Overhaul main gearbox.
g. Check gearbox chip detectors.

XXXVII **Tail Rotors (ATA 64)**

a. Install rotor assembly.
b. Replace blades.
c. Troubleshoot.

XXXVIII **Tail Rotor Drive (ATA 65)**

a. Replace bevel gearbox.
b. Replace universal joints.
c. Overhaul bevel gearbox.
d. Install drive assembly.
e. Check chip detectors.
f. Check/install bearings and hangers.
g. Check/service/assemble flexible couplings.
h. Check alignment of drive shafts.
i. Install and rig drive shafts.

XXXIX **Rotorcraft flight controls (ATA 67)**

a. Install swash plate.
b. Install mixing box.
c. Adjust pitch links.
d. Rig collective system.
e. Rig cyclic system.
f. Rig anti-torque system.
g. Check controls for assembly and locking.
h. Check controls for operation and sense.
i. Troubleshoot faulty system.

XL **Power Plant (ATA 71)**

a. Build up ECU.
b. Replace engine.
c. Repair cooling baffles.
d. Repair cowling.
e. Adjust cowl flaps.
f. Repair faulty wiring.
g. Troubleshoot.
h. Assist in dry motoring check.
i. Assist in wet motoring check.
j. Assist in engine start (manual mode).

XLI **Piston Engines(ATA 72)**

a. Remove/install reduction gear.
b. Check crankshaft run-out.
c. Check tappet clearance.

d. Check compression.
e. Extract broken stud.
f. Install helicoil.
g. Perform ground run.
h. Establish/check reference RPM.
i. Troubleshoot.

XLII **Turbine Engines (ATA 72)**

a. Replace module.
b. Replace fan blade.
c. Hot section inspection/borescope check.
d. Carry out engine/compressor wash.
e. Carry out engine dry cycle.
f. Engine ground run.
g. Establish reference power.
h. Trend monitoring/gas path analysis.
i. Troubleshoot.

XLIII **Fuel and control, piston (ATA 73)**

a. Replace engine driven pump.
b. Adjust AMC.
c. Adjust ABC.
d. Install carburetor/injector.
e. Adjust carburetor/injector.
f. Clean injector nozzles.
g. Replace primer line.
h. Check carburetor float setting.

XLIV **Fuel and control, turbine (ATA 73)**

a. Replace FCU.
b. Replace engine electronic control unit (FADEC).
c. Replace fuel metering unit (FADEC).
d. Replace engine driven pump.
e. Clean/test fuel nozzles.
f. Clean/replace filters.
g. Adjust FCU.
h. Troubleshoot faulty system.
i. Functional test of FADEC.

XLV **Ignition systems, piston (ATA 74)**

a. Change magneto.
b. Change ignition vibrator.
c. Change plugs.
d. Test plugs.
e. Check H.T. leads.
f. Install new leads.
g. Check timing.
h. Check system bonding.
i. Troubleshoot faulty system.

XLVI **Ignition systems, turbine (ATA 74)**

a. Perform functional test of the ignition system.
b. Check glow plugs/ ignitors.
c. Check H.T. leads.
d. Check ignition unit.
e. Replace ignition unit.
f. Troubleshoot faulty system.

XLVII **Engine Controls(ATA 76)**

a. Rig thrust lever.
b. Rig RPM control.
c. Rig mixture HP cock lever.
d. Rig power lever.
e. Check control sync (multi-eng).
f. Check controls for correct assembly and locking.
g. Check controls for range and direction of movement.
h. Adjust pedestal micro-switches.
i. Troubleshoot faulty system.

XLVIII **Engine Indicating (ATA 77)**

a. Replace engine instruments(s).
b. Replace oil temperature bulb.
c. Replace thermocouples.
d. Check calibration.
e. Troubleshoot faulty system.

XLIX **Exhaust, piston (ATA 78)**

a. Replace exhaust gasket.
b. Inspect welded repair.
c. Pressure check cabin heater muff.
d. Troubleshoot faulty system.

L **Exhaust, turbine (ATA 78)**

a. Change jet pipe.
b. Change shroud assembly.
c. Install trimmers.
d. Inspect/replace thrust reverser.
e. Replace thrust reverser component.
f. Deactivate/reactivate thrust reverser.
g. Operational test of the thrust reverser system.

LI **Oil (ATA 79)**

a. Change oil.
b. Check filter(s).
c. Adjust pressure relief valve.
d. Replace oil tank.
e. Replace oil pump.

f. Replace oil cooler.
g. Replace firewall shut off valve.
h. Perform oil dilution.
i. Troubleshoot faulty system.

LII **Starting (ATA 80)**

a. Replace starter.
b. Replace start relay.
c. Replace start control valve.
d. Check cranking speed.
e. Troubleshoot faulty system.

LIII **Turbines, piston engines (70)**

a. Replace PRT.
b. Replace turbo-blower.
c. Replace heat shields.
d. Replace waste gate.
e. Adjust density controller.

LIV **Engine water injection (ATA 82)**

a. Replace water/methanol pump.
b. Flow check water/methanol system.
c. Adjust water/methanol control unit.
d. Check fluid for quality.
e. Troubleshoot faulty system

LV **Accessory gear boxes (ATA 83)**

a. Replace gearbox.
b. Replace drive shaft.
c. Check Chip detector

APPENDIX III to AMC of CAR-66

Evaluation of the competence: assessment and assessors

This Appendix applies to the competence assessment performed by the designated assessors (and their qualifications).

1) What does "competence" mean and areas of focus for assessment

The assessment should aim at measuring the competence by evaluating three major factors associated to the learning objectives:

- Knowledge;
- Skills;
- Attitude.

Generally, knowledge is evaluated by examination. The purpose of this document is not to describe the examination process: this material mainly addresses the evaluation of "skills" and "attitude" after training containing practical elements. Nevertheless, the trainee needs to demonstrate sufficient knowledge to perform the required tasks.

"Attitude" is indivisible from the "skill" as this greatly contributes to the safe performance of the tasks.

The evaluation of the competence should be based on the learning objectives of the training, in particular:

- the (observable) desired performance. This covers what the trainee is expected to be able to do and how the trainee is expected to behave at the end of the training;

- the (measurable) performance standard that must be attained to confirm the trainee's level of competence in the form of tolerances, constraints, limits, performance rates or qualitative statements; and

- the conditions under which the trainee will demonstrate competence. Conditions consist of the training methods, the environmental, situational and regulatory factors.

The assessment should focus on the competencies relevant to the aircraft type and its maintenance including, but not limited to:

- Environmental awareness (act safely, apply safety precautions and prevent dangerous situations);

- Systems integration (demonstrate understanding of aircraft systems interaction, identify, describe, explain, plan, execute);

- Knowledge and understanding of areas requiring special emphasis or novelty (areas peculiar to the aircraft type, domains not covered by CAR 66 Appendix I, practical training elements that cannot be imparted through simulation devices, etc.);

- Using reports and indications (the ability to read and interpret);

- Aircraft documentation finding and handling (identify the appropriate aircraft documentation, navigate, execute and obey the prescribed maintenance procedures);

- Perform maintenance actions (demonstrate safe handling of aircraft, engines, components and tools);

- Aircraft final/close-up and report (apply close up, initiate appropriate actions /follow-up/ records of testing, establish and sign maintenance reords /logbooks).

2) How to assess

As far as feasible, the objectives of the assessment should be associated with the learning objectives and the passing level; it means that observable criteria should be set to measure the performance and should remain as objective as possible.

The general characteristics of effective assessment are: objective, flexible, acceptable, comprehensive, constructive, organized and thoughtful. At the conclusion, the trainee should have no doubt about what he/she did well, what he/she did poorly and how he/she can improve.

The following is a non-exhaustive list of questions that may be posed to assist the assessment:

- What are the success factors for the job?
- What are typical characteristics of a correct behavior for the task?
- What criteria should be observed?
- What level of expertise is expected?
- Is there any standard available?
- What is the pass mark? For example:
  - o "Go-no go" situation;
  - o How to allocate points? Minimum amount to succeed;
  - o "Must know or execute" versus "Good to know or execute" versus "Don't expect the candidate to be an expert".
- Minimum or maximum time to achieve? Use time effectively and efficiently.
- What if the trainee fails? How many times is the trainee allowed to fail?
- When and how should the trainee be prepared for the assessment?
- What proportion of judgment by the instructor out of collaboration with the trainee is needed during the evaluation stage?

The assessment may be:

- diagnostic (prior to a course), formative (reorientate the course on areas where there is a need to reinforce) or summative (partial or final evaluation);

- performed task-by-task, as a group of tasks or as a final assessment.

One method might be an initial assessment to be performed by the trainee himself /herself, then discussing areas where the perceptions of the trainee's performance by the assessors differ in order to:

- develop the self-assessment habits;
- make the assessment more acceptable and understandable to both parties.

A "box-ticking" exercise would be pointless. Experience has shown that assessment sheets have largely evolved over time into assessment of groups of "skills" because in practice such things eventually detracted from the training and assessment that it was intended to serve: evaluate at a point of time, encourage and orientate the training needs, improve safety and ultimately qualify people for their duties.

In addition, many other aspects should be appropriately considered during the assessment process such as stress and environmental conditions, difficulty of the test, history of evaluation (such as tangible progresses or sudden and unexpected poor performance made by the trainee), amount of time necessary to build competence, etc.

All these reasons place more emphasis on the assessor and highlight the function of the organisation's approval.

3) Who should assess

In order to qualify, the assessor should:

- Be proficient and have sufficient experience or knowledge in:
    - human performance and safety culture;
    - the aircraft type (necessary to have the certifying staff privileges in case of CRS issuances);
    - training/coaching/testing skills;
    - instructional tools to use;

- Understand the objective and the content of the practical elements of the training that is being assessed;

- Have interpersonal skills to manage the assessment process (professionalism, sincerity objectivity and neutrality, analysis skills, sense of judgment, flexibility, capability of evaluating the supervisor's or instructor's reports, handling of trainee's reactions to failing assessment with the cultural environment, being constructive, etc.);

- Be ultimately designated by the organisation to carry out the assessment.

The roles may be combined for:

- the assessor and the instructor for the practical elements of the Type Rating Training; or
- the assessor and the supervisor for the On-the-Job Training

Provided that the objectives associated with each role are clearly understood and that the competence and qualification criteria according to the company's procedures are met for both functions. Whenever possible (depending on the size of the organisation), it is recommended to split the roles (two different persons) in order to avoid any conflicts of interests.

When the functions are not combined, the role of each function should be clearly understood

Appendix IV to AMC of CAR- 66. A. 45(d)

Fuel Tank Safety training

This appendix includes general instructions for providing training on Fuel Tank Safety issues.

1. Level of training required by this Annex is only level 2.

   Level 2 Detailed training

Objectives: The attendant should, after the completion of the training:

1. know the history and the theoretical and practical elements of the subject, have an overview of Special Federal Aviation Regulations (SFARs) from 14 CFR SFAR 88 of the FAA and of JAA TGL 47, be able to give a detailed description of the concept of CDCCL, Airworthiness Limitations Items (ALI) and using theoretical fundamentals and specific examples,
2. have the capacity to combine and apply the separate elements of knowledge in a logical and comprehensive manner.
3. have detailed information on how the above items affect the aircraft in the scope of the activity of the organisation or in the fleet.
4. understand and carry out activities with the use of manufacturer and regulatory authority data providing instructions on design and maintenance, such as Service Bulletins, Airworthiness Directives, Aircraft Maintenance Manual, Component Maintenance Manual etc.
5. use easily the manufacturer's documentation from various sources and apply corrective action where appropriate.
6. identify the components or parts or the aircraft subject to FTS from the manufacturer's documentation, plan the action or apply a Service Bulletin and an Airworthiness Directive.

Continuing training

The interval between continuing training shall be established by the organisation employing such personnel, but should not exceed two years. The continuing training shall include knowledge on evolution of material, tools, documentation and manufacturer's or DGCA directives.

2. The personnel directly involved in Fuel Tank Safety (FTS) systems shall be qualified according to the following table:

Organisation	Personnel	Level of knowledge	Continuing training
CAR-66 licence holders in a continuing airworthiness management organisation	The airworthiness review staff as required by M.A.707.	2	Yes
CAR-66 licence holders in aircraft and component maintenance organisations	Maintenance organisation support and certifying staff	2	Yes

3. General requirements

The training for the personnel designated in table above has to be carried out before any airworthiness review certificate is issued or any maintenance task is certified on an aircraft or a component.

The training should be made in appropriate facilities containing examples of components, systems and parts affected by FTS issues and having access to aircraft or component where typical examples of FTS issues can be shown. The use of pictures, films and practical examples of the maintenance on fuel tank system is recommended. The training shall include a representative number of repair and inspections as required by the maintenance programme showing the necessity of using the manufacturer's data.

4. Characteristics of the training

The following characteristics shall be taken into consideration when the level 2 training programme are being established:

(a) understanding of the background and concepts of fuel tank safety as developed during the last 10 years, and

(b) how in maintenance organisations mechanics can recognize, interpret and handle the improvements that have been made or are being made during fuel tank system maintenance,

(c) awareness of any hazards working on the Fuel System, and especially with a Flammability Reduction System using nitrogen.

a), b) and c) should be introduced in the training programme addressing the following issues:

i) The theoretical background behind the fuel tank safety: the explosions of mixtures of fuel and air, the behavior of those mixtures in an aviation environment, the effects of temperature and pressure, energy needed for ignition etc, the 'fire triangle', - Explain 2 concepts to prevent explosions: (1) ignition source prevention and (2) flammability reduction,

ii) The major accidents and accident investigations and their conclusions,

iii) SFARs from 14 CFR SFAR 88 of the FAA and JAA Internal Policy INT POL 25/12: reason of these documents, and what was the ultimate goal, margins of fuel system safety improvements (from 10-6 to 10-9, in fact improvement by a factor 100- 1000, to identify unsafe conditions and to correct them, to systematically improve fuel tank maintenance),

iv) Explain the concepts that are being used: the results of SFAR 88 of the FAA and JAA INT/POL 25/12: modifications, airworthiness limitations and CDCCL,

v) Where relevant information can be found by the mechanics and how to use and interpret this information (maintenance manuals, component maintenance manuals)

vi) Fuel Tank Safety and Maintenance: fuel tank entry and exit procedures, clean working environment, what is meant by configuration control, wire separation, bonding of components etc,

vii) Flammability reduction systems: reason for their presence, their effects, the hazards of an FRS using nitrogen for maintenance, safety precautions in maintenance/working with an FRS,

viii) Recording maintenance actions, recording measures and results of inspections.

DGCA application forms for licenses and examinations

Form No	Description
CA Form 19-01	Application For Initial Issue Of CAR- 66 Aircraft Maintenance Engineer's Licence
CA Form 19-02	Application for extension of CAR- 66 aircraft maintenance engineer's licence
CA Form 19-03	Application for renewal of CAR- 66 aircraft maintenance engineer's licence
CA Form 19-04	Application for conversion/removal of limitations of CAR- 66 aircraft maintenance engineer's licence
CA Form 19-05	Application for issue of duplicate CAR- 66 aircraft maintenance engineer's licence
CA Form 19-06	Medical certificate
CA Form 19-07	Application for allotment of computer number for appearing in AME licence examinations
CA Form 19-08A	Application for appearing in written paper(s) of CAR 66 basic knowledge examination
CA Form 19-08B	*Application for appearing in CAR 66 type examination*
CA Form 19-09	Application for appearing in skill test of CAR-66 AME licence
CA Form 19-10	Format of aircraft maintenance engineer work record / log book
CA Form 19-11	Application for issue of basic knowledge examination certificate

Highlights of the CAR 66 Issue II R1

Sl. No.	CAR 66 Issue 02 R1 Reference	Description
1.	66.A.03 Licence Categories	In the existing AME licence category, category B3 is introduced for certifying unpressurised piston engine aircraft below 2000kgs MTOW
2.	66.A.20 Privileges	66.A.20 privileges of AME licence has been replaced with new one in line with rule 61
3.	66.A.30 Experience requirements	66.A.30 Aircraft Maintenance Experience requirements of issue of Category A, B1.2 and B 1.4 has been revised to 3 years from 4 years.
4.	66.A.45 Endorsement with aircraft ratings	66.A.45 (a) (3) endorsement on AME licence for aircraft ratings has been revised suitably to include category B3 requirement. Provision has been made for issue of Category- A licence without type rating.
5.	Sub-part B 66.A.100 General	Provision for the certification of Microlight, light sport aircraft, glider, balloon or an airship subject to meeting the requirements as specified in the relevant CAR
6.	Sub-part C 66.A.200 – 225 General	Requirements for certifying staff for certification of aircraft components introduced.
7.	GM 66.A.20(a) Privileges	Definition of Trouble shooting has been amended. In Base maintenance a new para has been added to include category B3.
8.	GM 66.A.25(a) Basic knowledge requirements	This para has been amended to include category B3.
9.	AMC 66.A.30 (e) Experience requirements	This para has been amended to include category B3.
10.	GM 66.A.45 Endorsement with aircraft ratings.	This para has been amended to include category B3.
11.	GM 66.A.70 Conversion provisions	GM 66.A.70 has been amended to include category B3.
12.	GM 66.A.70(d) Conversion provisions	This para has been amended to include category B3.
13.	AMC 66.A.205 (c) Requirements	New AMC has been added to explain “relevant modules of CAR 66 approved by the DGCA”.
14.	AMC 66.A.205 (g) Requirements	New AMC has been added to explain requirement for the grant of certification authorization.

15.	Appendix I – Basic Knowledge Requirements	Appendix –I Basic knowledge requirement has been revised to include syllabus for category B3. New knowledge level has been added in modules 3,4,5,6,8,10 and 16 for B3 category. New Modules 7B, 9B, 11C and 17B has been added to meet category B3 knowledge requirements.
16.	Appendix II – Basic Examination Standard	Question number and Examination duration has been amended to include B3 category.
17.	Appendix IV – Experience requirements for extending a CAR-66 Aircraft Maintenance Engineer's Licence	Experience requirements for adding a new category or subcategory to an existing CAR-66 licence has been amended to include Category B3
18.	Appendix V- Application and forms	Appendix V - Application and format are separated from the main CAR and published in the form section on DGCA website.
19.	Appendix VI – Aircraft Maintenance Engineer's Licence referred to in Rule 61 of the Aircraft Rules, 1937- CA Form 26	In Licence book "XII (a). LICENCE (SUB) CATEGORIES" column has been amended to include Category B3
20.	Appendix I to AMC of CAR66 Aircraft Type ratings	List of Aircraft updated to include new aircraft inducted in the country.

Highlights of the CAR 66 Issue II R2

Sl. No.	CAR 66 Issue 02 R1 Reference	Description
1.	66.A.35	Amended to replace skill test requirement with demonstration of skill.
2.	66.A.215 (b)	Amended to include AME Course.
3.	Appendix –II (Basic Examination Standard) para 1.5	Amended to make provision for appearing in failed module related to limitation papers from 90 days to 30 days.
4.	GM 66.A.35 (Skill Test Requirements)	Deleted.
5.	Appendix-I (Appendices to AMC for CAR 66)	Amended to add a note on Type rating endorsement covering several models/ variant. Group 1 Helicopter Table amended in line with EASA guidelines.

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