STATUTORY INSTRUMENT

Supplement to the Sierra Leone Gazette Vol. CXLVII, No. 1

dated 5th January, 2017

THE SIERRA LEONE CIVIL AVIATION AUTHORITY (APPROVED TRAINING ORGANIZATIONS) REGULATIONS, 2016.

Part 3 –APPROVED TRAINING ORGANIZATIONS

ARRANGEMENT OF CLAUSES

STATUTORY INSTRUMENT NO. 1 OF 2017

Published 5th January, 2017

The Civil Aviation, 2008
(Act No. 2 of 2008)

THE SIERRA LEONE CIVIL AVIATION, AUTHORITY (APPROVED TRAINING ORGANIZATION) REGULATIONS, 2016 Short tittle

In exercise of the powers conferred upon it by section 82 of the Civil Aviation Act 2008, the Authority hereby makes the following Regulations–

1.1 INTRODUCTION

This Regulation addresses the certification and administration of Approved Training Organizations (ATO). ICAO Annex 1 contains standards for approval of training organisations. The use of an ATO for the training and qualification of airmen is common in modern aviation, most particularly as operators upgrade their aircraft inventory and airmen transition to new aircraft. The ATO requirements do apply to the standards required for adequate training and qualification for a Sierra Leone certification. Thus, airmen requiring Sierra Leone certification, who receive training from a foreign ATO should be trained by an ATO meeting the standards of Part 3 of the regulations.

1.2 3.1 GENERAL

3.1.1 GENERAL

1.2.1.1 3.1.1.1 APPLICABILITY

Part 3 prescribes the requirements for certifying and administering Approved Training Organisations (ATO).

3.1.1.2 DEFINITIONS

(a) For the purpose of Part 3, the following definitions shall apply-

(1) ***Accountable manager (training).*** The manager who has corporate authority for ensuring that all training can be financed and carried out to the standard required by the Authority. The accountable manager may delegate, in writing, to another person in the organisation to become the accountable manager when authorised by the authority.

(2) ***Advanced flight training device.*** A flight training device that has a cockpit that accurately replicates a specific make, model, and type aircraft cockpit, and handling characteristics that accurately model the aircraft handling characteristics.

(3) ***AME Course.*** A training course for AME maintenance ratings (airframe/powerplant/avionics)

(4) ***Flight Training Equipment.*** Flight simulators, flight training devices, and aircraft.

(5) ***Line-Operational Simulation.*** Simulation conducted using operational-orientated flight scenarios that accurately replicate interaction among flightcrew members and between flightcrew members and dispatch facilities, other crewmembers, air traffic control, and ground operations.

(6) ***Line Operational Flight Training (LOFT).*** Training in a simulator with a complete crew using representative flight segments, which contain normal, abnormal, and emergency procedures that may be expected in line operations.

(6a) Approved Training. Training conducted under the special curricula and supervision approved by a Contracting State

(7) ***Approved Training Organisation (ATO).*** An organization approved by and operating under the supervision of a Contracting State in accordance with the requirements of Annex 1 to perform approved training

(8) ***Level 1 Approved Training Organisation (ATO).).*** A flight training facility which conducts all or substantially all of each flight training course using an aircraft.

(9) ***Level 2 Approved Training Organisation (ATO).*** A flight training facility which conducts all or substantially all of each flight training course using simulation media which are qualified and approved by the Authority.

(10) ***Satellite ATO.*** An ATO at a location other than primary location of the ATO.

(11) ***Specialty curriculum.*** A set of courses that is designed to satisfy a requirement of the Civil Aviation Regulations and that is approved by the Authority for use by a particular Level 2 ATO or satellite Level 2 ATO. The specialist curriculum includes training requirements unique to one or more Level 2 ATO clients.

(12) ***Training specifications.*** A document issued to a certified Approved Training Organisation by the Authority that prescribes that organisation's training, checking, and testing authorisations and limitations, and specifies training program requirements.

1.2.1.23.1.1.3 ABBREVIATIONS

The following acronyms are used in Part 3:

(1) ATO – Approved Training Organisation

(1) AFM – Aircraft Flight Manual

(2) AME – Aircraft Maintenance Engineer

(3) IFR – Instrument Flight Rules

(4) NOTAM – Notice to Airmen

3.1.2 Certificate Requirements

3.1.2.1 CERTIFICATE REQUIRED

(a) No person may operate an ATO without, or in violation of, an ATO certificate and training specifications issued under this part.

(b) Except for an AOC holder training its own flight crew, no person may conduct training, testing or checking in advanced flight training devices or flight simulators without, or in violation of, the certificate and training specifications required by this Part.

(c) The Authority will issue an applicant an ATO certificate and training specifications if the applicant shows that it meets the requirements of this Part.

3.1.2.2 APPLICATION FOR ISSUANCE OR AMENDMENT OF ATO CERTIFICATE

(a) The application for the approval of a training organization shall be made on a form and in a manner acceptable to the Authority

(b) An applicant for an ATO certificate and training specifications shall apply at least 120 calendar days before the beginning of any proposed training or 90 days before effecting an amendment to any approved training.

(c) Each applicant for an ATO certificate and training specification shall provide to the Authority that information shown in
Implementing Standard: See IS: 3.1.2.2 for certificate information needed by the Authority.

(d) An applicant for a certificate shall ensure that the facilities and equipment described in its application are–

(1) available for inspection and evaluation prior to approval; and

(2) in place and operational at the location of the proposed Level 2 ATO prior to issuance of a certificate under this Subpart.

(e) Each applicant shall provide 2 copies of its proposed training and procedures manual

(f) The Authority will issue to an applicant who meets the requirements and is approved by the Authority-

(1) an ATO certificate containing all business names included on the application under which the certificate holder may conduct operations and the address of each business office used by the certificate holder; and

(2) training specifications, issued by the Authority to the certificate holder, containing–

(i) authorisation for the ATO to function as a Level 1 ATO and/or Level 2 ATO;

(ii) the type of training authorised, including approved courses;

(iii) the category, class, and type of aircraft that may be used for training, testing and checking;

(iv) for each flight simulator or flight training device, the make, model, and series of aeroplane or the set of aeroplanes being simulated and the qualification level assigned, or the make, model, and series of rotorcraft, or set of rotorcraft being simulated and the qualification level assigned;

(v) for each flight simulator and flight training device subject to qualification evaluation by the Authority, the identification number assigned by the Authority;

(vi) the name and address of each satellite ATO, and the approved courses offered at each satellite ATO;

(vii) authorised deviations or waivers from this Subpart; and

(viii) any other items the Authority may require or allow.

(g) The authority may deny, suspend, revoke, or terminate a certificate under this Subpart if the Authority finds that the applicant or the certificate holder –

(1) held an ATO certificate that was revoked, suspended, or terminated within the previous 5 years; or

(2) employs or proposes to employ a person who -

(i) held an ATO certificate that was revoked, suspended, or terminated within the previous 5 years; or

(ii) exercised control over any certificate holder whose certificate has been revoked, suspended or terminated within the last 5 years; and

(iii) contributed materially to the revocation, suspension or termination of that certificate and who will be employed in a management or supervisory position, or who will be in control or have a substantial ownership interest in the ATO.

(3) has provided incomplete, inaccurate, fraudulent, or false information for an ATO certificate.

(h) At any time, the Authority may amend an ATO certificate –

(1) on the Authority's own initiative, under applicable Civil Aviation Act; or

(2) upon timely application by the certificate holder.

(i) The certificate holder shall file an application to amend an ATO certificate at least 60 calendar days prior to the applicant's proposed effective amendment date unless a different filing period is approved by the Authority.

(j) The Authority may issue an ATO certificate to an applicant–

(1) for an ATO inside or outside Sierra Leone ; and

(2) whose business office or primary location, or both, are located inside or outside Sierra Leone .

3.1.2.3 CURRICULUM AND PERSONNEL REQUIREMENTS

(a) Each ATO shall adhere to its approved curriculum.

(b) A certificate holder may not change its approved curriculum unless the change is approved by the Authority in advance.

(c) An applicant for an ATO certificate shall show that -

(1) for each proposed curriculum, the Level 2 ATO has, and shall maintain, a sufficient number of instructors who are qualified in accordance with Section 3.2.4 to perform the duties to which they are assigned;

(2) each applicant for, and holder of, a Level 1 ATO certificate shall meet the personnel requirements shown in Section 3.2.4.

(3) each applicant for, and holder of, an ATO certificate with AME courses shall meet the personnel requirements shown in 3.4.2.5.

(d) Each Level 2 ATO shall have designated, and shall maintain, a sufficient number of approved evaluators to provide required checks and tests to graduation candidates within 7 calendar days of training completion for any curriculum leading to airman licences or ratings, or both;

(1) each Level 2 ATO has, and shall maintain, a sufficient number of management personnel who are qualified and competent to perform required duties; and

(2) a management representative, and all personnel who are designated by the Level 2 ATO to conduct direct student training, are able to understand, read, write, and fluently speak English.

(e) The persons listed in this subsection may serve in more than one position for an ATO, provided that person is qualified for each position.

3.1.2.4 CONTENTS OF AN ATO CERTIFICATE

(a) The ATO certificate will consist of two documents-

(1) a certificate for public display signed by the Authority, and

(2) training specifications containing the terms, conditions, and authorisations applicable to the ATO certificate.

(b) The ATO certificate will contain-

(1) the name and location (main place of business) of the ATO;

(2) the date of issue and period of validity for each page issued;

(3) the authorised locations of operations; and

(4) training specifications for the following categories, as applicable:

(i) Pilot training

(ii) Other crewman training

(iii) Other airman training

(iv) AME training

(v) Other training

(5) Other authorisations, approvals and limitations issued by the Authority in accordance with the standards which are applicable to the training conducted by the ATO.

3.1.2.5 DURATION OF CERTIFICATE

(a) Except as shown in paragraph (c), the Authority will issue an ATO certificate which expires, unless surrendered, suspended, or revoked -

(1) on the last day of the 24th calendar month from the month the certificate was issued;

(2) except as provided in paragraph (b), on the date that any change in ownership of the school occurs;

(3) on the date of any significant change in the school's facilities occurs; or

(4) upon notice by the Authority that the school has failed for more than 60 days to maintain the required facilities, aircraft or personnel.

(b) A change in the ownership of an ATO does not terminate that school's certificate if, within 30 days –

(1) the certificate holder makes application for an appropriate amendment to the certificate; and

(2) no significant change in the facilities, operating personnel, or approved training courses is involved.

(c) The Authority will issue Level 2 ATO certificates without expiration date.

(d) If the Authority suspends, revokes, or terminates a certificate issued under this Part, the holder of that certificate shall return the certificate to the Authority within five working days after being notified that the certificate is suspended, revoked, or terminated.

3.1.2.6 CONTINUED VALIDITY OF APPROVAL

(a) Unless the approval has previously been surrendered, superseded, suspended, revoked or expired by virtue of exceeding any expiration date that may be specified in the approval certificate, the continued validity of approval is dependent upon-

(1) The ATO remaining in compliance with this part;

(2) The Authority being granted access to the organisation's facilities to determine continued compliance with this regulation; and

(3) The payment of any charges prescribed by the Authority.

3.1.2.7 DEVIATIONS OR WAIVERS

(a) The Authority may issue deviations or waivers from any of the requirements of this Part.

(b) An ATO requesting a deviation or waiver under this section shall provide the Authority with information acceptable to the Authority that shows –

(1) justification for the deviation or waiver; and

(2) that the deviation or waiver will not adversely affect the quality of instruction or evaluation.

3.1.2.8 SUSPENSION OR REVOCATION

(a) The Authority may suspend or revoke an ATO certificate if it is established that a certificate holder has not met, or no longer meets the requirements of this Part.

3.1.2.9 ADVERTISING LIMITATIONS

(a) The ATO may not:

(1) Make any statement relating to its ATO certification and training specifications that is false or designed to mislead any person contemplating enrolment in that ATO.

(2) Advertise that the ATO is certified unless it clearly differentiates between courses that have been approved under this Part and those that have not been approved under this Part.

(b) An ATO whose certificate has been surrendered, suspended, revoked, or terminated shall promptly-

(1) remove all indications, including signs, wherever located, that the ATO was certified by the Authority; and

(2) notify all advertising agents, and advertising media employed by the certificate holder to cease all advertising indicating that the ATO is certified by the Authority.

3.1.3 Location and Facilities

3.1.3.1 FACILITIES, EQUIPMENT AND MATERIAL

(a) Each certificate holder shall provide facilities, equipment and material equal to the standards currently required for the issue of the certificate and rating that it holds.

(b) A certificate holder may not make a substantial change in facilities, equipment or material that have been approved for a particular curriculum, unless that change is approved by the Authority in advance.

(c) A certificate holder with approved AME courses may not make any change in the ATO's location unless the change is approved by the Authority in advance. If the certificate holder desires to change the location of the ATO, the certificate holder shall notify the Authority, in writing, at least 30 days before the date of the relocation. The Authority may prescribe the conditions under which the ATO may operate while it is changing its location or housing facilities. If the certificate holder changes the location of the ATO without notification, the certificate shall be revoked.

(d) An applicant for, or holder of, a certificate issued under this Part shall establish and maintain a principal business office that is physically located at the address shown on its certificate.

(e) The principal business office may not be shared with, or used by, another person who holds an ATO certificate.

(f) An applicant for, or holder of, a certificate issued under this Part shall ensure that-

(1) each room, training booth, or other space used for instructional purposes is heated, lighted, and ventilated to conform to local building, sanitation, and health codes; and

(2) the facilities used for instruction are not routinely subject to significant distractions caused by flight operations and maintenance operations at the airport.

(g) Each certificate holder shall maintain the records required by this Part in facilities adequate for that purpose.

(h) An applicant for, or holder of, an ATO certificate with approved AME courses shall have and maintain the following instructional equipment as is appropriate to the rating sought:

(i) Various kinds of airframe structures, airframe systems and components, powerplants and powerplant systems and components (including propellers), of a quantity and type suitable to complete the practical projects required by its approved curricula.

(2) At least one aircraft of a type acceptable to the Authority.

(3) The equipment required by paragraph (h) need not be in airworthy condition, and if damaged prior to use by the ATO, shall have been repaired enough for complete assembly.

(j) An applicant for, or holder of, an ATO certificate with an AME rating shall have airframes, powerplants, propellers, appliances and components thereof, to be used for instruction and from which students will gain practical working experience, and shall ensure that the airframes, powerplants, propellers, appliances, and components thereof be sufficiently diversified as to show the different methods of construction, assembly, inspection and operation when installed in an aircraft for use.

(k) Each applicant for, or holder of, an ATO certificate with an AME rating shall ensure that it maintains a sufficient number of units of the material described in paragraph (h)(3) so that no more than eight students will work on any one unit at any one time.

(l) Each Applicant for, or holder of, an ATO certificate with an AME rating using an aircraft for instructional purposes that does not have retractable landing gear and wing flaps, shall provide training aids, or operational mock-ups of the retractable landing gear and wing flaps which are acceptable to the Authority.

(m) An applicant for an ATO certificate with an AME rating, or an applicant seeking an additional AME rating, shall have at least the facilities, equipment and materials appropriate to the ratings sought.

(n) An applicant for, or holder of, an ATO certificate with an AME rating shall maintain, on the premises and under the full control of the ATO, an adequate supply of material, special tools and shop equipment used in constructing and maintaining aircraft as is appropriate to the approved curriculum of the ATO, in order to assure that each student will be properly instructed.

(o) An applicant for, or holder of, an ATO certificate with an AME rating shall ensure that the special tools and shop equipment required by paragraph (h) be in satisfactory working condition for instructional and practice purposes.

Implementing Standard: See IS: 3.1.3.1 for specific requirements for facilities for AME courses.

3.1.3.2 FLIGHT TRAINING FACILITIES, EQUIPMENT AND COURSEWARE

(a) An applicant for, or holder of, a Level 2 ATO shall have available exclusively, for adequate periods of time and at a location approved by the Authority, adequate flight training equipment and courseware including at least one flight simulator or advanced flight training device.

(b) An applicant for, or holder of, an ATO certificate that plans to conduct pilot flight training shall show that it has continuous use of a briefing area located at each airport at which training flights originate that is –

(1) adequate to shelter students waiting to engage in their training flights;

(2) arranged and equipped for the conduct of pilot briefings; and

(3) for an ATO with an instrument rating course or commercial pilot course, equipped with adequate communication to sources of weather and flight planning information.

3.1.3.3 SATELLITE ATOs

(a) The holder of an ATO certificate may conduct training in accordance with a training program approved by the Authority at a satellite ATO if –

(1) the facilities, equipment, personnel and of course content of the satellite ATO meet the applicable requirements;

(2) the instructors and evaluators at the satellite ATO are under the direct supervision of management personnel of the principal ATO;

(3) the certificate holder notifies the Authority in writing that a particular satellite ATO is to begin operations at least 60 days prior to proposed commencement of operations at that satellite ATO; and

(4) the certificate holder's training specifications reflect the name and address of the satellite ATO and the approved courses offered at the satellite ATO.

(b) The Authority will issue training specifications which prescribe the operations required and authorised at each satellite ATO.

3.1.3.4 CHANGES TO THE ATO REQUIRING NOTICE TO THE AUTHORITY

(a) To enable the Authority to determine continued compliance with this Part, the ATO shall provide written notification to the Authority for approval at least 90 days prior to any of the following changes:

(1) The name of the organisation;

(2) The location of the organisation;

(3) The facilities, equipment or staff that could affect the ATO certification or ratings;

(4) Any ratings held by the ATO, whether granted by the Authority or held through an ATO certification issued by another contracting state;

(5) Additional locations of the organisation;

(6) Items in the training and procedures manual, including the syllabus and curricula;

(7) The accountable manager;

(8) The list of management personnel identified as described in the training and procedures manual.

(b) The Authority will amend the ATO certificate if the ATO notifies the Authority of a change in:

(1) Location or facilities or equipment;

(2) Additional locations of the organisation;

(3) Rating, including deletions;

(4) Items in the training and procedures manual, including the syllabus and curricula;

(5) Name of the organisation with same ownership; or

(6) Ownership.

(7) The Accountable Manager

(8) The list of management personnel identified as described in the training and procedures manual;

(c) When the Authority issues an amendment to an ATO certificate because of new ownership of the ATO, the Authority will assign a new certificate number to the amended ATO certificate.

(d) The Authority may prescribe the conditions under which the ATO may operate during such changes unless the Authority determines that the approval should be suspended.

(e) If changes are made by the ATO to the items listed in subparagraph (a) without notification to the Authority and amendment of the ATO certificate by the Authority, the ATO certificate may be suspended, or revoked, by the Authority.

3.1.3.5 INSPECTION FREQUENCY

(a) The Authority may, at any time, inspect an ATO holder on the ATO holder's premises to determine the ATO's compliance with this Part.

(b) Inspections will normally be repeated on a twelve month basis, which may be extended to a twenty-four month basis if, in the opinion of the Authority, the holder continues to meet the requirements under which it was originally certificated.

(c) After an inspection is made, the certificate holder will be notified, in writing, of any deficiencies found during the inspection.

3.1.4 Administrative

1.2.1.3 3.1.4.1 RECORD KEEPING

(a) Each ATO shall maintain a record for each trainee that contains-

(1) the name of the trainee;

(2) a copy of the trainee's licence, if any, and medical certificate, if required;

(3) the name of the course and the make and model of flight training equipment used, if applicable;

(4) the trainee's prerequisite experience and course time completed;

(5) the date the student graduated, terminated training, or transferred to another school;

(6) the trainee's performance on each lesson and the name of the instructor providing instruction;

(7) a current progress record for each trainee showing the practical projects or laboratory work completed or to be completed for each subject;

(8) the date and result of each knowledge test and end-of-course practical test and the name of the evaluator conducting the test(s); and

(9) the number of hours of additional training that was accomplished after any unsatisfactory practical test.

(b) The Authority will not consider a student's logbook as sufficient for the records required by paragraph (a).

(c) Each ATO shall maintain a record for each instructor or evaluator designed to instruct a course approved in accordance with this Part that indicates that the instructor or evaluator has complied with the applicable requirements of this Part.

(d) Each ATO shall-

(1) maintain the records required by paragraph (a) for at least 2 years following the completion of training, testing or checking;

(2) maintain the qualification records required by paragraph (c) while the instructor or evaluator is in the employment of the certificate holder and for the 2 years thereafter; and

(3) maintain the recurrent demonstration of proficiency records required by paragraph (c) for at least 2 years.

(e) Each ATO shall provide the records required by this section to the Authority upon request, within a reasonable time, and shall store and maintain the records required by –

(1) paragraph (b) at the ATO, or satellite ATO where the training, testing or checking, if appropriate, occurred or at another location acceptable to the Authority; and

(2) paragraph (c) at the ATO or satellite ATO where the instructor or evaluator is primarily employed, or at another location acceptable to the Authority.

(f) Each ATO shall provide to a trainee, upon request and at a reasonable time, a copy of his or her training records.

(g) Each ATO shall keep a current record of each student enrolled, showing, if applicable –

(1) the instruction credited under 3.4.2.6, if any; and

(2) the authenticated transcript of grades from a school previously attended.

1.2.1.4 3.1.4.2 GRADUATION CERTIFICATES AND TRANSCRIPTS

(a) Each ATO shall issue upon completion of training a graduate certificate to each student who completes its approved course of training.

(b) Each ATO shall include in each graduation certificate -

(1) the name of the school and the certificate number of the ATO;

(2) the name of the graduate to whom it was issued;

(3) the approved curriculum title;

(4) the date of graduation;

(5) a statement that the student has satisfactorily completed each required stage of the approved course of training including the tests for those stages;

(6) an authentication by an official of the school; and

(7) a statement showing the cross-country flight training that the student received in the course of training, if applicable.

(c) An ATO may not issue a graduation certificate to a student, or recommend a student for a licence or rating, unless the student has –

(1) completed the training specified in the approved course of training; and

(2) passed the required final tests.

1.2.1.5 3.1.4.3 TRANSCRIPTS

(a) Upon request, each ATO shall provide a transcript of a student's grades to each student who graduates from that ATO or who leaves it before being graduated.

(b) Each ATO shall include in the transcript required by paragraph (a)-

(1) the curriculum in which the student was enrolled;

(2) whether the student satisfactorily completed that curriculum;

(3) the final grades the student received; and

(4) an authentication by an official of the school.

3.2 PILOT TRAINING

3.2.1 General

3.2.1.1 PILOT TRAINING COURSES

(a) The Authority will issue certificates and training specifications for two levels of ATO which conduct pilot flight training courses, as shown:

(1) Certificates and training specifications:

(i) A Level 1 ATO is one which conducts the preponderance of each flight training course using an actual aircraft.

(ii) A Level 2 ATO is one which conducts all or substantially all of each flight training course using simulation media which are qualified and approved by the Authority.

(b) The Authority may approve the following courses of instruction to an applicant for, or holder of a Level 1 ATO certificate, provided the applicant meets the requirements of 3.1.2.2:

(1) Licensing and rating courses.

(i) Private pilot course. (IS: 3.2.1.1 Appendix A)

(ii) Instrument rating course (IS: 3.2.1.1 Appendix B)

(iii) Commercial pilot course. . (IS: 3.2.1.1 Appendix C)

(iv) Airline transport pilot course. (IS: 3.2.1.1 Appendix D)

(v) Flight instructor course. (IS: 3.2.1.1 Appendix E)

(vi) Flight instructor instrument course. (IS: 3.2.1.1 Appendix F)

(vii) Ground instructor course. (IS: 3.2.1.1 Appendix G)

(viii) Additional aircraft category or class rating course. (IS: 3.2.1.1 Appendix H)

(ix) Aircraft type rating course. (IS: 3.2.1.1 Appendix I)

(2) Special preparation courses. (IS: 3.2.1.1 Appendix J)

(i) Pilot refresher course.

(ii) Flight instructor refresher course.

(iii) Ground instructor refresher course.

(iv) Agricultural aircraft operations course.

(v) Rotorcraft external-load operations course.

(vi) Special operations course.

(vii) Test pilot course.

(3) Pilot ground school course. (IS: 3.2.1.1 Appendix K)

(c) The Authority may approve the following courses of instruction to an applicant for, or holder of a Level 2 ATO certificate, provided the applicant meets the requirements of 3.1.2.2:

(1) Any course for licensing or for any rating for which the applicant can show an effective curriculum and for which the Authority has qualified the simulation media.

3.2.1.2 REQUIREMENTS FOR A LEVEL 1 ATO CERTIFICATE

(a) The Authority will issue to an applicant a Level 1 ATO certificate with associated ratings if the applicant –

(1) held a provisional Level 1 ATO certificate issued under this Part for at least 24 calendar months preceding the month of application;

(2) meets the applicable requirements of this Subpart for the ratings sought; and

(3) within 24 calendar months preceding the month of application, has trained, recommended and had at least 80 percent of all applicants pass on the first attempt-

(i) a knowledge of a practical test for a pilot licence, flight instructor licence, ground instructor licence, or an additional rating.

Implementing Standard: See IS:3.2.1.1. Appendix J: Special Preparation Courses for an end-of-course test for a special training course.

1.2.1.6 3.2.1.3 PROVISIONAL LEVEL 1 ATO CERTIFICATE

The Authority may issue to an applicant that meets the applicable requirements of this Subpart, but does not meet the recent training activity requirements of 3.2.1.1., a provisional Level 1 ATO certificate with ratings.

1.2.1.7 3.2.1.4 RENEWAL OF CERTIFICATES AND RATINGS

(a) Level 1 ATO.

(1) A Level 1 ATO may apply for renewal of its certificate and ratings within 30 days preceding the month the level 1 ATO's certificate expires, provided the ATO meets the requirements prescribed in paragraph (a)(2).

(2) The Authority will renew for an additional 24 calendar months a Level 1 ATO certificate and ratings if the Authority determines the ATO's personnel, aircraft, facility and airport, approved training courses, training records and recent training ability and quality meet the requirements.

(3) A Level 1 ATO that does not meet the renewal requirements in paragraph (a)(2) may apply for a provisional Level 1 ATO certificate if the school meets the requirements of 3.2.1.3.

(b) Provisional Level 1 ATO.

(1) Except as provided in paragraph (b)(3), the Authority will not renew a provisional Level 1 ATO certificate or the ratings on that certificate.

(2) A provisional Level I ATO may apply for a Level I ATO certificate and associated ratings provided that ATO meets the requirements of this sub part.

(3) A provisional Level 1 ATO may apply for another provisional Level 1 ATO certificate, provided 180 days have elapsed since its last provisional Level 1 ATO certificate expired.

3.2.2 Flight Training Equipment Requirements

3.2.2.1 APPLICABILITY

(a) This section prescribes-

(1) the personnel and aircraft requirements for an ATO certificate; and

(2) the facilities that an ATO shall have available on a continuous basis.

3.2.2.2 AIRPORT REQUIREMENTS

Each applicant for, and holder of, a level 1 ATO certificate shall show that it has continuous use of each airport at which training flights originate, and that the airport has an adequate runway and the necessary equipment.
Implementing Standard: See IS: 3.2.2.2 for specific runway and equipment requirements.

3.2.2.3 AIRCRAFT REQUIREMENTS

(a) An applicant for, or holder of, and ATO certificate shall ensure, for each aircraft used for flight instruction and solo flights-

(1) except for flight instruction and solo flights in a curriculum for agricultural aircraft operations, external load operations, and similar aerial work operations, that the aircraft has an airworthiness certificate or a foreign airworthiness certificate, acceptable to the Authority;

(2) that each aircrafts is maintained and inspected in accordance with the requirements of Part 5; and

(3) that each aircraft is equipped as provided in the training specifications for the approved course for which it is used.

(b) Except as provided in paragraph (c), an applicant for, or holder of, an ATO certificate shall ensure that each aircraft used for flight instruction is at least a two-place aircraft with engine power controls and flight controls that are easily reached and that operate in a conventional manner from both pilot stations.

(c) A certificate holder may use aeroplanes with controls such as nose-wheel steering, switches, fuel selectors and engine air flow controls that are not easily reached and operated in a conventional manner by both pilots for flight instruction if the certificate holder determines that the flight instruction can be conducted in a safe manner considering the location of controls and their non-conventional operation, or both.

(d) Each certificate holder shall ensure that each aircraft used in a course involving IFR operations is equipped and maintained for IFR operations.

1.2.1.8 3.2.2.4 FLIGHT SIMULATORS AND FLIGHT TRAINING DEVICES

(a) An applicant for, or holder of, an ATO certificate shall show that each flight simulator and flight training device used for training, testing and checking will be or is specifically qualified and approved by the Authority for-

(1) each manoeuvre and procedure for the make, model and series of aircraft, set of aircraft or aircraft type simulated, as applicable; and

(2) each curriculum or training course in which the flight simulator or flight training device is used, if that curriculum or course is used to satisfy any requirement of these regulations.

(3) An applicant for, and holder of, a Level 1 ATO certificate shall show that each of its flight simulators and flight training devices-

(4) represent the aircraft for which the course is approved;

(5) is used only for training given by an authorized instructor; and

(6) is not used for more than 25 percent of the total flight training hour requirements.

(b) Each certificate holder shall ensure, prior to use, that the approval required by this section includes-

(1) the set of aircraft or type aircraft;

(2) if applicable, the particular variation within type for which the training, testing or checking is being conducted; and

(3) the particular manoeuvre, procedure or crewmember function to be performed.

(c) Each certificate holder shall ensure that each flight simulator or flight training device used by an ATO is –

(1) maintained to ensure the reliability of the performances, functions, and all other characteristics that were required for qualification;

(2) modified to conform with any modification to the aircraft being simulated if the modification results in changes to performance, function or other characteristics required for qualification;

(3) given a functional preflight check each day before being used; and

(4) provided with a discrepancy log in which the instructor or evaluator, at the end of each training session, enters each discrepancy.

(d) Unless otherwise authorized by the Authority, each certificate holder shall ensure that each component on a flight simulator or flight training device used by an ATO is operative if the component is essential to, or involved in, the training, testing or checking of airmen.

(e) The Authority will not restrict ATO instructors or students to specific-

(1) route segments during line-oriented flight training scenarios; or

(2) visual data bases replicating a specific customer's bases of operation.

(f) An applicant for, or holder of, an ATO certificate may request evaluation, qualification and continuing evaluation for qualification of flight simulators and flight training devices without-

(1) holding an air operator certificate; or

(2) having a specific relationship to an air operator certificate holder.

3.2.3 Curriculum And Syllabus Requirements

3.2.3.1 APPLICABILITY

This Section prescribes the curriculum and syllabus requirements for the issuance of an ATO certificate and training specifications for training, testing and checking conducted to meet the requirements of Part 2.

3.2.3.2 APPROVAL OF TRAINING PROGRAM

(a) Each applicant for, or holder of, an ATO certificate shall apply to the Authority for training program approval.

(b) Each applicant for training program approval shall indicate in the application-

(1) which courses are part of the core curriculum and which courses are part of the specialty curriculum;

(2) which requirements of Part 2 would be satisfied by the curriculum or curricula; and

(3) which requirements of Part 2 would not be satisfied by the curriculum or curricula.

(c) After a certificate holder begins operations under an approved training program, the Authority may require the certificate holder to make revisions to that training program if the Authority finds that the certificate holder is not meeting the provisions of its approved training program.

(d) If the Authority requires an ATO certificate holder to make revisions to an approved training program and the certificate holder does not make those required revisions within 30 calendar days, the Authority may suspend, revoke, or terminate the Level 2 ATO certificate under the provisions of 3.1.2.2(e)

3.2.3.3 TRAINING PROGRAM CURRICULUM REQUIREMENTS

(a) Each applicant shall ensure that each training program curriculum submitted to the Authority for approval meets the applicable requirements and contains-

(1) a syllabus for each proposed curriculum;

(2) minimum aircraft and flight training equipment requirements for each proposed curriculum;

(3) minimum instructor and evaluator qualifications for each proposed curriculum;

(4) a curriculum for initial training and continuing training of each instructor or evaluator employed to instruct in a proposed curriculum; and

(5) for each curriculum that provides for the issuance of a licence or rating in fewer than the minimum hours prescribed by Part 2-

(i) a means of demonstrating the ability to accomplish such training in the reduced number of hours; and

(ii) a means of tracking student performance.

1.2.1.9 3.2.3.4 TRAINING AND PROCEDURES MANUAL

(a) Each applicant for, or holder of an ATO certificate shall prepare and maintain a training manual and a procedures manual containing information and instructions to enable staff to perform their duties and to give guidance to students on how to comply with course requirements.

(b) The training manual and procedures manual may be combined.

(c) The ATO shall ensure that the training manual and the procedures manual are amended as necessary to keep the information contained therein up to date.

(d) Copies of all amendments to the training manual and the procedures manual shall be furnished promptly to all organisations or persons to whom the manual has been issued.

(e) See IS 3.2.3.4 provides detailed requirements for the training manual and the procedures manual and format for each manual.

3.2.4 PERSONNEL REQUIREMENTS

1.2.1.10 3.2.4.1 APPLICABILITY

This section prescribes the personnel and flight training equipment requirements for a certificate holder that is training to meet the requirements of Part 2.

1.2.1.11 3.2.4.2 LEVEL 2 ATO INSTRUCTOR ELIGIBILITY REQUIREMENTS

(a) A certificate holder may not employ a person as an instructor in a flight training course that is subject to approval by the Authority unless that person-

(1) is at least 18 years of age;

(2) is able to read, write, speak, and understand the English language;

(3) if instructing in an aircraft in flight, holds a flight instructor licence;

(4) if instructing in simulated flight, satisfies the requirements of paragraph (c); and

(5) meets at least one of the following requirements-

(i) meets the aeronautical experience requirements for a commercial pilot licence, excluding the required hours of instruction in preparation for the commercial pilot practical test;

(ii) if instructing in a flight simulator or flight training device that represents an aeroplane requiring a type rating or if instructing in a curriculum leading to the issuance of an airline transport pilot licence, meets the aeronautical experience requirements for an airline transport pilot; or

(iii) is employed as a flight simulator instructor or a flight training device instructor for an ATO providing instruction and testing to meet the requirements of Part 2.

(b) An ATO shall designate each instructor in writing for each approved course, prior to that person functioning as an instructor in that course.

(c) Prior to initial designation, each flight and simulator flight instructor shall complete the requirements of IS; 3.2.4.2(a).
Implementing Standard: See IS: 3.2.4.2. for specific training eligibility requirements.

1.2.1.12 3.2.4.3. LEVEL 2 ATO INSTRUCTOR AND EVALUATOR PRIVILEGES AND LIMITATIONS

(a) An ATO may allow an instructor to provide-

(1) instruction for each curriculum for which that instructor is qualified;

(2) testing and checking for which that instructor is qualified; and

(3) instruction, testing, and checking intended to satisfy the requirements of this Part.

(b) An ATO whose instructor or evaluator is designated in accordance with the requirements to conduct training, testing or checking in flight training equipment, may allow its instructor or evaluator to give endorsements required by Part 2 if that instructor or evaluator is authorized by the Authority to instruct or evaluate in a curriculum that requires such endorsements.

(c) An ATO may not allow an instructor to-

(1) excluding briefings and debriefings, conduct more than 8 hours of instruction in any 24-consecutive-hour period, or more than 6 days or 40 hours in any 7 day period;

(2) provide flight training equipment instruction unless that instructor meets the requirements of 3.2.4.4(a)(1) through (a)(4), and 3.2.4.4.(b), as applicable; or

(3) provide flight instruction in an aircraft unless that instructor-

(i) meets the requirements of 3.2.4.4.(a)(1),(a)(2), and (a)(5);

(ii) holds a flight instructor licence;

(iii) holds pilot licences and ratings applicable to the category, class, and aircraft type in which instructing;

(iv) if instructing or evaluating in an aircraft in flight while occupying a required crewmember seat, holds at least a valid second class medical certificate; and

(v) meets the recency of experience requirements of 8.10.33 and 8.10.37

1.2.1.13 3.2.4.4 LEVEL 2 ATO INSTRUCTOR TRAINING AND TESTING REQUIREMENTS

(a) Except as provided in paragraph (c), prior to designation and every 12 calendar months beginning the first day of the month following an instructor's initial designation, a certificate holder shall ensure that each of its instructors meets the following requirements:

(1) Each flight instructor or simulator flight instructor shall satisfactorily demonstrate to an authorised evaluator knowledge of, and proficiency in, instructing in a representative segment of each curriculum for which that instructor is designated to instruct under Subpart 3.4.

(2) Each instructor shall satisfactorily complete an approved course of ground instruction in at least-

(i) the fundamental principles of the learning process;

(ii) elements of effective teaching, instruction methods, and techniques;

(iii) instructor duties, privileges, responsibilities, and limitations;

(iv) training policies and procedures;

(v) cockpit resource management and crew co-ordination; and

(vi) evaluation techniques.

(3) Each instructor who instructs in a flight simulator or flight training device shall satisfactorily complete an approved course of training in the operation of the flight simulator, and an approved course of ground instruction, applicable to the training courses the instructor is designated to instruct, which shall include-

(i) proper operation of flight simulator and flight training device controls and systems;

(ii) proper operation of environmental and fault panels;

(iii) limitations of simulation; and

(iv) minimum equipment requirements for each curriculum.

(4) Each flight instructor who provides training in an aircraft shall satisfactorily complete an approved course of ground instruction and flight training in an aircraft, flight simulator, or flight training device, which shall include-

(i) performance and analysis of flight training procedures and manoeuvres applicable to the training courses that the instructor is designated to instruct;

(ii) technical subjects covering aircraft subsystems and operating rules applicable to the training courses that the instructor is designated to instruct.

(iii) emergency operations;

(iv) emergency situations likely to develop during training; and

(v) appropriate safety measures.

(5) Each instructor who instructs in flights training equipment shall pass a knowledge test and annual proficiency check-

(i) in the flight training equipment in which the instructor will be instructing; and

(ii) on the subject matter and manoeuvres of a representative segment of each curriculum for which the instructor will be instructing.

(c) In addition to the requirements of paragraphs (a)(1) through (a)(5), each certificate holder shall ensure that each instructor who instructs in a flight simulator that the Authority has approved for all training and all testing for the airline transport pilot licensing test, aircraft type rating test, or both, has met at least one of the requirements of IS:3.2.4.2(b).

(d) The Authority will consider completion of a curriculum required by paragraph (a) or (b) taken in the calendar month before or after the month in which it is due as taken in the month in which it was due for the purpose of computing when the next training is due.

(e) The Authority may give credit for the requirements of paragraph (a) or (b) to an instructor who has satisfactorily completed an instructor training course for a Part 9 certificate holder if the Authority finds such a course equivalent to the requirements of paragraph (a) or (b).

Implementing Standard: See IS: 3.2.4.2. specific testing and training requirements for a Level 2 ATO instructor.

1.2.1.14 3.2.4.5 LEVEL 2 ATO EVALUATOR REQUIREMENTS

(a) Except as provided by paragraph (d), each ATO shall ensure that each person authorised as an evaluator-

(1) is approved by the Authority;

(2) is in compliance with 3.2.4.2, 3.2.4.3, 3.2.4.4 ;

(3) prior to designation, satisfactorily completes a curriculum within 12 months that includes the following-

(i) evaluator duties, functions, and responsibilities;

(ii) methods, procedures and techniques for conducting required tests and checks;

(iii) evaluation of pilot performance; and

(iv) management of unsatisfactory tests and subsequent corrective action; and

(4) if evaluating in-flight training equipment, satisfactorily pass a knowledge test and annual proficiency check in a flight simulator or aircraft in which the evaluator will be evaluating.

(b) For the purpose of computing when evaluator training is due, the Authority will consider that an evaluator who satisfactorily completes a curriculum required by paragraph (a)(3) in the calendar month before or the calendar month after the month in which it was due, to have taken it in the month it was due.

(c) The Authority may give credit for the requirements of paragraph (a)(3) to an evaluator who has satisfactorily completed an evaluator training course for an AOC holder if the Authority finds such a course equivalent to the requirements of paragraph (a)(3).

1.2.1.15 3.2.4.6 LEVEL 1 ATO PERSONNEL

(a) Each applicant for, and holder of, a Level 1 ATO certificate shall have adequate personnel, including licensed flight instructors, licensed ground instructors, and holders of a commercial pilot licence with a lighter-than-air rating, if applicable, and a chief instructor who are qualified and competent to perform the duties assigned in each approved training course.

(b) Each instructor for ground or flight training shall hold a flight instructor licence, ground instructor licence, or commercial pilot licence with a lighter-than-air rating, as appropriate, with ratings for the approved training course and any aircraft used in that course.

1.2.1.17 3.2.4.7 LEVEL 1 ATO CHIEF INSTRUCTOR QUALIFICATIONS

To be designated as a chief instructor for a Level 1 ATO course, a person shall meet one or more of the requirements of IS: 3.2.4.7, as applicable.

Implementing Standard: See IS:3.2.4.7 for chief instructor qualification requirements.

1.2.1.18 3.2.4.8 LEVEL 1 ATO ASSISTANT CHIEF INSTRUCTOR QUALIFICATIONS

To be designated as an assistant chief Instructor for a Level 1 ATO course, a person shall meet the requirements of IS:3.2.4.8.

Implementing Standard: See IS:3.2.4.8 for assistant chief instructor qualification requirements.

1.2.1.19 3.2.4.9 LEVEL 1 ATO CHECK INSTRUCTOR QUALIFICATIONS

To be designated as a check instructor for a Level 1 ATO conducting student stage checks, end-of-course tests, and instructor proficiency checks under this Part, a person shall meet the applicable requirements of IS: 3.2.4.9.

Implementing Standard: See IS:3.2.4.9 for check instructor qualification requirements.

1.2.1.20 3.2.4.10 LEVEL 1 ATO INSTRUCTOR FLIGHT TRAINING

(a) No person other than a licensed flight instructor or commercial pilot with a lighter-than-air rating who has the ratings and the minimum qualifications specified in the approved training course outline may give a student flight training under an approved course of training.

(b) No ATO may authorise a student pilot to start a solo flight until the flight has been approved by an authorised instructor who is present at the place the flight originates.

(c) Each chief instructor and assistant chief instructor assigned to a training course shall complete, at least once every 12 calendar months, an approved syllabus of training consisting of ground or flight training, or both, or an approved flight instructor refresher course.

(d) Each licensed flight instructor or commercial pilot with a lighter-than-air rating who is assigned to a flight training course shall satisfactorily complete the following tasks, which shall be administered by the school's chief instructor, assistant chief instructor, or check instructor-

(1) Prior to receiving authorisation to train students in a flight training course, accomplish-

(i) a review of and a briefing on the objectives and standards of that training course; and

(ii) an initial proficiency check in each make and model of aircraft used in that training course in which that person provides training.

(3) Every 12 calendar months after the month in which the person last complied with paragraph (d)(1)(ii), accomplish a proficiency check in one of the aircraft in which the person trains students.

1.2.1.21 3.2.4.11 LEVEL 1 ATO INSTRUCTOR GROUND TRAINING

(a) Except as provided in paragraph (b), each instructor who is assigned to a ground training course, shall hold a flight or ground instructor licence, or a commercial pilot licence with a lighter-than-air rating with the appropriate rating for that course of training.

(b) A person who does not meet the requirements of paragraph (a) may be assigned ground training duties in a ground training course, if-

(1) the chief instructor who is assigned to that ground training course finds the person qualified to give that training; and

(2) the instructor serves under the supervision of the chief instructor or the assistant chief instructor who is present at the facility when the training is given.

(c) An instructor may not be used in a ground training course until that instructor has been briefed in regard to the objectives and standards of that course by the chief instructor, assistant chief instructor, or check instructor.

1.2.1.22 3.2.4.12 LEVEL 1 ATO CHIEF INSTRUCTOR RESPONSIBILITIES

(a) During training, each Level 1 ATO shall ensure that the chief instructor or an assistant chief instructor is available-

(1) At the level 1 ATO, or

(2) By telephone, radio or other electronic means.

3.2.5 OPERATING RULES

1.2.1.23 3.2.5.1 APPLICABILITY

(a) This section prescribes the operating rules applicable to a certified ATO and operating a course or training program curriculum approved in accordance with this Part.

1.2.1.24 3.2.5.2 PRIVILEGES

(a) A Level 2 ATO certificate holder may allow flight simulator instructors and evaluators to meet recency of experience requirements through the use of a flight simulator or flight training device if that flight simulator or flight training device is used in a course approved in accordance with Section 3.2.5

(b) The holder of an ATO certificate may advertise and conduct approved pilot training courses in accordance with the certificate and any ratings that it holds.

(c) A Level 1 ATO may credit towards the curriculum requirements of a course, previous training and pilot experience and knowledge, provided the student meets the requirements of IS:3.2.5.2.

Implementing Standard: See IS: 3.2.5.2. for specific transfer credit requirements.

1.2.1.25 2.2.5.3 LIMITATIONS: ATO

(a) Each ATO shall-

(1) ensure that a flight simulator or flight training device freeze, slow motion, or repositioning feature is not used during testing or checking; and

(2) Ensure that a repositioning feature is used during line operational simulation for evaluation and line-oriented flight training only to advance along a flight route to the point where the descent and approach phase of the flight begins.

(b) When practical testing, flight checking, or line operational simulation is being conducted, the Level 2 ATO shall ensure that one of the following occupies each supporting crewmember position-

(1) a crewmember qualified as SIC in the aircraft category and class, provided that no flight instructor who is giving instruction may occupy a crewmember position; and

(2) a student, provided that no student may be used in a crewmember position with any other student not in the same specific course.

(c) **Maintenance of personnel, facilities and equipment:** The holder of an ATO certificate may not provide training to a student who is enrolled in an approved course of training unless each airport, all flight training equipment, and each authorised instructor and evaluator continuously meets the requirements and the standards specified in the certificate holder's training specifications.

(d) A certified ATO may not require any student to attend classes of instruction more than 8 hours in any day or more than 6 days or 40 hours in any consecutive 7-day period.

1.2.1.26 3.2.5.4 LIMITATIONS: ENROLLED STUDENTS IN ACTUAL FLIGHT CURRICULA

Each student pilot shall carry the following items on each aircraft used for flight training and solo flights-

(1) a pre-takeoff and pre-landing checklist; and

(2) the operator's handbook or AFM for the aircraft if one is furnished by the manufacturer or copies of the handbook to each student using the aircraft.

1.2.1.27 3.2.5.5 LEVEL 1 ATO ENROLMENT DOCUMENTS

(a) The holder of a Level 1 ATO certificate shall furnish each student, upon enrolment, with a copy of the following:

(1) A certificate of enrolment containing-

(i) the name of the course in which the student is enrolled; and

(ii) the date of that enrolment.

(2) A copy of the student's training syllabus.

(3) For pilot students, a copy of the safety procedures and practices that describe-

(i) the use of facilities and the operation of its aircraft;

(ii) the weather minimums required by the school for dual and solo flights;

(iii) the procedures for starting and taxing aircraft on the ramp;

(iv) fire precautions and procedures;

(v) re-dispatch procedures after unprogrammed landings, on and off airports;

(vi) aircraft discrepancies and write-offs;

(vii) securing of aircraft when not in use;

(viii) fuel reserves necessary for local and cross-country flights;

(ix) avoidance of other aircraft in flight and on the ground;

(x) minimum altitude limitations and simulated emergency landing instructions; and

(xi) a description of and instructions regarding the use of assigned practice areas.

(4) The holder of Level 1 ATO certificate shall maintain a monthly listing of persons enrolled in each training course offered by the school.

(b) Each level 1 ATO applicant shall ensure that each training course for which it seeks approval meets the minimum curriculum requirements.

Implementing Standard: See IS: 3.2.5.5. for level 1 training course contents.

3.3 OTHER CREW MEMBERS

3.3.1 SPECIAL CURRICULA

An applicant for, or holder of, an ATO certificate may apply for approval to conduct a special course of airman training for which a curriculum is not prescribed in the implementing standards, if the applicant shows that the training course contains features that could achieve a level of pilot proficiency equivalent to that achieved by a training course prescribed in the requirements of Part 2, as applicable.

1.3 3.4 AIRMEN OTHER THAN FLIGHTCREW

1.3.1.13.4.1 Other than AME Courses

1.3.1.23.4.1.1 APPLICABILITY

(a) This Subpart provides an alternative means to accomplish flight training required by Parts 2 or 9.

(b) Certification under this Subpart is not required for training that is-

(1) approved under the provisions of Part 9; and

(2) conducted under Part 2, unless that Part requires certification under this Part.

1.3.1.33.4.1.2 OTHER TRAINING COURSES

(a) The Authority may approve the following courses of instruction to an applicant for, or holder of an ATO certificate, provided the applicant meets the applicable requirements of 3.1.2.2(d):

(1) Flight operations officer.

(2) Flight engineer.

(3) Cabin Crew.

(4) Material handlers.

(5) Ground servicing personnel.

(6) Security personnel.

(7) Others approved by the Authority.

(b) The Authority will approve a course for which the application is made if the ATO, or ATO applicant, shows that the course contains a curriculum that will achieve a level of competency equal to, or greater than, that required by the applicable Parts of these regulations.

1.3.1.43.4.1.3 FLIGHT OPERATIONS OFFICER TRAINING COURSE

(a) Application. An ATO proposing to train flight operations officers shall submit an application containing-

(1) instruction in the areas of knowledge and topics;

(2) a minimum of 200 total course hours; and

(3) an outline of the major topics and subtopics to be covered and the number of hours proposed for each.

(b) Duration and renewal.

(1) The authority to operate an aircraft flight operations officer-licensing course expires 24 months after the last day of the month of issuance by the Authority.

(2) The holder of an approval for an aircraft flight operations officer-licensing course shall apply to the Authority for renewal within 30 days prior to the expiration date.

(c) Instruction.

(1) The holder of a course approval shall ensure that it maintains an adequate number of instructors who maintain a 24 calendar-month average of at least 80 percent of the graduates of that school passing the practical test on the first attempt.

Implementing Standard: See IS: 3.2.5.5. for course approval requirements.

1.3.1.53.4.1.4 FLIGHT ENGINEER TRAINING COURSE

(a) The Authority may approve a Flight Engineer course of instruction to an applicant for, or holder of an ATO certificate, provided the applicant meets the requirements of IS: 3.2.1.1 Appendix M.

Implementing Standard: See IS: 3.2.1.1. Appendix M, for Flight Engineer Training Course Requirements.

3.4.2 AME TRAINING COURSES

1.3.1.63.4.,2.1 APPLICABILITY

(a) This Subpart prescribes the requirements for-

(1) issuing ATO certificates and ratings;

(2) conducting licensing courses and associated ratings for AMEs; and

(3) instructing the general operating rules for the holders of AME licenses and ratings.

1.3.1.73.4.2.2 AME TRAINING COURSES

(a) The Authority may approve the following courses of instruction to an applicant for or holder of ATO certificate provided the applicant meets the requirements of 3.1.2.2

(1) Airframe and Powerplant rating; and

(2) Avionics rating

1.3.1.83.4.2.3 GENERAL CURRICULUM REQUIREMENTS

(a) Each ATO shall have an approved curriculum that is designed to qualify its students to perform the duties of an AME for a particular rating or ratings.

(b) The curriculum shall offer the required module and appropriate levels of instruction for the rating sought.

(c) The curriculum shall cover the subjects and items prescribed in IS: 3.4.2.3.

(d) Each ATO shall teach each subject to at least the indicated level of proficiency defined in the applicable appendix to IS:3.4.2.3.

(e) The certificate holder shall maintain a curriculum that shows-

(1) the required practical projects to be completed;

(2) for each subject, the proportions of theory and other instructions to be given; and

(3) a list of the minimum required tests to be given.

(f) Each ATO may issue AME licences of competency to persons successfully completing specialty courses provided that all requirements are met and the licenses of competency specifies the aircraft make and model to which the licence applies.

Implementing Standard: See IS: 3.4.2.3, for applicable AME course curriculum subjects and items.

1.3.1.93.4.2.4 AME TRAINING PROGRAM PROVIDERS

(a) The holder of a training organisation applicant may apply to the Authority for approval for an AME training program.

(b) An AOC holder, an AMO, or an ATO may apply to the Authority for approval for an AME training program that meets the requirements of this Subpart.

Implementing Standard: See IS: 3.4.2.3, for AME training program curriculum requirements.

1.3.1.10 3.4.2.5 INSTRUCTOR REQUIREMENTS

(a) Each ATO shall provide the number of instructors holding appropriate licenses and ratings, issued under Part 2, Section 2.4.4, that the Authority determines is necessary to provide adequate instruction and supervision of the students, including at least one such instructor for each 25 students in each class held in a shop where students are performing actual tasks appropriate to the curriculum.

(b) An ATO may provide specialised instructors, who are not licensed in accordance with Part 2, to teach mathematics, physics, basic electricity, basic hydraulics, drawing and similar subjects.

(c) Each ATO shall maintain a list of the names and qualifications of such specialised instructors, and upon request, provide a copy of the list, with a summary of the qualifications of each specialised instructor to the Authority.

1.3.1.11 3.4.2.6 ATTENDANCE AND CREDIT FOR PRIOR INSTRUCTION OR EXPERIENCE

(a) An ATO may credit a student with instruction or previous experience as follows:

(1) Instruction satisfactorily completed at-

(i) an accredited university, college or junior college;

(ii) an accredited vocational, technical, trade or high school;

(iii) a military technical school; or

(iv) an ATO.

(2) Previous aviation maintenance experience comparable to required curriculum subjects-

(i) by determining the amount of credit to be allowed by documents verifying previous experience; and

(ii) by giving the student a test equal to the one given to students who complete the comparable required curriculum subject at the ATO.

(3) Credit to be allowed for previous instruction-

(i) by an entrance test equal to one given to the students who complete a comparable required curriculum subject at the crediting ATO;

(ii) by an evaluation of an authenticated transcript from the student's former school; or

(iii) in the case of an applicant from a military school, only on the basis of an entrance test.

(4) A certificate holder may credit a student seeking an additional rating with previous satisfactory completion of the general portion of an AME's curriculum.

(b) Each ATO shall show hours of absence allowed and how it will make missed material available to the student.

1.4IS: 3.1.2.2 APPLICATION FOR ISSUANCE OR AMENDMENT OF ATO CERTIFICATE

(a) Each applicant for an ATO certificate and training specification shall provide to the Authority the following information:

(1) A statement showing that the minimum qualification requirements for each management position are met or exceeded.

(2) A statement acknowledging that the applicant may notify the Authority within 10 working days of any change made in the assignment of persons in the required management positions.

(3) The proposed training specifications requested by the applicant.

(4) The proposed evaluation authorisation.

(5) A description of the flight training equipment that the applicant proposes to use.

(6) A description of the applicant's training facilities, equipment, qualifications of personnel to be used and proposed evaluation plans.

(7) A training program curriculum, including syllabi, outlines, courseware, procedures and documentation to support the items required in 3.1.2.3, upon request by the Authority.

(8) A description of a record keeping system that will identify and document the details of training, qualification, licensing of students, instructors and evaluators.

(9) A description of quality control measures proposed.

(10) A method of demonstrating the applicant's qualification and ability to provide training for a licence or rating in fewer than the minimum hours prescribed in Part 2 if the applicant proposes to do so.

1.5 IS: 3.1.3.1 FACILITIES FOR AME COURSES

(a) An applicant for, and holder of, an ATO certificate shall have facilities the Authority determines are appropriate for the maximum number of students expected to be taught at any time, as follows:

(1) An enclosed classroom.

(2) Suitable facilities arranged to assure proper separation from the working space, for parts, tools, materials and similar articles.

(3) Suitable area for application of finishing materials, including paint spraying.

(4) Suitable areas equipped with wash tank and degreasing equipment with air pressure or other adequate cleaning equipment.

(5) Suitable facilities for running engines.

(6) Suitable area with adequate equipment, including benches, tables and test equipment, to disassemble, service and inspect-

(i) Ignition systems, electrical equipment, avionics equipment and appliances;

(ii) Carburetors and fuel systems; and

(iii) Hydraulic and vacuum systems for aircraft, aircraft engines, and their appliances.

(7) Suitable space with adequate equipment, including tables, benches, stands and jacks for disassembling, inspecting and rigging aircraft.

(8) Suitable space with adequate equipment for disassembling, inspecting, assembling, troubleshooting and timing engines.

1.6 IS: 3.2.1.1 APPENDIX A: PRIVATE PILOT LICENSING COURSE

(a) Applicability. Appendix A prescribes the minimum curriculum for a private pilot licensing course with the following ratings-

(1) Aeroplanes single-engine;

(2) Aeroplane multiengine;

(3) Rotorcraft helicopter;

(4) Rotocraft gyroplane;

(5) Powered-lift;

(6) Glider;

(7) Lighter-than-air airship; and

(8) Lighter-than-air balloon;

(b) Eligibility for enrolment. A person shall hold a student pilot license prior to enrolling in the flight portion of the private pilot licensing course.

(c) Aeronautical knowledge training.

(1) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each approved course includes at least the following hours of ground training on the following aeronautical knowledge areas, appropriate to the aircraft category and class rating-

(i) 40 hours for an aeroplane, rotorcraft, or powered-lift category rating;

(ii) 15 hours for a glider category rating;

(iii) 10 hours for a lighter-than-air category with a balloon class rating; and

(iv) 35 hours for a lighter-than-air category with an airship class rating.

(2) Ground training shall include the following aeronautical knowledge areas-

(i) Applicable Sierra Leone regulations for private pilot privileges, limitations, and flight operations;

(ii) Accident reporting requirements of

(iii) Applicable subjects of the Authority provided aeronautical information publications;

(iv) Aeronautical charts for VFR navigation using pilotage, dead reckoning, and navigation systems;

(v) Radio communication procedures;

(vi) Recognition of critical weather situations from the ground and in flight, windshear avoidance, and the procurement and use of aeronautical weather reports and forecasts;

(vii) Safe and efficient operation of aircraft, including collision avoidance, and recognition and avoidance of wake turbulence;

(viii) Effects of density altitude on takeoff and climb performance;

(ix) Weight and balance computations;

(x) Human performance relevant to private pilot-aeroplanes

(xi) Principles of aerodynamics, powerplants, and aircraft systems;

(xii) If the training course is for an aeroplane category or glider category rating, stall awareness, spin entry, spins, and spin recovery techniques;

(xiii) Aeronautical decision making and judgement

(xiv) Pre-flight action that includes-

(A) Obtaining information on runway lengths, data on takeoff and landing distances, weather reports and forecasts, and fuel requirements; and

(B) Planning for alternatives if a planned flight cannot be completed or delays are encountered.

(d) Flight training.

(1) Each applicant for, and holder of, and ATO certificate with this rating shall include at least the following hours of flight training on the areas of operation listed in paragraph (d), appropriate to the aircraft category and class rating-

(i) 40 hours for an aeroplane, rotorcraft, powered-lift, or
airship rating;

(ii) 6 hours for a glider rating, and

(iii) 8 hours for balloon rating

(2) Each applicant for, and holder of, an ATO certificate with this rating shall include at least the following hours of flight training in each course-

(i) For each category and class, unless otherwise noted, 20 hours from a licensed flight instructor on the applicable areas of operation that includes at least-

(A) 3 hours of cross-country flight training in the category and class involved;

(B) 3 hours of night training in the category and class involved that includes:-

(I) One cross-country flight of more than 100 nautical miles total distance; and

(II) 10 take-offs ad 10 landings to a full stop (with each landing involving a flight in the traffic pattern)

(C) 3 hours of instrument training in the category and class involved; and

(D) 3 hours in the category and class involved in preparation for the practical test within 60 days preceding the date of the test.

(3) Specific training for other categories and classes as shown;

(i) **For a rotorcraft-helicopter and gyroplane course**:

(A) 3 hours of night flight training in a helicopter that includes one cross-country flight of more than 50 nautical miles total distance.

(ii) For a glider course:
4 hours from a licensed flight instructor on the areas of operation in paragraph (e)(6) that includes at least-

(A) Five training flights in a glider on launch/tow procedures approved for the course and in the applicable areas of operation listed in paragraph (e)(6); and

(B) Three training flights in a glider in preparation for the practical test within 60 days preceding the date of the test.

(iii) For a lighter-than-air airship course:
20 hours from a commercial pilot with an airship rating on the areas of operation in paragraph (e)(7) that includes at least-

(A) The training shown in a paragraph (c)(1)(iv), taken in a lighter-than-air airship;

(B) 3 hours of night flight training in an airship that includes-

(I) One cross-country flight over 25 nautical-miles total distance, and

(II) Five takeoffs and five landings to a full stop (with each landing involving a flight in the traffic pattern).

(iv) For a lighter-than-air balloon course:
8 hours, including at least five flights, from a commercial pilot with a balloon rating on the areas of operation in paragraph (e)(8), that includes-

(A) If the training is being performed in a gas balloon-

(I) Two flights of 1 hour each;

a. One flight involving a controlled ascent to 3000 ft (914.4 meters) above the launch site; and

(II) Two flights in preparation for the practical test within 60 days preceding the date of the test.

(B) If the training is being performed in a balloon with an airborne heater-

(I) Two flights of 30 minutes each;

a. One flight involving a controlled ascent to 2000 ft (609.6) meters above the launch site; and

(II) Two flights in preparation for the practical test within 60 days preceding the date of the test.

(4) Each approved course shall include flight training in the following areas of operation that are applicable to the aircraft category and class rating-

(i) Preflight preparation;

(ii) Preflight procedures;

(iii) Airport and seaplane base operations;

(iv) Take-offs, landings and go-arounds

(v) Performance manoeuvres

(vi) Ground reference manoeuvres;

(vii) Navigation;

(viii) Slow flight and stalls;

(ix) Basic instrument manoeuvres;

(x) Emergency operations;

(xi) Night operations; and

(xii) Post flight procedures.

(5) In addition, for the specific category and class of aircraft shown, each approved course shall include the applicable flight training in the following areas of operation:

(i) For a multi-engine aeroplane course-

(A) multi-engine operations.

(ii) For a rotorcraft-helicopter course-

(A) hovering manoeuvres.

(iii) For a rotorcraft- gyroplane course-

(A) flight at slow airspeeds.

(iv) For a powered-lift course-

(A) hovering manoeuvres.

(v) For a glider course-

(A) launches/tows, as appropriate and landings;

(B) performance speeds; and

(C) soaring techniques.

(vi) For a lighter-than-air balloon course-

(A) launches and landings.

(e) Solo flight training. Each approved course shall include at least the following solo flight training-

(1) For an aeroplane single-engine course: 5 hours of solo flight training in a single-engine aeroplane on the applicable areas of operation in paragraph (d) that includes at least-

(i) One solo cross-country flight of at least 100 nautical miles with landings at a minimum of three points, and one segment of the flight consisting of a straight-line distance of at least 50 nautical miles between the takeoff and landing locations; and

(ii) Three takeoffs and three landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower.

(2) For an aeroplane multi-engine course: 5 hours of flight training in a multi-engine aeroplane performing the functions of a pilot in command while under the supervision of a licensed flight instructor. The training shall consist of the applicable areas of operation in paragraph (d) and include at least-

(i) One cross-country flight of at least 100 nautical miles with landings at a minimum of three points, and one segment of the flight consisting of a straight-line distance of at least 50 nautical miles between the takeoff and landing locations; and

(ii) Three takeoffs, and three landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower.

(3) For a rotorcraft- helicopter course: 5 hours of solo flight training in a helicopter on the areas of operation in paragraph (d) that includes at least-

(i) One solo cross-country flight of more than 50 nautical miles with landings at a minimum of three points, and one segment of the flight consisting of a straight-line distance of at least 25 nautical miles between the takeoff and landing locations; and

(ii) Three takeoffs and three landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower.

(4) For a rotorcraft gyroplane course: 5 hours of solo flight training in gyroplanes on the applicable areas of operation in paragraph (d) that includes at least-

(i) One solo cross-country flight of more than 50 nautical miles with landings at a minimum of three points, and one segment of the flight consisting of a straight-line distance of at least 25 nautical miles between the takeoff and landing locations; and

(ii) Three takeoffs and three landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower.

(5) For a powered-lift course: 5 hours of solo flight training in a powered-lift on the applicable areas of operation in paragraph (d) that includes at least-

(i) One solo cross-country flight of at least 100 nautical miles with landings at a minimum of three points, and one segment of the flight consisting of a straight-line distance of at least 50 nautical miles between the takeoff and landing locations;

(ii) Three takeoffs and three landings to a full stop (with each landing involving a flight in the traffic pattern) at an airport with an operating control tower; and

(iii) Transition from hover to forward flight using wing lift.

(6) For a glider course: Two solo flights in a glider on the applicable areas of operation in paragraph (d) and the launch and tow procedures appropriate for the approved course.

(7) For a lighter-than-air airship course: 5 hours of flight training in the applicable areas of operation shown in paragraph (d) in an airship performing the functions of pilot in command while under the supervision of a commercial pilot with an airship rating.

(8) For a lighter-than-air balloon course: Training on the applicable areas of operation in paragraph (d), as applicable, and-

(i) Two solo flights in a balloon with an airborne heater; or

(ii) At least two flights in a gas balloon performing the functions of pilot in command while under the supervision of a commercial pilot with a balloon rating.

(f) Stage checks and end-of-course tests.

(1) Each student, to graduate from a private pilot course shall satisfactorily accomplish the stage checks and end-of-course tests, consisting of the applicable areas of operation listed in paragraph (d) for the aircraft category and class rating.

(2) Each student shall demonstrate satisfactorily proficiency prior to being endorsed to operate an aircraft in solo flight.

1.7IS: 3.2.1.1 APPENDIX B: INSTRUMENT RATING COURSE

(a) Applicability. This appendix prescribes the minimum curriculum for an instrument rating course and additional instrument rating course, required under this Part, for the following ratings:

(1) Instrument: aeroplane.

(2) Instrument: helicopter.

(3) Instrument: powered-lift.

(b) Eligibility for enrolment: A person shall hold at least a private pilot licence with an aircraft category and class rating appropriate to the instrument rating for which the course applies prior to enrolling in the flight portion of the instrument rating course.

(c) **Aeronautical knowledge training.**

(1) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each approved course includes at least the following hours of ground training on the aeronautical knowledge areas appropriate to the instrument rating sought-

(i) 30 hours for an initial instrument rating.

(ii) 20 hours for an additional instrument rating.

(2) Ground training shall include the following aeronautical knowledge areas-

(i) Applicable Civil Aviation Regulations for IFR flight operations;

(ii) Appropriate information in the 'Aeronautical Information Publication';

(iii) Air traffic control system and procedures for instrument flight operations;

(iv) IFR navigation and approaches by use of navigation systems;

(v) Use of IFR enroute and instrument approach procedure charts;

(vi) Procurement and use of aviation weather reports and forecasts, and the elements of forecasting weather trends on the basis of that information and personal observation of weather conditions;

(vii) Safe and efficient operation of aircraft under instrument flight rules and conditions;

(viii) Recognition of critical weather situations and windshear avoidance;

(ix) Aeronautical decision making and judgment; and

(x) Crew resource management, to include crew communication and coordination.

(d) **Flight training**

(1) Each approved course must include at least the following flight training on the approved areas of operation appropriate to the instrument-aircraft category and class rating for which the course applies.

(i) 35 hours of instrument training if the course is for an initial instrument rating;

(ii) 15 hours of instrument training if the course is for an additional instrument rating;

Note: *For the use of flight simulators or flight training devices - the course may include training in a flight simulator or flight training device, provided it is representative of the aircraft for which the course is approved, meets the requirement of this paragraph and the training is given by an authorised instructor.*

(2) Training in a flight simulator that meets the requirements of CAR 3.2.2.4 may be credited for a maximum of 50 percent of the total flight training hour requirements of the approved course, or of this section, whichever is less.

(3) **For an instrument aeroplane course:**

Instrument training time from a certificated flight instructor with an instrument rating on the approved areas of operation including at least one cross-country flight that-

(i) Is in the category and class of aeroplane that the course is approved for, and is performed under IFR;

(ii) Is a distance of at least 100 nautical miles along airways or ATC-directed routing with one segment of the flight consisting of at least a straight-line distance of 50 nautical miles between airports;

(iii) Involves an instrument approach at each airport; and

(iv) Involves three different kinds of approaches with the use of navigation systems.

(4) **For an instrument helicopter course:**

Instrument training time from a certificated flight instructor with an instrument rating on the approved areas of operation including at least one cross-country flight that –

(i) Is in the helicopter and is performed under IFR;

(ii) Is a distance of at least 100 nautical miles along airways or ATC-directed routing with one segment of the flight consisting of at least a straight-line distance of 50 nautical miles between airports;

(iii) Involves an instrument approach at each airport; and

(iv) Involves three different kinds of approaches with the use of navigation systems.

(5) **For an instrument powered-lift course:** Instrument training time from a certificated flight instructor with an instrument rating on the approved areas of operation including at least one cross-country flight that –

(i) Is in powered-lift and is performed under IFR;

(ii) Is a distance of at least 250 nautical miles along airways or ATC-directed routing with one segment of the flight consisting of at least a straight-line distance of 100 nautical miles between airports;

(iii) Involves an instrument approach at each airport; and

(v) Involves three different kinds of approaches with the use of navigation systems.

(6) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes the flight training on the applicable areas of operation listed in this paragraph appropriate to the instrument aircraft category and class rating-

(i) Preflight preparation;

(ii) Preflight procedures;

(iii) Air traffic control clearances and procedures;

(iv) Flight by reference to instruments;

(v) Navigation systems;

(vi) Instrument approach procedures;

(vii) Emergency operations; and

(viii) post flight procedures

(e) **Stage checks and end-of-course tests**.

(1) Each student, to graduate from an instrument rating course shall satisfactorily accomplish the stage checks and end-of-course tests, consisting of the areas of operation listed in paragraph (c) that are appropriate to the aircraft category and class rating.

1.8IS: 3.2.1.1 APPENDIX C: COMMERCIAL PILOT LICENSING COURSE

(a) **Applicability**. This appendix prescribes the minimum curriculum for a commercial pilot licence course required under this Part, for the following ratings:

(1) Aeroplanes single-engine.

(2) Aeroplane multi-engine

(3) Rotorcraft helicopter.

(4) Rotocraft gyroplane.

(5) Powered-lift

(6) Glider

(7) Lighter-than-air airship.

(8) Lighter-than-air balloon.

(b) **Eligibility for enrolment**. A person shall hold the following prior to enrolling in the flight portion of the commercial pilot licence course-

(1) At least a private pilot licence; and

(2) If the course is for a rating in an aeroplane or a powered-lift category-

(i) Hold an instrument rating in the aircraft that is appropriate to the aircraft category rating for which the course applies; or

(ii) Be enrolled concurrently in an instrument rating course that is appropriate to the aircraft category rating for which the course applies and pass the required instrument rating practical test prior to completing the commercial pilot licence course.

(c) **Aeronautical knowledge training.**

(1) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes at least the following ground training on the applicable aeronautical knowledge areas listed in paragraph (b).

(i) 65 hours of an aeroplane category rating, powered-lift category rating, or a lighter-than-air category with an airship class rating.

(ii) 30 hours for a rotorcraft category rating.

(iii) 20 hours for a glider category rating.

(iv) 20 hours for a lighter-than-air category with a balloon class rating

(2) Ground training shall include the following aeronautical knowledge areas.

(i) Civil Aviation regulations that apply to commercial pilot privileges, limitations and flight operations.

(ii) Accident reporting requirements of Sierra Leone .

(iii) Basic aerodynamics and the principles of flight.

(iv) Meteorology, to include recognition of critical weather situations, windshear recognition and avoidance, and the use of aeronautical weather reports and forecasts.

(v) Safe and efficient operation of aircraft.

(vi) Weight and balance computations.

(vii) Use of performance charts.

(viii) Significance and effects of exceeding aircraft performance limitations.

(ix) Use of aeronautical charts and a magnetic compass for pilotage and dead reckoning.

(x) Use of air navigation facilities.

(xi) Aeronautical decision making and judgement.

(xii) Principles and functions of aircraft systems.

(xiii) Manoeuvres, procedures, and emergency operations appropriate to the aircraft.

(xiv) Night and high-altitude operations.

(xv) Description of and procedures for operating within the Sierra Leone Airspace System.

(xvi) Procedures for flight and ground training for lighter-than-air ratings.

(xvii) Human performance and limitations

(d) **Flight training**

(1) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes at least the following flight training on the applicable areas of operation listed in paragraph (c):

(i) 155 hours of an aeroplane, powered-lift, or an airship rating.

(ii) 115 hours for a rotorcraft rating.

(iii) 6 hours for a glider rating.

(iv) 10 hours and 8 training flights for a balloon rating.

(2) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes at least the following flight training-

(i) **For an aeroplane single-engine course**: 55 hours of flight training from licensed flight instructor on the areas of operation listed in paragraph (c) (1) that includes at least-

(I) 5 hours instrument training in a single-engine aeroplane;

(II) 10 hours of training in a single-engine aeroplane that has retractable landing gear, flaps, and a controllable pitch propeller, or is turbine-powered;

(III) One cross-country flight in single-engine aeroplane of a least a 2-hour duration, a total straight-line distance of more than 100 nautical miles from the original point of departure, and occurring in day VFR conditions;

(IV) One cross-country flight in a single-engine aeroplane of at least a 2-hour duration, a total straight-line distance of more than 100 nautical miles from the original point of departure and occurring in night VFR conditions; and

(V) 3 hours in a single-engine aeroplane in preparation for the practical test within 60 days preceding the date of the test.

(ii) **For an aeroplane multi-engine course:** The flight training shown in paragraph (d)(1), accomplished in a multi-engine aeroplane.

(iii) **For a rotorcraft helicopter and gyroplane course -**

(I) The flight training shown in paragraph (d)(1), accomplished in a helicopter; except 30 hours of flight training from a licensed flight instructor on the areas of operation listed in paragraph (e)(3) that includes at least-

a. 5 hours of instrument training;

b. One cross-country flight in a helicopter of at least a 2-hours duration, a total straight-line distance of more than 50 nautical miles from the original point of departure, and occurring in day VFR conditions; and

c. One cross-country flight in a helicopter of at least a 2-hour duration, a total straight-line distance of more than 50 nautical miles from the original point of departure, and occurring in night VFR conditions.

(iv) **For a powered-lift course:** The applicable flight training shown in paragraph (d)(1), flown

in a powered-lift aircraft.

(v) **For a glider course:** 4 hours of flight training from a licensed flight instructor on the areas of operation in paragraph (e)(6), that includes at least-

(A) Five training flights in a glider on launch/tow procedures approved for the course and on the appropriate areas of operation listed in paragraph (e)(6); and

(B) Three training flights in a glider in preparation for the practical test within the 60 days preceding the date of the test.

(vi) **For a lighter-than-air airship course:** 55 hours of training in airships from a commercial pilot with an airship rating on the areas of operation in paragraph (c)(7) that includes at least-

(A) 3 hours of instrument training in an airship;

(B) One cross-country flight in an airship of at least a 1-hour duration, a total straight-line distance of more than 25 nautical miles from the original point of departure, and occurring in day VFR conditions; and

(C) One cross-country flight in an airship of at least a 1-hour duration, a total straight-line distance of more than 25 nautical miles from the original point of departure, and occurring in night VFR conditions; and

(D) 3 hours in an airship, in preparation for the practical test within 60 days preceding the date of the test.

(vii) **For a lighter-than-air balloon course**: Flight training form a commercial pilot with a balloon rating on the areas of operation in paragraph

(e)(8) that includes at least-

(A) For a gas balloon-

(I) Two flights of 1 hour each;

(II) One flight involving a controlled ascent to at least 5000ft. above the launch site; and

(III) Two flights in preparation for the practical test within 60 days preceding the date of the test.

(B) For a balloon with an airborne heater-

(I) Two flights of 30 minutes each;

a. One flight involving a controlled ascent to at least 3000ft. above the launch site; and

b. Two flights in preparation for the practical test within 60 days preceding the date of the test.

(3) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes the flight training on the following areas of operation, as applicable-

(i) For an aeroplane singled-engine course-

(A) Preflight preparation;

(B) Preflight procedures;

(C) Airport and seaplane base operations;

(D) Takeoffs, landings, and go-arounds;

(E) Performance manoeuvres;

(F) Navigation;

(G) Slow flight and stalls;

(H) Emergency operations;

(I) High-altitude operations, and

(J) Post flight procedures.

(4) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course for the following category and class ratings includes flight training on the applicable areas of operation:

(i) For an aeroplane multi-engine course-

(A) Multi-engine operations.

(ii) For a rotorcraft helicopter course-

(A) Hovering manoeuvres;

(B) Transition to wing-borne flight;

(C) Transition to hover; and

(D) Special operations.

(iii) For a rotorcraft gyroplane course-

(A) Flight at slow airspeeds

(iv) For a powered-lift course-

(A) Hovering manoeuvres; and

(B) Special operations.

(v) For a glider course-

(A) Launches/tows, as appropriate and landings, and

(B) Soaring techniques.

(vi) For lighter-than-air airship course-

(A) Fundamentals of instructing;

(B) Technical subjects; and

(C) Preflight lessons on a manoeuvre to be performed in flight.

(vii) For a lighter-than-air balloon course-

(A) Fundamentals of instructing;

(B) Technical subjects;

(C) Preflight lesson on a manoeuvre to be performed in flight; and

(D) Launches and landings.

(e) **Solo training.** Each applicant for, and holder of, a Level 1 ATO certificate, shall ensure that each approved course includes at least the following solo flight training-

(1) For an aeroplane single-engine course: 10 hours of solo flight training in a single-engine aeroplane on the area of operation in paragraph (d)(3)(i) that include at least-

(i) One cross-country flight, if the training is being performed on a small island, with landings at a minimum of three points, and one of the segments consisting of a straight-line distance of at least 150 nautical miles;

(ii) One cross-country flight, if the training is being performed on other than a small island, with landings at a minimum of three points, and one segment of the flight consisting of a straight-

line distance of at least 250 nautical miles; and

(iii) 5 hours in night VFR conditions with 10 takeoffs and 10 landings with each landing involving a flight with a traffic pattern at an airport with an operating control tower.

(2) For an aeroplane multiengine courses: 10 hours of flight training in a multiengine aeroplane performing the functions of pilot in command while under supervision of a licensed flight instructor, consisting of the areas of operation in paragraph (d)(4)(i) that include at least-

(i) One cross –country flight, if the training is being performed on a small island, with landings at a minimum of three points, and one of the segments consisting of a straight-line distance of at least 150 nautical miles;

(ii) One cross-country flight, if the training is being performed on a small island with landings at a minimum of three points and one segment of the flight consisting of straight-line distance of at least 250 nautical miles; and

(iii) 5 hours in night VFR conditions with 10 takeoffs and 10 landings with each landing involving a flight with a traffic pattern at an airport with an operating control tower.

(3) For a rotorcraft - helicopter course: 10 hours of solo flight training in a helicopter on the areas of operation in paragraph (d)(4)(ii) that include at least-

(i) One cross-country flight with landings at a minimum of three points and one segment of the flight consisting of a straight-line distance of at least 50 nautical miles from the original

point of departure; and

(ii) 5 hours in night VFR conditions with 10 takeoffs and 10 landings involving a flight with a traffic pattern at an airport with an operating control tower.

(4) For a rotorcraft - gyroplane course: 10 hours of solo flight training in a gyroplane on the areas of operation in paragraph (d)(4)(iii) that include at least-

(i) One cross-country flight with landings at a minimum of three points and one segment of the flight consisting of a straight-line distance of at least 50 nautical miles from the original point of departure; and

(ii) 5 hours in night VFR conditions with 10 takeoffs and 10 landings with each landing involving a flight with a traffic pattern at an airport with an operating control tower.

(5) For a powered-lift course: 10 hours of solo flight training in a powered-lift on the areas of operation in paragraph (d)(4)(iv) that include at least-

(i) One cross-country flight, if the training is being performed on a small island, with landings at a minimum of three points, and one segment of the flight consisting a straight-line distance of at least 150 nautical miles;

(ii) One cross-country flight, it the training is being performed on a small island, with landings at a minimum of three points, and one segment of the flight consisting of straight-line distance of at least 250 nautical miles; and

(iii) 5 hours in night VFR conditions with 10 takeoffs and 10 landings with each landing involving a flight with a traffic pattern at an

airport with an operating control tower.

(6) For a glider course: 5 solo flights in a glider in the areas of operation in paragraph (d)(4)(v).

(7) For a lighter-than-air airship course: 10 hours of flight training in an airship, while performing the functions of pilot-in- command under the supervision of a commercial pilot with an airship rating consisting of the areas of operation in paragraph (d)(4)(vi) that include at least-

(i) One cross-country flight with landings at a minimum of three points, and one segment of the flight consisting of a straight-line distance of at least 25 nautical miles from the original point of departure; and

(ii) 5 hours in night VFR conditions with 10 takeoffs and 10 landings with each landing involving a flight with a traffic pattern.

(8) For a lighter-than-air balloon course:

(i) Training on the applicable areas of operation in paragraph (d)(4)(vii), while performing the duties of pilot in command under the supervision of a commercial pilot with a balloon rating.

(ii) Two solo flights if the course is for a hot air balloon rating.

(iii) At least two flights in a gas balloon for a gas balloon rating.

(f) Stage checks and end-of-course tests:

(1) Each student, to graduate from a commercial pilot course, shall satisfactorily accomplish the stage checks and end-of-course tests consisting of the applicable areas of operation listed in paragraph

(d)(4)

(2) Each student shall demonstrate satisfactory proficiency prior to being endorsed to operate an aircraft in solo flight.

1.9IS: 3.2.1.1 APPENDIX D: AIRLINE TRANSPORT PILOT LICENSING COURSE

(a) Applicability. This appendix prescribes the minimum curriculum for an airline transport pilot licensing course under this Part, for the following ratings-

(1) Aeroplane single-engine.

(2) Aeroplane multi-engine.

(3) Rotorcraft helicopter.

(4) Powered-lift.

(b) Eligibility for enrolment. Prior to enrolling in the flight portion of the airline transport pilot licensing course, a person shall-

(1) Meet the aeronautical experience requirements prescribed in Part 2, Subpart 2.2.5 for an airline transport pilot licence that is appropriate to the aircraft category and class rating for which the course applies;

(2) Hold at least a commercial pilot license and an instrument rating;

(3) Meet the military experience requirements under 2.2.3. to qualify for a commercial pilot license and an instrument rating, if the person is a rated military pilot or former rated military pilot of the Sierra Leone

Armed Forces; or

(4) Hold a foreign airline transport pilot license or foreign commercial pilot license and an instrument rating, issued by a contracting State to the Convention on International Civil Aviation.

(c) Aeronautical knowledge areas.

(1) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes at least 40 hours of ground training on the applicable aeronautical knowledge areas listed in paragraph (b).

(2) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that ground training includes the following aeronautical knowledge areas-

(i) Applicable Civil Aviation regulations that relate to airline transport pilot privileges, limitations, and flight operations;

(ii) Meteorology, including knowledge of and effects of fronts, frontal characteristics, cloud formations, icing, and upper-air data;

(iii) General system of weather and NOTAM collection, dissemination, interpretation, and use;

(iv) Interpretation and use of weather charts, maps, forecasts, sequence reports, abbreviations, symbols;

(v) Sierra Leone Weather Service functions as they pertain to operations in the Sierra Leone Airspace System;

(vi) Windshear and microburst awareness,

identification, and avoidance;

(vii) Principles of air navigation under instrument meteorological conditions in the Sierra Leone Airspace System;

(viii) Air Traffic control procedures and pilot responsibilities as they relate to enroute operations, terminal area and radar operations, and instrument departure and approach procedures;

(ix) Aircraft loading, weight and balance, use of charts, graphs, tables, formulas, and computations, and the effects on aircraft performance;

(x) Aerodynamics relating to an aircraft's flight characteristics and performance in normal and abnormal flight regimes;

(xi) Human factors relevant relevant to the airline transport pilot;

(xii) Aeronautical decision making and judgement; and

(xiii) Crew resource management to include crew communication and co-ordination.

(d) Flight training.

(1) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes at least 25 hours of flight training on the applicable areas of operation listed in paragraph (d)(2), at least 15 hours of this flight training must be instrument flight training; and

(2) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes flight training on the following areas of operation,

as applicable-

(i) Preflight preparation;

(ii) Preflight procedures;

(iii) Takeoff and departure phase;

(iv) In-flight manoeuvres;

(v) Instrument procedures;

(vi) Landings and approaches to landings;

(vii) Normal and abnormal procedures;

(viii) Emergency procedures; and

(ix) Post flight procedures.

(e) Stage checks and end-of-course tests.

(1) Each student, to graduate from an airline transport pilot course shall satisfactorily accomplish the stage checks and end-of-course tests, consisting of the areas of operation listed in paragraph (d)(2) that are appropriate to the aircraft category and class rating for which the course applies.

1.10 IS:3.2.1.1 APPENDIX E: FLIGHT INSTRUCTOR LICENSING COURSE

(a) Applicability. This appendix prescribes the minimum curriculum for a flight instructor licensing course and an additional flight instructor rating course required under this Part, for the following ratings-

(1) Aeroplane single-engine.

(2) Aeroplane multi-engine.

(3) Rotorcraft helicopter.

(4) Rotorcraft gyroplane

(5) Powered-lift

(6) Glider category

(b) Eligibility for enrolment. A person shall hold the following prior to enrolling in the flight portion of the flight instructor or additional flight instructor rating course-

(1) A commercial pilot licence or an airline transport pilot licence with an aircraft category and class rating appropriate to the flight instructor rating for which the course applies; and

(2) An instrument rating or privilege in an aircraft that is appropriate to the aircraft category and class rating for which the course applies, if the course is for a flight instructor aeroplane or powered-lift instrument rating.

(c) Aeronautical knowledge training.

(1) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes at least the following ground training in the aeronautical knowledge areas listed in paragraph (d)-

(i) 40 hours of training if the course is for an initial issuance of a flight instructor certificate; or

(ii) 20 hours of training if the course is for an additional flight instructor rating.

(2) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that ground training includes the following aeronautical knowledge

areas-

(i) The fundamentals of instructing, includes-

(A) The learning process;

(B) Elements of effective teaching;

(C) Student evaluation and testing;

(D) Course development;

(E) Lesson planning, and

(F) Classroom training techniques

(ii) The aeronautical knowledge areas required for-

(A) A private and commercial pilot licence that is appropriate to the category and class rating sought; and

(B) An instrument rating that is appropriate to the aircraft category and class rating for which the course applies, if the course is for an aeroplane or powered-lift aircraft rating.

(3) A Level 1 ATO may credit a student who satisfactorily completes 2 years of study on the principles of education at a college or university with no more than 20 hours of the training required in paragraph (c)(1).

(d) **Flight training**

(1) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes at least the following flight training on the applicable areas of operation of paragraphs (d)(2)

and (d)(3)-

(i) 25 hours for an aeroplane, rotorcraft, or powered-lift rating; and

(ii) 10 hours and 10 flights for a glider category rating.

(2)Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes flight training on the following areas of operation, as applicable for each category and class-

(i) Fundamentals of instructing;

(ii) Technical subject areas;

(iii) Preflight preparation;

(iv) Preflight lesson on a manoeuvre to be performed in flight;

(v) Preflight procedures;

(vi) Airport and seaplane base operations;

(vii) Takeoffs, landings, and go-arounds;

(viii) Fundamentals of flight;

(ix) Performance manoeuvres

(x) Ground reference manoeuvres

(xi) Slow flight, stalls, and spins

(xii) Basic instrument manoeuvres

(xiii) Emergency operations; and

(xiv) Post flight procedures.

(3) For the category and class of aircraft shown below, each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes flight training in the following areas of operation, as applicable:

(i) For an aeroplane: multiengine course-

(A) Multi-engine operations.

(ii) For a rotorcraft: helicopter course-

(A) Hovering manoeuvres; and

(B) Special operations.

(iii) For a rotorcraft: gyroplane course-

(A) Flight at slow speeds.

(iv) For a powered – lift course-

(A) Hovering manoeuvres;

(B) Transition to wing – borne flight;

(C) Transition to hover; and

(D) Special operations.

(v) For a glider course-

(A) Launches, landings, and go-arounds;

(B) Performance speeds; and

(C) Soaring techniques.

(e) **Stage checks and end-of-course tests**.

(1) Each student, to graduate from a flight instructor course shall satisfactorily accomplish the stage checks and end-of-course tests, consisting of the applicable areas of operation listed in paragraph (d) of this appendix.

(2) A student enrolled in a flight instructor – aeroplane rating or flight instructor – glider rating course shall have-

(i) Received a logbook endorsement from a licensed flight instructor certifying the student received ground and flight training on stall awareness, spin entry, spins, and spin recovery procedures in an aircraft that is certified for spins and that is appropriate to the rating sought; and

(ii) Demonstrated instructional proficiency in stall awareness, spin entry, spins, and spin recovery procedures.

1.11 IS:3.2.1.1 APPENDIX F: FLIGHT INSTRUCTOR INSTRUMENT LICENSING COURSE

(a) Applicability. This appendix prescribes the minimum curriculum for a flight instructor instrument licensing course required under this part, for the following ratings-

(1) Flight Instructor Instrument: Aeroplane.

(2) Flight Instructor Instrument: Helicopter.

(3) Flight Instructor Instrument: Powered – lift aircraft.

(b) Eligibility for enrollment. A pilot shall hold, prior to

enrolling in the flight portion of the course-

(1) A commercial pilot licence or airline transport pilot licence with a category and class rating appropriate to the rating sought; and

(2) For commercial pilot license holders, an instrument rating that is appropriate to the rating sought.

(c) Aeronautical knowledge training.

(1) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes at least 15 hours of ground training on the applicable aeronautical knowledge areas listed in paragraph (c) (2).

(2) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes ground training on the following aeronautical knowledge areas-

(i) The fundamentals of instructing including-

(A) Learning process;

(B) Elements of effective teaching;

(C) Student evaluation and testing;

(E) Lesson planning; and

(F) Classroom training techniques.

(ii) The aeronautical knowledge areas required for the instrument rating that is appropriate to the category and class of aircraft.

(d) **Flight training**.

(1) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes at least 15 hours of flight training in the applicable

areas of operation of paragraph (b).

(2) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course for the flight instructor-instrument rating includes flight training on the following areas of operation -

(i) Fundamentals of instructing;

(ii) Technical subject areas;

(iii) Preflight preparation;

(iv) Preflight lesson on a manoeuvre to be performed in flight;

(v) Air traffic control clearances and procedures;

(vi) Flight by reference to instruments;

(vii) Navigation systems;

(viii) Instrument approach procedures

(ix) Emergency operations; and

(x) Post flight procedures.

(e) Stage checks and end-of-course tests.

(1) Each student, to graduate from a flight instructor instrument course shall satisfactorily accomplish the stage checks and end-of-course tests, consisting of the applicable areas of operation listed in paragraph (d)

1.12 IS: 3.2.1.1 APPENDIX G: GROUND INSTRUCTOR LICENSING COURSE

(a) Applicability. This appendix prescribes the minimum curriculum for a ground instructor licensing course and an additional ground instructor rating course, issued under

Part 2 for the following ratings-

(1) Ground Instructor: Basic.

(2) Ground Instructor: Advanced

(3) Ground Instructor: Instrument.

(b) Aeronautical knowledge training.

(1) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes at least the following ground training on the applicable knowledge areas listed in paragraphs (2), (3), (4) and (5)-

(i) 20 hours of training for an initial issuance of a ground instructor certificate; or

(ii) 10 hours of training for an additional ground instructor rating.

(2) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that ground training includes the following aeronautical knowledge areas-

(i) Learning process;

(ii) Elements of effective teaching;

(iii) Student evaluation and testing;

(iv) Course development;

(v) Lesson planning; and

(vi) Classroom training techniques.

(3) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that ground training for a basic ground instructor licence includes the aeronautical knowledge areas applicable to a private pilot.

(4) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that ground training for an advanced ground instructor rating includes the aeronautical knowledge areas applicable to a private, commercial, and airline transport pilot.

(5) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that ground training for an instrument ground instructor rating includes the aeronautical knowledge areas applicable to an instrument rating.

(6) A Level 1 ATO may credit a student who satisfactorily completed 2 years of study on the principles of education at a college or university with 10 hours of the training required in paragraph (a)(1).

(c) Stage checks and end-of-course tests.

(1) Each student, to graduate from a ground instructor course shall satisfactorily accomplish the stage checks and end-of-course tests, consisting of the applicable knowledge areas of this appendix.

1.13IS: 3.2.1.1 APPENDIX H: ADDITIONAL AIRCRAFT CATEGORY OR CLASS RATING COURSE

(a) **Applicability.** This appendix prescribes the minimum curriculum for an additional aircraft category rating course or an additional aircraft class rating course required under this Part, for the following ratings:

(1) Aeroplane single-engine.

(2) Aeroplane multi-engine

(3) Rotorcraft helicopter.

(4) Rotorcraft gyroplane.

(5) Powered-lift.

(6) Glider.

(7) Lighter-than-air airship.

(8) Lighter-than-air balloon.

(b) **Eligibility for enrolment.** A person shall hold the level of pilot licence for the additional category and class rating for which the course applies prior to enrolling in the flight portion of an additional aircraft category or additional aircraft class rating course.

(c) **Aeronautical knowledge training.** Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course for an additional category rating and additional class rating includes the total number of hours of training in all the aeronautical knowledge areas appropriate to the aircraft rating and pilot licence level sought.

(d) Flight training. Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course for an additional category rating or additional aircraft class includes the total number of hours of flight training on all of the areas of operation of this paragraph appropriate to the aircraft rating and pilot licence level for which the course applies.

(e) Stage checks and end-of-course tests.

(1) Each student, to graduate from an additional aircraft category rating course or an additional aircraft class rating course shall satisfactorily accomplish the stage checks and end-of-course tests, consisting of the applicable areas of operation in this appendix.

(2) Each student shall demonstrate satisfactory proficiency prior to being endorsed to operate an aircraft in solo flight.

1.14 IS: 3.2.1.1. APPENDIX I: AIRCRAFT TYPE RATING COURSE

(a) Applicability. This appendix prescribes the minimum Level 1 ATO curriculum for an aircraft type rating course for:

(1) A type rating in an aeroplane category: single-engine class.

(2) A type rating in an aeroplane category: multi-engine class.

(3) A type rating in a rotorcraft category: helicopter class.

(4) A type rating in a powered-lift category.

(5) Other aircraft type ratings specified by the Authority through the aircraft type certificate procedures.

(b) Eligibility for enrollment.

(1) Prior to enrolling in the flight portion of an aircraft type rating course, a person shall hold at least a private pilot licence and-

(i) An instrument rating in the category and class of aircraft that is appropriate to the aircraft type rating for which the course applies, provided the aircraft's type certificate does not have a VFR limitation; or

(ii) Be concurrently enrolled in an instrument rating course in an aircraft of the type rating sought, and pass the required instrument rating practical test concurrently with the type rating practical test.

(c) Aeronautical knowledge training.

(1) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes at least 10 hours of ground training on the applicable aeronautical knowledge areas listed in paragraph (b).

(2) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that ground training

includes the following aeronautical areas-

(i) Subjects requiring a practical knowledge of the aircraft type and its powerplant, systems, components, operational, and performance factors;

(ii) The aircraft's normal, abnormal, and emergency procedures, and the operations and limitations relating thereto;

(iii) Appropriate provisions of the approved aircraft's flight manual;

(iv) Location of and purpose of inspecting each item on the aircraft's checklist that relate to the exterior and interior preflight; and

(v) Use of the aircraft's pre-start checklist, appropriate control system checks, starting procedures, radio and electronic equipment checks, and the selection of proper navigation and communication radio facilities and frequencies.

(d) Flight training.

(1) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each course includes at least-

(i) Flight training on the applicable areas of operation of paragraph (b) in the aircraft type for which the course applies; and

(ii) At least 5 hours shall be instrument training in the aircraft for which the course applies.

(2) Each applicant for, and holder of, a Level 1 ATO certificate shall ensure that each type rating course includes the flight training on the following areas

of operation-

(i) Preflight preparation;

(ii) Preflight procedures;

(iii) Takeoff and departure phase;

(iv) In-flight manoeuvres;

(v) Instrument procedures;

(vi) Landings and approaches to landings;

(vii) Normal and abnormal procedures;

(viii) Emergency procedures; and

(ix) Post flight procedures.

(e) Stage checks end-of-course tests. Each student, to graduate from an aircraft type rating course shall satisfactorily accomplish the state checks and end-of course tests, consisting of the applicable areas of operation for the airline transport pilot licence.

1.15 IS: 3.2.1.1 APPENDIX J: SPECIAL PREPARATION COURSES

(a) Applicability. This appendix prescribes the minimum curriculum for the special preparation courses that are listed in 3.1.2.2.

(b) Eligibility for enrolment. Prior to enrolling in the fight portion of a special preparation course, a person shall hold a pilot licence, fight instructor certificate, or ground instructor licence that is appropriate for the exercise of the operating privileges or authorisations sought.

(c) General requirements

(1) To be approved, an applicant for a special preparation course shall present to the Authority a

proposal that:

(i) Meets the appropriate requirements of this Appendix.

(ii) Prepares the graduate with the necessary skills, competency, and proficiency to exercise safely the privileges of the certificate, rating, or authorisation for which the course is established.

(iii) Includes ground and fight training on the operating privileges or authorisation sought.

(c) Stage check and end-of-course tests.

(1) Each person, to graduate from a special preparation course shall satisfactorily accomplish the stage checks and end-of-course tests, consisting of the areas of operation that are appropriate to the operating privileges or authorisation sought, and for which the course applies.

(d) Agricultural aircraft operations course.

(1) A special preparation course for pilots in agricultural aircraft operations shall include at least the following-

(i) 25 hours of training on-

(A) Agricultural aircraft operations;

(B) Safe piloting operating practices and procedures for handling, dispensing, and disposing agricultural and industrial chemicals, including operating in and around congested areas; and

(C) Applicable provisions of Part 11, subpart 11.2

(ii) 15 hours of flight training on agricultural

aircraft operations.

(e) Rotorcraft external-load operations course.

(1) A special preparation course for pilots of external-load operations shall include at least the following:

(i) 10 hours to training on-

(A) Rotorcraft external-load operations;

(B) Safe piloting operating practices and procedures for external-load operations, including operating in and around congested areas; and

(C) Applicable provisions of Part 11, Subpart 11.3.

(ii) 15 hours of flight training on external-load operations.

(f) Test pilot course.

(1) Each applicant for, and holder of, a special preparation course for test pilot duties shall include at least the following:

(i) Aeronautical knowledge training on-

(A) Performing aircraft maintenance, quality assurance, and certification test flight operations; and

(B) Applicable parts of these regulations that pertain to aircraft maintenance, quality assurance, and certification tests.

(ii) 15 hours of flight training.

(g) Special operations course.

(1) A special preparation course for pilots in special operations that are mission-specific for certain aircraft shall include at least the

following:

(i) Aeronautical knowledge training on-

(A) Performing that special flight operation;

(B) Safe piloting operating practices and procedures for performing that special fight operation;

(C) Applicable parts of these regulations that pertain to that special flight operation; and

(D) Pilot in command duties and responsibilities for performing that special flight operation.

(ii) Flight training on that special flight operation.

(h) Pilot refresher course.

(1) Each applicant for, and holder of, a special preparation pilot refresher course for a pilot licence, aircraft category and class rating, or instrument rating shall include at least the following:

(i) 4 hours of aeronautical knowledge training on;

(A) The aeronautical knowledge areas that are applicable to the level of pilot licence, category rating, class rating, or instrument rating sought;

(B) Safe piloting operating practices and procedures; and

(C) Applicable provisions of Parts 2 and 9.

(ii) 6 hours of flight training on the areas of operation that are applicable to the level of pilot licence, aircraft category and class rating, or instrument rating, as appropriate, for performing pilot-in-command duties and

responsibilities.

(i) Flight instructor refresher course.

(1) Each applicant for, and holder of, a special preparation flight instructor refresher course shall include at least a combined total of 16 hours of aeronautical knowledge training, flight training, or any combination of ground and flight training on the following:

(i) Aeronautical knowledge training on-

(A) Aeronautical knowledge areas that apply to student, private, and commercial pilot licences and instrument ratings;

(B) The aeronautical knowledge areas that apply to flight instructor certificates;

(C) Safe piloting operating practices and procedures, including airport operations and operating in Sierra Leone Airspace System; and

(D) Applicable provisions of Parts 2 and 9.

(ii) Flight training, to review-

(A) The areas of operations applicable to student, private, and commercial pilot licences and instrument ratings; and

(B) The skills, competency, and proficiency for performing flight instructor duties and responsibilities.

(j) Ground instructor refresher course

(1) A special preparation ground instructor refresher course shall include at least 16 hours of

aeronautical knowledge training on-

(i) The aeronautical knowledge areas that apply to student, private, and commercial pilots and instrument rated pilots and ground instructors;

(ii) Safe piloting operating practices and procedures, including airport operations and operating in Sierra Leone Airspace System; and

(iii) Applicable provisions of Parts 2 and 9.

1.16IS: 3.2.1.1 APPENDIX K: PILOT GROUND SCHOOL COURSE

(a) Applicability. This appendix prescribes the minimum curriculum for a pilot ground school course.

(b) General requirements. Each applicant for, and holder of, an approved training course for a pilot ground school shall include training on the aeronautical knowledge areas that are-

(1) needed to safely exercise the privileges of the certificate, rating, or authority for which the course is established; and

(2) conducted to develop competency, proficiency, resourcefulness, self-confidence, and self-reliance in each student.

(c) Aeronautical knowledge training requirements. Each applicant for, and holder of, an approval pilot ground school course shall include-

(1) The aeronautical knowledge training that is appropriate to the aircraft rating and pilot licence level for which the course applies; and

(2) An adequate number of total aeronautical knowledge training hours appropriate to the aircraft rating and pilot licence level for which the course applies.

(d) Stage checks and end-of-course tests. Each person, to graduate from a pilot ground school course shall satisfactorily accomplish the stage checks and end-of-course tests, consisting of the areas of operation that are appropriate to the operating privileges or authorisation that graduation from the course will permit.

1.17 IS: 3.2.1.1. APPENDIX M: FLIGHT ENGINEER COURSE

(a) Each flight engineer training course holder shall comply with the following-

(1) Training course outline:

(i) **Format.** An applicant shall prepare separate course outlines for each for each type of aeroplane.

(ii) Ground course outline.

(iii) The Authority will accept any arrangement of subject if all the subject material listed in the following table is included and at least the minimum programmed hours are assigned to each subject.

(iv) If any flight engineer training course holder desires to include additional subjects in the ground course curriculum, the hours allotted to these additional subjects may not be included in the minimum programmed classroom hours.

(v) All subjects, except Theory of Flight and Aerodynamics and Regulations, shall apply to the same type of aeroplane in which the flight engineer training course holder presents training.

Subject Area		Classroom Hours
Civil Aviation Regulations		10
Theory of Flight and Aerodynamics		10
Aeroplane Familiarisation, to include, As applicable:	Specifications Construction features Flight controls Hydraulic systems Pneumatic systems Electrical systems Anti-icing and de-icing systems Pressurization and air-conditioning-systems Vacuum systems Pitot static systems Instrument systems Fuel and oil systems Emergency equipment	90
Engine Familiarisation to include, as applicable:	Specifications Construction features Lubrication Ignition Fuel systems Accessories Propellers Instrumentation Emergency equipment	45
Normal Operations (Ground and Flight), to include, as appropriate:	Servicing methods and procedures Operation of all the aeroplane systems Operation of all the engine systems Loading and centre of gravity computations Cruise control (normal, long range, maximum endurance) Power and fuel computation Meteorology as applicable to engine operation	50
Emergency Operations, to include:	Landing gear, brakes, flaps, spoilers, speed brakes, and leading edge devices Pressurization and air-conditioning Portable fire extinguishers Fuselage fire and smoke control Loss of electrical power Engine fire control Engine shut-down and restart Oxygen	80
Total (exclusive of final tests)		235

(2) **Flight Course Outline**.

(i) The flight-training curriculum shall include at least 10 hours of flight instruction in an aeroplane. A student may not credit the flight time required for the practical test as part of the required flight instruction.

(ii) The flight engineer training course holder shall present all of the flight training in the same aircraft type.

(iii) As appropriate to the aircraft type, the flight engineer training course holder shall teach the following subjects in the flight-training course:

Subject Area	
Normal Duties, Procedures And Operations:	To include as appropriate- Aeroplane preflight. Engine starting, power checks, pre-takeoff, post-landing and shut-down procedures. Power controlTemperature control. Engine operation analysis. Operation of all systems. Fuel management. Logbook entries. Pressurisation and air conditioning.
Recognition and Correction Of In-Flight Malfunctions:	Analysis of abnormal engine operation. Analysis of abnormal operation of all systems. Corrective action
Emergency Operation In flight:	Engine fire control. Fuselage fire control. Smoke control. Loss of power or pressure in each system. Engine overspeed. Fuel dumping. Landing gear, spoilers, speed brakes, and flap extension and retraction. Engine shut-down and restart. Use of oxygen.

(iv) The Authority may allow the school to teach the flight training time in a flight simulator.

(v) To obtain credit for flight training time in a flight simulator, the student shall occupy the flight engineer station and operate the controls.

(b) Revisions. Each flight engineer training course holder shall request revisions of the course outlines, facilities or equipment by following the procedures for original approval of the course.

(c) Ground school credits.

(1) A flight engineer training course holder may grant credit to a student in the ground school course for comparable previous training or experience that the student can show by written evidence.

(2) A flight engineer training course holder shall meet the quality of instruction described in this Appendix.

(3) Before granting credit for previous training or experience, the flight engineer training course holder shall ensure that the student passes a test given by the flight engineer training course holder on the subject for which the credit is to be given.

(4) The flight engineer training course holder shall incorporate results of the test, the basis for credit allowance, and the hours credited as part of the student's records.

(d) Records and Reports.

(1) The flight engineer training course holder shall maintain, for at least two years after a student graduates, fails, or drops from a course, a record of the student's training, including a chronological log of the subject course, attendance examinations, and grades.

(2) Except as provided in paragraph (3), the flight engineer training course holder shall submit to the Authority, not later than January 31 of each year, a report for the previous calendar year's training, to include-

(i) Name, enrollment and graduation date of each student;

(ii) Ground school hours and grades of each student;

(iii) Flight and flight simulator hours, and grades of each student; and

(iv) Names of students failed or dropped, together with their school grades and reasons for dropping.

(3) Upon request, the Authority may waive the reporting requirements of subparagraph (2) of this paragraph for an approved flight engineer course that is part of an approved training course under Part 9.

(e) **Quality of instruction**.

(1) The Authority shall revoke approval of a flight engineer training course holder's ground course whenever less than 80 percent of the students pass the Authority knowledge test on the first attempt.

(2) The Authority shall revoke approval of a flight engineer training course holder's flight course whenever less than 80 percent of the students pass the Authority practical test on the first attempt.

(3) Notwithstanding paragraphs (1) and (2), the Authority may allow continued approval of a ground or flight course when the Authority finds-

(i) That the failure rate was based on less than a representative number of students; or

(ii) That the flight engineer training course holder has taken satisfactory means to improve the effectiveness of the training.

(f) **Time limitation.** Each student shall apply for the written test and the flight test within 90 days after completing the ground school course.

(g) **Statement of course completion**.

(1) Each flight engineer training course holder shall give to each student who successfully completes an approved flight engineer ground school training course, and passes the Authority knowledge test, a statement of successful completion of the course that indicates the date of training, the type of aeroplane on which the ground course training was based, and the number of hours received in the ground school course.

(2) Each flight engineer training course holder shall give each student who successfully completes an approved flight engineer flight course, and passed the Authority practical test, a statement of successful completion of the flight course that indicates the dates of the training, the type of aeroplane used in the flight course, and the number of hours received in the flight course.

(3) A flight engineer training course holder who is approved to conduct both the ground course and the flight course may include both courses in a single statement of course completion if the provisions of paragraphs (1) and (2) of this sub section are included.

(4) The requirements of this paragraph do not apply to an AOC holder with an approved training course under Part 9, providing the student receives a flight engineer license upon completion of that course.

(h) Duration. Except for a course operated as part of an approved training course under Part 9, the approval to operate a flight engineer ground course or flight course terminates 24 months after the last day of the month of issue.

1.18 IS: 3.2.1.2 LEVEL 1 ATO CHIEF FLIGHT INSTRUCTOR QUALIFICATIONS

(a) Each ATO shall designate a supervisory instructor for a flight training course who shall meet one or more of the following requirements, as applicable:

(1) Hold a commercial pilot license or an airline transport pilot license, and, except for a chief instructor for a training course solely for a lighter-than-air rating, a current flight instructor license with appropriate aircraft category, class, and instrument ratings for the category and class of aircraft used in the course.

(2) Meet the pilot in command recent flight experience requirements of 8.4.1.9 through 8.4.1.11, as applicable.

(3) Pass a knowledge test on:

(i) Teaching methods;

(ii) Applicable provisions of Authority provided aeronautical information publications;

(iii) Applicable provisions of Parts 2, 3, and 8; and

(iv) The objectives and approved course completion standards of the course for which the person seeks to obtain designation.

(4) Pass a proficiency test on instructional skills and ability to train students on the flight procedures and manoeuvres appropriate to the course.

(b) Except for a training course for gliders, balloons, or airships, the chief instructor shall meet the applicable requirements in paragraphs (c), (d), and (e).

(c) For a training course for a private pilot license or rating, a chief instructor shall have:

(1) At least 1,000 hours as pilot in command; and

(2) Primary flight training experience as a licensed flight instructor or an instructor in a military pilot flight training program, or a combination thereof, consisting of at least 2 years and a total of 500 flight hours.

(d) For a training course for an instrument rating or a rating with instrument privileges, a chief instructor shall have:

(1) At least 100 hours of flight time under actual or simulated instrument conditions;

(2) At least 1,000 hours as pilot in command; and

(3) Instrument flight instructor experience as a licensed flight instructor-instrument or an instructor in a military pilot flight training program, or a combination thereof, consisting of at least:

(i) 2 years and a total of 250 flight hours; or

(ii) 400 flight hours of instrument flight instruction.

(e) For a training course for other than a private pilot license or rating, or an instrument rating or a rating with instrument privileges, a chief instructor shall have:

(1) At least 2,000 hours as pilot in command; and

(2) Flight training experience as a licensed flight instructor or an instructor in a military pilot flight training program, or a combination thereof, consisting of at least 3 years and a total of 1,000 flight hours.

(f) A chief instructor for a training course for gliders or balloons is required to have only 40 percent of the hours required in paragraphs (c) and (e).

(g) A chief instructor for a training course for airships is required to have only 40 percent of the hours required in paragraphs (c), (d), and (e).

(h) To be eligible as chief instructor for a ground school course, a person shall have one year of experience as a ground school instructor at a certified Level 1 ATO.

1.19 IS: 3.2.2.2 AIRPORT REQUIREMENTS

(a) Each applicant for, and holder of, a level 1 ATO certificate shall show that the airport at which training flights originate has the following:

(1) At least one runway or takeoff area that allows training aircraft to make a normal takeoff and landing at the aircraft's maximum certified takeoff gross weight under the following conditions-

(i) Wind not more than 5 knots;

(ii) Temperatures equal to the mean high temperature for the hottest month of the year in the operating area;

(iii) If applicable, with the powerplant operation, and landing gear and flap operation as recommended by the manufacturer; and

(iv) In the case of a takeoff-

(A) With smooth transition from liftoff to the best rate of climb speed without exceptional piloting skills or techniques; and

(B) Clearing all obstacles in the takeoff flight path by at least 50 feet.

(2) A wind direction indicator that is visible from the end of each runway at ground level.

(3) A traffic direction indicator when-

(i) The airport does not have an operating control tower; and

(ii) Traffic and wind advisories are not available.

(4) Except as provided in paragraph (a)(5), permanent runway lights if that airport is to be used for night training flights.

(5) Adequate non-permanent lighting or shoreline lighting for an airport or seaplane base for night training flights in seaplanes, if approved by the Authority.

1.20IS: 3.2.3.4 TRAININGAND PROCEDURES MANUAL

(a) The training manual for use at an ATO conducting approved training courses should include the following:

(1) Chapter 1: the training plan:

(i) The aim of the course: a statement of what the student is expected to do as a result of the training, the level of performance, and the training constraints to be observed.

(ii) Pre entry requirements: minimum age, educational requirements (including language), medical requirements.

(iii) Credits for previous experience: to be obtained from the [Authority] before training begins.

(iv) Training curricula: the flying curriculum (single engine), the flying curriculum (multi engine), the synthetic flight training curriculum and the theoretical knowledge training curriculum.

(v) The time scale and scale in weeks, for each curriculum: arrangements of the course and the integration of curricula time.

(vi) Training program: the general arrangements of daily and weekly programs for flying, ground and synthetic flight training. Bad weather constraints. Program constraints in terms of maximum student training times, (flying, theoretical knowledge, synthetic) e.g. per day/ week/month. Restrictions in respect of duty periods for students. Duration of dual and solo flights at various stages. Maximum flying hours in any day/night. Maximum number of training flights in any day/night. Minimum rest period between duty period.

(vii) Training records: rules for security of records and documents. Attendance records. The form of training records to be kept. Persons responsible for checking records and students' log books. The nature and frequency of records checks. Standardization of entries in training records. Rules concerning log book entries.

(viii) Safety training: individual responsibilities. Essential exercises. Emergency drills (frequency). Dual checks (frequency at various stages). Requirement before first solo day/ night/navigation etc.

(ix) Checks and tests: flying: progress checks and skill tests. Knowledge: progress tests and knowledge tests. Authorization for test. Rules concerning refresher training before retest. Test reports and records. Procedures for test paper preparation, type of question and assessment, standard required for 'pass'. Procedure for question analysis and review and for raising replacement papers. Retest procedures.

(x) Training effectiveness: individual responsibilities. General assessment. Liaison between departments. Identification of unsatisfactory progress (individual students). Actions to correct unsatisfactory progress. Procedure for changing instructors. Maximum number of instructor changes per student. Internal feedback system for detecting training deficiencies. Procedure for suspending a student from training. Discipline. Reporting and documentation.

(xi) Standards and level of performance at various stages: individual responsibilities. Standardization. Standardization requirements and procedures. Application of test criteria.

(2) Chapter 2: briefing and air exercises

(i) Air exercise: a detailed statement of the content specification of all the air exercises to be taught, arranged in the sequence to be flown with main and sub titles.

(ii) Air exercise reference list: an abbreviated list of the above exercises giving only main and sub titles for quick reference, and preferably in flip card form to facilitate daily use by instructors.

(iii) Course structure-phase of training: a statement of how the course will be divided into phases, indication of how the above air exercises will be divided between the phases and how they will be arranged to ensure that they are completed in the most suitable learning sequence and that essential (emergency) exercises are repeated at the correct frequency. Also, the curriculum hours for each phase and for groups of exercises within each phase shall be stated and when progress tests are to be conducted, etc.

(iv) Course structure integration of curricula: the manner in which theoretical knowledge, synthetic flight training and flying training will be integrated so that as the flying training exercises are carried out students will be able to apply the knowledge gained from the associated theoretical knowledge instruction and synthetic flight training.

(v) Student progress: the requirement for student progress should include a brief but specific statement of what a student is expected to be able to do and the standard of proficiency he or she must achieve before progressing from one phase of air exercise training to the next. Include minimum experience requirements in terms of hours, satisfactory exercise completion, etc. As necessary before significant exercises, e.g. night flying.

Note: *Instructional methods: the ATO requirements, particularly in respect of pre and post flying briefing, adherence to curricula and training specifications, authorisation of solo flights, etc.*

Progress tests: the instructions given to examining staff in respect of the conduct and document of all progress tests.

Glossary of terms: definition of significant terms as necessary.

Appendices: progress test report forms. Skill test report forms. ATO certificates of experience, competence, etc. As required.

(3) Chapter 3: synthetic flight training: structure generally as for chapter 2.

(4) Chapter 4: knowledge instruction: structure generally as for chapter 2 with a training specification and objectives for each subject. Individual lesson plans to include mention of the specific training aids available for use.

(vi) 14 CFR: Inspector's Handbook

(vii) IEM No. 3 To Jar FCL 1/2.055

(b) The procedures manual for use at an ATO conducting approved training courses should include the following:

(1) Chapter 1: general:

(i) A list and description of all volumes in the procedures manual.

(ii) Administration (function and management).

(iii) Responsibilities (all management and administrative staff).

(iv) Student discipline and disciplinary action.

(v) Approval/authorization of flights.

(vi) Preparation of flying program (restriction of numbers of aircraft in poor weather).

(vii) Command of aircraft.

(viii) Responsibilities of pilot in command.

(ix) Carriage of passengers.

(x) Aircraft documentation.

(xi) Retention of documents.

(xii) Flight crew qualification records (licences and ratings).

(xiii) Revalidation (licences, ratings and medical certificates).

(xiv) Flying duty period and flight time limitations (flying instructors).

(xv) Flying duty period and flight time limitations (students).

(xvi) Rest periods (flying instructors).

(xvii) Rest periods (students).

(xviii) Pilots' log books

(xix) Flight planning (general).

(xx) Safety (general: equipment, radio listening watch, hazards, accidents and incidents (including reports), safety pilots, etc.

(2) Chapter 2: technical

(i) Aircraft descriptive notes.

(ii) Aircraft handling (including checklists, limitations, aircraft maintenance and technical logs, in accordance with relevant requirements, etc.)

1.21 IS: 3.2.4.2. LEVEL 2 ATO INSTRUCTOR TRAINING AND TESTING REQUIREMENTS

(a) Prior to initial designation, each flight and simulator flight instructor shall complete the following requirements-

(1) Complete at least 8 hours of ground training on the following subject matter:

(i) Instruction methods and techniques.

(ii) Training policies and procedures.

(iii) The fundamental principles of the learning process.

(iv) Instructor duties, privileges responsibilities, and limitations.

(v) Proper operation of simulation controls and systems.

(vi) Proper operation of environmental control and warning or caution panels.

(vii) Limitations of simulation.

(viii) Minimum equipment requirements for each curriculum.

(ix) Revisions to the training courses.

(x) Information on knowledge and skills related to human performance, including cockpit resources management and crew co-ordination.

(2) Satisfactorily complete a knowledge test-

(i) On the subjects specified in paragraph(a)(1); and

(ii) That is accepted by the Authority as being of equivalent difficulty, complexity, and scope as the tests provided by the Authority for the flight instructor aeroplane and instrument flight instructor knowledge tests

(b) Each certificate holder shall ensure that each instructor who instructs in a flight simulator that the Authority has approved for all training and all testing for the airline transport pilot licensing test, aircraft type rating test, or both, has met at least one of the following requirements:

(1) Each instructor shall have performed 2 hours in flight including three takeoffs and three landings as the sole manipulator of he controls of an aircraft of the same category and class, and, if a type rating is required, of the same type replicated by the approved flight simulator in which that instructor is designated to instruct.

(2) Each instructor shall have participated in an approved line-observation programme as specified in 8.10.1.43 and that-

(i) Was accomplished in the same aeroplane type as the aeroplane represented by the flight simulator in which that instructor is designated to instruct: and

(ii) Included line-oriented flight training of at least I hour of flight during which the instructor was the sole manipulator of the controls in a flight simulator that replicated the same aircraft type for which that instructor is designated to instruct.

1.22 IS 3.2.4.7 LEVEL 1 ATO CHIEF INSTRUTOR QUALIFICATIONS

(a) Each ATO shall designate a supervisory instructor for a flight training course who shall meet one or more of the following requirements, as applicable:

(1) Hold a commercial pilot licence or an airline transport pilot licence, and, except for a chief instructor for a training course solely for a lighter-than-air-rating, a current flight instructor licence with appropriate aircraft category, class, and instrument ratings for the category and class of aircraft used in the course.

(2) Meet the pilot in command recent flight experience requirements of 8.4.1.9 through 8.4.1.11, as applicable.

(3) Pass a knowledge test on-

(i) Teaching methods;

(ii) Applicable provisions of aeronautical information publications provided by the Authority;

(iii) Applicable provisions of parts 2, 3, and 8; and

(iv) The objectives and approved course completion standards of the course for which the person seeks to obtain designation.

(4) Pass a proficiency test on instructional skills and ability to train students on the fight procedures and manoeuvres appropriate to the course.

(b) Except for a training course for gliders, balloons, or airships, the chief instructor shall meet the applicable requirements in paragraphs (c), (d) and (e).

(c) For a training course for a private pilot licence or rating, a chief instructor shall have –

(1) At least 1000 hours as pilot in command; and

(2) Primary fight training experience as a licensed flight instructor or an instructor in a military pilot flight training program, or a combination thereof, consisting of at least 2 years and a total of 500 flight hours.

(d) For a training course for an instrument rating or a rating with instrument privileges, a chief instructor shall have-

(1) At least 100 hours of flight time under actual or simulated instrument conditions;

(2) At least 1000 hours as pilot in command; and

(3) Instrument flight instructor experience as a licensed flight instructor-instrument or an instructor in a military pilot flight training program, or a combination thereof, consisting of at least-

(i) 2 years and a total of 250 flight hours; or

(ii) 400 flight hours of instrument flight instruction.

(e) For a training course for other than a private pilot licence or rating, or an instrument rating or a rating with instrument privileges, a chief instructor shall have-

(1) At least 2000 hours as pilot in command; and

(2) Flight training experience as a licensed flight instructor or an instructor in a military pilot flight training program, or a combination thereof, consisting of at least 3 years and a total of 1000 flight hours.

(f) A chief instructor for a training course for gliders or balloons is required to have only 40 percent of the hours required in paragraphs (c), and (e).

(g) A chief instructor for a training course for airships is required to have only 40 percent of the hours required in paragraphs (c), (d) and (e).

(h) To be eligible as chief instructor for a ground school course, a person shall have one year of experience as a ground school instructor at a certified Level 1 ATO.

1.23 IS: 3.2.4.8 LEVEL 1 ATO ASSISTANT CHIEF INSTRUCTOR QUALIFICATIONS

(a) To be eligible for designation as an assistant chief instructor, a person shall meet the following requirements-

(1) Hold a commercial pilot or an airline transport pilot licence and, except for the assistant chief instructor for a training course for a lighter-than-air rating, a current flight instructor licence with appropriate aircraft category, class, and instrument ratings for the category and class of aircraft used in the course.

(2) Meet the pilot in command recent flight experience requirements of 8.4.1.9 through 8.4.1.11, as applicable.

(3) Pass a knowledge test on-

(i) Teaching methods;

(ii) Applicable provisions of aeronautical information publications provided by the Authority;

(iii) Applicable provisions of Parts 2,3,and 8; and

(iv) The objectives and approved course completion standards of the course for which the person seeks to obtain designation.

(4) Pass a proficiency test on the flight procedures and manoeuvres appropriate to that course.

(5) Meet the applicable requirements in paragraphs (b), (c) and (d), except that an assistant chief instructor for a training course for gliders, balloons, or airships is required to have only 40 percent of the hours required in paragraphs (b) and (c).

(b) For a training course for a private pilot licence or rating, an assistant chief instructor shall have-

(1) At least 500 hours as pilot in command; and

(2) Flight training experience as a licensed flight instructor or an instructor in a military pilot flight training program, or a combination thereof, consisting of at least 1 year and a total of 250 flight hours.

(c) For a training course for an instrument rating or a rating with instrument privileges, an assistant chief flight instructor shall have-

(1) At least 50 hours of flight time under actual or simulated instrument conditions;

(2) At least 500 hours as pilot in command; and

(3) Instrument flight instructor experience as a licensed flight instructor-instrument or an instructor in a military pilot flight training program, or a combination thereof, consisting of at least 1 year and a total of 125 flight hours.

(d) For a training course other than for a private pilot licence or rating, or an instrument rating or a rating with instrument privileges, an assistant chief instructor shall have-

(1) At least 1000 hours as pilot in command; and

(2) Flight training experience as a licensed flight instructor or an instructor in a military pilot flight training program, or a combination thereof, consisting of at least 1½ years and a total of 500 flight hours.

(e) To be eligible for designation as an assistant chief instructor for a ground school course, a person shall have 6 months of experience as a ground school instructor at a certified Level 1 ATO.

1.24 IS: 3.2.4.9 LEVEL 1 ATO CHECK INSTRUCTOR QUALIFICATIONS

(a) To be designated as a check instructor for conducting student stage checks, end-of-course tests, and instructor proficiency checks under this Part, a person shall meet the following requirements, as applicable:

(1) Pass a test, given by the chief instructor, on-

(i) Teaching methods;

(ii) Applicable provisions of aeronautical information publications provided by the Authority;

(iii) Applicable provisions of Parts 2, 3, and 8; and

(iv) The objectives and course completion standards of the approved training course for the designation sought.

(2) For flight checks and tests-

(i) Meet the requirements in paragraph (a)(1);

(ii) Hold a commercial pilot licence or an airline transport pilot licence and, except for a check instructor for a training course for a lighter-than-air rating, a current flight instructor licence, with appropriate aircraft category, class, and instrument ratings for the category and class of aircraft used in the course;

(iii) Meet the pilot in command recent flight experience requirements of 8.4.1.9 through 8.4.1.11, as applicable; and

(iv) Pass a proficiency test, given by the chief instructor or assistant chief instructor, on the flight procedures and manoeuvres of the approved training course.

(3) For checks and tests that relate to ground training-

(i) Meet the requirements in paragraph (a)(1);

(ii) Except for a training course for a lighter-than-air rating, hold a current flight instructor licence or ground instructor licence with ratings appropriate to the category and class of aircraft used in the course; and

(iii) For a training course for a lighter-than-air rating, hold a commercial pilot licence with a lighter-than-air category rating and the appropriate class rating.

(b) Before functioning as a check instructor, a person who meets the eligibility requirements in paragraph (a) shall-

(1) Be designated in writing by the chief instructor to conduct student stage checks, end-of-course tests, and instructor proficiency checks; and

(2) Be approved by the Authority.

(c) A check instructor may not conduct a stage check or an end-of-course test of any student for whom the check instructor has-

(1) Served as the principal instructor; or

(2) Recommended for a stage check or end-of-course test.

1.25 IS: 3.2.5.2 TRANSFER PRIVILEGES

(a) A Level 1 ATO receiving a student from another Level 1 ATO may credit that pilot's previous experience towards the curriculum requirements of a course subject to the following conditions:

(1) If the credit is based upon 3.2.5.2 or 3.4.2.6, the gaining ATO may credit that student not more than 50 percent of the curriculum requirements.

(2) If the credit is not based upon 3.2.5.2 or 3.4.2.6, the gaining ATO may credit that student not more than 25 percent of the curriculum requirements;

Note: *The receiving ATO shall determine the amount of course credit to be credited under paragraph (1) or paragraph (2), based on a proficiency test or knowledge test, or both, of the student.*

(b) The receiving ATO may grant credit for training specified in paragraph (a)(1) or paragraph (2) only if the previous provider of the training has certified the kind and amount of training provided, and the result of each stage check and end-of-course test, if applicable, given to the student.

(c) An AME training course holder may evaluate and grant credit for an entrant's previous training provided-

(1) The AME training course holder determines that the training is verifiable and comparable to portions of the training program.

(2) The individual requesting credit passes an examination given by the AME training course holder, which is equivalent to those examinations given by the AME training course holder for the same subject in the training program.

1.26 IS: 3.2.5.5. TRAINING COURSE: CONTENTS

(a) Each applicant for, and holder of, a level 1 ATO certificate shall ensure that each training course contains-

(1) A description of each flight simulator or flight training device used for training;

(2) A listing of the airports at which training flights originate and a description of the facilities, including pilot briefing areas that are available for use by the school's students and personnel at each of those airports;

(3) A description of the type of aircraft including any special equipment used for each phase of training.

(4) The minimum qualifications and rating for each instructor assigned to ground or flight training; and

(5) A training syllabus that includes-

(i) The prerequisites for enrolling in the ground and flight portion of the course that include the pilot licence and rating (if required by this Part), training, pilot experience, and pilot knowledge;

(ii) A detailed description of each lesson, including the lesson's objectives, standards, and planned time for completion;

(iii) Course learning objectives;

(iv) Stage learning objectives and standards; and

(v) Description of the checks and tests to be used to measure learning after each stage of training.

(b) A level 1 ATO may-

(1) Include training in a flight simulator or flight training device, provided it is representative of the aircraft for which the course is approved, meets the requirements of this paragraph, and the training is given by an authorised instructor; and

(2) Permit a student to credit training in a flight simulator that meets the requirements of 3.2.2.4 for a maximum of 25 percent of the total flight training hour requirements of the approved course.

1.27IS: 3.4.2.3 AME TRAINING PROGRAMME CURRICULUM REQUIREMENTS

***Note 1**:This implementing standard defines terms used in this subparagraph, and describes the levels of proficiency at which items under each subject in each curriculum must be taught, as outlined in this subparagraph.*

(a) **Definitions.**

(1) **Inspect** means to examine by sight and touch.

(2) **Check** means to verify proper operation.

(3) **Troubleshoot** means to analyse and identify malfunctions.

(4) **Service** means to perform functions that assure continued operation.

(5) **Repair** means to correct a defective condition. Repair of an airframe or powerplant system includes component replacement and adjustment, but not component repair.

(6) **Overhaul** means to disassemble, inspect, repair as necessary, and check.

(b) **Teaching levels**.

(1) Level 1 requires:

(i) Knowledge of general principles, but no practical application.

(ii) No development of manipulative skill.

(iii) Instruction by lecture, demonstration and discussion.

(2) Level 2 requires:

(i) Knowledge of general principles, and limited practicalapplication.

(ii) Development of sufficient manipulative skill to perform basic operations.

(iii) Instruction by lecture, demonstration, discussion and limited practical application.

(3) Level 3 requires:

(i) Knowledge of general principles, and performance of a high degree of practical application.

(ii) Development of sufficient manipulative skills to simulate return to service

.

(iii) Instruction by lecture, demonstration, discussion, and a high degree of practical application.

(c) **Teaching materials and equipment**.

(1) The curriculum may be presented utilising currently accepted educational materials and equipment, including, but not limited to: calculator, computers, and audio-visual equipment

Note 2: *The syllabus relevant to the examinations for all licence categories is presented in this IS 3.4.2.3 as a series of subjects or combinations of subjects referred to as Modules, the content of each of the Modules is detailed in this Implementing Standard.*

Note 3: *The examinations for each category of licence, and its sub divisions where appropriate are based on a number of the modules, and the modules category relationship is set out overleaf. It will be noted that the modular arrangements recognised that major areas of the syllabus are common to more than one licence category and or its sub-divisions. Thus, when an existing licence is to be extended to include another category or sub-division, those modules which have been satisfied by previous examinations may be excluded.*

Note 4: *Each module is numbered and contains a series of syllabus subject headings. Each subject is then further expanded in more detailed against level numbers corresponding to Licence Without Type Rating (LWTR) and Type Rating (TR). This expansion of detail provides an indication of the degree/level of knowledge, experience, competence and skill in aeronautical engineering required by the Authority.*

(d) **Basic Knowledge Levels Category A, B1, B2 and C Certifying Staff**

Basic knowledge for category A, B1 and B2 certifying staff are indicated by the allocation of knowledge levels indicators (1, 2 or 3) against each applicable subject area in this implementing standard. Category C certifying staff with a mechanical background should meet the category B1 basic knowledge levels. Category C certifying staff with an avionic background should meet the category B2 basic knowledge levels.

The knowledge level indicators are defined as follows:

(1) **LEVEL 1**: A familiarization with the principal elements of the subject.

Objectives:

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

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

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

(2) **LEVEL 2:** A general knowledge of the theoretical and practical aspects of the subject.

An ability to apply that knowledge.

Objectives:

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

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

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

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

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

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

Objectives:

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

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

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

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

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

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

(e) Modularisation

Qualification on basic subjects for each aircraft maintenance licence category or sub category 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	RESERVED
	TURBINE ENGINES	PISTON ENGINES	TURBINE ENGINES	PISTON ENGINES	AVIONICS	
1	X	X	X	X	X	
2	X	X	X	X	X	
3	X	X	X	X	X	
4	X	X	X	X	X	
5	X	X	X	X	X	TO BE
6	X	X	X	X	X	DEVELOPED
7	X	X	X	X	X	
8	X	X	X	X	X	
9	X	X	X	X	X	
10	X	X	X	X	X	
11	X	X				
12			X	X		
13					X	
14					X	
15	X		X			
16		X		X		
17	X	X				
18	Reser-ved					

(f) AME Basic Knowledge Levels - SUBJECT MODULES

1. Mathematics
2. Physics
3. Electrical Fundamentals
4 Electronic Fundamentals
5. Digital Techniques/ Electronic Instrument Systems
6. Materials and Hardware
7. Maintenance Practices
8. Basic Aerodynamics
9. Human Factors Principles
10. Aviation Legislation
11. Aeroplane Aerodynamics, Structures and Systems
12. Helicopter Aerodynamics, Structures and Systems
13. Aircraft Aerodynamics, Structures and Systems
14. Propulsion
15. Gas Turbine Engine
16. Piston Engine
17. Propeller
18. Reserved

Note 1: *The subject modules may be sub divided into sub modules for the purpose of training and/or examination*

Note 2: *The levels specified in this IS will be subjected to regular review in the light of experience*

MODULE 1 MATHEMATICS

		Level		
		A	**B1**	**B2**
1.1	**Arithmetic**	**1**	**2**	**2**

1. Arithmetical terms and signs,
2. methods of multiplication and division,
3. fractions and decimals,
4. factors and multiples,

5. weights,
6. measures and conversion factors,
7. ratio and proportion,
8. averages and percentages,
9. areas and volumes,
10. squares,
11. cubes,
12. square and cube roots.

1. 2 Algebra

(a) **1 2 2**

1. Evaluating simple algebraic expressions,
2. addition,
3. subtraction,
4. multiplication and division,
5. use of brackets,
6. simple algebraic fractions.

(b) **1 2 2**

1. Linear equations and their solutions;
2. Indices and powers,
3. negative and fractional indices;
4. Binary and other applicable
5. numbering systems;
6. Simultaneous equations and second degree
7. equations with one unknown,
8. logarithms.

1.3 Geometry

(a) 1 2

1. Simple geometrical constructions;

(b) **2 2 2**

1. Graphical representation;
2. nature and uses of graphs,
3. graphs of equations/functions;

(c) **2 2**

1. Simple trigonometry;
2. trigonometrical relationships,
3. use of tables and rectangular and polar co ordinates.

MODULE 2 PHYSICS

***Note**: Students should become conversant with Metric, Imperial (British) and US units and measurements.*

Level A B1 B2

2.1 Matter 1 1 1

1. Nature of matter: the chemical elements,
2. structure of Atoms, molecules.
3. Chemical compounds.
4. States: solid,
5. liquid and gaseous.
6. Changes between states.

2.2 Mechanics

(a) Statics **1 2 1**

1. Forces, moments and couples,
2. representation as vectors;
3. Centre of gravity.
4. Elements of theory of stress,
5. strain and elasticity: tension, compression, shear and torsion;
6. Nature and properties of solid, fluid and gas;
7. Pressure and buoyancy in liquids (barometers).

(b) Kinetics **1 2 1**

1. Linear movement:; uniform motion in a straight line, motion

   i. under constant acceleration (motion under gravity);

2. Rotational movement:: uniform circular motion (centrifugal/

   i. centripetal forces);

3. Periodic motion: pendular movement.
4. Simple theory of vibration, harmonics and resonance.
5. Velocity ratio, mechanical advantage and efficiency.

(c) Dynamics

(i) **1 2 1**

1. Mass.
2. Force, inertia, work, power, energy (potential, kinetic and

   i. total energy), heat, efficiency.

(ii) **1 2 2**

1. Momentum, conservation of momentum.
2. Impulse.

3. Gyroscopic principles.

4. Friction: nature and effects, coefficient of friction

i. (rolling resistance).

(d) Fluid dynamics

(i) Specific gravity and density. **2 2 2**

(ii) **1 2 1**

i. Viscosity, fluid resistance, effects of streamlining.

ii. Effects of compressibility on fluids.

iii. Static, dynamic and total pressure: Bernoulli's Theorem, Venturi.

2.3 Thermodynamics

(a) **2 2 2**

1. Temperature: thermometers and temperature scales: Celsius, Fahrenheit and Kelvin.

2. Heat definition.

(b) **2 2**

a. Heat capacity, specific heat.

b. Heat transfer: convection, radiation and conduction.

c. Volumetric expansion

d. First and second law of thermodynamics.

e. Gases: ideal gas laws, specific heat at constant volume and constant pressure, work done by expanding gas.

i. Isothermal, adiabatic expansion and compression, engine

ii. cycles, constant volume and constant pressure, refrigerators and heat pumps.

f. Latent heats of fusion and evaporation, thermal energy, heat of combustion.

2.4 Optics (Light) - 2 2

g. Nature of light; speed of light.

h. Laws of reflection and refraction: reflection at plane surfaces,

i. reflection by spherical mirrors, refraction, lenses.

i. Fibre optics.

2.5 Wave Motion and 2 2

1. Wave motion: mechanical waves, sinusoidal wave motion, interference phenomena, standing waves.

2. Sound: speed of sound, production of sound, intensity, pitch and quality, Doppler effect.

MODULE 3. ELECTRICAL FUNDAMENTALS

Level

A B1 B2

3.1 Electron Theory 1 1 1

* Structure and distribution of electrical charges within: Atoms, molecules, ions, compounds.

* Molecular structure of conductors, semiconductors and insulators.

3.2 Static Electricity and Conduction 1 2 2

* Static electricity and distribution of electrostatic charges.

* Electrostatic laws of attraction and repulsion.

* Units of charge, Coulomb's Law.

* Conduction of electricity in solids, liquids, gases and a vacuum.

3.3 Electrical Terminology 1 2 2

* The following terms, their units and factors affecting them: potential difference, electromotive force, voltage, current, resistance, conductance, charge, conventional current flow, electron flow.

3.4 Generation of Electricity 1 1 1

* Production of electricity by the following methods: light, heat, friction, pressure, chemical action, magnetism and motion.

3.5 DC Sources of Electricity 1 2 2

* 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.

3.6 DC Circuits 2 2

* 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.

3.7 Resistance / Resistor

(a) **2 2**

* Resistance and affecting factors.
* Specific resistance.
* Resistor colour code, values and tolerances, preferred values, Wattage ratings.

* Resistors in series and parallel.
* Calculation of total resistance using series, parallel and series parallel combinations.
* Operation and use of potentiometers and rheostats;
* Operation of Wheatstone Bridge.

(b) **1 1**

* 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.

3.8 Power 2 2

* Power, work and energy (kinetic and potential).
* Dissipation of power by a resistor.
* Power formula.
* Calculations involving power, work and energy.

3.9 Capacitance / Capacitor 2 2

* 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.

3.10 Magnetism 2 2

(a)

* Theory of magnetism.
* Properties of a magnet.
* Action of a magnet suspended in the Earth's magnetic field.
* Magnetisation and demagnetsation.
* Magnetic shielding.
* Various types of magnetic material.
* Electromagnets construction and principles of operation.
* Hand clasp rules to determine: magnetic field around current carrying conductor.

(b) **2 2**

* 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.

3.11 Inductance / Inductor 2 2

* Faraday's Law;
* Action of inducing a voltage in a conductor moving in a magnetic field;
Ï% Induction principles;

Module 3 (continued)

Level

AB1 B2

* Effects of the following on the magnitude of an induced voltage: magnetic field strength, rate of change of flux, number of conductor turns.
* Mutual induction.
* The effect the rate of change of primary current and mutual inductance has on induced voltage.
* Factors affecting mutual inductance: number of turns in coil, physical size of coil, permeability of coil, position of coils with respect to each other.
* Lenz's Law and polarity determining rules.
* Back EMF, self-induction.
* Saturation point.
* Principal uses of inductors.

3.12 DC Motor / Generator Theory - 2 2

* Basic motor and Generator theory.
* Construction and purpose of components in DC Generator .
* Operation of, and factors affecting output and direction of current flow in DC Generator s.
* Operation of, and factors affecting output power, torque, speed and direction of rotation of DC motors.
* Series wound, shunt wound and compound motors.
* Starter Generator construction.

3.13 AC Theory 1 2 2

* Sinusoidal waveform: phase, period, frequency, cycle.
* Instantaneous, average, root mean square, peak, peak to peak current values and calculations of these values, in relation to voltage, current and power.
* Triangular/Square waves.
* Single / 3 phase principles.

3.14 Resistive (R), Capacitive (C) and Inductive (L) Circuits 2 2

* Phase relationship of voltage and current in L, C and R circuits, parallel, series and series parallel.
* Power dissipation in L, C and R circuits.
* Impedance, phase angle, power factor and current calculations.
* True power, apparent power and reactive power calculations.

3.15 Transformers 2 2

* 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.
* Primary and Secondary current, voltage, turns ratio, power, efficiency.
* Auto transformers.

3.16 Filters 1 1

* Operation, application and uses of the following filters: low pass, high pass, band pass, band stop.

3.17 AC Generator s 2 2

* Rotation of loop in a magnetic field and waveform produced.
* Operation and construction of revolving armature and revolving field type AC Generator s.
* Single phase, two phase and three phase alternators.
* Three phase star and delta connections advantages and uses.
* Calculation of line and phase voltages and currents.
* Calculation of power in a three phase system.
* Permanent Magnet Generator s.

3.18 AC Motors - 2 2

* Construction, principles of operation and characteristics of: AC synchronous and induction motors both single and polyphase;
* Methods of speed control and direction of rotation.
* Methods of producing a rotating field: capacitor, inductor, shaded or split pole.

MODULE 4 ELECTRONIC FUNDAMENTALS

Level

A B1 B2

4.1 Semiconductors

4.1.1 Diodes

(a) **2 2 -**

* Diode symbols.
* Diode characteristics and properties.

* Diode in series and parallel.
* Main characteristics and use of ~ on controlled rectifiers (thyristors), light emitting diode, photo conductive diode, varistor, rectifier diodes.
* Functional testing of diode.

(b) **2**

* Materials, electron configuration, electrical properties.
* P and N type materials: effects of impurities on conduction, majority and minority carriers.
* PN junction in a semiconductor, development of a potential across a PN junction in unbiased, forward biased and reverse biased conditions.
* Diode parameters: peak inverse voltage, maximum forward current, temperature, frequency, leakage current, power dissipation.
* Operation and function of diodes in the following circuits: clippers, clampers, full and half wave rectifiers, bridge rectifiers, voltage doublers and triplers.
* Detailed operation and characteristics of the following devices: silicon controlled rectifier (thyristor), light emitting diode, Shottky diode, photo conductive diode, varactor diode, varistor, rectifier diodes, Zener diode.

4.1.2 Transistors

(a) **1 2**

* 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 stabilization.
* Multistage circuit principles: cascades, push-pull, oscillators, multivibrators, flip-flop circuits.

4.1.3 Integrated Circuits

(a) **- 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.

Ï%Principles of operation and use of the following synchro system components / features: resolvers, differential, control and torque, transformers, inductance and capacitance transmitters.

(b) - - **2**

* Understanding of the following terms : Open and closed loop, follow up, servomechanism, analogue, transducer, null, damping, feedback, deadband.

Ï%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.

MODULE 5 DIGITAL TECHNIQUES

ELECTRONIC INSTRUMENT SYSTEMS

Level

A B1 B2

5.1 Electronic Instrument Systems 1 2 3

***** Typical systems arrangements and cockpit layout of electronic instrument systems.

5.2 Numbering Systems - 1 2

***** Numbering systems: binary, octal and hexadecimal.

***** Demonstration of conversions between the decimal and binary, octal and hexadecimal systems and vice versa.

5.3 Data Conversion - 1 2

* Analogue Data, Digital Data.

* Operation and application of analogue to digital, and digital to analogue converters, inputs and outputs, limitations of various types.

5.4 Data Buses - 2 2

* Operation of data buses in aircraft systems, including knowledge of ARINC and other specifications.

5.5 Logic Circuits - 2 2

(a)

*Identification of common logic gate symbols, tables and equivalent circuits.

*Applications used for aircraft systems, schematic diagrams.

(b) - - **2**

* Interpretation of logic diagrams.

5.6 Basic Computer Structure

(a) **1 2** -

* Computer terminology (including bit, byte, software, hardware, CPU, IC, and various memory devices such as RAM, ROM, PROM).

Ï%Computer technology (as applied in aircraft systems).

(b) - - **2**

* Computer related terminology.
* Operation, layout and interface of the major components in a microcomputer including their associated bus systems.
* Information contained in single and multi-address instruction words.
* Memory associated terms.
* Operation of typical memory devices.

* Operation, advantages and disadvantages of the various data storage systems.

5.7 Microprocessors - - 2

- 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.

5.8 Integrated Circuits - - 2

- Operation and use of encoders and decoders.

- Function of encoder types.

- Uses of medium, large and very large scale integration.

5.9 Multiplexing - - 2

- Operation, application and identification in logic diagrams of multiplexers and demultiplexers.

5.10 Fibre Optics - 1 2

- Advantages and disadvantages of fibre optic data transmission over electrical wire propagation.

- Fibre optic data bus.

- Fibre optic related terms.

- **T**erminations.

- Couplers, control terminals, remote terminals.

- **A**pplication of fibre optics in aircraft systems.

5.11 Electronic Displays - 2 2

- Principles of operation of common types of displays used in modern aircraft, including Cathode Ray Tubes, Light Emitting Diodes and Liquid Crystal Display.

5.12 Electrostatic Sensitive Devices 1 2 2

- Special handling of components sensitive to electrostatic discharges.
- Awareness of risks and possible damage, component and personnel anti-static protection devices.

5.13 Software Management Control - 2 2

- Awareness of restrictions, airworthiness requirements and possible catastrophic effects of unapproved changes to software programmes.

5.14 Electromagnetic Environment - 2 2

- Influence of the following phenomena on maintenance practices for electronic system:

EMC – Electromagnetic Compatibility

EMI – Electromagnetic Interference

HIRF – High Intensity Radiated Field Lighting / lighting protection.

5.15 Typical Electronic / Digital Aircraft Systems - 2 2

- General arrangement of typical electronic/digital aircraft systems and associated BITE(Built In Test Equipment) testing such as:

ACARS - ARINC Communication and Addressing and Reporting System

ECAM - Electronic Centralized Aircraft Monitoring
EFIS - Electronic Flight Instrument System
EICAS - Engine Indication and Crew Alerting System
FBW - Fly by Wire
FMS - Flight Management System
GPS - Global Positioning System
IRS - Inertial Reference System
TCAS - Traffic Alert Collision Avoidance System

***Note**: Different manufacturers may use different terminology for similar systems.*

MODULE 6 MATERIALS AND HARDWARE

Level

A B1 B2

6.1 Aircraft Materials – Ferrous

(a) **1 2 1**

- Characteristics, properties and identification of common alloysteels used in aircraft.
- Heat treatment and application of alloy steels.

(b)

- Testing of ferrous materials for hardness, tensile strength, fatigue strength and impact resistance. **- 1 1**

6.2 Aircraft Materials – Non-Ferrous

(a) **1 2 1**

- Characteristics, properties and identification of common non-ferrous materials used in aircraft.
- Heat treatment and application of non-ferrous materials.

(b)

- Testing of non-ferrous material for hardness, tensile strength, fatigue strength and impact resistance. **- 1 1**

6.3 Aircraft Materials – Composite and Non-Metallic

(a) **1 2 2**

- Characteristics, properties and identification of common composite and non-metallic materials, other than wood, used in aircraft.
- Sealants and bonding agents.

(b) **1 2 -**

- The detection of defects in composite materials.
- Repair of composite materials.

6.4 Corrosion

(a) **1 1 1**

- Chemical fundamentals.
- Formation by: galvanic action process, microbiological, stress.

(b) **2 3 2**

- Types of corrosion and their identification.
- Causes of corrosion.
- Material types, susceptibility to corrosion.

6.5 Fasteners

6.5.1 Screw threads 2 2 2

- Screw nomenclature.
- Thread forms, dimensions and tolerances for standard threads used in aircraft.
- Measuring screw threads.

6.5.2 Bolts, studs and screws 2 2 2

- Bolt types: specification, identification and marking of aircraft bolts, international standards.
- Nuts: self-locking, anchor, standard types.
- Machine screws: aircraft specifications.
- Studs: types and uses, insertion and removal.
- Self tapping screws, dowels.

6.5.3 Locking devices 2 2 2

- Tab and spring washers, locking plates, split pins, pal-nut, wire locking, quick release fasteners, keys, circlips, cotter pins.

6.5.4 Aircraft rivets 1 2 1

- Types of solid and blind rivets: specifications and identification, heat treatment.

6.6 Pipes and Unions

(a) **2 2 2**

- Identification of, and types of rigid and flexible pipes and their connectors used in aircraft.

(b) **2 2 1**

- Standard unions for aircraft hydraulic, fuel, oil, pneumatic and air system pipes.

6.7 Springs - 2 1

- Ty**pes** of springs, materials, characteristics and applications.

6.8 Bearings 1 2 2

- Purpose of bearings, loads, material, construction.
- Ty**pe**s of bearings and their application.

6.9 Transmissions 1 2 2

- Gear types and their application.
- Gear ratios, reduction and multiplication gear systems, driven and driving gears, idler gears, mesh patterns.
- Belts and pulleys, chains and sprockets.

6.10 Control Cables 1 2 1

- Types of cables.
- End fittings, turnbuckles and compensation devices.
- Pulleys and cable system components.
- Bowden cables.
- Aircraft flexible control systems.

6.11 Electrical Cables and Connectors 1 2 2

- Cable types, construction and characteristics.
- High tension and co-axial cables.
- Crimping.
- Connector types, pins, plugs, sockets, insulators, current and voltage rating, coupling, identification codes.

MODULE 7 MAINTENANCE PRACTICES

Level

A B1 B2

7.1 Safety Precautions – Aircraft and Workshop 3 3 3

- Aspects of safe working practices including precautions to take when working with electricity, gases especially oxygen, oils and chemicals.
- Instruction in the remedial action to be taken in the event of a fire or another accident with one or more of these hazards.

7.2 **Workshop Practices 3 3 3**

- Care of tools, control of tools, use of workshop materials.
- Dimensions, allowances and tolerances, standards of workmanship.
- Calibration of tools and equipment, calibration standards.

7.3 Tools 3 3 3

- Common hand tool types.
- Common power tool types.
- Operation and use of precision measuring tools.
- Lubrication equipment and methods.
- Operation, function and use of electrical general test equipment.

7.4 Avionic General Test Equipment - 2 3

- Operation, function and use of avionic general test equipment.

7.5 Engineering Drawings, Diagrams and Standards 1 2 2

- Drawing types and diagrams, their symbols, dimensions, tolerances and projections.
- Identifying title block information.
- Microfilm, microfiche and computerized 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.

7.6 Fits and Clearances 1 2 1

- Drill sizes for bolt holes, classes of fits.
- Common system of fits and clearances.
- Schedule of fits and clearances for aircraft and engines.
- Limits for bow, twist and wear.
- Standard methods for checking shafts, bearings and other parts.

7.7 Electrical Cables and Connectors 1 2 2

- Continuity, insulation and bonding techniques and testing.
- Use of crimp tools: hand and hydraulic operated.

- Testing of crimp joints.
- Connector pin removal and insertion.
- Co-axial cables: testing and installation precautions.
- Wiring protection techniques: Cable looming and loom support, **c**able clamps, protective sleeving techniques including heat shrink wrapping, shielding.

7.8 Riveting 1 2 -

- Riveted joints, rivet (spacing and pitch).
- Tools used for riveting and dimpling.
- Inspection of riveted joints.

7.9 Pipes and Hoses 1 2 -

- Bending and balling/flaring aircraft pipes.
- Inspection and testing of aircraft pipes and hoses.
- Installation and clamping of pipes

7.10 Springs 1 2 -

- Inspection and testing of springs.

7.11 Bearings 1 2 -

- Testing, cleaning and inspection of bearings.
- Lubrication requirements of bearings.
- Defects in bearings and their causes.

7.12 Transmissions 1 2 -

- Inspection of gears, backlash.
- Inspection of belts and pulleys, chains and sprockets.
- Inspection of screw jacks, lever devices, push-pull rod systems.

7.13 Control Cables 1 2 -

- Swaging of end fittings.
- Inspection and testing of control cables.
- Bowden cables.
- **A**ircraft flexible control systems.

7.14 Sheet Metal Work - 2 -

- Marking out and calculation of bend allowance.
- Sheet metal working, including bending and forming.
- Inspection of sheet metal work.

7.15 Welding, Brazing, Soldering and Bonding

(a) - **2 2**

- Soldering method.
- Inspection of soldered joints.

(b) - 2 -

- Welding and brazing methods.
- Inspection of welded and brazed joints.
- Bonding methods and inspection of bonded joints.

7.16 Aircraft Weight and Balance

(a) - **2 2**

- Centre of Gravity / Balance limits calculation: use of relevant documents.

(b) - **2** -

- Preparation of aircraft for weighing.
- Aircraft weighing.

7.17 Aircraft Handling and storage 2 2 2

- Aircraft taxiing / towing and associated safety precautions.
- Aircraft jacking, chocking, securing and associated safety precautions.
- Aircraft storage methods.
- Refueling / defuelling procedures.
- De-icing/anti-icing procedures.
- Electrical, hydraulic and pneumatic ground supplies.
- Effects of environmental conditions on aircraft handling and operation.

7.18 Disassembly, Inspection, Repair and Assembly Techniques

(a) **2 3 2**

- 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 1**

- Non-destructive inspection techniques including, penetrant, radiographic, eddy current, ultrasonic and boroscope methods.

(d) **2 2 2**

- Disassembly and re-assembly techniques.

(e) - **2 2**

- Trouble shooting techniques.

7.19 Abnormal Events

(a) **2 2 2**

- Inspections following lighting strikes and HIRF penetration.

(b) **2 2 -**

- Inspections following abnormal events such as heavy landings and flight through turbulence.

7.20 Maintenance Procedures 1 2 2

- Maintenance planning.
- Modification procedures.
- Stores procedures.
- Certification/release procedures.
- Interface with aircraft operation.
- Maintenance Inspection/Quality Control/Quality Assurance.
- Additional maintenance procedures.
- Control of life limited components.

MODULE 8 BASIC AERODYNAMICS

Level

A B1 B2

8.1 Physics of the Atmosphere 1 2 2

- International Standard Atmosphere (ISA), application to aerodynamics.

8.2 AERODYNAMICS 1 2 2

- 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

- 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

- Longitudinal, lateral and directional stability (active and passive).

MODULE 9 HUMAN FACTORS

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 -

- Responsibility: individual and group.
- Motivation and de-motivation.
- Peer pressure.
- Culture issues.
- Team working.
- Management, supervision and leadership.

9.4 Factors Affecting Performance 2 2 2

- Fitness / health.
- Stress: domestic and work related.
- Time pressure and deadlines.
- Workload: overload and underload.
- Sleep and fatigue, shiftwork.
- Alcohol, medication, drug abuse.

9.5 Physical Environment 1 1 1

- Noise and fumes.
- Illumination.
- Climate and temperature.
- Motion and vibration.
- Working environment.

9.6 Tasks 1 - -

- Physical work.
- Repetitive tasks.
- Visual inspection.
- Complex systems.

9.7 Communication 2 2 2

- Within and between teams.
- Work logging and recording.
- Keeping up to date, currency.
- Dissemination of information.

9.8 Human Error 1 2 2

- Error models and theories.
- Types of error in maintenance tasks.
- Implications of errors (i.e. accidents).
- Avoiding and managing errors.

9.9 Hazards in the Workplace 1 2 2

- Recognizing and avoiding hazards.
- Dealing with emergencies.

MODULE 10 AVIATION LEGISLATION

		Level		
		A	**B1**	**B2**
10.1	**Regulatory Framework**	**1**	**1**	**1**

- Role of the Sierra Leone Civil Aviation Authority
- Role of International Civil Aviation Organisation.
- Role of the Joint Aviation Authorities (JAA).
- Role of the JAA full member Authorities.
- Role of the JAA candidate member Authorities.
- Joint Airworthiness Requirements: relationship between JAR-OPS, JAR-145, JAR-66 and JAR-147.
- Relationship between Sierra Leone Civil Aviation Authority and other sAviation Authorities.

10.2	**JAR-66 – Certifying Staff – Maintenance**	**2**	**2**	**2**

- Detailed understanding of JAR-66.

10.3	**JAR-145 – Approved Maintenance Organizations**	**2**	**2**	**2**

- Detailed understanding of JAR-145.

10.4 JAR-OPS – Commercial Air Transportation

(a)	**General**	**1**	**1**	**1**

- Air Operator's Certificate.
- Operators ' Responsibilities.
- Documents to be Carried.
- Aircraft Placarding (Markings).

(b)	**Subpart M**	**2**	**2**	**2**

- Maintenance Responsibility.
- Maintenance Management.
- Aircraft Maintenance Programme.
- Aircraft Technical Log.
- Maintenance Records and Log Books
- Accident/Occurrence Reporting.

10.5 Aircraft Certification

(a) **General**

- Certification rules: Type Certification, Supplemental Type Certification
- Design/Production Organisation Approvals.

(b)	**Documents**	**-**	**2**	**2**

- Certificate of Airworthiness.
- Certificate of Registration.
- Noise Certificate.
- Weight Schedule.
- Radio Station Licence and Approval.

10.7 Maintenance Requirements

(a)		**1**	**2**	**2**

- Maintenance programmes, 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.

(b) - **1** **1**

- Continuing airworthiness.
- Test flights.
- ETOPS: maintenance and dispatch requirements.
- All Weather Operations, Category II/III operations and minimum equipment requirements.

MODULE 11 AEROPLANE AERODYNAMICS, STRUCTURES AND SYSTEMS

Level

A B1 B2

11.1 Theory of Flight

11.1.1 Aeroplane Aerodynamics and Flight Controls **1** **2** **-**

- Operation and effect of:
  - roll control: ailerons and spoilers.
  - pitch control: elevators, stabilators, variable incidence stabilizers 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 Generator s, stall wedges or leading edge devices.
- Operation and effect of trim tabs, balance and antibalance (leading) tabs, servo tabs, spring tabs, mass balance, control surface bias, aerodynamic balance panels.

11.1.2 High Speed Flight **1** **2** **-**

- 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.

11.2 Airframe Structures – General Concepts **2** **2** **-**

(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.
- Lighting strike protection provision.

(b) **1** **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, anodizing, painting.
- Surface cleaning.
- Airframe symmetry: methods of alignment and symmetry checks.

11.3 Airframe Structures – Aeroplanes

11.3.1 Fuselage (ATA 52 / 53 / 56) 1 2

- Construction and pressurization sealing.
- Wing, stabiliser, pylon and undercarriage attachments.
- Seat installation and cargo loading system.
- Doors: construction, mechanisms, operation and safety devices.
- Windows and windscreen construction and mechanisms.

11.3.2 Wings (ATA 57) 1 2 -

- Construction.
- Fuel storage.
- Landing gear, pylon, control surface and high lift/drag attachments.

11.3.3 Stabilisers (ATA 55) 1 2

- Construction.
- Control surface attachment.

11.3.4 Flight Control Surfaces (ATA 55/57) 1 2 -

- Construction and attachment.
- Balancing – mass and aerodynamic.

11.3.5 Nacelles / Pylons (ATA 54) 1 2 -

- Construction.
- Firewalls.
- Engine mounts.

11.4 Air Conditioning and Cabin Pressurisation (ATA 21)

11.4.1 Air Supply 1 2 -

- Sources of air supply including engine bleed, APU and ground cart.

11.4.2 Air Conditioning 1 3 -

- Air conditioning systems.
- Air cycle and vapour cycle machines.
- Distribution systems.
- Flow, temperature and humidity control system.

11.4.3 Pressurization 1 3 -

- Pressurization systems.
- Control and indication including control and safety valves.
- Cabin pressure controllers.

11.4.4 Safety and warning devices 1 3 -

- Protection and warning devices.

11.5 Instruments/Avionic Systems

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.
- Other aircraft system indication.

11.5.2 Avionic Systems 1 1 -

- Fundamentals of system lay-outs and operation of:
  - Autoflight (ATA 22)
  - Communications(ATA 23)
  - Navigation Systems (ATA 34)

11.6 Electrical power (ATA 24) 1 1 -

- 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.

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.
- Cabin entertainment equipment.
- Galley installation.

- Cargo handling and retention equipment.
- Airstairs.

11.8 Fire Protection (ATA 26) 1 3 -

- Fire and smoke detection and warning systems.
- Fire extinguishing systems.
- System tests.

11.9 Flight Controls (ATA 27) 1 3 -

- 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.
- Balancing and rigging.
- Stall protection system.

11.10 Fuel Systems (ATA 28) 1 3 -

- 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.

11.11 Hydraulic Power (ATA 29) 1 3 -

- System lay-out.
- Hydraulic fluids.
- Hydraulic reservoirs and accumulators.
- Pressure generation: electric, mechanical, pneumatic.
- Emergency pressure generation.
- Pressure control.
- Power distribution.
- Indication and warning systems.
- Interface with other systems.

11.12 Ice and Rain Protection (ATA 30) 1 3 -

- Ice formation: classification and detection.
- Anti-icing systems: electrical, hot air and chemical.
- De-icing systems: electrical, pneumatic and chemical.
- Rain repellant and removal.
- Probe and drain heating.

11.13 Landing Gear (ATA 32) 2 3 -

- Construction, shock absorbing.
- Extension and retraction systems: normal and emergency.
- Indications and warning.
- Wheels, brakes, antiskid and autobraking;
- Tyres.
- Steering.

11.14 Lights (ATA 33) 2 3 -

- External: navigation, landing, taxiing, ice.
- Internal: cabin, cockpit, cargo.
- Emergency.

11.15 Oxygen (ATA 35) 1 3 -

- System lay-out: cockpit, cabin.
- Sources, storage, charging and distribution.
- Supply regulation.
- Indications and warnings.

11.16 Pneumatic / vacuum (ATA 36) 1 3 -

- System lay-out.
- Sources: engine / APU, compressors, reservoirs, ground supply.
- Pressure control.
- Distribution.
- Indications and warning.
- Interfaces with other systems.

11.17 Water/Waste (ATA 38) 2 3 -

- Water system lay-out, supply, distribution, servicing and draining;
- Toilet system lay-out, flushing and servicing
- Corrosion aspects.

11.18 On Board Maintenance Systems (ATA 45) 1 2 -

- Central maintenance computers.
- Data loading system.
- Electronic library system.
- Printing.
- Structure monitoring (damage tolerance monitoring).

MODULE 12 HELICOPTER AERODYNAMICS - STRUCTURE AND SYSTEMS

Level		
A	B1	B2

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.

12.2 Flight Control Systems 2 3 -

- Cyclic control.
- Collective control.
- Swashplate.
- Yaw control: Anti-Torque Control, Tail rotor, bleed air.
- Main Rotor Head: Design and operation features.
- Blade Dampers: Function and construction.
- Rotor Blades: Main and tail rotor blade construction and attachment.
- Trim control, fixed and adjustable stabilizers.
- System operation: manual, hydraulic, electrical and fly-by-wire.
- Artificial feel.
- Balancing and rigging.

12.3 Blade Tracking and Vibration Analysis 1 3 -

- Rotor alignment.
- Main and tail rotor tracking.
- Static and dynamic balancing.
- Vibration types, vibration reduction methods.
- Ground resonance.

12.4 Transmissions 1 3 -

- Gear boxes, main and tail rotors.
- Clutches, free wheel units and rotor brake.

12.5 Airframe Structures

(a) **2 2 -**

- 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.
- Lighting strike protection provision.

(b) **1 2 -**

- Construction methods of: stressed skin fuselage, formers, stringers, longerons, bulkheads, frames, doublers, struts, ties, beans, floor structures, reinforcement, methods of skinning and anti-corrosive protection.
- Pylon, stabilizer 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, anodizing, painting.
- Surface cleaning.
- Airframe symmetry: methods of alignment and symmetry checks.

12.6 Air Conditioning (ATA 21)

12.6.1 Air supply 1 2 -

- Sources of air supply including engine bleed and ground cart.

12.6.2 Air Conditioning 1 3 -

- Air conditioning systems.
- Distribution systems.
- Flow and temperature control systems.
- Protection and warning devices.

12.7 Instruments/Avionic Systems

12.7.1 Instruments 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 co-ordinator.
- Compasses: direct reading, remote reading.
- Vibration indicating systems – HUMS.
- 0ther aircraft system indication.

12.7.2 Avionic Systems 1 1 -

- Fundamentals of system layouts and operation of:
  - Auto Flight (ATA 22).
  - Communications (ATA 23).
  - Navigation Systems (ATA 34).

12.8 Electrical Power (ATA 24) 1 3 -

- 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.

12.9 Equipment and Furnishings (ATA 25)

(a) **2 2 -**

- Emergency equipment requirements.
- Seats, harnesses and belts.
- Lifting systems.

(b) **1 1 -**

- Emergency flotation systems.
- Cabin lay-out, cargo retention.
- Equipment lay-out.
- Cabin furnishing installation.

12.10 Fire Protection (ATA 26) 1 3 -

- Fire and smoke detection and warning systems.
- Fire extinguishing systems.
- System tests.

12.11 Fuel Systems (ATA 28) 1 3 -

- System lay-out.
- Fuel tanks.
- Supply systems.
- Dumping, venting and draining.
- Cross-feed and transfer.
- Indications and warnings.
- Refuelling and defuelling.

12.12 Hydraulic Power (ATA 29) 1 3 -

- System lay-out.
- Hydraulic fluids.
- Hydraulic reservoirs and accumulators.
- Pressure generation: electric, mechanical, pneumatic.
- Emergency pressure generation.
- Pressure control.
- Power distribution.
- Indication and warning systems.
- Interface with other systems.

12.13 Ice and Rain Protection (ATA 30) 1 3 -

- Ice formation, classification and detection.
- Anti-icing and de-icing systems: electrical, hot air and chemical.
- Rain repellant and removal.
- Probe and drain heating.

12.14 Landing Gear (ATA 32) 2 3 -

- Construction, shock absorbing.
- Extension and retraction systems: normal and emergency.
- Indications and warning.
- Wheels, tyres, brakes.
- Steering.
- Skids, floats.

12.15 Lights (ATA 33) 2 3 -

- External: navigation, landing, taxiing, ice.
- Internal: cabin, cockpit, cargo.
- Emergency.

12.16 Pneumatic / Vacuum (ATA 36) 1 3 -

- System lay-out.
- Sources: engine, compressors, reservoirs, ground supply.
- Pressure control.
- Distribution.
- Indications and warnings.
- Interfaces with other systems.

MODULE 13 AIRCRAFT AERODYNAMICS, STRUCTURE AND SYSTEMS

Level

A B1 B2

13.1 Theory of Flight

(a) **Aeroplane Aerodynamics and Flight Controls - - 1**

- Operation and effect of:

- roll control: ailerons and spoilers
- pitch control: elevators, stabilators, variable incidence stabilizers and canards.
- yaw control, rudder limiters.

- Control using elevons, ruddervators.
- High lift devices: slots, slats, flaps.
- Drag inducing devices: spoilers, lift dumpers, speed brakes.
- Operation and effect of trim tabs, servo tabs, control surface bias.

(b) High Speed Flight - - 1

- Speed of sound, subsonic flight, transonic flight, supersonic flight, Mach number, critical Mach number.

(c) Rotary Wing Aerodynamics - - 1

- Terminology.
- Operation and effect of cyclic, collective and anti-torque controls.

13.2 Structures –General Concepts

(a) **- - 2**

- Fundamentals of structural systems.

(b) **- - 2**

- Zonal and station identification systems
- Electrical bonding
- Lighting strike protection provision.

13.3 Auto flight (ATA 22) - - 3

- 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.

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 Omni-directional Range (VOR).
- Automatic Direction Finding (ADF).
- Instrument Landing System (ILS).
- Microwave Landing System (MLS).
- Flight Director systems
- Distance Measuring Equipment (DME).
- Very Low Frequency and hyperbolic navigation (VLF/Omega).
- Doppler navigation.
- Area navigation, RNAV systems.
- Flight Management Systems.
- Global Positioning System (GPS), Global Navigation Satellite Systems (GNSS).
- Inertial Navigation System.
- Air Traffic Control transponder, secondary surveillance radar.

- Traffic Alert and Collision Avoidance System (TCAS).
- Weather avoidance radar.
- Radio altimeter.
- ARINC communication and reporting.

13.5 Electrical Power (ATA 24) - - 3

- 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.

13.6 Equipment and Furnishings (ATA 25) - - 3

- Electronic emergency equipment requirements.
- Cabin entertainment equipment.

13.7 Flight Controls (ATA 27)

(a) - - **1**

- Primary controls: aileron, elevator, rudder, spoiler
- Trim control.
- Active load control.
- High lift devices.
- Lift dump, speed brakes.
- System operation: manual, hydraulic, pneumatic.
- Artificial feel: yaw damper, Mach trim, rudder limiter, gust locks.
- Stall protection systems.

(b) - - 2

- System operation: electrical, fly-by-wire.

13.8 Instrument Systems (ATA 31) - - 2

- Classification.
- Atmosphere.
- Terminology.
- Pressure measuring devices and systems.
- Pitot static systems.
- Altimeters.
- Vertical speed indicators.
- Airspeed indicators.
- Machmeters.
- Altitude reporting / alerting systems
- Air data computers.
- Instrument pneumatic systems.
- Direct reading pressure and temperature gauges.
- Temperature indicating systems.
- Fuel quantity indicating systems.
- Gyroscopic principles.
- Artificial horizons.
- Slip indicators.
- Directional gyros.
- Ground Proximity Warning Systems
- Compass systems.
- Flight Data Recording systems.
- Electronic Flight Instrument Systems.
- Instrument warning systems including master warning systems and centralized warning panels
- Stall warning systems and angle of attack indicating systems.
- Vibration measurement and indication.

13.9 Lights (ATA 33) - - 3

- External: navigation, landing, taxiing, ice.
- Internal: cabin, cockpit, cargo.
- Emergency.

13.10 On board Maintenance Systems (ATA 45) - - 2

- Central maintenance computers.
- Data loading system.
- Electronic library system.
- Printing.
- Structure monitoring (damage tolerance monitoring).

MODULE 14 PROPULSION

Level

A B1 B2

14.1 Turbine Engines

(a) - - **1**

- Constructional arrangement and operation of turbojet, turbofan, turboshaft and turbopropeller engines.

(b)

- Electronic Engine Control and Fuel Metering Systems (FADEC); - - **2**

14.2 Engine Indicating Systems - - 2

- 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.

MODULE 15 GAS TURBINE ENGINE

Level

A B1 B2

15.1 Fundamentals 1 2 -

- Potential energy, kinetic energy, Newton's laws of motion, Brayton cycle.
- The relationship between force, work, power, energy, velocity, acceleration.
- **C**onstructional arrangement and operation of turbojet, turbofan, turboshaft, turboprop.

15.2 Engine Performance - 2 -

- Gross thrust, net thrust, choked nozzle thrust, thrust distribution, resultant thrust, thrust horsepower, equivalent shaft horsepower, specific fuel consumption.
- Engine efficiencies.
- By-pass ratio and engine pressure ratio.
- Pressure, temperature and velocity of the gas flow.
- Engine ratings, static thrust, influence of speed, altitude and hot climate, flat rating, limitations.

15.3 Inlet 2 2 -

- Compressor inlet ducts.
- Effects of various inlet configurations.
- Ice protection.

15.4 Compressors 1 2 -

- Axial and centrifugal types.
- Constructional features and operating principles and applications.
- Fan balancing.
- Operation.
- Causes and effects of compressor stall and surge.
- Methods of air flow control: bleed valves, variable inlet guide vanes, variable stator vanes, rotating stator blades.
- Compressor ratio.

15.5 Combustion Section 1 2 -

- Constructional features and principles of operation.

15.6 Turbine Section 2 2 -

- Operations and characteristics of different turbine blade types.
- Blade to disk attachment.
- Nozzle guide vanes.
- Causes and effects of turbine blade stress and creep.

15.7 Exhaust 1 2 -

- Constructional features and principles of operations.
- Convergent, divergent and variable area nozzles.
- Engine noise reduction.
- Thrust reversers.

15.8 Bearing and Sales - 2 -

- Construction features and principles of operations.

15.9 Lubricants and fuels 1 2 -

- Properties and specifications.
- Fuel additives.
- Safety precautions.

15.10 Lubrication Systems 1 2 -

- System operation / lay-out and components.

15.11 Fuel Systems 1 2 -

- Operation of engine control and fuel metering systems including electronic engine control (FADEC).
- Systems lay-out and components.

15.12 Air Systems 1 2 -

- Operation of engine air distribution and anti-ice control systems, including internal cooling, sealing and external air services.

15.13 Starting and Ignition Systems 1 2 -

- Operation of engine start systems and components.
- Ignition systems and components.
- Maintenance safety requirements.

15.14 Engine Indication Systems 1 2 -

- 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, temperature and flow.
- Engine speed.
- Vibration measurements and indication.
- Torque.
- Power.

15.15 Power Augmentation System - 1 -

- Operation and applications.
- Water injection, water methanol.
- Afterburner systems.

15.16 Turbo-prop Engines 1 2 -

- Gas coupled/ free turbine and gear coupled turbines.
- Reduction gears.
- Integrated engine and propeller controls.
- Over speed safety devices.

15.17 Turboshaft engines 1 2 -

- Arrangements, drive systems, reduction gearing, couplings, controls systems.

15.18 Auxiliary Power Units (APUs) 1 2 -

- Purpose, operation, protective systems.

15.19 Powerplant Installation 1 2 -

- Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connectors, wiring looms, control cables and rods, lifting points and drains.

15.20 Fire Protection Systems 1 2 -

- Operation of detection and extinguishing systems.

15.21 Engine Monitoring and Ground Operation 1 3 -

- Procedures of starting and grounds 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.

15.22 Engine Storage and Preservation - 2 -

- Preservation and depreservation for the engine and accessories / system.

MODULE 16 PISTON ENGINE

Level

A B1 B2

16.1 Fundamentals 1 2 -

- Mechanical, thermal and volumetric efficiencies.
- Operating cycles.
- Piston displacement and compression ratio.
- Engine configuration and firing order.

16.2 Engine Performance 1 2 -

- Power calculation and measurement.
- Factors affecting engine power.
- Mixture/leaning, pre-ignition.

16.3 Engine Construction 1 2 -

- Crank case, crank shaft, cam shafts, sumps.
- Accessory gearbox.
- Cylinder and piston assemblies.
- Connecting rods, inlet and exhaust manifolds.
- Valve mechanism.
- Propeller reduction gearboxes.

16.4 Engine Fuel Systems

16.4.1 Carburetors 1 2 -

- Types, construction and principles of operation.
- Icing and heating.

16.4.2 Fuel injection systems 1 2 -

- Types, construction and principles of operation.

16.5 Starting and Ignition Systems 1 2 -

- Starting systems.
- Magneto types, construction and principles of operation.
- Ignition harness, spark plugs.
- Low and high tension systems.

16.6 Induction, Exhaust and Cooling Systems 1 2 -

- Construction and operations of: induction system including alternate air systems.
- Exhaust systems and engine cooling systems.

16.7 Supercharging / Turbocharging 1 2 -

- Principles and purpose of supercharging and its effects on engine parameters.
- Construction and operation of supercharging/ turbocharging systems.
- Systems terminology.
- Control systems.
- Systems protection.

16.8 Lubricants and Fuel 1 2 -

- Properties and specification.
- Fuel additives.
- Safety precautions.

16.9 Lubrication System 1 2 -

- System operation / lay-out and components.

16.10 Engine Indication System 1 2 -

- Engine speed.
- Cylinder head temperature.
- Oil pressure and temperature.
- Exhaust Gas Temperature.
- Fuel temperature, pressure and flow.
- Manifold pressure.

16.11 Powerplant Installation 1 2 -

- Configuration of firewalls, cowlings, acoustic panels, engine mounts, anti-vibration mounts, hoses, pipes, feeders, connections, wiring looms, control cables and rods, lifting points and drains.

16.12 Engine Monitoring and Ground Operation 1 3 -

- Procedure for starting and grounds run-up.
- Interpretation of engine power output and parameters.
- Inspection of engine and components: criteria, tolerances, and data specified by engine manufacturer.

16.13 Engine Storage and Preservation - 2 -

- Preservation and depreservation for engine and accessories / systems.

MODULE 17 PROPELLER

		Level	
A	**B**	**B2**	
17.1	**Fundamentals**	**1**	**2**	**-**

- Blade elements 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.

17.2	**Propeller Construction**	**1**	**2**	**-**

- Construction methods and materials used in composite and metal propellers;
- Blade station, blade face, blade shank, blade back and hub assembly.
- Fixed pitch, controllers pitch, constant speeding propeller.
- Propeller/spinner installation.

17.3	**Propeller Pitch Control**	**1**	**2**	**-**

- Speed control and pitch change methods.
- Feathering and reverse pitch;
- Overspeed protection.

17.4	**Propeller Synchronising**	**-**	**2**	**-**

- Synchronising and synchrophasing equipment.

17.5	**Propeller Ice Protection**	**1**	**2**	**-**

- Fluid electrical de-icing equipment.

17.6	**Propeller Maintenance**	**1**	**3**	**-**

- Static and dynamic balancing.
- Blade tracking.
- Assessment of blade damage, erosion, corrosion, impact damage, delamination.
- Propeller treatment/ repair schemes.
- Propeller engine running.

MADE this *14th* day of *March, 2016.*

LEONARD BALOGUN KOROMA,
Minister of Transport and Aviation.

FREETOWN
SIERRA LEONE.

PRINTED AND PUBLISHED BY THE GOVERNMENT PRINTING DEPARTMENT, SIERRA LEONE.
GAZETTE NO. 1 OF 5TH JANUARY, 2017