



CAD 54

PILOT LICENCES AND ASSOCIATED RATINGS REQUIREMENTS DOCUMENT

Part One General

Part Two Private Pilot's Licences and Instructor Ratings

Part Three Professional Pilot's Licences

Revision 15 - JUNE 2019

*This document replaces the April 2011 edition of
'Pilot Licences and Associated Ratings'*

FOREWORD

The policy document “CAD 54 - Requirements Document: Pilot Licences and Associated Ratings” contains the requirements for the grant and renewal of flight crew licences and associated ratings under Part IV of the Air Navigation (Hong Kong) Order 1995 [AN(HK)O].

In formulating the requirements for the grant of licences and ratings, the ICAO Annex 1 Standards and Recommended Practices (SARPs) to the Convention on International Civil Aviation are adopted unless a Notification of Differences has been filed with the ICAO.

Any person applying for or holding a licence granted or renewed under the AN(HK)O must comply with the requirements contained in this policy document and any amendment which may be issued from time to time.

Enquiries on flight crew licensing requirements should be referred to:

Address: Personnel Licensing Office
Flight Standards and Airworthiness Division
Civil Aviation Department
1 Tung Fai Road
Hong Kong International Airport
Lantau
Hong Kong

Email: plo@cad.gov.hk

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PART 1 CHAPTER 1 GENERAL INFORMATION

1.1 INTRODUCTION

- 1.1.1 The Air Navigation (Hong Kong) Order [AN(HK)O], as amended, allows Hong Kong flight crew licences and the associated ratings to be issued subject to the satisfaction of the Director-General of Civil Aviation (DGCA) that the applicant is a fit person to hold the licence or rating concerned, and is appropriately qualified to act in the capacity to which the licence or rating relates. Such licences and ratings entitle the holders to act within the privileges of the licence or rating concerned as members of flight crew in aircraft registered in Hong Kong. Officers of the Civil Aviation Department (CAD) act on behalf of the DGCA in the processing of applications for and issuance of licences.
- 1.1.2 This publication sets out the privileges of, and the requirements which have to be met for the grant of Hong Kong pilot licences, and the associated ratings that are currently available, and the procedures to be followed to obtain such licences and ratings.
- 1.1.3 Except where courses and examinations are conducted under a TRTO Approval or CAD 509 Approval or where approval has been granted to an operator to conduct in-house courses and examinations, the CAD provides all the theoretical knowledge examination papers, examination venue and invigilating services. The examination papers are marked to a standard that meets the requirements published by ICAO. Airborne or flight simulator tests and ratings, are either conducted by the CAD or by pilots who are authorised as examiners to perform such flying tests and ratings.
- 1.1.4 All the technical terms used in this publication should be interpreted as per Article 98(1) of the AN(HK)O. However, in the absence of a statutory interpretation, a technical term used in this publication should be construed as per its definition stated in ICAO Annex 1.
- 1.1.5 Much of the text of this publication is presented in the third person singular. For conciseness, the pronoun “he” is used throughout. “She” should be substituted where appropriate.
- 1.1.6 To make this document more readable, abbreviations are used except where confusion may be caused. A list of the abbreviations is given in Part 1 Appendix A.
- 1.1.7 Nothing in this publication is intended to conflict with the AN(HK)O or other legislations which, in case of doubt, must be regarded as overriding.
- 1.1.8 Pursuant to Article 63 of AN(HK)O, no person shall with intent to make any false representation for the purpose of procuring for himself or any other person the grant, issue, renewal or variation of any such certificate, licence, approval, permission, exemption or other document under the Order.
- 1.1.9 Application forms mentioned in this publication are available at the CAD’s website (<https://www.cad.gov.hk/english/applications.html>).

1.2 AGE LIMITS

1.2.1 The minimum age for the grant of a licence is as follows:

Licence Type	Minimum Age
Private Pilot's Licence	17 years
Multi-crew Pilot's Licence (Aeroplanes)	18 years
Commercial Pilot's Licence	18 years
Airline Transport Pilot's Licence	21 years
Flight Radiotelephony Operator's (Restricted) Licence	17 years

1.2.2 The requirements for the grant of a licence may be met before the applicant reaches the minimum required age but the licence will not be issued until he reaches that age.

1.2.3 Where the other qualifying requirements are met before the applicant reaches the minimum age, he should ensure that they will still be valid by the time he reaches that age. The periods over which the results of examinations and tests remain valid are given in the chapters dealing with the examinations and tests concerned.

1.2.4 Student pilots may act as the PIC from their 17th birthday for the purpose of qualifying for the grant of a licence provided they act only in accordance with instructions given by a flying instructor, hold a valid Medical Certificate and fly only in Hong Kong territorial airspace. There is no minimum age for undertaking dual instructions but any received before the age of 14 is not counted towards the experience required for the grant of a licence.

1.2.5 Licence holders must not fly as flight crew members for public transport operations:

- (a) in aircraft certificated and operated for single-crew operations once attained the age of 60 years
- (b) in aircraft certificated and operated for multi-crew operations once attained the age of 65 years.

1.3 EVIDENCE OF IDENTITY

1.3.1 All applicants will be required to provide evidence of identity by including in the licence application copies of the personal information pages of his valid passport or his valid Hong Kong Identity Card.

1.3.2 Any CAD approved self-sponsored student who completed a CAD509 integrated course applying for a Hong Kong professional pilot's licence will not be processed unless the applicant holds a valid Hong Kong Permanent Identity Card or a valid visa/entry permit issued by the Hong Kong Immigration Department for employment purpose as a professional pilot by a Hong Kong Air Operator Certificate holder.

1.4 **PERIOD OF VALIDITY OF HONG KONG PILOT'S LICENCES**

1.4.1 The below licences are lifetime licences:

Private Pilot's Licence (Aeroplanes)

Private Pilot's Licence (Helicopters and Gyroplanes)

Commercial Pilot's Licence (Aeroplanes)

Commercial Pilot's Licence (Helicopters and Gyroplanes)

Multi-Crew Pilot's Licence (Aeroplanes)

Airline Transport Pilot's Licence (Aeroplanes)

Airline Transport Pilot's Licence (Helicopters and Gyroplanes)

Flight Radiotelephony Operator's (Restricted) Licence

1.4.2 However, the validity period of licences remain as per the period indicated in the licences, unless otherwise specified.

1.4.3 The privileges conferred by the licences, and any ratings therein, may only be exercised when the appropriate ratings and Medical Certificate are valid.

1.5 **LICENCES CURRENTLY NOT AVAILABLE**

1.5.1 Certain licences and ratings which may be issued under the AN(HK)O are not currently available, these are:

Pilot's Licences (Balloons and Airships)

Pilot's Licences (Gliders)

Night Rating (Aeroplanes)

Night Rating (Helicopters)

Instrument Rating (Helicopters) in Private Pilot's Licences

Towing Rating (Flying Machines)

Flight Navigator's Licence

1.5.2 However, the CAD may issue the above licences on the basis of a foreign licence provided that:

- (a) there is a need for the issue of a licence for the applicant to operate such an aircraft on the Hong Kong register
- (b) the foreign licence meets all the Standards and Recommended Practices specified in Annex 1 (Personnel Licensing) to the Convention on International Civil Aviation
- (c) all requirements for the conversion of a foreign flight crew licence as determined by the CAD are met.

1.5.3 For the issue and renewal of the above licences, the holder will be required to arrange an examiner acceptable to the CAD to conduct the flight test. All costs related to the services of the examiner will be borne by the licence holder. In addition, the CAD may wish to witness the conduct of the flight test. The holder will be required to pass the Hong Kong medical examination for the issue or renewal of a Medical Certificate appropriate to the licence.

1.5.4 Applicants who wish to obtain details of the above licences and ratings can write to the Personnel Licensing Office (PELO).

1.6 **RENEWAL OF LICENCES**

1.6.1 Hong Kong professional pilot's licences are renewed on request.

1.6.2 Renewal of a licence may be applied up to 60 days before the date of expiry of the current licence.

1.6.3 The legal requirement for licence holders to carry a valid licence with them on any flight for the purpose of public transport that include passage outside the Hong Kong airspace should be kept in mind when arranging licence renewal.

1.6.4 Before the new licence can be issued, the existing licence must be returned to the PELO.

1.7 **CHARGES FOR LICENCES AND RATINGS**

1.7.1 The fees to be paid to the Civil Aviation Department in connection with the applications for licences and associated ratings are set out in the Hong Kong Air Navigation (Fees) Regulations.

1.7.2 A crossed cheque for the required amount made payable to the 'Government of Hong Kong Special Administrative Region' must be forwarded along with the application, unless prior payment arrangement has been made with the CAD.

1.7.3 Please note that the application fee is required to be paid at the time of application and is non-refundable even if the application is refused, withdrawn or otherwise ceases to have effect.

1.8 **EXAMINATION CONDUCT**

1.8.1 The examination conduct for all theoretical knowledge examinations and the consequences of committing an unauthorized conduct are set out in Appendix D of Part 1.

1.9 REVIEW OF LICENSING DECISIONS

1.9.1 When an application is refused, or the licence or rating is granted in terms other than those requested, the applicant may request that the case be reviewed.

1.9.2 Similarly, an applicant who has failed a test or examination which he is required to pass before he is granted or may exercise the privileges of a licence or rating, may request that the Director-General of Civil Aviation determines whether the test or examination was properly conducted.

1.9.3 Any request under these provisions should be made to the Assistant Director-General of Civil Aviation (Flight Standards) at the address given in paragraph 1.9.4, within 14 days after receiving the notice of refusal to grant a licence or rating, notice to grant it in terms other than those requested, or notice of failure of an examination or test.

1.9.4 Listed below is the address referred to in this Section.

Assistant Director-General of Civil Aviation (Flight Standards)
Flight Standards and Airworthiness Division
Civil Aviation Department
1 Tung Fai Road
Hong Kong International Airport
Lantau
Hong Kong

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PART 1 CHAPTER 2 MEDICAL

2.1 INTRODUCTION

- 2.1.1 To qualify for the grant of a Medical Certificate, applicants must meet the international standards specified in Annex 1 to the Convention on International Civil Aviation. In Hong Kong, two standards of Medical Certificate for pilots are issued, namely, Class 1 and Class 2.
- 2.1.2 A Class 1 Medical Certificate is required for all Hong Kong professional pilot's licences.
- 2.1.3 A Class 2 Medical Certificate is sufficient for Hong Kong Private Pilot's Licences except for:
- (a) the inclusion of an instrument rating, in which case he is required to hold a valid Class 1 Medical Certificate
 - (b) the inclusion of any other licence privileges where a Class 1 Medical Certificate is required.
- 2.1.4 Prospective applicants for a licence are strongly advised to ensure that they meet the medical requirements before committing themselves to any substantial expenses in satisfying other licensing requirements.
- 2.1.5 In general terms, applicants should be free from any physical or mental disabilities, have good vision in both eyes with good colour vision and have good hearing. The need to wear corrective lenses is not in itself a bar provided that the vision can be satisfactorily corrected. Other physical disabilities may be acceptable provided that they can be adequately compensated.
- 2.1.6 When an applicant undergoes a medical examination under Article 20(7)(b) of the AN(HK)O, he must provide medical information and history to the Approved Medical Examiner (AME) and sign a declaration in Form DCA 153.
- 2.1.7 The content of the examination for the grant or renewal of a Medical Certificate varies with the class of certificate being applied for and the age and medical history of the applicant.
- 2.1.8 The AME will report to the CAD in writing, any false declaration made by an applicant during an examination required under Article 20(7)(b) of the AN(HK)O.
- 2.1.9 If any false or misleading representation or the failure to release supporting medical information is found in connection with the application, the CAD may refuse to a grant medical certificate or withdraw any medical certificate granted, without prejudice to other actions applicable under the Hong Kong Legislation.
- 2.1.10 Before a new medical certificate can be issued, the existing medical certificate must be returned to the PELO, except for the renewal of medical certificates.
- 2.1.11 A medical examination for the renewal of medical certificate may be undertaken up to a calendar month before the expiry date of the current medical certificate.
- 2.1.12 The PELO has procedures in place to ensure that medical confidentiality is respected in the licensing process and that all medical records received and kept at the PELO for licensing purposes are securely held in lockable storage facilities accessible to only staff members of the PELO or other personnel authorised by the DGCA.

2.2 MEDICAL CERTIFICATES

- 2.2.1 Before the grant of a Medical Certificate, the applicant must undergo a medical examination conducted by a CAD AME and meet the medical standards laid down. Subsequently, a CAD Approved Medical Assessor (AMA) will base on the medical report submitted by the AME to assess the suitability of the applicant for the grant of a Medical Certificate.
- 2.2.2 Applicants for the grant of a Medical Certificate should therefore arrange an examination with an AME.
- 2.2.3 A list of current AME's is available upon request. Applicants who wish to obtain the list can send a request to the PELO via email at plo@cad.gov.hk.

2.3 VALIDITY PERIODS

- 2.3.1 The validity period of a Medical Certificate varies according to the class of certificate being applied for, the type of pilot licence held and the holder's age on the date of the medical examination.
- 2.3.2 A Medical Certificate is valid until the last day of the month in which the renewal medical examination falls due. Unless otherwise specified, to determine the month when a renewal medical examination falls due, an appropriate period from the table below is to be added to the date of the medical examination.

Licence	Holder's Age	Class of Medical Certificate	Validity period in months	
CPL/ MPL(A)/ ATPL	Under 40	1	12	
	40 - 59	1	(i) Single-crew commercial air transport operations carrying passengers <i>Notes: Not applicable to MPL(A) holders.</i>	6
		1	(ii) Commercial air transport operations other than (i) above	12
	60 or over	1	6	
PPL / IR	Under 60	1	12	
	60 or over	1	6	
PPL / Student Pilot	Under 40	2	60	
	40-49	2	24	
	50 or over	2	12	
Air Traffic Controller's Licence (ATCL)	Under 40	3	48	
	40-49	3	24	
	50 or over	3	12	

- 2.3.3 Unless otherwise restricted, a Class 1 Medical Certificate is valid for Class 2 purposes for the period appropriate to age and licence privileges.
- 2.3.4 The expiry of any special examination listed on page 1 of the Medical Certificate does not affect the validity of the certificate. However, the Medical Certificate will not be renewed until any expired special examination has been renewed.
- 2.3.5 Notwithstanding paragraphs 2.3.2 to 2.3.4 above, the period of validity of a Medical Certificate may be reduced when clinically indicated.
- 2.3.6 Notwithstanding paragraphs 2.3.2 to 2.3.4 above, the period of validity of a Medical Certificate may be extended by 14 days, at the discretion of the AME, subject to the conditions set out by the CAD.
- 2.3.7 A licence holder must not exercise the privileges of his licence beyond the relevant period of validity of the Medical Certificate in his licence.

2.4 **UNFIT AIRCREW**

- 2.4.1 No one is entitled to act as a flight crew member if he knows or suspects he is medically unfit. Any holder of Medical Certificate, who:
- (i) suffers an injury affecting his ability to act as a flight crew member, or
 - (ii) is affected by any illness involving incapacity to undertake his flight crew functions for a period of 20 days or more
 - (iii) in the case of a woman, has reason to believe she is pregnant

must notify the CAD in writing as soon as possible in the case of injury or pregnancy and as soon as the period of 20 days has elapsed in the case of illness. The Medical Certificate is deemed to be suspended from the date of occurrence of such injury, or the elapse of the 20-day period of illness, or the confirmation of the pregnancy, until such time as the individual obtains clearance from the CAD AMA.

- 2.4.2 A licence holder must not exercise the privileges of his licence while under the influence of any psychoactive substances which might render him unable to safely and properly exercise these privileges.
- 2.4.3 A licence holder must not engage in any problematic use of psychoactive substances.

2.5 **CHARGES FOR EXAMINATIONS**

- 2.5.1 Charges to be paid for medical examinations conducted by the CAD AMEs are arranged between the applicant and the AME concerned.

2.6 MEDICAL STANDARDS NOT MET – SPECIAL CASES

2.6.1 If the medical standards as presented in the ICAO Annex 1 are not met for a particular licence, the appropriate Medical Certificate will not be issued or renewed unless the following conditions are fulfilled:

- (a) Accredited medical conclusion indicates that in special circumstances, the applicant's failure to meet any requirement, whether numerically or otherwise, is such that the exercise of the privileges of the licence applied for is not likely to jeopardise flight safety.
- (b) Relevant ability, skill and experience of the applicant and operational conditions have been considered.
- (c) The licence is endorsed with special limitation(s) when the safe performance of the licence holder's duties is dependent on the compliance with such limitation(s).

2.7 REVIEW OF MEDICAL CERTIFICATION DECISIONS

2.7.1 Anyone who is not satisfied with the decision made to issue or not to issue a medical certificate should submit an application for review to the PELO with reasons and medical evidence within 14 days from the issue of the written notification.

2.7.2 An application for review should be made to the PELO at the address below:

Personnel Licensing Office
Flight Standards and Airworthiness Division
Civil Aviation Department
1 Tung Fai Road
Hong Kong International Airport
Lantau
HONG KONG

PART 1 CHAPTER 3 LANGUAGE PROFICIENCY

3.1 INTRODUCTION

3.1.1 AN(HK)O Article 20(1)(a) empowers the DGCA to grant flight crew licences, subject to such conditions as he thinks fit, upon his being satisfied that the applicant demonstrates, inter alia, the language ability to act in the capacity to which the licence relates. For this purpose, the applicant should furnish such evidence and undergo such examinations and tests as required by the DGCA.

3.1.2 Article 20A of the AN(HK)O provides the legal power for an endorsement in respect of language proficiency to be included in a licence subject to the DGCA being satisfied that the applicant has demonstrated the ability to speak and understand the language used for radiotelephony communications.

3.1.3 A person must not act as a flight crew member of a Hong Kong registered aircraft which is being flown in or over a place outside Hong Kong unless his licence bears a valid Language Proficiency Endorsement issued by the CAD.

3.2 LICENSING REQUIREMENTS AND PROCEDURES

3.2.1 To apply for the inclusion of a Language Proficiency Endorsement in a Hong Kong Pilot's Licence, the applicant must have demonstrated, in a manner acceptable to the CAD, the ability to speak and understand the English language used for radiotelephony communications to the level specified in the language proficiency requirements in ICAO Annex 1.

3.2.2 The language proficiency requirements stated in paragraph 3.2.1 above apply not only to the use of ICAO phraseology, but also pronunciation, structure, vocabulary, fluency, comprehension and the interactions in the general use of the language. They apply equally to native and non-native speakers.

3.2.3 The licence applicant/holder who demonstrated proficiency below the Expert Level (Level 6) should be formally evaluated at intervals in accordance with an individual's demonstrated proficiency level, as follows:

- (a) Those demonstrating English language proficiency at the Operational Level (Level 4) should be evaluated at least once every three years.
- (b) Those demonstrating English language proficiency at the Extended Level (Level 5) should be evaluated at least once every six years.

3.2.4 An example of an acceptable means of compliance will involve the following procedures:

- (a) The licence applicant/holder undergoes a language assessment acceptable to the CAD.
- (b) Subject to the licence holder/applicant being assessed as having demonstrated language proficiency at Level 4 or above according to the ICAO Language Proficiency Rating Scale, he can submit a duly completed Form DCA 530 to the PELO for the inclusion of a Language Proficiency Endorsement of the acquired level in his Hong Kong Pilot's Licence as an evidence of compliance.

3.2.5 The Language Proficiency Endorsement in a Hong Kong Pilot's Licence should state the following:

“The holder of this licence has demonstrated English language proficiency at [Expert Level (Level 6) or Extended Level (Level 5) or Operational Level (Level 4)] in accordance with the Language Proficiency Rating Scale specified in Annex 1 to the Convention on International Civil Aviation.”*

*As appropriate according to the licence holder/applicant's assessment results recorded in Form DCA 530.

3.3 **COMPLIANCE REQUIREMENTS FOR OPERATORS**

3.3.1 All operators in Hong Kong, including GFS, HKAC and business jet operators, are required to:

- (a) establish its own English Language Proficiency Assessment Programme (ELPAP) to assess its pilots in their employ or pilots flying under the auspices of Hong Kong Aviation Club (HKAC) according to the ICAO Annex 1 language proficiency requirements and the ICAO Language Proficiency Rating Scale
- (b) submit its ELPAP to the CAD for acceptance
- (c) ensure that no pilot in their employ acts as a flight crew member of a Hong Kong registered aircraft which is being flown in or over any place outside Hong Kong unless he has included in his HK Pilot's Licence a valid Language Proficiency Endorsement of at least Level 4.

3.3.2 The CAD will base on the guidelines stipulated in ICAO published Doc 9835 – Manual on the Implementation of ICAO Language Proficiency Requirements to consider accepting the ELPAP proposed by an operator as a means of compliance with the ICAO Annex 1 language proficiency requirements.

3.3.3 The acceptance process will involve the CAD observing the conduct of the language testing service and inspecting the acceptability of the testing service provider including the credentials of the test developer(s) and the rater(s) and the associated procedures and facilities.

3.3.4 If the proposed means of compliance is considered acceptable, a Letter of Acceptance, valid for a period of three years, detailing the conditions for acceptance will be issued to the operator concerned. The Letter of Acceptance will state that the CAD may conduct interim inspection(s) for surveillance purpose.

3.4 LANGUAGE PROFICIENCY POLICY FOR PPL HOLDERS FLYING WITHIN HONG KONG

3.4.1 After consulting ICAO and giving due consideration of the operating standards, the level of local PPL activities and the oversight efficacy, the CAD has adopted the following policies regarding PPL holders flying within Hong Kong:

- (a) Compliance with the ICAO language proficiency requirements is not mandatory for holders of a Hong Kong PPL flying within Hong Kong airspace.
- (b) For Hong Kong PPL applicants or holders who have not demonstrated compliance with the ICAO language proficiency requirements to the level specified in Annex 1, the following applies:
 - i. Provided that the applicant or holder has met all licensing requirements for the grant of a Hong Kong PPL including holding a valid FRORL, a Hong Kong PPL will be issued.
 - ii. The following endorsement will be included under Item XIII of the licence:

The holder of this licence has not been assessed on the Language Proficiency Requirements as specified in Annex 1 to the Convention on the International Civil Aviation.
 - iii. They are obliged under Article 19(9)(a) of the AN(HK)O and Article 40 of the Convention to the International Civil Aviation to obtain prior permission from State(s) whose airspace/territory is to be entered.
- (c) Holders of Hong Kong PPL acting as a flight crew member of a Hong Kong registered aircraft which is being flown in or over any place outside Hong Kong must comply with the licensing requirements stated in Section 3.2 above.
- (d) Foreign pilot licence holders seeking to fly on a Hong Kong registered aircraft will be considered for licence validation under Article 21 of the AN(HK)O only if their foreign licence bears a valid ICAO Language Proficiency Endorsement of at least Level 4 or a valid endorsement conferring an equivalent compliance status.

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**PART 1 CHAPTER 4 FLIGHT RADIOTELEPHONY OPERATOR'S
(RESTRICTED) LICENCES (FRORL)**

4.1 INTRODUCTION

4.1.1 The privileges of the Flight Radiotelephony Operator's (Restricted) Licence (FRORL) are set out in Part A of Schedule 9 to the AN(HK)O. The holder of the licence is entitled to operate radiotelephony apparatus in any aircraft if the stability of the frequency radiated by the transmitter is maintained automatically. The holder is, however, not entitled to operate the transmitter, or to adjust its frequency, except by the use of external switching devices.

4.1.2 A FRORL is a pre-requisite for the issue of all Hong Kong pilot's licences and is not automatically issued.

4.2 APPLICATIONS

4.2.1 To apply for a FRORL, the applicant should pass the Radiotelephony theoretical knowledge examination conducted by the CAD and fulfil one of the following, subject to the conditions in paragraph 4.2.2 below:

- (a) pass a practical communication test carried out by a CAD Authorised Examiner
- (b) produce evidence of the completion of an in-flight radiotelephony training.

4.2.2 If a FRORL is being applied for with a Hong Kong pilot's licence, the FRORL will normally be issued if one of the following conditions is met:

- (a) The applicant has completed a CAD approved integrated course of flight and ground training under the auspices of a Flight Training Organization approved in accordance with CAD 509 requirements.
- (b) The applicant is a holder of a Flight Radiotelephony Operator's Licence issued by another ICAO Contracting State.

4.3 EXAMINATION AND TEST REQUIREMENTS

4.3.1 The written and practical examinations will cover the following syllabus:

Pre-flight

Familiarisation with aircraft radio equipment
Microphone technique and listening out
Call signs and abbreviations
Phonetic alphabets and standard phraseologies

Departure Procedures

Radio checks
Taxi instructions/information and read back
Holding
Departure clearance

En route Procedures

Frequency changing
Height reporting
Position reporting

Circuit Procedures

Joining circuit
Landing clearance
Orbit, extend, touch-and-go
Go around
Vacating runways

Emergency Procedures

Uncertainty of position
Radio failure
Practice pan
Mayday

Knowledge of the Relevant Parts of the Following Publications and Notices

(a) AN(HK)O

Radio equipment of aircraft Article 14
Operation of radio in aircraft. Article 35
Radio equipment to be carried in aircraft..... Schedule 6
Flight crew of Aircraft : Licences and Ratings..... Schedule 9

(b) Hong Kong AIP

(c) Current AICs and NOTAMs.

- 4.3.2 Radiotelephony training is a continuous teaching and assessment process carried out during the applicant's flying training. Flying instructors must ensure that each syllabus item has been demonstrated to the student and practised by the student during flight and that the student has achieved a satisfactory standard.
- 4.3.3 Records of this training must be maintained on a student training record with a minimum of 15 separate entries being recorded. The student's standard will be assessed during the GFT.

PART 1 CHAPTER 5 RECORDING AND CREDITING OF FLIGHT TIME

5.1 INTRODUCTION

5.1.1 According to Article 22 of the AN(HK)O, every member of the flight crew of an aircraft registered in Hong Kong and every person who engages in flying for qualifying for the grant or renewal of a Hong Kong Pilot's Licence should keep a personal flying log book in which at least the following particulars must be recorded:

- (a) the name and address of the holder of the log book
- (b) particulars of the holder's licence (if any) to act as member of the flight crew of an aircraft
- (c) the name and address of his employer (if any)

5.1.2 Particulars of each flight during which the holder of the log book acted either as a member of the flight crew of an aircraft or for the purpose of qualifying for the grant or renewal of a Hong Kong Pilot's Licence as the case may be, must be recorded in the log book at the end of each flight or as soon thereafter as is reasonably practicable, including:

- (a) the date and places at which the holder embarked on and disembarked from the aircraft and the time spent during the course of a flight when he was acting in either capacity
- (b) the type and registration of the aircraft (or simulator)
- (c) the name of Pilot-in-Command
- (d) the capacity in which the holder acted in flight
- (e) particulars of any special conditions under which the flight was conducted, including night flying and instrument flying
- (f) particulars of any test or examination undertaken whilst in flight.

5.1.3 Particulars of any test or examination undertaken whilst in a flight simulator should be recorded in the log book, including:

- (a) the date of the test or examination
- (b) the type of simulator
- (c) the capacity in which the holder acted
- (d) the nature of the test or examination.

5.1.4 The log book is to be kept up-to-date and is to be produced as and when required by the CAD.

5.2 FLIGHT TIME

5.2.1 For the purpose of this Chapter and Appendix C:

- (a) An aeroplane is deemed to be in flight from the moment when, after the embarkation of its crew for the purpose of taking off, the aeroplane first moves under its own power, until it next comes to rest after landing.
- (b) A helicopter is deemed to be in flight from the moment the helicopter first moves under its own power for the purpose of taking off until the rotors are next stopped.

5.3 **LOGGING OF FLIGHT TIME**

5.3.1 The method of recording flight time is detailed in Part 1 Appendix C.

PART 1 APPENDIX A ABBREVIATIONS

AE	Authorised Examiner
AFI	Assistant Flying Instructor
AIC	Aeronautical Information Circular
AIP	Aeronautical Information Publication
AMA	Approved Medical Assessor
AME	Approved Medical Examiner
ATPL(A)	Airlines Transport Pilot's Licence (Aeroplanes)
ATPL(H)	Airlines Transport Pilot's Licence (Helicopters)
amsl	Above mean sea level
AN(HK)O	Air Navigation (Hong Kong) Order
CAD	Civil Aviation Department
CAD 509(A)	CAD 509(A) – Requirements for Approval of Flying Training Organisations Offering an Integrated Course of Training for Hong Kong Commercial Pilot's Licence with Instrument Rating (Aeroplanes)
CAD 509(H)	CAD 509(H) –Flying Training Organisations Offering an Integrated Course of Training for Hong Kong Commercial Pilot's Licence (Helicopters) / Instrument Rating (Helicopters)
CAD 509(MPL)	CAD 509(MPL) – Requirements for Approval of Flying Training Organisations Offering an Integrated Course of Training for Hong Kong Multi-crew Pilot's Licence with Instrument Rating (MPL)
CFI	Chief Flying Instructor
C of A	Certificate of Airworthiness
C of E	Certificate of Experience
C of T	Certificate of Test
C of V	Certificate of Validation
CPL(A)	Commercial Pilot's Licence (Aeroplanes)
CPL(H)	Commercial Pilot's Licence (Helicopters)
FI	Flying Instructor
FIC	Flying Instructor Course
FIE	Flying Instructor Examiner
FRORL	Flight Radiotelephony Operators (Restricted) Licence
FTO	Flying Training Organisation
GFT	General Flight Test
ICAO	International Civil Aviation Organisation
IMC	Instrument Meteorological Conditions
IR(A)	Instrument Rating (Aeroplanes)
IR(H)	Instrument Rating (Helicopters)
IRE	Instrument Rating Examiner
Kg	Kilogramme
Kt	Knot
MPL(A)	Multi-crew Pilot's Licence (Aeroplanes)
MTWA	Maximum Total Weight Authorized
nm	Nautical mile
NOTAM	Notice to Airmen
P2	Co-pilot
P2X	Cruise pilot
PIC	Pilot-in-command
PIC U/S	Pilot-in-command, Under Supervision

PELO	Personnel Licensing Office
PPL(A)	Private Pilot's Licence (Aeroplanes)
PPL(H)	Private Pilot's Licence (Helicopters)
P U/T	Pilot Under Training
QFI	Qualified Flying Instructor
SPIC	Student Pilot-in-command
TRE	Type Rating Examiner
TRTO	Type Rating Training Organisation
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

PART 1 APPENDIX B PILOT LICENCES: CONTENT AND FORMAT

A Hong Kong Pilot's Licence comprises the following:

1 COVER

Private Pilot (Aeroplanes)	Light brown
Private pilot (Helicopters)	Light grey
Commercial Pilot (Aeroplanes)	Light blue
Commercial Pilot (Helicopters)	Dark grey
Multi-Crew Pilot (Aeroplanes)	Dark blue
Airline Transport Pilot (Aeroplanes)	Dark green
Airline Transport Pilot (Helicopters)	Two dark grey stripes on a white background

2 LICENCE TITLE PAGE AND PARTICULARS OF HOLDER

This page specifies the type of licence and the licence number. It includes personal particulars and the dates over which he may exercise the privileges of the licence. The page is stamped and dated by the CAD on the issue of the licence and is signed by the issuing officer. The licence is not valid unless it also bears in the space provided on this page the ordinary signature of the holder in ink. The reverse of the page gives any limitations to which the licence might be subject to.

3 THE MEDICAL CERTIFICATES

The Medical Certificate testifies to the medical fitness of the licence holder for performing the functions to which the licence relates and specifies the purpose and periods for which it will remain valid.

4 FLIGHT RADIOTELEPHONY OPERATOR'S (RESTRICTED) LICENCES

This empowers the holder to operate radio telephony equipment in an aircraft.

5 AIRCRAFT RATINGS

The format for this page is dependent on the type of licence held.

5.1 Private Pilot's Licence

The aircraft rating lists the groups of aircraft which the licence holder is entitled to fly under the privileges of his Private Pilot's Licence.

5.2 Professional Pilot's Licences

- (a) The Aircraft Rating (A) lists the types of aircraft which the licence holder is entitled to fly under the privileges of his professional pilot's licence.
 - (i) Part 1 lists the types which he is entitled to fly as PIC.
 - (ii) Part 2 lists the types which he is entitled to fly as co-pilot.
- (b) The Aircraft Rating (B) lists the aircraft, by groups, which the licence holder may fly under the privileges of a Private Pilot's Licence included in his professional pilot's licence.

6 THE AIRCRAFT RATING: CERTIFICATE OF TEST

The functions to which an aircraft rating relates must not be performed unless it bears a valid certificate of test (C of T) or certificate of experience (C of E). This certificate gives the dates on which a flight test, or, in certain circumstances, a test on an approved simulator, in relation to a type or a group of aircraft included in the Aircraft Rating was satisfactorily completed in the capacity of either PIC or co-pilot.

7 THE AIRCRAFT RATING: CERTIFICATE OF EXPERIENCE

The functions to which an aircraft rating relates must not be performed unless it bears a valid C of T or C of E. The C of E certifies that the holder of the licence produced, to a person authorized to sign the certificate, his flying log book to show that in a specified period preceding the date on which the certificate was signed he had completed the minimum flying experience required to maintain a valid C of E in relation to the rating.

8 INSTRUMENT RATINGS

This empowers the holder to fly in controlled airspace in circumstances requiring compliance with the Instrument Flight Rules and as PIC in certain other specified circumstances.

9 INSTRUMENT RATINGS: CERTIFICATE OF TEST

The functions to which an instrument rating relates must not be performed unless it bears a valid C of T. This certificate gives the dates on which a test in relation to the IR was satisfactorily passed. The maximum validity of the certificate is 13 months from the date of effect.

10 ASSISTANT FLYING INSTRUCTOR AND FLYING INSTRUCTOR RATINGS

The Assistant Flying Instructor (AFI) and Flying Instructor (FI) Ratings empower the holder to give instruction in flying within the privileges of the ratings concerned.

11 AFI RATING AND FI RATING: CERTIFICATE OF TEST

The functions to which an AFI or FI rating relates must not be performed unless it bears a valid C of T. This certificate gives the dates on which the licence holder has satisfactorily passed a test in relation to the AFI or FI Rating.

PART 1 APPENDIX C RECORDING AND CREDITING OF FLIGHT TIME

Case	Operating capacity	Entry in log book under 'Holder's operating capacity'	Recording of item in log book and crediting of time
A	Pilot-in-command (PIC)	PIC or P1	Enter time in 'Pilot-in-command (P1)' column.
B	Co-pilot performing the duties of PIC under the supervision of pilot-in-command (PIC U/S) See Note 7	PIC U/S	Enter time in 'Pilot-in-command (P1)' column.
C	Co-pilot See Notes 6 & 8	P2	Enter time in 'Second Pilot' or 'Co-pilot (P2)' column.
D	Co-pilot whilst holding PPL	P2	Enter time as for Case C.
E	Pilot on flight deck performing the duties as		
	(i) In-flight relief pilot	P2	Enter time in 'Second Pilot' or in 'Co-pilot (P2)' column.
	(ii) Cruise relief co-pilot	P2X	Enter time in 'Second Pilot' or in 'Co-pilot (P2)' column.
	(iii) Pilot, not being P1 or P2, supervising co-pilot activities	P2	Enter time as for Case C.
	(iv) No duties assigned (Super-numerary)	SNY	Enter time in 'Any other flying' or spare column and annotate 'SNY'. Not counted towards licence experience requirements.
F	Pilot under instruction for the purpose of gaining a licence or rating, or for conversion to an aircraft type within a PPL Aircraft Rating group.	P U/T	Enter time in 'Dual' column.

Case	Operating capacity	Entry in log book under 'Holder's operating capacity'	Recording of item in log book and crediting of time
G	Other than Case I, student pilot flying as pilot-in-command on a Hong Kong CAD approved course of CPL/IR training during which the flight instructor on board the aircraft only observed the student acting as pilot-in-command and did not influence or control the flight of the aircraft.	SPIC	Enter time in 'Pilot-in-command (P1)' column. Unless otherwise specified, counted in full towards licence experience requirements.
H	Pilot under instruction on a course of CPL or CPL/IR training acting as pilot-in-command under the supervision of a flying instructor.	PIC U/S	Enter time in 'Pilot-in-command (P1)' column.
I	Pilot undergoing any form of flight test with a CAD Authorised Examiner (other than Case J)	PIC U/S for successful test P U/T for unsuccessful test	For successful test enter time in 'Pilot-in-command (P1)' column and have it certified by the aircraft commander or the supervising pilot. For unsuccessful tests enter time in 'Dual' column.
J	Pilot undergoing a flight test in the capacity of co-pilot	P2	As for Case C.
K	Student pilot flying as the sole occupant of an aircraft during training for the grant of a PPL, CPL or MPL	PIC or P1	Enter time in 'Pilot-in-command (P1)' column.
L	Pilot acting as Safety Pilot	SNY	As for Case E(iv). Not counted towards licence experience requirements.
M	Pilot undergoing Flight Instructor Course training as pilot-in-command accompanied by: Pilot acting as 'student' for instructional purposes	PIC or P1 SNY	Roles in 'Operating capacity' Column are inter-changeable between pilots. Time spent as 'P1' to be entered and counted as for Case K. Time spent as 'student' to be entered and counted as for Case E(iv). Not counted towards licence experience requirements.

NOTES:

1. The pilot-in-command, who is nominated by the operator as the pilot-in-command for the duration of the flight, may log the whole flight time as P1 or PIC.
2. Subject to Note 7 below, the co-pilot performing the tasks of “pilot flying” may log the corresponding flight time as PIC U/S when he is seated at the flying controls and discharges the necessary duties. Time spent outside the control seat for rest purposes cannot be recorded as flight time for licensing purposes.
3. Subject to Note 8 below, the co-pilot performing the tasks of “pilot monitoring” may log the corresponding flight time as P2 when he is seated at the flying controls and discharges the necessary duties. Time spent outside the control seat for rest purposes cannot be recorded as flight time for licensing purposes.
4. Subject to Note 8 below, the in-flight relief pilot, who is seated at the flying controls and discharges his duties, may log the corresponding on-seat flight time as P2. The time spent outside the control seat for rest purposes cannot be recorded as flight time for licensing purposes.
5. Subject to Note 8 below, the P2X rating holder, who is seated at the flying controls and discharges his duties as an in-flight relief co-pilot, may log the corresponding on-seat flight time as P2X. The time spent outside the control seat for rest purposes cannot be recorded as flight time for licensing purposes.
6. Whenever two members of flight crew acting in the same capacity share a particular operating duty, each performing such duty for particular periods only and neither acting under the supervision of the other, only the time during which the duty was performed is to be recorded in the appropriate column of the personal flying log book.
7. A pilot claiming time spent as co-pilot performing the duties and functions of pilot-in-command, under the supervision of the pilot-in-command, towards meeting the licence requirements as given in Case B, will be credited with that flight time only if:
 - (a) the flight was conducted in an aircraft certificated or required by the Civil Aviation Authority of the State of Registry for operation with a minimum crew of at least two pilots
 - (b) he was responsible for checking the accuracy of the flight plan, loadsheet and fuel calculations for the flight
 - (c) he ensured that all crew checks were carried out in accordance with the laid down operation procedures
 - (d) throughout the flight he carried out all the duties and functions of pilot-in-command and, under normal circumstances, conducted the take-off and the landing unless in case of operational restriction he has at least conducted the take-off or the landing
 - (e) he resolved all meteorological, communication and air traffic control problems
 - (f) the pilot-in-command did not have to overrule any course of action proposed or taken by the co-pilot.
8. A pilot claiming flying hours as co-pilot towards meeting the overall flying experience requirements for a licence, as provided for in cases C, D, E(i), E(ii), E(iii) or I will only be credited with that flight time if holding an appropriate licence to perform co-pilot duties, and if:
 - (a) the flight was conducted in an aircraft required by its Certificate of Airworthiness, or by Article 18(3)(b) of the Air Navigation (Hong Kong) Order, to carry a crew of not less than two pilots; or
 - (b) the flight was conducted by an AOC holder choosing to operate a particular aircraft as a two pilot operation and provided that the specific duties that the second pilot was required to perform on all flights in respect of the operation of the aircraft were contained in the Operations Manual relating to the aircraft; or

- (c) it was conducted in a military aircraft normally flown by more than one pilot; or
 - (d) exceptionally in Cases C and D, and subject to prior agreement with the CAD it was conducted in an aircraft not required to carry two pilots but which was fitted with full dual controls for that flight, and the pilot-in-command certifies in the co-pilot's log book that the flight was conducted as a genuine two pilot operation.
9. Flight time in microlight aircraft or motorised gliders cannot be counted towards any of the requirements for a Hong Kong pilot licence.

PART 1 APPENDIX D EXAMINATION CONDUCT

1 INTRODUCTION

- 1.1 The provisions set out in this appendix apply to all flight crew licensing theoretical knowledge examinations unless otherwise stated.

2 INSTRUCTIONS TO CANDIDATES

- 2.1 The Instructions to Candidates list out the general examination etiquette and examination conduct to follow. The instructions are available on the CAD website, in the examination booking forms and at the CAD examination centre.
- 2.2 All candidates should read the examination instructions carefully before attending the examination and be aware of the possible consequences of any misconduct committed during the examination.
- 2.3 The candidate has the sole responsibility to ensure that the requirements and rules of the examinations are complied with. The CAD will not accept any claims from candidates for being misinformed by others (including invigilators) as an excuse for the exemption from penalty for the breach of any instructions listed.

3 CHEATING OR UNAUTHORIZED CONDUCT

- 3.1 In any flight crew licensing theoretical knowledge examination, candidates cannot:
- (a) provide false or incorrect personal particulars in his answer sheet with intent to deceive
 - (b) obtain knowledge of examination papers prior to the examination improperly
 - (c) have any unauthorized article on/in the examination desk or on his person
 - (d) communicate or attempt to communicate improperly with any person inside or outside the examination room during an examination session
 - (e) read from notes, books or electronic devices brought into the examination room or from the work of another candidate during an examination session
 - (f) attempt to take away from the examination room any examination material
 - (g) leave the examination room without permission
 - (h) start to work on the questions before being instructed to do so
 - (i) continue to write after being told to stop writing at the end of an examination session
 - (j) take any part of an examination on behalf of another person
 - (k) be represented by another person for an examination

(l) disobey the instructions of the invigilator in an examination session.

3.2 Any candidate performing any of the acts specified in paragraph 3.1 above is liable to all or any of the following, without refund of his examination fees:

(a) Disqualification of the concerned subject

(b) Disqualification of all or any subjects already passed

(c) Debarment from sitting further flight crew licensing theoretical knowledge examinations for up to 12 months

(d) Debarment from applying for any flight crew licence and/or associated rating for up to 12 months

3.3 Certain kind of misconduct may also be considered a violation to the AN(HK)O, and doing so may render the involved candidate liable on summary conviction to a fine and on conviction on indictment to a fine or imprisonment as specified in Article 91 of the AN(HK)O.

**PART 2 CHAPTER 1 HONG KONG PRIVATE PILOT'S LICENCES
(AEROPLANES) PPL (A) GROUPS A B and C**

1.1 GENERAL

1.1.1 The privileges of the Hong Kong PPL(A) are set out in Schedule 9 to the AN(HK)O.

1.1.2 The licence privileges may be extended by including:

- (a) an AFI or FI rating
- (b) an Instrument Rating.

1.1.3 Night Ratings are not issued for Hong Kong Private Pilot's Licences.

1.2 REQUIREMENTS FOR THE GRANT OF PPL(A)

1.2.1 The requirements for the grant of a PPL(A) are detailed in this Chapter.

Paragraph 1.3	Flying Experience
Paragraph 1.4	PPL Flight Test
Paragraph 1.5	Theoretical Knowledge Examinations
Paragraph 1.6	Medical
Paragraph 1.7	Language Proficiency

1.3 FLYING EXPERIENCE FOR INITIAL GRANT OF PPL(A) - Group A

1.3.1 For licensing purposes, flying experience excludes all flying in microlight or motor gliders.

1.3.2 An applicant for a PPL(A) that includes an aircraft rating in Group A (single-engine aeroplanes of which the MTWA does not exceed 5700 kg) should produce evidence of having satisfactorily completed a course of flying training to a syllabus recognised by the CAD and pass a flying test.

1.3.3 The syllabus of the flying training must provide for a minimum of 40 hours of flight time as a pilot of a Group A aeroplane fitted with dual controls that includes at least:

- (a) 10 hours as PIC in accordance with instructions given by an AFI or FI
- (b) 20 hours as PU/T with an AFI or an FI which include at least:
 - (i) 4.5 hours of instruction in instrument flying of which 2 hours can be completed in an instrument training device
 - (ii) 4 hours of instruction in pilot navigation
 - (iii) 2 hours of stall and spin awareness and avoidance training of which 1 hour must have been completed within 9 months preceding the date the licence application is received by the PELO
- (c) a PPL flight test.

1.3.4 The applicant should produce evidence of having received dual instructions from an authorised flight instructor covering the following areas to the level of performance required for a private pilot:

- (a) Recognise and manage threats and errors
- (b) Pre-flight operations, including mass and balance determination, aeroplane inspection and servicing
- (c) Aerodrome and traffic pattern operations, collision avoidance precautions and procedures
- (d) Control of the aeroplane by external visual reference
- (e) Flight at critically slow airspeeds, recognition of, and recovery from, incipient and full stalls
- (f) Flight at critically high airspeeds, recognition of, and recovery from, spiral dives
- (g) Normal and crosswind take-offs and landings
- (h) Maximum performance (short field and obstacle clearance) take-offs; short-field landings
- (i) Flight by reference solely to instruments, including the completion of a level 180-degree turn
- (j) Navigation flying exercises using visual reference, dead reckoning and where available, radio navigation aids
- (k) Emergency operations, including simulated aeroplane equipment malfunctions
- (l) Operations to, from and transiting controlled aerodromes, compliance with air traffic services procedures
- (m) Communication procedures and phraseology

1.3.5 The remaining flying experience may be obtained in an aeroplane of any Group but the applicant will be required to submit evidence of having a reasonable amount of recent experience in a Group A aeroplane.

1.3.6 The flight time for the licence flight tests may be included as part of the overall 40 hours experience for the grant of a licence but not the 10 hours as PIC.

1.3.7 The ICAO requirements for the issue of a PPL include 10 hours as PIC, 5 hours of which must have been on cross-country flights that include a flight of not less than 150 nm during which the applicant has made two full-stop landings at two different aerodromes. Due to the difficulty of completing such a flight in Hong Kong, the solo cross-country flight time required for the grant of PPL(A) in Hong Kong is reduced to 1 hour 15 min. In such case, the licence will be endorsed for the following:

“The holder has not met the requirements of experience of cross-country solo flight time for the issue of a private pilot licence and the associated ratings, as specified in Annex 1 to the Convention on International Civil Aviation.”

This endorsement may be removed by the PELO when the applicant can produce log book evidence supported by the FTO concerned, of having completed the ICAO cross-country flying requirements.

1.4 PPL FLIGHT TESTS

1.4.1 An applicant for a PPL(A) to be endorsed with an aircraft rating for Group A will be required to pass a flight test conducted by a CAD authorised PPL examiner.

1.4.2 The applicant should have demonstrated on the PPL flight test the ability to perform as a pilot-in-command of an aircraft type in Group A, the procedures and manoeuvres required in para. 1.3.4 above with a degree of competency appropriate to the privileges of a holder of PPL(A) as set forth in Schedule 9 to AN(HK)O 1995, and to:

- (a) recognise and manage threats and errors
- (b) operate the aircraft within its limitations
- (c) complete all manoeuvres with smoothness and accuracy
- (d) exercise good judgement and airmanship
- (e) apply aeronautical knowledge
- (f) maintain control of the aircraft at all times in a manner such that successful outcome of a procedure or manoeuvre is assured.

1.4.3 The flight test will normally consist of one flight of approximately one hour, during which the candidate will be assessed on all items as detailed in the Appendix A of Part 2. A candidate who fails any part of the flight test may be required to undertake further flying training before being accepted for a re-test. All parts of the flight test must be completed within a 28-day period.

1.4.4 The validity period of a PPL flight test is 13 months.

1.5 THEORETICAL KNOWLEDGE EXAMINATIONS

1.5.1 Theoretical knowledge examinations are conducted by the CAD. An applicant for a PPL(A) is required to obtain a pass in each of the following subjects:

- (a) Aviation Law, Flight Rules and Procedures (Aeroplanes)
- (b) Navigation
- (c) Meteorology
- (d) Radiotelephony (for the issue of an FRORL)
- (e) Human Performance
- (f) Aircraft (General) (Aeroplanes)
- (g) Aircraft (Type)

1.5.2 The pass mark in each examination is 75%. The examination papers will be scored by the marks awarded for correct answers. No adjustment will be made for incorrect answers or unanswered questions.

1.5.3 A pass in each examination is valid until the last calendar day of the 12th month from the month in which the examination was passed.

- 1.5.4 The theoretical knowledge examination syllabus is given in the Appendix B of Part 2.
- 1.5.5 The holder of a Hong Kong pilot's licence (helicopters) will be exempt from all theoretical knowledge examinations except:
- (a) Aviation Law, Flight Rules and Procedures (Aeroplanes)
 - (b) Aircraft (General) (Aeroplanes)
 - (c) Aircraft (Type).
- 1.5.6 Applicants who fail the same subject of examination for a PPL 3 times in any 12-month period will normally be subject to a 3-month ban before being allowed to re-sit that examination.
- 1.5.7 Applicants who fail the same subject of examination for a PPL 6 times will be subject to a special review.

1.6 **MEDICAL REQUIREMENTS**

- 1.6.1 An applicant for a PPL(A) must hold a valid Hong Kong Class 1 or 2 Medical Certificate.

1.7 **LANGUAGE PROFICIENCY REQUIREMENTS**

- 1.7.1 Refer to Part 1 Chapter 3.

1.8 **HOLDERS OF FOREIGN PILOT'S LICENCE (AEROPLANES)**

- 1.8.1 A Hong Kong PPL(A) may be issued by way of conversion of a foreign pilot's licence. Foreign licence holders should apply to the PELO for a Licence Conversion Assessment. The PELO will issue Licence Conversion Terms that set out all the requirements to be met for the issue of a Hong Kong PPL(A) based on conversion. Applicant will normally be required to:
- (a) pass the Aviation Law, Flight Rules and Procedures (Aeroplanes) examination
 - (b) pass an Aircraft (Type) examination on the same aircraft in which the flight test was taken
 - (c) pass the Human Performance examination
 - (d) pass an Aircraft Rating flight test conducted by a CAD examiner
 - (e) hold a Class 1 or Class 2 Medical Certificate issued by the HKCAD
 - (f) pay an administrative fee as specified in Cap.448D.

- 1.8.2 All required examinations must be passed within 3 attempts and before the end of the 12th calendar month from which the first examination was taken, failing which the application for licence conversion will be re-assessed.
- 1.8.3 Holders of a pilot's licence (aeroplanes) issued by an ICAO Contracting State or an administration other than Hong Kong may operate aeroplanes registered in Hong Kong for private purposes provided that they:
- (a) hold a valid Certificate of Validation (C of V) issued by the HKCAD
 - (b) hold a valid foreign pilot's licence that includes:
 - (i) a valid R/T licence
 - (ii) a valid ICAO Language Proficiency Endorsement of Level 4 or above.
 - (iii) a valid medical certificate issued by the State of licence issue
 - (c) meet all the recency requirements of the State of licence issue.
- 1.8.4 The following ratings endorsed in a foreign pilot's licence are NOT eligible for the validation for private purposes:
- (a) Instrument Ratings
 - (b) Night Ratings
 - (c) Instructor Ratings
 - (b) Any additional ratings or privileges
- 1.8.5 To apply for a C of V for private purposes, the foreign pilot's licence holder is required to produce documentary evidence that he has satisfactorily completed a check-out flight and an oral review with an Authorised Examiner (AE) appointed by the CAD for the purpose. In this case, the C of V is normally valid for 6 months from the date of the check-out flight or oral review, whichever is earlier, unless otherwise specified. The applicant is required to submit the following to the PELO:
- (a) A duly completed Form DCA 634P as an application for C of V
 - (b) A duly completed Form DCA 634P/A as an evidence of having completed a check-out flight and an oral review with an AE appointed by the CAD
 - (c) A certified copy of a valid foreign pilot's licence with a valid R/T licence and a valid ICAO Language Proficiency Endorsement of Level 4 or above
 - (d) A valid medical certificate issued by the State of licence issue
 - (e) Recent log book entries to show that flight recency requirements have been met
 - (f) An identity proof
 - (g) An administrative fee as specified in Cap.448D

- 1.8.6 Original copy of documents listed in para. 1.8.5 above will be required to be verified by the PELO before the issue of the C of V.
- 1.8.7 The Director-General of Civil Aviation may, in particular cases, require the applicant to meet additional requirements for the issue of a C of V.

1.9 **AIRCRAFT RATINGS**

1.9.1 An Aircraft Rating enables the licence holder to act as PIC of the following Group of aircraft contained in the Aircraft Rating page of the licence:

- (a) Group A aircraft rating entitles the holder to act as PIC of all single-engine aeroplanes of which the MTWA does not exceed 5700 kg.
- (b) Group B aircraft rating entitles the holder to act as PIC of all multi-engine aeroplanes of which the MTWA does not exceed 5700 kg.
- (c) Group C aircraft rating entitles the holder to act as PIC of a specified type of aeroplane of which the MTWA exceeds 5700 kg.

1.10 **VALIDITY OF AIRCRAFT RATINGS**

1.10.1 The validity of an aircraft rating is maintained by the inclusion in the pilot's personal flying log book of periodic Cs of T or Cs of E, of which the validity period is 13 months from the date of the aircraft rating flight test and the date of the last flight respectively.

1.10.2 Only officers of the CAD are authorised to sign aircraft rating Cs of T for PPL holders, except that, any subsequent instrument rating renewal C of T may be signed by Authorized Examiners. Cs of E for PPL may, however, be signed by persons authorized by the CAD, subject to paragraph 1.10.7 below.

1.10.3 The minimum flying experience required to maintain an Aircraft Rating by means of Cs of E is 5 hours as a pilot in an aircraft of the same Group as the rating in the licence within the 13 months preceding the date of signing of the new C of E. All flying must be completed within the validity period of an existing C of E or C of T.

1.10.4 Of the 5 hours experience required, 3 hours must have been as PIC and the remainder may be made up of:

- (a) PIC U/S flight time gained with a flying instructor on a successful check flight or with an Authorised Examiner on a successful flight test for the grant, renewal or revalidation of a rating in a PPL
- (b) dual flying instruction flown with a flying instructor but only if, at the end of the flight the instructor considered the pilot fit to fly as PIC, and so certifies in the log book.

1.10.5 Flying experience towards a C of E may be gained on aircraft of any nationality, providing the holder was appropriately licenced, the log book entries have been certified as correct and his most recent C of E is valid at the time of flying.

1.10.6 Pilots with more than one Group of aeroplane on their licence wishing to maintain the validity of each Aircraft Rating must include at least 1 flight as PIC on an aircraft in each Group (or type in the case of Group C aeroplanes) in the Aircraft Rating of the licence as part of the overall minimum 5 hours.

- 1.10.7 An applicant whose most recent C of T or C of E has expired, by a period less than 13 months, the C of E must be signed by officers of the CAD, provided that the flying experience requirements are met.
- 1.10.8 An applicant whose most recent C of T or C of E has expired by more than 13 months but less than 5 years will be required to pass an Aircraft Rating flight test. The required items in the test are to be determined by the Authorised Examiner and agreed by the CAD.
- 1.10.9 An applicant whose most recent C of T or C of E has expired by more than 5 years but less than 10 years will be required to pass the following before a new C of T can be issued:
- (a) Theoretical knowledge examinations in Aviation Law, Flight Rules and Procedures (Aeroplanes), Human Performance and Aircraft (Type)
 - (b) An Aircraft Rating flight test
- 1.10.10 An applicant whose most recent C of T or C of E has expired by more than 10 years will be required to pass the following before a new C of T can be issued:
- (a) All the theoretical knowledge examinations required for licence issue
 - (b) An Aircraft Rating flight test
 - (c) A General Flight Test.

1.11 **ADDITION OF MULTI-ENGINE (GROUP B) RATINGS**

- 1.11.1 PPL(A) holders who wish to add a Group B aircraft rating to their existing Group A aircraft rating must:
- (a) complete a course of training with a syllabus recognised by the CAD
 - (b) pass a flight test
 - (c) pass an Aircraft (type) theoretical knowledge examination.
- 1.11.2 The course of flying training must:
- (a) be completed within 12 months before the date of application
 - (b) take place on flights made for the sole purpose of Group B training
 - (c) provide:
 - (i) 2.5 hours as PU/T under conditions of normal flight
 - (ii) 3.5 hours as PU/T in engine failure procedures and asymmetric flying techniques
 - (iii) 1 hour of instrument flying.
- 1.11.3 Applicants should produce evidence of having received dual instructions from an authorised flight instructor covering the areas stated in para. 1.3.4 above to the level of performance required for a private pilot in the aircraft of Group B.

- 1.11.4 For a Group B rating restricted to centre-line thrust aircraft only, the training in engine failure procedures and asymmetric flying techniques may be reduced to 2.5 hours.
- 1.11.5 PPL(A) holders with an aircraft rating in Group B restricted to centre-line thrust aircraft only who wish to convert to an unrestricted Group B rating will be required to carry out 3 hours of flying as PU/T in an asymmetric flight on an aircraft with the engines mounted symmetrically on either side of the lateral axis.
- 1.11.6 In all cases, applicants will be required to pass an Aircraft (type) theoretical knowledge examination and an flight test on a representative type within the Group for which the aircraft rating is required.

1.12 **APPLICATIONS**

- 1.12.1 An application for the issue of a PPL(A) should be sent to the PELO and include the following documents:
- (a) Personal flying log book
 - (b) Medical Certificate
 - (c) Form DCA 528PPL
 - (d) One recent full faced photograph sized 25mm x 30mm
 - (e) Identity proof
 - (f) Qualifying cross-country certificate (if applicable)
 - (g) Licence
 - (h) Administrative fee(s) as specified in Cap.448D

1.13 **RECORDS OF TRAINING**

- 1.13.1 The records of flying and ground training should be kept by every FTO involved in a student's training. Irrespective of how many FTOs have been involved in a PPL applicant's training, the person signing the certificate of training on the application form is normally responsible for verifying that all the required training has been satisfactorily completed.
- 1.13.2 The CAD may require the inspection of a student's training records before issuing a licence or rating. All records thus required will be returned. Records are to be kept for at least two years following completion of training.
- 1.13.3 On the completion of any course of training, the student's log book should be certified by the FTO as a true record of the training completed.

**PART 2 CHAPTER 2 HONG KONG PRIVATE PILOT'S LICENCES
(HELICOPTERS) PPL(H)**

2.1 LICENCE PRIVILEGES

2.1.1 The privileges of the Hong Kong PPL(H) are set out in Schedule 9 to the AN(HK)O.

2.1.2 The licence privileges may be extended by including an AFI or FI rating.

2.1.3 Night Ratings are not issued for a Hong Kong Private Pilot's Licences.

2.2 REQUIREMENTS FOR THE GRANT OF PPL(H)

2.2.1 The requirements for the grant of a PPL(H) are detailed in this Chapter.

Paragraph 2.3	Flying Experience
Paragraph 2.4	PPL Flight Test
Paragraph 2.5	Theoretical Knowledge Examinations
Paragraph 2.6	Medical
Paragraph 2.7	Language Proficiency

2.3 FLYING EXPERIENCE FOR INITIAL GRANT OF PPL(H)

2.3.1 An applicant for a PPL(H) should produce evidence of having satisfactorily completed a course of flying training to a syllabus recognised by the CAD and pass a flying test.

2.3.2 The syllabus of the flying training must provide for a minimum of 40 hours of flight time as a pilot of helicopters that include at least:

- (a) 10 hours as PIC in accordance with instructions given by a helicopter AFI or FI
- (b) 20 hours as PU/T with a helicopter AFI or FI
- (c) a PPL flight test.

2.3.3 The applicant should produce evidence of having received dual instructions from an authorised flight instructor covering the following areas to the level of performance required for a private pilot:

- (a) Recognise and manage threats and errors
- (b) Pre-flight operations, including mass and balance determination, aeroplane inspection and servicing
- (c) Aerodrome and traffic pattern operations, collision avoidance precautions and procedures
- (d) Control of the helicopter by external visual reference
- (e) Recovery at the incipient stage from settling with power: recovery techniques from low-rotor rpm within the normal range of engine rpm

- (f) Ground manoeuvring and run-ups; hovering; take-offs and landings – normal, over effect of wind and sloping ground
- (g) Take-offs and landings with minimum necessary power; maximum performance take-off and landing techniques; restricted site operations; quick stops
- (h) Navigation flying exercises using visual reference, dead reckoning and where available, radio navigation aids; including a flight of at least one hour
- (i) Emergency operations, including simulated helicopter equipment malfunctions; auto-rotative approach
- (j) Operations to, from and transiting controlled aerodromes, compliance with air traffic services procedures
- (k) Communication procedures and phraseology

2.3.4 For holders of a valid pilot's licence issued by Hong Kong or an ICAO contracting state, the 40 hours requirement in para. 2.3.2 above may be reduced to 35 hours.

2.3.5 The flight time for the licence flight test may be included as part of the overall 40 hours experience for the grant of a licence but not the 10 hours as PIC.

2.3.6 The ICAO requirements for the issue of a PPL include 10 hours as PIC, 5 hours of which must have been on cross-country flights. This cross-country flying must include a qualifying flight of not less than 100 nm in the course of which landings at two different points must be made. Due to the difficulty of completing such a flight in Hong Kong, the solo cross-country flight time required for the grant of PPL(H) in Hong Kong is reduced to 1 hour. In such case, the licence will be endorsed for the following:

“The holder has not met the requirements of experience of cross-country solo flight time for the issue of a private pilot licence and the associated ratings, as specified in Annex 1 to the Convention on International Civil Aviation.”

This endorsement may be removed by the PELO when the applicant can produce log book evidence supported by the FTO concerned, of having completed the ICAO cross-country flying requirements.

2.4 **PPL FLIGHT TESTS**

2.4.1 An applicant for a PPL(H) is required to pass a flight test conducted by a TRE who is also a helicopter FI.

2.4.2 The applicant should have demonstrated on the PPL flight test the ability to perform as a pilot-in-command of a helicopter type to be endorsed in the licence, the procedures and manoeuvres required in para. 2.3.3 above with a degree of competency appropriate to the privileges of a holder of PPL(H) as set forth in Schedule 9 to AN(HK)O 1995, and to:

- (a) recognise and manage threats and errors
- (b) operate the helicopter within its limitations

- (c) complete all manoeuvres with smoothness and accuracy
- (d) exercise good judgement and airmanship
- (e) apply aeronautical knowledge
- (f) maintain control of the aircraft at all times in a manner such that successful outcome of a procedure or manoeuvre is assured.

2.4.3 The flight test will normally consist of one flight of approximately one hour, during which the candidate will be assessed on all items as detailed in the Appendix C of Part 2. A candidate who fails any part of the flight test may be required to undertake further flying training before being accepted for a re-test. All parts of the flight test must be completed within a 28-day period.

2.4.4 The validity period for a PPL(H) flight test is 13 months.

2.5 **THEORETICAL KNOWLEDGE EXAMINATIONS**

2.5.1 Theoretical knowledge examinations are conducted by the CAD. An applicant for a PPL(H) is required to obtain a pass in each of the following subjects:

- (a) Aviation Law, Flight Rules and Procedures (Helicopters)
- (b) Navigation
- (c) Meteorology
- (d) Radiotelephony (for the issue of an FRORL)
- (e) Human Performance
- (f) Aircraft (General) (Helicopters)
- (g) Aircraft (Type)

2.5.2 The pass mark in each examination is 75%. The examination papers will be scored by the marks awarded for correct answers. No adjustment will be made for incorrect answers or unanswered questions.

2.5.3 A pass in each examination is valid until the last calendar day of the 12th month from the month in which the examination was passed.

2.5.4 The theoretical knowledge examination syllabus is given in the Appendix D of Part 2.

2.5.5 The holder of a Hong Kong pilot's licence (aeroplanes) will be exempt from all theoretical knowledge examinations except:

- (a) Aviation Law and Procedures (Helicopters)
- (b) Aircraft (General) (Helicopters)
- (c) Aircraft (Type)

2.5.6 Applicants who fail the same subject of examination for a PPL 3 times in any 12-month period will normally be subject to a 3-month ban before being allowed to re-sit that examination.

2.5.7 Applicants who fail the same subject of examination for a PPL 6 times will be subject to a special review.

2.6 **MEDICAL REQUIREMENTS**

2.6.1 An applicant for a PPL(H) must hold a valid Hong Kong Class 1 or 2 Medical Certificate.

2.7 **LANGUAGE PROFICIENCY REQUIREMENTS**

2.7.1 Refer to Part 1 Chapter 3.

2.8 **HOLDERS OF FOREIGN PILOT'S LICENCE (HELICOPTERS)**

2.8.1 A Hong Kong PPL(H) may be issued by way of conversion of a foreign pilot's licence. Foreign licence holders should apply to the PELO for a Licence Conversion Assessment. The PELO will issue Licence Conversion Terms that set out all the requirements to be met for the issue of a Hong Kong PPL(H) based on conversion. Applicants will normally be required to:

- (a) pass the Aviation Law, Flight Rules and Procedures (Helicopters) examination
- (b) pass the Aircraft (Type) examination on the same aircraft in which the flight test was taken
- (c) pass the Human Performance examination
- (d) obtain 5 hours of experience as pilot on the first helicopter type to be endorsed in the licence
- (e) pass a PPL flight test conducted by a TRE who is also a helicopter FI
- (f) hold a Class 1 or Class 2 Medical Certificate issued by the HKCAD
- (g) pay an administrative fee as specified in Cap.448D.

2.8.2 All required examinations must be passed within 3 attempts and before the end of the 12th calendar month from which the first examination was taken, failing which the application for licence conversion will be re-assessed.

2.8.3 Holders of a private pilot's licence (helicopters) issued by an ICAO Contracting State or an administration other than Hong Kong may operate helicopters registered in Hong Kong for private purposes provided that they:

- (a) hold a valid Certificate of Validation (C of V) issued by the HKCAD
- (b) hold a valid foreign pilot's licence that includes:
 - (i) a valid R/T licence
 - (ii) a valid ICAO Language Proficiency Endorsement of Level 4 or above
 - (iii) a valid medical certificate issued by the State of licence issue

(c) meet all the recency requirements of the State of licence issue.

2.8.4 The following ratings endorsed in a foreign pilot's licence are NOT eligible for the validation for private purposes:

- (a) Instrument Ratings
- (b) Night Ratings
- (c) Instructor Ratings
- (d) Any additional ratings or privileges

2.8.5 To apply for a C of V, the foreign pilot's licence holder is required to produce documentary evidence that he has satisfactorily completed a check-out flight and an oral review with an Authorised Examiner (AE) appointed by the CAD for the purpose. In this case, the C of V is normally valid for 6 months from the date of the check-out flight or oral review, whichever is earlier, unless otherwise specified. The applicant is required to submit the following to the PELO:

- (a) A duly completed Form DCA 634P as an application for C of V
- (b) A duly completed Form DCA 634P/H as an evidence of having completed a check-out flight and an oral review with an AE appointed by the CAD
- (c) A certified copy of a valid foreign pilot's licence with a valid R/T licence and a valid ICAO Language Proficiency Endorsement of Level 4 or above
- (d) A valid medical certificate issued by the State of licence issue
- (e) Recent log book entries to show that flight recency requirements have been met
- (f) An identity proof
- (g) An administrative fee as specified in Cap.448D

2.8.6 Original copy of documents listed in para. 2.8.5 above will be required to be verified by the PELO before the issue of the C of V.

2.8.7 The Director-General of Civil Aviation may, in particular cases, require the applicant to meet additional requirements for the issue of a C of V.

2.9 AIRCRAFT RATINGS

2.9.1 An Aircraft Rating enables the licence holder to act as PIC of the types of helicopters contained in the Aircraft Rating page of the licence.

2.10 VALIDITY OF AIRCRAFT RATINGS

2.10.1 The validity of an aircraft rating is maintained by the inclusion in the pilot's personal flying log book of periodic Cs of T or Cs of E, of which the validity period is 13 months from the date of the aircraft rating flight test and the date of the last flight respectively.

2.10.2 Only officers of the CAD are authorised to sign aircraft rating Cs of T for PPL holders. Cs of E for PPL may, however, be signed by persons authorised by the CAD, subject to paragraphs 2.10.7 below.

2.10.3 The minimum flying experience required to maintain an Aircraft Rating by means of Cs of E is 5 hours as a pilot in a helicopter of the same type as the rating in the licence within the 13 months preceding the date of signing of the new C of E. All flying must be completed within the validity period of an existing C of E or C of T.

2.10.4 Of the 5 hours experience required, 3 hours must have been as PIC and the remainder may be made up of:

- (a) PIC U/S flight time gained with a flying instructor on a successful check flight or with an Authorised Examiner on a successful flight test for the grant, renewal or revalidation of a rating in a PPL
- (b) dual flying instruction flown with a flying instructor but only if, at the end of the flight the instructor considered the pilot fit to fly as PIC, and so certifies in the log book.

2.10.5 Flying experience towards a C of E may be gained on aircraft of any nationality, providing the holder was appropriately licensed, the log book entries have been certified as correct and his most recent C of E is valid at the time of flying.

2.10.6 Pilots with more than one type of helicopter on their licence wishing to maintain the validity of each Aircraft Rating must include at least 1 flight as PIC on each type in the Aircraft rating of the licence as part of the overall minimum 5 hours.

2.10.7 An applicant whose most recent C of T or C of E has expired, by a period less than 13 months, the C of E must be signed by officers of the CAD, provided that the flying experience requirements are met.

2.10.8 An applicant whose most recent C of T or C of E has expired by more than 13 months but less than 5 years will be required to pass an aircraft rating flight test. The required items in the test are determined by the Authorised Examiner and agreed by the CAD.

2.10.9 An applicant whose most recent C of T or C of E has expired by more than 5 years but less than 10 years will be required to pass the following before a new C of T can be issued:

- (a) Theoretical knowledge examinations in Aviation Law, Flight Rules and Procedures (Helicopters), Human Performance and Aircraft (Type)
- (b) An Aircraft Rating flight test.

- 2.10.10 An applicant whose most recent C of T or C of E has expired by more than 10 years will be required to pass the following before a new C of T can be issued:
- (a) All the theoretical knowledge examinations required for licence issue
 - (b) An Aircraft Rating flight test

2.11 **INCLUSION OF ADDITIONAL TYPES**

- 2.11.1 PPL(H) holders who wish to have an additional helicopter type rating included in their licence must:
- (a) have 5 hours as pilot on the helicopter type to be included
 - (b) pass a flight test conducted by a TRE
 - (c) pass an Aircraft (Type) theoretical knowledge examination.

2.12 **APPLICATIONS**

- 2.12.1 An application for the issue of a PPL(H) should be sent to the PELO and include the following documents:
- (a) Personal flying log book
 - (b) Medical Certificate
 - (c) Form DCA 528PPL
 - (d) One recent full face photograph sized 25mm x 30mm
 - (e) Identity proof
 - (f) Qualifying cross-country certificate (if applicable)
 - (g) Licence
 - (h) Administrative fee(s) as specified in Cap.448D

2.13 **RECORDS OF TRAINING**

- 2.13.1 The records of flying and ground training should be kept by every FTO involved in a student's training. Irrespective of how many FTO's have been involved in a PPL applicant's training, the person signing the certificate of training on the application form is normally responsible for verifying that all the required training has been satisfactorily completed.
- 2.13.2 The CAD may require the inspection of a student's training records before issuing a licence or rating. All records thus required will be returned. Records are to be kept for at least two years following completion of training.
- 2.13.3 On the completion of any course of training, the student's log book should be certified by the FTO as a true record of the training completed.

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3.1 INTRODUCTION

- 3.1.1 The circumstances under which an instructor rating is required are set out in Article 23 of the AN(HK)O. An AFI or FI rating is required if flying instruction is given for either the purpose of a person becoming qualified for the initial grant of a pilot's licence, or for the inclusion or variation of any rating in his pilot's licence.
- 3.1.2 An AFI or FI rating is not required where instruction is given to a person for the purpose of becoming qualified for inclusion in his licence of an aircraft rating for a multi-engine aircraft or any of the classes shown in column 4 of the table in Schedule 1 to the AN(HK)O when he already holds a rating under AN(HK)O for such class of aircraft.
- 3.1.3 The holder of an AFI/FI rating must have met the knowledge requirements for the issue of a CPL in accordance with ICAO Annex 1. Applicants are required to complete an Instructor's examination set to a syllabus consistent with the level of knowledge required for the grant of a CPL.

3.2 THE ASSISTANT FLYING INSTRUCTOR (AFI) AND FLYING INSTRUCTOR (FI) RATING PRIVILEGES

- 3.2.1 The privileges of the AFI and FI rating are set out in Part B of Schedule 9 to the AN(HK)O.
- 3.2.2 In general terms, the holder of an AFI rating may give flying instruction in any type of aircraft in which he is qualified to act as PIC and endorsed in his AFI rating, provided that such instruction is given under the supervision of a person who holds a FI rating and is present during the take-off and landing at the aerodrome from which the instruction is to begin and end.
- 3.2.3 However, an AFI may not give directions to a person in respect of the person's:
- (a) first solo flight
 - (b) first solo flight by night
 - (c) first solo cross-country flight by day
 - (d) first solo cross-country flight by night.
- 3.2.4 The holder of an FI rating may give flying instruction in any aircraft in which he is qualified to act as the PIC provided the aircraft is of a Group or a type for which his FI rating is endorsed.

3.3 ASSISTANT FLYING INSTRUCTOR (AEROPLANES) RATINGS

3.3.1 Applicants for the entry to the course for an AFI (Aeroplanes) Rating are required to have either of the following pre-entry qualifications:

- (a) Hold a Hong Kong professional pilot's licence with 30 hours as a PIC on single-engine, piston-powered aeroplanes, of which 5 hours must have been obtained in the preceding 13 months
- (b) Hold a Hong Kong PPL(A) with 150 hours as a PIC in aeroplanes, which include 20 hours of cross-country flight time. The cross-country flying must include a flight of 300 nm during which the aircraft came to rest at two intermediate and different aerodromes

3.3.2 The course for the AFI (Aeroplanes) Rating should comprise at least 55 hours ground and 28 hours flight training conducted by an FIC Instructor. The flight test is additional to the course training time.

3.3.3 The course is designed to qualify applicants to give instruction on single-engine aeroplanes to a PPL standard. It does not qualify him to give instruction in applied instrument flying utilising radio navigation aids, instrument approaches, aerobatic flying or night flying.

3.3.4 A maximum of 5 hours mutual flying may be credited to the AFI course. The pilot acting as an instructor is to record the flight time as PIC, and the pilot acting as student is to record it as supernumerary.

3.3.5 Under normal circumstances, the course for the AFI (Aeroplanes) Rating, the flight test and the theoretical knowledge examinations must all be completed within 12 months from the start of the training. In particular, the flight test and theoretical knowledge examinations must be completed within 9 and 12 months respectively preceding the date that the AFI application is received by the PELO.

3.3.6 For the grant of the rating, the applicants are required to:

- (a) complete an AFI Rating ground and flight training course recognised by the CAD
- (b) pass a theoretical knowledge examination conducted by the CAD
- (c) pass the theoretical knowledge examination of Human Performance at CPL level
- (d) pass the Aircraft (Type) examination of the aircraft type to be endorsed
- (e) pass an oral and flight test conducted by an authorised Flying Instructor Examiner (FIE) and complete the Form DCA 270
- (f) hold a valid Class 1 or 2 Medical Certificate issued by the HKCAD
- (g) provide certified log book
- (h) pay an administrative fee as specified in Cap.448D.

3.3.7 The syllabus of the theoretical knowledge examination is in Part 2 Appendix E.

3.3.8 All AFI (Aeroplanes) Ratings will be issued with restrictions of "Aerobatic Flying", "Night Flying" and "Radio Navigation and Instrument Approaches", unless requirements for the removal of such restrictions are met.

3.4 **REMOVAL OF RESTRICTIONS**

3.4.1 To qualify for the removal of the restriction for giving instruction in Aerobatic Flying, applicants must:

- (a) complete 8 hours of ground training and 5 hours of flight training according to a syllabus recognised by the CAD
- (b) pass a flight test by an FIE.

3.4.2 To qualify for the removal of the restriction for giving instruction in Night Flying, applicants must:

- (a) hold a valid Night Rating or Instrument Rating
- (b) complete a CAD recognised instructor training for Night Rating which must consist of at least 5 hours of ground training and 3 hours of flight training at night
- (c) pass a flight competency check by an FIE.

3.4.3 Due to airspace and geographical constraints and the lack of training and testing facilities, the restriction on giving instruction in applied instrument flying utilising radio navigation aids and instrument approaches is not normally removed.

3.5 **ENDORSEMENT OF ADDITIONAL TYPES**

3.5.1 To qualify for the endorsement in the AFI (Aeroplanes) Rating of an additional type of single-engine aeroplane, applicants must:

- (a) have 5 hours of flight experience as PIC on that type of aeroplane
- (b) pass an Aircraft (Type) examination of the aircraft type to be endorsed
- (c) pass an oral and flight test conducted by an FIE on the type and complete a Form DCA 270.

3.5.2 To qualify for the endorsement in the AFI (Aeroplanes) Rating of a multi-engine type aeroplane, applicants are required to:

- (a) hold a valid Group B aircraft rating
- (b) have 30 hours as PIC or PU/T on multi-engine aeroplanes, of which 15 hours must be as PIC, including 5 hours as PIC on the type for which the endorsement is sought
- (c) complete a course of multi-engine aeroplane instructor training comprising at least 15 hours of ground and 7 hours of flight training
- (d) pass the Aircraft (Type) examination on the aircraft type to be endorsed
- (e) pass an oral and flight test on the type conducted by an FIE and complete a Form DCA 270.

3.5.3 On receipt of the completed Form DCA 270 together with his licence, certified log book and the appropriate fees, the PELO will endorse an “Aeroplanes (Landplanes) Multi-Engine” rating.

3.5.4 The requirements for the endorsement of an additional type of multi-engine aeroplane are the same as that for single-engine types.

3.6 **FLYING INSTRUCTOR (AEROPLANES) RATINGS**

3.6.1 For the grant of an FI (Aeroplanes) Rating, applicants are required to:

- (a) have 400 hours as PIC of aeroplanes, including 200 hours as instructor on aeroplanes
- (b) have been an AFI (Aeroplanes) for more than six months
- (c) pass an oral and flight test conducted by a FIE and complete the Form DCA 270
- (d) hold a valid Class 1 or 2 Medical Certificate issued by the HKCAD
- (e) provide certified log book
- (f) pay an administrative fee as specified in Cap.448D.

3.6.2 If the applicant holds an AFI rating endorsed for multi-engine aeroplanes, the oral and flight test may be taken on either a single-engine aeroplane, or a multi-engine aeroplane.

3.6.3 Endorsements included in the AFI rating will be transferred to the FI rating.

3.6.4 An FI Rating (Aeroplanes) will be endorsed to permit the holder to give flying instruction in any single-engine aeroplane specified in either Part 1 of the aircraft rating (A) of his professional pilot’s licence, or, within his PPL privileges only.

3.6.5 If the holder is qualified to give instruction in multi-engine aeroplanes, the FI rating will be endorsed for such aeroplanes. However, before giving instruction in multi-engine aeroplanes in which he can exercise only private pilot privileges, he will be required to have 5 hours as PIC of the type concerned.

3.6.6 If a holder of an FI rating endorsed for single-engine aeroplanes only wishes to add an endorsement for multi-engine aeroplanes, he will be required to meet the same qualifying requirements as in the case for an AFI rating.

3.7 ASSISTANT FLYING INSTRUCTOR (HELICOPTERS) RATINGS

3.7.1 Applicants for the entry to the course for an AFI (Helicopters) Rating are required to have the following pre-entry qualifications:

- (a) Have 300 hours as PIC of helicopters, including 15 hours, in the six months immediately preceding the course, as PIC on the type of helicopter on which the course is to be conducted
- (b) Pass a general handling flight check by a helicopter FIE or a helicopter FIC Instructor on the type of helicopter on which the course is to be conducted

3.7.2 Before being permitted to take the AFI rating flight test, applicants will be required to have 30 hours as PIC of the first type of helicopter to be endorsed in the rating and on which the test is to be taken, of which, 15 hours must be obtained in the six months preceding the date of the test.

3.7.3 The course of training for the AFI (Helicopters) Rating shall consist of two parts:

- (a) at least 125 hours of theoretical knowledge instruction, including at least 25 hours teaching and learning instruction; and
- (b) at least 30 hours of flight instruction, of which 25 hours shall be dual flight instruction, of which 5 hours may be conducted in a full flight simulator (FFS), a flight and navigation procedures trainer (FNPT) levels I or II or a flight training device (FTD) levels 2 or 3. The remaining 5 hours may be mutual flying (that is, two applicants flying together to practice flight demonstrations).

The flight test is additional to the course training time. The course does not qualify the applicant to give instruction in instrument flying, aerobatic flying or night flying.

3.7.4 Under normal circumstances, the course for the AFI (Helicopters) Rating, the flight test and the theoretical knowledge examination must be all be completed within 12 months from the start of the training. In particular, the flight test and theoretical knowledge examination must be completed within 9 and 12 months respectively preceding the date that the AFI application is received by the PELO.

3.7.5 For the grant of the rating, the applicants are required to:

- (a) complete the AFI Rating ground and flight training course recognised by the CAD
- (b) pass a theoretical knowledge examination conducted by the CAD
- (c) pass the theoretical knowledge examination Human Performance at CPL level
- (d) pass the Aircraft (Type) examination of the helicopter type to be endorsed
- (e) pass an oral and flight test conducted by an authorised FIE and complete the Form DCA 275
- (f) hold a valid Class 1 or 2 Medical Certificate issued by the HKCAD
- (g) provide certified log book
- (h) pay an administrative fee as specified in Cap.448D.

- 3.7.6 The syllabus of the theoretical knowledge examination is in Part 2 Appendix E.
- 3.7.7 All AFI (Helicopters) Ratings will be issued with restrictions of “Aerobatic Flying”, “Night Flying” and “Radio Navigation and Instrument Approaches”, unless requirements for the removal of such restrictions are met.

3.8 **REMOVAL OF RESTRICTIONS**

- 3.8.1 Due to airspace and geographical constraints and the lack of training and testing facilities, the restrictions on giving instruction in applied instrument flying utilising radio navigation aids, instrument approaches, aerobatic flying and night flying are not normally removed.

3.9 **ENDORSEMENT OF ADDITIONAL HELICOPTER TYPES**

- 3.9.1 The holder of an AFI(H) Rating may only give instruction on types of helicopters endorsed in the rating.
- 3.9.2 To qualify for the endorsement in the AFI (Helicopters) Rating of an additional type of helicopter holders who wish to be qualified for the endorsement of in the rating must:
- (a) have 5 hours as PIC on that type of helicopter
 - (b) pass the Aircraft (Type) examination of the aircraft type
 - (c) pass an oral and flight test conducted by an FIE(H) and complete a Form DCA 275.
- 3.9.3 Where the type for which the additional endorsement is sought is of a type of any of the categories listed below, the applicant will be required to have 30 hours as PIC of helicopters in that category, including 5 hours as PIC on the type on which the test is to be taken. The categories are:
- (a) helicopters exceeding 2300 kg maximum total weight authorised
 - (b) turbine-engine helicopters
 - (c) multi-engine helicopters
 - (d) multi-rotor helicopters.

3.10 **FLYING INSTRUCTOR (HELICOPTERS) RATINGS**

3.10.1 For the grant of an FI (Helicopter) Rating, applicants are required to:

- (a) have 500 hours as PIC of helicopters, including 200 hours as instructor on helicopters and 30 hours as PIC on the first type of helicopter to be endorsed in the rating and upon which the rating flight test is to be taken
- (b) have been an AFI (Helicopters) for six months
- (c) pass an oral and flight test conducted by a helicopter FIE and complete a Form DCA 275
- (d) hold a valid Class 1 or 2 Medical Certificate issued by the HKCAD
- (e) provide certified log book
- (f) pay an administrative fee as specified in Cap.448D.

3.10.2 Endorsements on the AFI rating will be transferred to the FI rating.

3.10.3 An FI rating (Helicopters) will be endorsed to permit the holder to give flying instruction in any of the type of helicopter for which the rating is endorsed.

3.10.4 The requirements for endorsement of additional helicopter types in a FI(H) are the same as those for an AFI(H).

3.11 **THE AFI AND FI RATING CERTIFICATES OF TEST (C of T)**

3.11.1 The privileges of an AFI or FI rating must not be exercised unless the licence contains a valid C of T in respect of the functions to which the rating relates.

3.11.2 The C of T is to be completed by the CAD. The period of validity of a C of T in relation to an AFI rating and an FI rating is 13 and 25 months respectively from the date of test on the certificate.

3.11.3 The test may be taken on any type of aeroplane or helicopter for which the rating is endorsed. However, where a rating is endorsed for both single-engine and multi-engine aeroplanes or helicopters, then successive revalidation flight tests must be alternately taken on single-engine and multi-engine aeroplanes or helicopters. If the rating lapses, retests are required on aircrafts in both Groups in order to revalidate the ratings for both.

3.12 **HOLDER OF A FOREIGN PILOT'S LICENCE WITH A FLYING INSTRUCTOR'S RATING**

3.12.1 Holders of a foreign licence with instructional experience should apply to the PELO for terms for the issue of a rating.

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PART 2 CHAPTER 4 INSTRUMENT RATINGS

Refer to Part 3 Chapter 10 or 11 for full details.

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**PART 2 APPENDIX A PPL(A) FLIGHT TEST SYLLABUS
AEROPLANES GROUPS A & B**

This syllabus lists all the items which should be covered during training and which will be examined during the PPL flight test in either Group A or B. The candidates will be required to demonstrate a satisfactory standard of knowledge and handling in each category.

A.1 Preparation for flight:

- Self-briefing
- Weather suitability
- Aeroplane documentation
- Personal equipment check
- Weight and balance (calculate)
- Weight and performance (calculate)
- Fuel and oil state
- Aeroplane acceptability
- ATC booking out
- Pre flight inspection

A.2 Starting, taxiing and power checks:

- Pre start checks
- Post start checks
- Taxiing techniques
- Power checks

A.3 Take-off:

- Pre take-off checks (vital actions)
- Assessment of cross-wind component
- Normal and cross-wind take-offs
- During and post take off checks

A.4 Aerodrome departure procedures

A.5 Climbing

A.6 Straight and level flight

A.7 Descending with power/flap

A.8 Turning:

- Level
- Climbing
- Descending
- High angles of bank

- | A.9 **Stalling:**
 - Safety checks
 - Symptoms
 - Recognition
 - Clean stall and recovery without power and with power
 - Recovery when a wing drops
 - Approach to stall in the approach and in the landing configurations, with and without power and recovery at the incipient stage

- | A.10 **Spin Avoidance:**
 - Safety checks
 - Placing the aircraft in the different configurations most likely incur a stall with a wing drop and recovery action is to be taken immediately with the start of the wing drop to straight and level after recovery from the stall, which shall only be carried out on single-engine spin capable aircraft. Wing drop at the stall for the purposes of spin avoidance training must not be induced by application of pro-spin rudder and the induction of a spin.
 - Instructor induced distractions during the stall

- | A.11 **Forced landings without power (Group A only):**
 - Checks procedure and judgement

- | A.12 **Flight by sole reference to instruments:**
 - Straight and level
 - Climbing and climbing turns
 - Descending and descending turns
 - Turns on to specified headings
 - Recovery to straight and level flight from climbing and descending turns

- | A.13 **Navigation and orientation:**
 - Recognition of features
 - Assessment of position

- | A.14 **Circuit joining procedures**

- | A.15 **Circuit procedures**

- | A.16 **Approach and landing:**
 - Pre landing checks (vital actions)
 - Assessment of cross-wind component
 - Powered approach
 - Flapless approach
 - Glide approach (Group A only)
 - Short field landing
 - Bad weather circuit
 - Cross-wind landing
 - Missed approach procedure
 - Checks after landing

- | A.17 **Simulated emergencies:**
 - Engine fire in the air/on the ground
 - Cabin fire in the air/on the ground
 - Engine failure after take-off
 - Other simulated emergencies

- | A.18 **Engines and systems handling**

- | A.19 **Airmanship/awareness:**
 - Look out
 - Positioning (restricted airspace, hazards and weather)
 - ATC liaison
 - Aerodrome discipline

- | A.20 **Actions after flight:**
 - Engine shut down
 - Parking and securing aeroplane
 - Recording of flight details

- | A.21 **Flight with asymmetric power (Group B only):**
 - Feathering and unfeathering
 - Procedure for engine failure in the cruise
 - Normal manoeuvres with one engine inoperative
 - Compliance with recommended speeds
 - Determination of critical speeds
 - Simulated engine failures after take-off at or above safety speed
 - Approach and go around with one engine at zero thrust
 - Approach and landing with one engine at zero thrust
 - Use of asymmetric committal height (Decision Height)

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PART 2 APPENDIX B PPL(A) THEORETICAL KNOWLEDGE EXAMINATION SYLLABUS

B.1 AVIATION LAW, FLIGHT RULES AND PROCEDURES

B.1.1 The Air Navigation (Hong Kong) Order

<u>Subject</u>	<u>Article Number</u>
Aircraft to be registered	3
Nationality and registration marks	5
Certificate of airworthiness to be in force	7
Issue, renewal etc., of certificates of airworthiness	8
Certification of maintenance review	9(1),(3),(4),(6),(7),(8)
Inspection, overhaul, repair, replacement and modification	11(1),(2),(3),(4),(5),(7)
Equipment of aircraft	13(1),(2)
Radio equipment of aircraft	14(1),(2),(4)
Aircraft, engine and propeller log books	15
Aircraft weight schedule	16(1),(2)
Composition of crew of aircraft	18(1),(2),(5)
Members of flight crew - requirement of licences	19(1),(4),(7)
Grant, renewal and effect of Flight Crew Licences	20(1),(2),(3), (4)(a),(4)(c), (5),(6),(7)(a),(7)(b),(7)(c),8
Endorsement in respect of language proficiency	20A
Personal flying log book	22
Instruction in flying	23
Pre-flight action by commander of aircraft	32
Pilots to remain at controls	33
Operation of radio in aircraft	35(1),(2),(3)
Towing of gliders	38
Towing, picking up and raising of persons and articles	39(1)
Dropping of animals and articles	40
Dropping of persons	41
Carriage of weapons and munitions of war	43
Carriage of dangerous goods	44
Method of carriage of persons	45
Endangering safety of aircraft	47
Endangering safety of any person or property	48
Passengers and crew members not to be under influence of psychoactive substances	49
Exhibition of notices indicating prohibition of smoking	50
Authority of pilot in command of aircraft	51
Stowaways	52
Documents to be carried	57
Production of documents and records	59(1),(3),(4)
Revocation, suspension and variation of certificates, licences and other documents	62(1),(2),(3)
Offences in relation to documents and records	63(1),(2),(3),(5)
Rules of the Air	64
Power to prohibit or restrict flying	69
Aerodromes: instruction in flying	71(1),(2)(a),(2)(b)
Power to prevent aircraft flying	87
Obstruction of persons	89
Enforcement of directions	90
Penalties	91(1)

Extra-territorial effect of the Order	92(1)
Application of Order to aircraft registered outside Hong Kong	93
Application of Order to the Government etc.	94
Exemption from Order	95
Interpretation	98(1),(4),(5)
General classification of aircraft	Schedule 1 - Part A
Categories of Aircraft	Schedule 3
Aircraft Equipment	Schedule 5 - 1,2,4(2)(a) Scales A, C, D, E, M
Radio equipment to be carried in aircraft	Schedule 6 - 1,2(1)
Flight Crew of Aircraft, Licences and Ratings	Schedule 9
(a) Aeroplane Pilots	Part A1-PPL(Aeroplanes)
(b) Other Flight Crew	Part A5 - Flight Radiotelephony Operator's (Restricted) Licence
(c) Ratings	Part B
(d) Certificate of Test or Experience	Part C-1(a) Table 1-Case A,2,3,4,5,6,7
Documents to be carried by aircraft registered in Hong Kong	Schedule 12 - International air navigation, other than public transport or aerial work
Rules of the Air	Schedule 14 Section I to VIII, (except 42(c) to (u))
Air Navigation (General) Regulations	Schedule 15
(a) Pilot maintenance	Regulation 15

B.1.2 **The Hong Kong Aeronautical Information Publication (AIP)**

Candidates should be familiar with the contents of the Hong Kong AIP and have detailed knowledge of the subjects listed below. However, items such as latitude and longitude, obstruction heights, maintenance periods, radio frequencies etc should NOT be memorised.

B.1.2.1 *General (GEN)*

Designated authorities
Special procedures for general aviation
Aircraft instruments, equipment, and flight documents
Difference from ICAO standards in respect of PPL
Units of measurement
Time system
Abbreviations
Aeronautical information services
Air traffic services
Communication services
Meteorological services
Search and rescue

B.1.2.2 *En-route (ENR)*

General rules and procedures
VFR ATS airspace classification
Communication failure procedure
Occurrence reports

Other activities of a dangerous nature
Serial sporting and recreational activities

B.1.2.3 *Aerodromes (AD)*

ATS communication facilities
Bird concentration
Local traffic regulations
Procedures for local flights in Hong Kong ATZ and CTR
Procedures for UCARAs
Procedures for entry & exit to SKARA

B.1.3 **Hong Kong Civil Aviation (Investigation of Accidents) Regulations**

Interpretation	Regulation 2
Application	Regulation 3
Notice of accidents and incidents	Regulation 5
Access to and removal of damaged aircraft	Regulation 7

B.1.4 **AOPA Ground Training Manual**

Relationship between the Certificate of Airworthiness, the Flight Manual/ Pilot Operations Handbook	Pages 1-10
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Flying Instruction, definition and instruction to be given Instructor's endorsement of flight times	Page 1-34
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NOTES:

- (a) Where an Article of the AN(HK)O refers to a Schedule that is not listed in the syllabus, a detailed knowledge of that Schedule is not required.
- (b) Publications may not be consulted during this examination.

B.2 NAVIGATION

B.2.1 Aeronautical Charts

Familiarity with 1:500,000 and 1:250,000 topographical charts, including the knowledge of: representative fraction, methods of indicating relief, the principal ICAO chart symbols, isogonals, latitude and longitude, plotting positions, measuring tracks and distances.

B.2.2 Knowledge and practical use of the 1:200,000 chart used in Hong Kong, including plotting positions, measuring tracks and distances and extrapolating information, and a knowledge of Hong Kong airspace restrictions and procedures.

B.2.3 Units of distance and height used in navigation, viz. nautical miles, statute miles, kilometres, metres and feet. Conversions from one unit to another.

B.2.4 Track, heading (true, magnetic and compass). Variation and deviation. Airspeed (IAS, RAS, TAS), ground speed, wind velocity, and drift.

B.2.5 The use of the navigational computer for the determination of heading, airspeed, ground speed, wind velocity, track and drift angle. The use of the circular slide rule for solving time, distance and simple fuel calculations. Methods of determining track error and corrections to heading by the 1 in 60 rule, and by 5 degree and 10 degree lines. Corrections to ETA. Flight Planning.

B.2.6 The direct reading magnetic compass; unreliability during turns and accelerations; the effect of metal objects placed in the vicinity of the compass.

B.3 METEOROLOGY

B.3.1 Properties of the Atmosphere

Relationship between temperature, pressure and density. International Standard Atmosphere.

B.3.2 Wind

Relationship between wind and isobars, gusts, squalls and turbulence; diurnal variation of wind; variation of wind with height; sea breezes; airflow in vicinity of high ground and low level wind shear.

B.3.3 Clouds and Precipitation

Clouds associated with different types of precipitation; flight conditions in and near clouds giving precipitation; cumulonimbus and thunderstorm; and orographic effects.

B.3.4 Visibility

Fog, mist, haze and their differences; formation and clearance of radiation and advection fog,(diurnal variations), and hill fog; and vertical and oblique visibility, reduced visibility due to industrial pollution.

B.3.5 Fronts and Pressure Systems

Characteristics of warm and cold front occlusions; and weather associated with depressions, anticyclones, cols, different air masses and tropical storms.

B.3.6 Icing

Airframe icing in relation to cloud types, hoar frost and rain ice. Engine icing, precautions, prevention and clearance

B.3.7 Altimetry

Correction for variations in surface pressure. Variation of pressure with height. QFE and QNH.

B.3.8 Forecasts, Reports and Warnings

Contents of, and terms and symbols used, in aviation forecast documents (including TAFs), in other forms of forecast services and weather reported (including METARs) available to the private pilot; and SIGMETs and aerodrome warnings; typhoon warning system and signals.

B.4 RADIOTELEPHONY

Refer to the syllabus in Part 1 Chapter 4 Paragraph 4.3.

B.5 HUMAN PERFORMANCE

Recommended reading: “Human Factors for Pilots”. Roger Green and others.

B.5.1 Basic Aviation Physiology and health Maintenance

B.5.1.1 *Basic Physiology and the effects of flight*

Anatomy and physiology of the eye, ear, vestibular, and respiratory systems.

Composition of the atmosphere, gas laws, and the nature of the human requirement for oxygen.

Effects of reduced ambient pressure and of sudden decompression; times of useful consciousness.

Recognising and coping with hypoxia and hyperventilation.

Entrapped gases and barotrauma.

Diving and flying.

Effects of acceleration(+ and - G) on circulatory system, vision, and consciousness.

Mechanism, effects and management of motion sickness.

B.5.1.2 *Flying and Health*

Noise and age induced hearing loss.

Visual defects and their correction.

ECG, blood pressure, arterial disease and coronary risk factors.

Alcoholism.

Common ailments and fitness to fly; gastro-enteritis, colds, use of common drugs and their side effects.

Toxic hazards.

Causes of in-flight incapacitation.

B.5.2 Basic Aviation Psychology

B.5.2.1 Basic plan of human information processing, including the concepts of sensation, attention, memory, central decision making, and the creation of mental models.

Limitations of central decision channel and mental workload,

Functions of attention in selecting information sources, attention getting stimuli.

General structure and limitations of memory.

Perception, the integration of sensory information to form a mental model.

Effects of experience and expectation on perception.

Recognising and managing spatial disorientation.

Use of visual cues in landing.

Eye movements, visual search techniques, mid-air collisions.

The nature of skill acquisition, the exercise of skill, conscious and automatic behaviour, errors of skill.

Rule based behaviour, procedures, simulator training, failure of rule-based behaviour.

Knowledge-based behaviour problem solving and decision making, inference formation, failures in knowledge based behaviour.

Maintaining accurate mental models, situational awareness, confirmation bias.

B.5.3 Stress and Stress Management

B.5.3.1 Definitions, concepts, and models of stress.

Arousal; concepts of over and under arousal.

Environmental stresses.

Domestic stress.

Fatigue.

Effects of stress on attention, motivation, and performance.

Life stress.

Coping strategies, identifying stress and stress management.

B.5.4 **Social Psychology and Ergonomics of the Flight Deck**

B.5.4.1 *Individual Differences, Social Psychology*

Individual differences, definitions of intelligence and personality.

Assessing personality.

Main dimensions of personality: extroversion and anxiety. Other important traits: warmth and sociality, impulsivity, tough-mindedness, dominance, stability, and boldness.

Individual personality related problems of flying, especially risk-taking.

Concepts of conformity, compliance, and risk shift. interacting air traffic services, maintenance personnel, and passengers.

Judgement, making decisions and assessing risk.

B.5.4.2 *The Design of Flight Decks, Documentation and Procedures*

Basic principles of control, display and workspace design.

Eye datum, anthropometry, and workspace constraints. External vision requirements, reach comfort and posture.

Display size, legibility, scale design, colour, and illumination. Common errors in display interpretation.

Control size, loading, location and compatibility of controls with displays.

The presentation of warning information and misinterpretation of warnings.

The design and appropriate use of checklists and manuals.

B.6 AIRCRAFT (GENERAL) (AEROPLANES)

B.6.1 Properties of Air

Density, pressure, temperature, and humidity and the relationship between these properties. International Standard Atmosphere.

B.6.2 Principles of Flight

Meaning and significance of terms. Relationships of thrust/drag, lift/weight, and the aerofoil/angle of attack/centre of lift/stall. Forces on the tailplane. Balance of forces in flight. Stability and instability. Drag, (induced/parasite). Stalling: effect of weight, angle of bank. Spinning. Range and Endurance.

B.6.3 Flying Controls

Ailerons, rudder, elevator and stabilator - direction of movement and effect. Principles of mass and aerodynamic balance. Knowledge of trimming devices - direction of movement and effect. Knowledge of flaps, slats and spoilers - use and effect.

B.6.4 Engines

A general knowledge of the principles and operation of a piston engine and associated systems (e.g. ignition, cooling, carburation, fuel oil and carburettor heat). Principles of fixed pitch propeller. Control of engines and indications of performance and limitations. Mixture control. A general understanding of the possible technical reasons for engine failure in flight.

B.6.5 Systems

B.6.5.1 *D.C. Electrics*

A general knowledge of the principles of generating and distribution system. Voltage and current control. Batteries, capacity.

B.6.5.2 *Instruments General*

A general knowledge of the pitot/static system and operation of associated instruments. A general knowledge of the operation of gyroscopic flight instruments and also instruments associated with electrical, engine and vacuum systems.

B.6.5.3 *Vacuum*

Knowledge of vacuum systems in use. Normal/abnormal indications.

B.6.5.4 *Landing Gear, Fixed*

Shock absorbers, brakes, tyres. Particular emphasis on recognition of wear and defects. Nose/tail wheel steering.

B.6.5.5 *Heating and Ventilating*

Knowledge of systems generally in use.

B.6.6 Loading and Performance

Understanding of the principles of weight and balance; significance of C of G datum and the importance of establishing C of G position within the correct range. Knowledge of precautions when loading aircraft, e.g. security of loads and hazards of magnetic and flammable goods. Factors affecting take-off, climb and landing performance.

B.6.7 Emergencies

General principles of action to be taken in the event of fire in the air or on the ground. Types of fire extinguishers and method of use.

B.6.8 Aircraft Airworthiness

B.6.8.1 Knowledge of requirements for, and content of:

Certificate of Airworthiness,
Certificate of Release to Service,
Certificate of Maintenance Review.

B.6.8.2 Understanding of requirements of an Approved Maintenance Schedule (usually General Purpose Maintenance Schedule)

B.6.8.3 Understanding of scope and responsibility for Pilot Maintenance and Duplicate Control Inspection.

B.6.9 Structural Limitations

Precautions to be observed when recovering from the more unusual attitudes of flight e.g. steep turns, steep dives, etc. Avoiding excessive 'g' forces. Understanding of action following a heavy landing or after flight through severe turbulence and the typical indications.

B.7 AIRCRAFT (TYPE)

B.7.1 This examination will be a multiple choice examination conducted by the CAD on a representative type of aeroplane within the Group agreed between the CAD and the aircraft operators.

B.7.2 The syllabus will vary depending on the type of aircraft and the candidate will be expected to achieve a satisfactory standard in the following areas:

(a) Pilot Maintenance

(b) Airframe Limitations

Including weight and balance calculations from the Flight Manual (or equivalent document).

(c) Aircraft Systems

Flying controls and flaps.

Landing gear (fixed or retractable as applicable).

Electrics system.

Heating and ventilating system.

Flight instruments.

Power engine, fuel and oil systems.

Propeller (fixed pitch or variable pitch as applicable).

B.7.3 In addition to the above, a candidate will, (where applicable) be required to demonstrate a satisfactory knowledge in the following areas for more complex aircraft, particularly those in Group B:

Hydraulic system.

Cabin heating system.

Airframe/Propeller de-icing and anti-icing.

Oxygen and pressurisation systems.

Auto pilot.

Propeller (feathering).

Asymmetric airframe and engine limitations (Use of the 'V' speeds).

Flight director system.

This syllabus lists all the items which should be covered during training and which will be examined during the flight test. The candidate will be required to demonstrate a satisfactory standard of knowledge and handling in all items included in the flight test which will be conducted at the maximum permissible landing weight.

C.1 PPL(H) Flight Test Syllabus

- (a) Pre-flight inspection
- (b) Starting procedure; running up
- (c) Taxying
- (d) Take-off, hovering and landing into wind
- (e) Flying a square pattern with constant heading at speeds not exceeding 25 knots
- (f) Take-off, turn 360 degrees each way in a hovering flight, cross-wind landing within limitations of the type of helicopter
- (g) Straight and level flight at given power setting and airspeeds
- (h) Climbing and descending turns
- (i) Steep turns at constant altitude and airspeed
- (j) Entry into autorotation, go-around procedure
- (k) Landing in simulated autorotation on a given spot
- (l) In servo-controlled aircraft, an approach and landing using the supplementary system
- (m) Recognition and correction of 'over-pitching'
- (n) Limited power take-off and landing
- (o) Action on the event of fire in the air
- (p) Flight into, and out of, a restricted landing area
- (q) Shut down procedures

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PART 2 APPENDIX D PPL(H) THEORETICAL KNOWLEDGE EXAMINATION SYLLABUS

D.1 AVIATION LAW, FLIGHT RULES AND PROCEDURES

Refer to the syllabus in Part 2 Appendix B Paragraph B.1.

D.2 NAVIGATION

Refer to the syllabus in Part 2 Appendix B Paragraph B.2.

D.3 METEOROLOGY

Refer to the syllabus in Part 2 Appendix B Paragraph B.3.

D.4 RADIOTELEPHONY

Refer to the syllabus in Part 1 Chapter 4 Paragraph 4.3.

D.5 HUMAN PERFORMANCE

Refer to the syllabus in Part 2 Appendix B Paragraph B.5.

D.6 **AIRCRAFT (GENERAL)**

D.6.1 **AIRCRAFT (GENERAL) (SINGLE-ENGINE HELICOPTERS)**

D.6.1.1 **Properties of Air**

Definition and significance of density, pressure, temperature and the relationship between them; humidity; International Standard Atmosphere.

D.6.1.2 **Principles of Flight**

Understanding of and relationship between: relative air flow/angle of attack/pitch angle/total reaction/weight, thrust/drag in respect of an aerofoil and the rotor as a whole. Understanding and significance of associated terms such as: coning angle, flapping, phase lag, dragging, flapback, dissymmetry of lift, torque reaction, vortex ring state, ground cushion, ground resonance, autorotation, stability, and over-pitching. A general knowledge of forces acting on the helicopter in all phases of flight including interaction between main and tail rotors. Rotor speed limitations.

D.6.1.3 **Flying Controls and Transmission Systems**

A general knowledge of Flying Control Systems (including basic servo operated systems), interconnected engine controls and trimming devices. A detailed knowledge of the direction of movement and functioning of controls.

A general knowledge of types of main rotor head, blades and tail rotors in common use.

A general knowledge of transmission systems, clutches, free wheel units and tail rotor drives in common use.

D.6.1.4 **Engines**

The piston or gas turbine engine section of PPL(H) – Theoretical Knowledge Examination Aircraft (General), as applicable to the type of helicopter for which application is made, must be successfully completed prior to type endorsement on a PPL(H). Should application be made for a helicopter with an engine of different technology from that already endorsed on a PPL(H) - Aircraft General, then the applicable engine section of the PPL(H) Aircraft (General) Examination must be successfully completed prior to endorsement of the licence with the new type.

D.6.1.4.1 *Piston Engines*

A general knowledge of the principles and operation of a piston engine and associated systems (e.g. ignition, cooling, carburation, fuel and oil). Engine control and indication of performance. Operation of associated controls. Operating limitations. A general understanding of the possible technical reasons for engine failure in flight.

D.6.1.4.2 *Gas Turbine Engines*

A general knowledge of the principles and operation of a gas turbine engine and associated system (e.g. fuel, oil, starting and ignition). Engine control and indication of performance. Operation of associated controls. Operating limitations. A general understanding of the possible technical reasons for engine failure in flight.

D.6.1.5 **Systems**

D.6.1.5.1 *D.C. Electrics*

A general knowledge of the principles of generating and distribution systems. Batteries and their capacity. Components in general use.

D.6.1.5.2 *Instruments*

A general knowledge of pitot/static systems and the operation of associated instruments. A general knowledge of the operation of gyroscopic flight instruments and also of instruments associated with electrical, engine and transmission systems.

D.6.1.5.3 *Vacuum*

A general knowledge of systems in use. Normal abnormal indications.

D.6.1.5.4 *Hydraulic*

A general knowledge of the operation of systems in general use. Normal/abnormal indications.

D.6.1.6 **Heating and Ventilation**

A general knowledge of the operation of systems in general use.

D.6.1.7 **Loading and Performance**

Understanding of the principles of weight and balance calculation; significance of the C of G datum and the importance of establishing the C of G within the correct range, longitudinal and lateral. Knowledge of precautions to be taken when loading a helicopter, e.g. security of loads and hazards of magnetic and flammable goods. Factors affecting hover, take-off, climb, autorotative and landing performance. Hazards of exceeding maximum total weight authorised.

D.6.1.8 **Emergencies**

General principles of the action to be taken in the event of a fire in the air or on the ground. Type of fire extinguishers and methods of use. Basic knowledge of First Aid and use of kits which are generally available. Knowledge of requirements for stowage and use of life jackets and life rafts. Recognition of the effects of carbon monoxide and knowledge of its dangers.

D.6.1.9 **Aircraft Airworthiness**

Knowledge of the requirement for the content of: Certificate of Airworthiness; Certificate of Maintenance Review. Understanding the requirements of the Approved Maintenance Schedule. Understanding the scope and responsibility of Pilot Maintenance as defined by the current Air Navigation (Hong Kong) Order and Air Navigation (General) Regulations and for Duplicate Control Inspections.

D.6.1.10 **Structural Limitation**

Precautions to be observed when recovering from the more unusual attitudes of flight, e.g. steep turns, steep dives, autorotation. Avoiding excessive vibration and $>g$ forces. Understanding of actions required after a heavy landing or after flight through severe turbulence and typical indications of structural damage.

D.6.2 **AIRCRAFT (GENERAL) (MULTI-ENGINE HELICOPTERS)**

Due to the generally more complex nature of multi-engine helicopters, pilots wishing to include in their licence a rating for such a helicopter shall normally be required to take the Aircraft (General) Theoretical Knowledge Examination which is set for professional helicopter licences. Advice should be sought from PELO.

D.6.2.1 **SYLLABUS**

D.6.2.1.1 **Principles of Flight (Helicopters)**

D.6.2.1.1.1 *Principles of Flight (helicopters)*

An understanding of the derivation of lift. The effects of varying airflow conditions on the rotor. The features associated with the rotary wing concept (in-flow roll, flap back, lift dissymmetry, cross-coupling effects, phase-lag, torque reaction, coriolis effect, vortex ring state) and the methods employed to accommodate these effect. The effects of operation through various flight phases (hover, transition, translational flight, autorotation). The forces acting upon a helicopter and the consequences of their variation. The meaning and relevance of terms associated with rotor wing flight. The limiting factors in rotary wing flight.

D.6.2.1.1.2 *Helicopter Controls, Rotors and Transmissions*

The general principles of helicopter flying controls and rotor head systems.

An understanding of the means by which main rotor collective and cyclic path operation and directional control are achieved, and their respective effects on the helicopter main rotor and tail rotor. The reasons for and means by which pitch control surfaces may achieve their objectives. The different types of rotor head and the way in which they respond to control inputs and airflow changes. Cross-coupling of controls. The means by which power is transmitted from engine(s) to the rotors. The means by which trim may be achieved and its corresponding effect upon helicopters.

A detailed knowledge of the responsibilities of a pilot for duplicate inspection of control systems in circumstances permitted by Chapter A6-2 of British Civil Airworthiness Requirements, and in relation thereto, the inspection of control systems, movements, adjustments, stops, locking devices and bonding.

D.6.2.1.2 **Engines**

D.6.2.1.2.1 *Piston Engines and Supercharging*

The general principles of this type of engine as a propulsive unit, including propellers.

An understanding of the principles of fuel injection and carburation and the means by which such systems are controlled automatically or by the pilot to accommodate varying conditions. Induction anti-icing. The principles of ignition and the means by which ignition requirements may be met. Engine starting and shut down, and the systems which may be employed to achieve such operations. The requirements of engine cooling and lubrication systems and the means by which these requirements may be met. The problems associated with fuel storage on board the aircraft and the features incorporated to accommodate these problems. Engine fire detection and protection. The parameters which may be measured to assess engine performance in flight and the effect of varying ambient conditions on these parameters.

A detailed knowledge of the responsibilities of a pilot for duplicate inspection of control systems in circumstances permitted by Chapter A6-2 of British Civil Airworthiness Requirements, and in relation thereto, the inspecting of control systems, movements, adjustments, stops, locking devices and bonding.

A general principles of supercharging/turbo-charging piston engines.

An understanding of the various means available for supercharging/turbo-charging. The mechanisms which may be employed to regulate superchargers/turbo-chargers and how they achieve their effect. The effects on engine parameters of varying supercharging and ambient conditions. The meaning and significance of full throttle height, manifold pressure, boost, exhaust gas temperature, and the effects of varying ambient conditions and control inputs on them.

D.6.2.1.2.2 *Gas Turbine Engines*

The general principles of gas turbine engines.

An understanding of the various stages of a gas turbine cycle. The problems associated with centrifugal and axial compressors and the means by which they are overcome. Engine fuel control and delivery to the combustion systems. The effects of varying ambient conditions and the methods which may be employed to accommodate them. Engine starting relighting and shutdown and the systems which may be employed to achieve such operations. The requirements of engine lubrication systems and the means by which they may be met. Any requirements for thrust augmentation and the means by which it may be met, and the effect on the engine of its operation. Thrust reverse systems. The problems associated with fuel storage on board the aircraft and the features incorporated to accommodate these problems. Engine fire detection and protection. The parameters which may be measured to assess engine performance in flight and the effect of varying ambient conditions and air bleeds on these parameters. Engine anti-icing systems.

A detailed knowledge of the responsibilities of a pilot for duplicate inspection of control systems in circumstances permitted by Chapter A6-2 British Civil Airworthiness Requirements, and in relation thereto, the inspection of control systems, movements, adjustments, stops, locking devices and bonding.

D.6.2.1.3 **Electrics**

D.6.2.1.3.1 *D.C. Electrics*

An understanding of the general principles underlying the production of d.c. from electro-magnetic or chemical sources. The quantities and units associated with d.c. electrics.

An understanding of d.c. generators and their control. Electrical supply systems and associated components. The parallelling of d.c. supplies. The components and parameters employed to monitor generator, battery or bus-bar supplies. Failure warning devices. Circuit protection devices. The production of constant frequency a.c. from d.c. lead acid and nickel cadmium batteries. Motors and actuators. Bonding. Single and double pole distribution.

D.6.2.1.3.2 *A.C. Electrics*

An understanding of the general principles underlying the production of a.c. from electro-magnetic sources. The quantities and units associated with a.c. electrics.

An understanding of a.c. generators and their control. A.C. electrical supply systems and associated components. The parallelling of a.c. supplies. The components and parameters employed to monitor supply. The transformation of a.c./d.c. power from a.c. supplies. The effects of varying supply parameters on inductive or capacitive load.

D.6.2.1.4 **Airframe Systems**

D.6.2.1.4.1 *Hydraulics*

The general principles of transmission of force by fluid under pressure.

An understanding of the means by which pressure is produced and how pressure is controlled in a system. Constant pressure and constant delivery systems. Accumulators and the reasons for their installation. Valves associated with pressure distribution. Normal and abnormal system operation. Safety features which may be incorporated in systems. The problems associated with storage and supply of hydraulic fluid on an aircraft. The requirements of hydraulic fluids and seals and the different types encountered.

D.6.2.2 **EXAMINATION REQUIREMENTS**

D.6.2.2.1 For the initial multi-engine rating a candidate will be required to take and pass all sections. A candidate passing not less than two sections will be granted a partial pass. Candidates failing to pass all four sections in three attempts will be required to take all sections again. A time bar will be imposed before a new cycle of attempts may be started.

D.6.2.2.2 A licence holder wishing to include a further multi-engine rating in his licence who took the examination prior to 1 January 1992 will be required to take and pass AC Electrics and Piston Engines or Gas Turbine Engines as appropriate to that helicopter type.

D.6.2.2.3 A guide to the depth of knowledge required in each subject is given by the following code classification. Ability to arrive at the correct answer by:

Code 1 factual recall

Code 2 comprehension and logical combination of separate items of factual recall

Code 3 logical combination of all relevant items of factual recall and a sound knowledge of the principles involved

Code 4 a thorough knowledge of the subject and the principles involved, and their application to the problem

The depth of knowledge classification for Aircraft (General) (Multi-engine Helicopters) is Code 3.

D.6.2.2.4 Examination papers will include at appropriate points, questions to test the candidate's knowledge of:

(a) the type of information to be found in Certificates of Airworthiness, flight manuals, crew manuals, crew manuals (those required by Chapter A7-3 of British Civil Airworthiness Requirements) and associated documents

(b) the various type of emergency equipment used in aeroplanes; the suitability of different types of fire extinguishers for different types of fire

(c) the repairs and replacements which may be carried out by a licensed pilot as listed in the Air Navigation (General) Regulations, Regulation 16, as amended

(d) the methods used concerning repairs and replacements which may be carried out by a licensed pilot.

D.7 **AIRCRAFT (TYPE)**

D.7.1 **AIRCRAFT (TYPE)**
(SINGLE-ENGINE HELICOPTERS MTWA NOT EXCEEDING 2730 kg)

This examination will confine to the specific type of helicopter upon which the applicant is being flight tested and must be successfully completed for each type on which the applicant wishes to qualify. A satisfactory standard of knowledge in the following areas must be demonstrated.

D.7.1.1 **Airframe Limitations**
(including weight and balance calculations form in the Flight Manual or equivalent documents)

D.7.1.2 **Performance**
(including airspeed/altitude limitations and practical use of data in the flight manual or equivalent documents)

D.7.1.3 **Flying Controls and Transmissions**

D.7.1.4 **Rotor Heads**

D.7.1.5 **Blades Tail Rotor Drives**

D.7.1.6 **Servo Systems**

D.7.1.7 **Power Plant**

D.7.1.8 **Fuel and Oil System**

D.7.1.9 **Controls**

D.7.1.10 **Flight Instruments**

D.7.1.11 **Electrical Systems**

D.7.1.12 **Heating and Ventilation System**

D.7.1.13 **Auto-stabiliser (if fitted)**

D.7.2 **AIRCRAFT (TYPE) (MULTI-ENGINE HELICOPTERS)**

Due to the generally more complex nature of multi-engine helicopters, pilots wishing to include in their licence a rating for such a helicopter shall normally be required to take the Aircraft (Type) Theoretical Knowledge Examination which is set for professional helicopter licences. Advice should be sought from PELO.

Applicants are required to have a satisfactory knowledge of items in this part of the syllabus only insofar as they relate to the helicopter type for which a rating is sought.

The syllabus for these examinations is as follows:

D.7.2.1 **Limitations**

Weight and loading limitations; definitions of the datum point. Centre of gravity (if centre of gravity limits vary and are shown by a graph, questions on the matter are only of a general nature). Speed limitations. Engine operating limitations. Rotor limitations. Temperature and altitude limitations.

D.7.2.2 **Engine Operation**

The management of the engine(s) and their installations, and the effect of changes in ambient conditions on their performance. Starting procedure and method of determining that power output is satisfactory. Operation under normal, abnormal and emergency conditions and precautions to be observed (this covers running up, taxiing, lift-off, hover, cruising, shutting down and/or relighting/restarting in the air, autorotation, landing, shutting down). Symptoms indicating icing and management of equipment provided to contend with icing when icing is experienced or expected. Action in the event of fire in flight and on the ground.

D.7.2.3 **Auxiliary Power Unit (when approved for use in flight)**

Management under normal, abnormal and emergency conditions. Action in the event of fire in flight and on the ground.

D.7.2.4 **Auxiliary Power Unit (when approved for ground use only)**

Management under normal and abnormal conditions. Action in the event of fire.

D.7.2.5 **Fuel Systems(including engine refrigerants such as water or water methanol)**

Grade(s) of fuel to be use. Refrigerant to be use. Location and management of refuelling and defuelling, and water/sediment drainage points. Tank capacities (usable/unusable fuel) and means of ascertaining contents on the ground and in flight. The means of ascertaining fuel consumption enroute. Management under normal, abnormal and emergency conditions. Effects of altitude changes in flight.

D.7.2.6 Oil Systems (Engine)

Grade(s) of oil to be used. Location of replenishing and drainage points. Capacity (tank, sump or usable) and means of ascertaining contents on the ground and in flight. Management under normal, abnormal and emergency conditions.

D.7.2.7 Control and Transmission Systems

A knowledge of the main and anti-torque rotors; collective, cyclic and directional control systems; trimming devices; stabilisers; rotor brakes. The system provided for converting engine output into rotor rotation. Management under normal, abnormal and emergency conditions and precautions to be observed. Grades of lubricating oils and hydraulic fluids; location of replenishing points and method of ascertaining correct contents. Indicating and warning devices associated with the control and transmission systems.

D.7.2.8 Automatic Stabilisation Systems (systems to augment stability in flight)

Management under normal, abnormal and emergency conditions. Indications of abnormal functioning.

D.7.2.9 Automatic Pilot System (systems for automatic control of the path of the helicopter)

Management under normal, abnormal and emergency conditions. Indications of abnormal functioning. Switching arrangements with associated system.

D.7.2.10 Instrument and Compass Systems (including flight systems)

Normal and alternative pitot, static and vacuum supplies. Normal, alternative and emergency electrical power supplies; associated circuit protection, switching and warning devices. Operation of the instrument and compass controls (knobs, switches, etc.), which affect the presentation given by the instruments and compass presentation. Switching arrangements with associated systems.

NOTE: Only type knowledge is covered and only to the extent detailed above. It is emphasised that this examination is not concerned with either general or type knowledge of how instruments and compasses work; nor with their operational use.

D.7.2.11 Pneumatic Pressure and/or vacuum systems

The purpose of the principal components. Management under normal, abnormal and emergency conditions.

D.7.2.12 Hydraulic systems

Location of replenishing points. Means of ascertaining the contents on the ground and in flight. Management under normal abnormal and emergency conditions.

D.7.2.13 Landing gear (land and water) and wheel brake systems

Management under normal, abnormal and emergency conditions.

D.7.2.14 Electrical systems

Meaning of terms. Knowledge of the condition of aircraft batteries and the method of ascertaining the voltage and charge. An elementary knowledge of the principles of operation of the generating system(s). Ground power supplies. Location and functioning of circuit breakers and fuses. Lighting systems, internal and external. Management of the electrical systems under normal, abnormal and emergency conditions.

D.7.2.15 Radio and radar systems

Normal, alternative and emergency power supplies; associated circuit protection, switching and warning devices.

NOTE: Only type knowledge is covered and only to the extent detailed above. It is emphasised that this examination is not concerned with either general or type knowledge of how radio and radar systems work, nor with the use of such systems.

D.7.2.16 Air conditioning systems

Meaning of terms. The principles of operation, the purpose of the principal components. Management under normal, abnormal and emergency conditions. Indications of abnormal functioning.

D.7.2.17 Ice and rain protection systems

Indications of icing. Management when icing is experienced or expected under normal, abnormal and emergency conditions. Management to maintain clear vision. Replenishment and duration of supplies.

D.7.2.18 Additional aspects

(a) Emergency equipment and procedures:

Location and management of emergency exits and equipment, including oxygen. Action in the event of fire (other than engine or auxiliary power unit fire which is included in the appropriate section). Methods of dispersal of smoke in compartments.

(b) Fuselage apertures (doors, hatches, etc.):

Security procedures and indications for fuselage apertures and associated devices such as air-stairs.

(c) Equipment for specified flight roles (spray gear, freight, winches etc.):

Management under normal, abnormal and emergency conditions.

D.7.2.19 **Flight characteristics**

In accordance with data in the appropriate flight manual: take-off technique; regulation of weight with special regard to the characteristics of the take-off and landing areas, and enroute flight conditions; behaviour of the aircraft following engine failure; emergency landing techniques.

PART 2 APPENDIX E FLYING INSTRUCTOR RATING THEORETICAL KNOWLEDGE EXAMINATION SYLLABUS

E.1 Teaching and Learning

The learning process; fundamentals of teaching; the instructor's role; teaching methods; use of teaching aids

E.2 Training Administration

Documentation; the flying instructor's responsibility; the HK flying instructor's rating

E.3 Aviation Law, Flight Rules and Procedures

Refer to the syllabus in Part 2 Appendix B Paragraph B.1.

E.4 Navigation

Air navigation, including the use of aeronautical charts, instruments and navigation aids; an understanding of the principles and characteristics of appropriate navigation systems; operation of airborne equipment

E.5 Meteorology

Interpretation and application of aeronautical meteorological reports, charts and forecasts; use of, and procedures for obtaining, meteorological information, pre-flight and in-flight; altimetry

Aeronautical meteorology; climatology of relevant areas in respect of the elements having an effect upon aviation; the movement of pressure systems, the structure of fronts, and the origin and characteristics of significant weather phenomena which affect take-off, en-route and landing conditions; hazardous weather avoidance

E.6 Principles of Flight

Physics and mechanics relevant to aerodynamics including Bernoulli's Principle; aerofoils, lift and drag; flying controls; stability; stall and spin; turning flight; load factor and manoeuvres; the propeller; aircraft performance; weight and balance

Applicants for FI (Helicopters) Rating should also refer to the theoretical knowledge examination syllabus for CPL(H) in Part 3 Appendix A Items A.13.2, A.13.3 and A.13.4

E.7 Airframes

Airframe structure; stress; fuselage and wing construction; the tail unit; aileron, elevators and rudder; trimming controls control systems; flaps; landing gear; brake systems; aircraft tyres; aircraft seats; baggage; control locks; maintenance procedures

E.8 **Aero Engines**

The four-stroke cycle; ignition systems; carburetion; carburettor icing; oil systems; fuel systems; cooling systems; vacuum system; electrical system; variable pitch propeller; engine handling; starting and stopping

E.9 **Aircraft Airworthiness**

The Certificate of Airworthiness; the Flight Manual and its supplement; the Certificate of Maintenance Review; the Maintenance Schedule; pilot maintenance; aircraft, engine and propeller log books; compliance requirements; pilot's responsibility to record defects

E.10 **Aircraft Instruments**

Pitot-static system; airspeed indicator; altimeter; vertical speed indicator; gyro supply systems; turn and balance indicator; attitude indicator; heading indicator; magnetic compass; engine instruments including fuel indicators, oil pressure indicators, oil temperature indicators, cylinder head temperature indicators, carburettor temperature indicators, exhaust gas analysers, tachometers and manifold pressure gauges; other ancillary instruments including flap indicators, vacuum gauges, ammeters and generator/alternator warning lights and outside air thermometers

E.11 **Fire, First Aid and Safety Equipment**

Fire, dangers and precautions

Knowledge on first aid including procedures following an accident, fractured or broken limbs, severe bleeding, head injuries, severe shock and burns; first aid kits, its stowage and replacement of items

Safety equipment including seat belts and harnesses, fire extinguishers, lifejackets and liferafts

E.12 **Human Performance**

Same as the theoretical knowledge examination syllabus for PPL (A) in Part 2 Appendix B Item B.5 with emphasis on oxygen altitude and the body, physiological phenomena during manoeuvring, fatigue and tiredness, alcohol, drugs, common cold and carbon monoxide.

Candidates should be aware that although the syllabus is the same as the one for PPL (A), the depth of knowledge required on individual subject is expected to be at CPL level.

E.13 **Radiotelephony**

Radiotelephony procedures and phraseology as applied to VFR operations; actions to be taken in case of communication failure or other emergency situations

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PART 2 APPENDIX G AFI/FI (HELICOPTERS) SYLLABUS

The course of training for the AFI (Helicopters) Rating shall consist of two parts:

- (a) at least 125 hours of theoretical knowledge instruction, including at least 25 hours teaching and learning instruction [Please refer to G.1 of Appendix G] ; and
- (b) at least 30 hours of flight instruction, of which 25 hours shall be dual flight instruction, of which 5 hours may be conducted in a full flight simulator (FFS), a flight and navigation procedures trainer (FNPT) levels I or II or a flight training device (FTD) levels 2 or 3. The remaining 5 hours may be mutual flying (that is, two applicants flying together to practice flight demonstrations). [Please refer to G.2 of Appendix G]

The flight test is additional to the course training time. The course does not qualify the applicant to give instruction in instrument flying, aerobatic flying or night flying.

G.1

Part 1

TEACHING AND LEARNING

- (a) The course should include at least 125 hours of theoretical knowledge instruction, including at least 25 hours teaching and learning instruction.

CONTENT OF THE TEACHING AND LEARNING INSTRUCTIONS (INSTRUCTIONAL TECHNIQUES):

- (b) The learning process:

- (1) motivation;
- (2) perception and understanding;
- (3) memory and its application;
- (4) habits and transfer;
- (5) obstacles to learning;
- (6) incentives to learning;
- (7) learning methods;
- (8) rates of learning.

- (c) The teaching process:

- (1) elements of effective teaching;
- (2) planning of instructional activity;
- (3) teaching methods;
- (4) teaching from the 'known' to the 'unknown';
- (5) use of 'lesson plans'.

- (d) Training philosophies:

- (1) value of a structured (approved) course of training;
- (2) importance of a planned syllabus;
- (3) integration of theoretical knowledge and flight instruction.

- (e) Techniques of applied instruction:

- (1) theoretical knowledge: classroom instruction techniques:

- (i) use of training aids;
- (ii) group lectures;
- (iii) individual briefings;
- (iv) student participation or discussion.

(2) flight: airborne instruction techniques:

- (i) the flight or cockpit environment;
- (ii) techniques of applied instruction;
- (iii) post-flight and in-flight judgement and decision making.

(f) Student evaluation and testing:

(1) assessment of student performance:

- (i) the function of progress tests;
- (ii) recall of knowledge;
- (iii) translation of knowledge into understanding;
- (iv) development of understanding into actions;
- (v) the need to evaluate rate of progress.

(2) analysis of student errors:

- (i) establish the reason for errors;
- (ii) tackle major faults first, minor faults second;
- (iii) avoidance of over criticism;
- (iv) the need for clear concise communication.

(g) Training programme development:

- (1) lesson planning;
- (2) preparation;
- (3) explanation and demonstration;
- (4) student participation and practice;
- (5) evaluation.

(h) Human performance and limitations relevant to flight instruction:

(1) physiological factors:

- (i) psychological factors;
- (ii) human information processing;
- (iii) behavioural attitudes;
- (iv) development of judgement and decision making.

(2) threat and error management.

(i) Specific hazards involved in simulating systems failures and malfunctions in the aircraft during flight:

- (1) importance of 'touch drills';
- (2) situational awareness;
- (3) adherence to correct procedures.

(j) Training administration:

- (1) flight or theoretical knowledge instruction records;
- (2) pilot's personal flying logbook;
- (3) the flight or ground curriculum;
- (4) study material;
- (5) official forms;
- (6) flight manual or equivalent document (for example owner's manual or pilot's operating handbook);
- (7) flight authorisation papers;
- (8) aircraft documents;
- (9) the private pilot's licence regulations

GROUND INSTRUCTION

Note: During ground instruction the student instructor should pay specific attention to the teaching of enhanced ground instruction in weather interpretation, planning and route assessment, decision making on encountering Degraded Visual Environment (DVE) including reversing course or conducting a precautionary landing.

G.2 Part 2

AIR EXERCISES

- (a) The air exercises are similar to those used for the training of PPL(H) but with additional items designed to cover the needs of an AFI(H).
- (b) The numbering of exercises should be used primarily as an exercise reference list and as a broad instructional sequencing guide: therefore the demonstrations and practices need not necessarily be given in the order listed. The actual order and content will depend upon the following interrelated factors:
 - (1) the applicant's progress and ability;
 - (2) the weather conditions affecting the flight;
 - (3) the flight time available;
 - (4) instructional technique considerations;
 - (5) the local operating environment;
 - (6) applicability of the exercises to the helicopter type.
- (c) It follows that student instructors will eventually be faced with similar interrelated factors. They should be shown and taught how to construct flight lesson plans, taking these factors into account, so as to make the best use of each flight lesson, combining parts of the set exercises as necessary.

GENERAL

- (d) The briefing normally includes a statement of the objectives and a brief reference to principles of flight only if relevant. An explanation is to be given of exactly what air exercises are to be taught by the instructor and practised by the student during the flight. It should include how the flight will be conducted about who is to fly the

helicopter and what airmanship, weather and flight safety aspects currently apply. The nature of the lesson will govern the order in which the constituent parts are to be taught.

- (e) The four basic components of the briefing will be:
 - (1) the aim;
 - (2) principles of flight (briefest reference only);
 - (3) the air exercise(s) (what, and how and by whom);
 - (4) airmanship (weather, flight safety etc.).

PLANNING OF FLIGHT LESSONS

- (f) The preparation of lesson plans is an essential prerequisite of good instruction and the student instructor is to be given supervised practice in the planning and practical application of flight lesson plans.

GENERAL CONSIDERATIONS

- (g) The student instructor should complete flight training to practise the principles of basic instruction at the PPL(H) level.
- (h) During this training, except when acting as a student pilot for mutual flights, the student instructor occupies the seat normally occupied by the FI(H).
- (i) It is to be noted that airmanship and look-out is a vital ingredient of all flight operations. Therefore, in the following air exercises the relevant aspects of airmanship are to be stressed at all times.
- (j) If the privileges of the AFI(H) certificate are to include instruction for night flying, exercise 28 should be undertaken either as part of the course or subsequent to certificate issue.
- (k) The student instructor should learn how to identify common errors and how to correct them properly, which should be emphasised at all times.
- (l) The student instructor should be trained to keep in mind that wherever possible, flight simulation should be used to demonstrate to student pilots the effects of flight into DVE and to enhance their understanding and need for avoidance of this potentially fatal flight regime.

SYLLABUS OF FLIGHT INSTRUCTION CONTENTS

LONG BRIEFINGS AND AIR EXERCISES

EXERCISE 1: FAMILIARISATION WITH THE HELICOPTER

- (a) Long briefing objectives:
 - (1) introduction to the helicopter;

- (2) explanation of the cockpit layout;
 - (3) helicopter and engine systems;
 - (4) checklist(s) and procedures;
 - (5) familiarisation with the helicopter controls;
 - (6) differences when occupying the instructor's seat;
 - (7) emergency drills:
 - (i) action if fire in the air and on the ground: engine, cockpit or cabin and electrical fire;
 - (ii) system failure drills as applicable to type;
 - (iii) escape drills: location and use of emergency equipment and exits.
- (b) Air exercise: all long briefing objectives mentioned above should also be trained on site during the air exercise.

EXERCISE 2: PREPARATION FOR AND ACTION AFTER FLIGHT

(a) Long briefing objectives:

- (1) flight authorisation and helicopter acceptance, including technical log (if applicable) and certificate of maintenance;
 - (2) equipment required for flight (maps, etc.);
 - (3) external checks;
 - (4) internal checks;
 - (5) student comfort, harness, seat and rudder pedal adjustment;
 - (6) starting and after starting checks;
 - (7) system, power or serviceability checks (as applicable);
 - (8) closing down or shutting down the helicopter (including system checks).
 - (9) parking and leaving the helicopter (including safety or security as applicable);
 - (10) completion of authorisation sheet and helicopter serviceability documents.
- (b) Air exercise: all long briefing objectives mentioned above should also be trained on site during the air exercise.

EXERCISE 3: AIR EXPERIENCE

(a) Long briefing objectives:

Note: there is no requirement for a long briefing for this exercise.

(b) Air exercise:

- (1) air experience;
- (2) cockpit layout, ergonomics and controls;
- (3) cockpit procedures: stability and control.

EXERCISE 4: EFFECTS OF CONTROLS

(a) Long briefing objectives:

- (1) function of the flying controls (primary and secondary effect);
- (2) effect of air speed;
- (3) effect of power changes (torque);
- (4) effect of yaw (sideslip);
- (5) effect of disc loading (bank and flare);
- (6) effect on controls of selecting hydraulics on/off;
- (7) effect of control friction;
- (8) use of instruments;
- (9) operation of carburettor heat or anti-icing control.

(b) Air exercise: all long briefing objectives mentioned above should also be trained on site during the air exercise.

EXERCISE 5: POWER AND ATTITUDE CHANGES

(a) Long briefing objectives:

- (1) relationship between cyclic control position, disc attitude, fuselage attitude and air speed flap back;
- (2) power required diagram in relation to air speed;
- (3) power and air speed changes in level flight;
- (4) use of the instruments for precision;
- (5) engine and air speed limitations;

(b) Air exercise:

- (1) relationship between cyclic control position, disc attitude, fuselage attitude and air speed flap back;
- (2) power and air speed changes in level flight;
- (3) use of instruments for precision (including instrument scan and lookout).

EXERCISE 6: LEVEL FLIGHT, CLIMBING, DESCENDING AND TURNING

Note: for ease of training this exercise is divided into four separate parts in the PPL(H) syllabus but may be taught complete or in convenient parts.

(a) Long briefing objectives:

- (1) basic factors involved in level flight;
- (2) normal power settings;
- (3) use of control friction or trim;
- (4) importance of maintaining direction and balance;
- (5) power required or power available diagram;
- (6) optimum climb and descent speeds, angles or rates;
- (7) importance of balance, attitude and co-ordination in the turn;
- (8) effects of turning on rate of climb or descent;
- (9) use of the gyro direction or heading indicator and compass;
- (10) use of instruments for precision.

(b) Air exercises:

- (1) maintaining straight and level flight at normal cruise power;
- (2) control in pitch, including use of control friction or trim;
- (3) use of the ball or yaw string to maintain direction and balance;
- (4) setting and use of power for selected air speeds and speed changes;
- (5) entry to climb;
- (6) normal and maximum rate of climb;
- (7) levelling off from climb at selected altitudes or heights;
- (8) entry to descent;
- (9) effect of power and air speed on rate of descent;
- (10) levelling off from descent at selected altitudes or heights;
- (11) entry to medium rate turns;
- (12) importance of balance, attitude and co-ordination to maintain level turn;
- (13) resuming straight and level flight;
- (14) turns onto selected headings, use of direction indicator and compass;

- (15) turns whilst climbing and descending;
- (16) effect of turn on rate of climb or descent;
- (17) use of instruments for precision (including instrument scan and lookout).

EXERCISE 7: AUTOROTATION

- (a) Long briefing objectives:
 - (1) characteristics of autorotation;
 - (2) safety checks (including look-out and verbal warning);
 - (3) entry and development of autorotation;
 - (4) effect of AUM, IAS, disc loading, G forces and density altitude on RRPM and rate of descent;
 - (5) rotor and engine limitations;
 - (6) control of air speed and RRPM;
 - (7) recovery to powered flight;
 - (8) throttle override and control of ERPM or RRPM during re-engagement (as applicable);
 - (9) danger of vortex condition during recovery.
- (b) Air exercise:
 - (1) safety checks (including verbal warning and look-out);
 - (2) entry to and establishing in autorotation;
 - (3) effect of IAS and disc loading on RRPM and rate of descent;
 - (4) control of air speed and RRPM;
 - (5) recovery to powered flight;
 - (6) medium turns in autorotation;
 - (7) simulated engine off landing (as appropriate).

EXERCISE 8: HOVERING AND HOVER TAXIING

- (a) Long briefing objectives:
 - (1) ground effect and power required;
 - (2) effect of wind, attitude and surface;
 - (3) stability in hover and effects of over controlling;
 - (4) effect of control in hover;

- (5) control and co-ordination during spot turns;
 - (6) requirement for slow hover speed to maintain ground effect;
 - (7) effect of hydraulic failure in hover;
 - (8) specific hazards, for example snow, dust, etc.
- (b) Air exercise:
- (1) ground effect and power or height relationship;
 - (2) effect of wind, attitude and surface;
 - (3) stability in hover and effects of over controlling;
 - (4) effect of control and hover technique;
 - (5) gentle forward running touchdown;
 - (6) control and co-ordination during spot (90 ° clearing) turns;
 - (7) control and co-ordination during hover taxi;
 - (8) dangers of mishandling and over pitching;
 - (9) (where applicable) effect of hydraulics failure in hover;
 - (10) simulated engine failure in the hover and hover taxi.

EXERCISE 9: TAKE-OFF AND LANDING

- (a) Long briefing objectives:
- (1) pre take-off checks or drills;
 - (2) importance of good look-out;
 - (3) technique for lifting to hover;
 - (4) after take-off checks;
 - (5) danger of horizontal movement near ground;
 - (6) dangers of mishandling and over pitching;
 - (7) technique for landing;
 - (8) after landing checks;
 - (9) take-off and landing crosswind and downwind.
- (b) Air exercise:
- (1) pre take-off checks or drills;
 - (2) pre take-off look-out technique;

- (3) lifting to hover;
- (4) after take-off checks;
- (5) landing;
- (6) after landing checks or drills;
- (7) take-off and landing crosswind and downwind.

EXERCISE 10: TRANSITIONS FROM HOVER TO CLIMB AND APPROACH TO HOVER

- (a) Long briefing objectives:
 - (1) revision of ground effect;
 - (2) translational lift and its effects;
 - (3) inflow roll and its effects;
 - (4) revision of flap back and its effects;
 - (5) avoidance of curve diagram and associated dangers;
 - (6) effect or dangers of wind speed and direction during transitions;
 - (7) transition to climb technique;
 - (8) constant angle approach;
 - (9) transition to hover technique.
- (b) Air exercise:
 - (1) revision of take-off and landing;
 - (2) transition from hover to climb;
 - (3) effect of translational lift, inflow roll and flap back;
 - (4) constant angle approach;
 - (5) technique for transition from descent to hover;
 - (6) a variable flare simulated engine off landing.

EXERCISE 11: CIRCUIT, APPROACH AND LANDING

- (a) Long briefing objectives:
 - (1) circuit and associated procedures;
 - (2) take-off and climb (including checks or speeds);
 - (3) crosswind leg (including checks, speeds or angles of bank in turns);

- (4) downwind leg (including pre-landing checks);
- (5) base leg (including checks, speeds or angles of bank in turns);
- (6) final approach (including checks or speeds);
- (7) effect of wind on approach and hover IGE;
- (8) crosswind approach and landing technique;
- (9) missed approach and go-around technique (as applicable);
- (10) steep approach technique (including danger of high sink rate);
- (11) limited power approach technique (including danger of high speed at touchdown);
- (12) use of the ground effect;
- (13) abandoned take-off technique;
- (14) hydraulic failure drills and hydraulics off landing technique (where applicable);
- (15) drills or technique for tail rotor control or tail rotor drive failure;
- (16) engine failure drills in the circuit to include;
- (17) engine failure
- (18) on take-off:
 - (i) crosswind;
 - (ii) downwind;
 - (iii) base leg;
 - (iv) on final approach.
- (19) noise abatement procedures (as applicable).

(b) Air exercise:

- (1) revision of transitions and constant angle approach;
- (2) basic training circuit, including checks;
- (3) crosswind approach and landing technique;
- (4) missed approach and go-around technique (as applicable);
- (5) steep approach technique;
- (6) basic limited power approach or run on technique;
- (7) use of ground effect;

- (8) hydraulic failure and approach to touchdown with hydraulics off and to recover at safe height (as applicable);
- (9) simulated engine failure on take-off, crosswind, downwind, base leg and finals;
- (10) variable flare simulated engine off landing.

EXERCISE 12: FIRST SOLO

(a) Long briefing objectives:

- (1) warning of change of attitude due to reduced and laterally displaced weight;
- (2) low tail, low skid or wheel during hover or landing;
- (3) dangers of loss of RRPM and over pitching;
- (4) pre take-off checks;
- (5) into wind take-off;
- (6) drills during and after take-off;
- (7) normal circuit, approach and landing;
- (8) action if an emergency.

- (b) Air exercise: all long briefing objectives mentioned above should also be trained on site during the air exercise.

EXERCISE 13: SIDEWAYS AND BACKWARDS HOVER MANOEUVRING

(a) Long briefing objectives:

- (1) revision of hovering;
- (2) directional stability and weather cocking effect;
- (3) danger of pitching nose down on recovery from backwards manoeuvring;
- (4) helicopter limitations for sideways and backwards manoeuvring;
- (5) effect of CG position.

(b) Air exercise:

- (1) revision of hovering and 90 ° clearing turns;
- (2) manoeuvring sideways heading into wind;
- (3) manoeuvring backwards heading into wind;
- (4) manoeuvring sideways and backwards heading out of wind;
- (5) manoeuvring backwards too fast and recovery action.

EXERCISE 14: SPOT TURNS

- (a) Long briefing objectives:
 - (1) revision of ground effect and effect of wind;
 - (2) weather cocking and control actions;
 - (3) control of RRPM;
 - (4) torque effect;
 - (5) cyclic limiting stops due to CG position (where applicable);
 - (6) rate of turn limitations;
 - (7) spot turn about pilot position;
 - (8) spot turn about tail rotor position;
 - (9) spot turn about helicopter geometric centre;
 - (10) square (safe visibility) and clearing turn.
- (b) Air exercise:
 - (1) weather cocking, torque effect and control actions;
 - (2) rate of turn;
 - (3) spot turn about pilot position;
 - (4) spot turn about tail rotor position;
 - (5) spot turn about helicopter geometric centre;
 - (6) square and clearing turn.

EXERCISE 15: HOVER OUT OF GROUND EFFECT AND VORTEX RING

- (a) Long briefing objectives:
 - (1) revision of ground effect and power required diagram;
 - (2) drift, height and power control, look-out or scan;
 - (3) vortex ring, (including dangers, recognition and recovery actions);
 - (4) loss of tail rotor effectiveness.
- (b) Air exercise:
 - (1) to demonstrate hover OGE;
 - (2) drift, height, power control and look-out, and instrument scan technique;
 - (3) recognition of incipient stage of vortex ring and settling with power;
 - (4) recovery action from incipient stage of vortex ring;

(5) recognition of loss of tail rotor effectiveness and recovery actions.

EXERCISE 16: SIMULATED ENGINE OFF LANDINGS

- (a) Long briefing objectives:
- (1) revision of basic autorotation;
 - (2) effect of AUM, disc loading, density altitude and RRPM decay;
 - (3) use of cyclic and collective to control speed or RRPM;
 - (4) torque effect;
 - (5) use of flare or turn to restore RRPM;
 - (6) technique for variable flare simulated EOL;
 - (7) technique for constant attitude simulated EOL;
 - (8) revision of technique for hover or hover taxi simulated EOL;
 - (9) emergency technique for engine failure during transition;
 - (10) technique for low level simulated EOL.
- (b) Air exercise
- (1) revision of entry to and control in autorotation;
 - (2) variable flare simulated EOL
 - (3) constant attitude simulated EOL;
 - (4) hover simulated EOL;
 - (5) hover taxi simulated EOL;
 - (6) low level simulated EOL.

EXERCISE 17: ADVANCED AUTOROTATIONS

- (a) Long briefing objectives:
- (1) effect of air speed or AUM on angles or rates of descent
 - (2) effect of RRPM setting on angle or rate of descent;
 - (3) reason and technique for range autorotation;
 - (4) reason and technique for constant attitude autorotation;
 - (5) reason and technique for low speed and 'S' turns in autorotation;
 - (6) speed or bank limitations in turns in autorotation;
 - (7) revision of re-engagement or go-around procedures.

- (b) Air exercise:
- (1) selection of ground marker and standard datum height to determine distance covered during various autorotation techniques;
 - (2) revision of basic autorotation;
 - (3) technique for range autorotation;
 - (4) technique for constant attitude autorotation;
 - (5) technique for low speed autorotation, including need for timely speed recovery;
 - (6) technique for 'S' turn in autorotation;
 - (7) 180 and 360 ° turns in autorotation;
 - (8) revision of re-engagement and go-around technique.

EXERCISE 18: PRACTICE FORCED LANDINGS

- (a) Long briefing objectives:
- (1) types of terrain or surface options for choice of best landing area;
 - (2) practice forced landing procedure;
 - (3) forced landing checks and crash actions;
 - (4) rules or height for recovery and go-around.
- (b) Air exercise:
- (1) recognition of types of terrain from normal cruise height or altitude;
 - (2) practice forced landing technique;
 - (3) revision of recovery or go-around technique.

EXERCISE 19: STEEP TURNS

- (a) Long briefing objectives:
- (1) air speed or angle of bank limitations;
 - (2) technique for co-ordination to hold bank or attitude;
 - (3) revision of speed or bank limitations in autorotation including RRPM control;
 - (4) significance of disc loading, vibration and control feedback;
 - (5) effect of wind in turns at low level.
- (b) Air exercise:
- (1) technique for turning at 30 ° of bank;

- (2) technique for turning at 45 ° of bank (where possible);
- (3) steep autorotative turns;
- (4) explanation of faults in the turn: balance, attitude, bank and coordination;
- (5) effect of wind at low level.

EXERCISE 20: TRANSITIONS

- (a) Long briefing objectives:
 - (1) revision of effect of ground cushion, translational lift and flap back;
 - (2) training requirement for precision exercise;
 - (3) technique for transition to forward flight and back to hover as precision exercise;
 - (4) effect of wind.
- (b) Air exercise:
 - (1) transition from hover to minimum 50 knots IAS and back to hover;

Note: select constant height (20 - 30 ft) and maintain.

 - (2) effect of wind.

EXERCISE 21: QUICK STOPS

- (a) Long briefing objectives:
 - (1) power control co-ordination;
 - (2) revision of effect of wind;
 - (3) technique for quick stop into wind;
 - (4) technique for quick stop from crosswind;
 - (5) revision of air speed and angles of bank limitations;
 - (6) technique for emergency turn from downwind;
 - (7) technique for quick stop from downwind from high speed: flare and turn;
 - (8) technique for quick stop from downwind from low speed: turn and flare;

Note: use reasonable datum speed for example high speed, low speed.

 - (9) danger of holding flare when downwind, (vortex ring) - (minimum speed 70 knots);
 - (10) to revise danger of high disc loading.
- (b) Air exercise:

- (1) technique for quick stop into wind;
- (2) technique for quick stop from crosswind;
- (3) danger of vortex ring and disc loading;
- (4) technique for quick stop from downwind with low speed;
- (5) technique for quick stop from downwind with high speed;
- (6) emergency turns from downwind.

EXERCISE 22: NAVIGATION

- (a) Long briefing objectives:

Note: to be broken down into manageable parts at discretion of instructor.

- (1) flight planning:
 - (i) weather forecasts and actuals;
 - (ii) map selection, orientation, preparation and use:
 - (A) choice of route;
 - (B) regulated or controlled airspace;
 - (C) danger, prohibited and restricted areas;
 - (D) safety altitude.
 - (iii) calculations:
 - (A) magnetic heading(s), time(s) en route;
 - (B) fuel consumption;
 - (C) mass and balance.
 - (iv) flight information:
 - (A) NOTAMs etc;
 - (B) noting of required radio frequencies;
 - (C) selection of alternate landing sites.
 - (v) helicopter documentation;
 - (vi) notification of the flight:
 - (A) pre-flight administration procedures;
 - (B) flight plan form (where appropriate).

- (2) departure:

- (i) organisation of cockpit workload;
 - (ii) departure procedures:
 - (A) altimeter settings;
 - (B) ATC liaison in controlled or regulated airspace;
 - (C) setting heading procedure;
 - (D) noting of ETA(s);
 - (E) maintenance of height or altitude and heading.
 - (iii) procedure for revisions of ETA and headings to include:
 - (A) 10° line, double track, track error and closing angle;
 - (B) 1 in 60 rule;
 - (iv) amending an ETA;
 - (v) log keeping;
 - (vi) use of radio;
 - (vii) use of nav aids;
 - (viii) weather monitoring and minimum weather conditions for continuation of flight;
 - (ix) significance of in-flight decision making;
 - (x) technique for transiting controlled or regulated airspace;
 - (xi) uncertainty of position procedure;
 - (xii) lost procedure.
- (3) arrival:
- (i) aerodrome joining procedure, in particular ATC liaison in controlled or regulated airspace:
 - (A) altimeter setting;
 - (B) entering traffic pattern;
 - (C) circuit procedures.
 - (ii) parking procedures, in particular:
 - (A) security of helicopter;
 - (B) refuelling;
 - (C) closing of flight plan, (if appropriate);

- (D) post flight administrative procedures.
- (4) navigation problems at low heights and reduced visibility:
- (i) actions before descending;
 - (ii) significance of hazards, (for example obstacles and other traffic);
 - (iii) difficulties of map reading;
 - (iv) effects of wind and turbulence;
 - (v) significance of avoiding noise sensitive areas;
 - (vi) procedures for joining a circuit from low level;
 - (vii) procedures for a bad weather circuit and landing;
 - (viii) actions in the event of encountering DVE;
 - (ix) appropriate procedures and choice of landing area for precautionary landings;
 - (x) decision to divert or conduct precautionary landing;
 - (xi) precautionary landing.
- (5) radio navigation:
- (i) use of VOR:
 - (A) availability, AIP and frequencies;
 - (B) selection and identification;
 - (C) use of OBS;
 - (D) to or from indications: orientation;
 - (E) use of CDI;
 - (F) determination of radial;
 - (G) intercepting and maintaining a radial;
 - (H) VOR passage;
 - (I) obtaining a fix from two VORs.
 - (ii) use of ADF equipment:
 - (A) availability of NDB stations, AIP and frequencies;
 - (B) selection and identification;
 - (C) orientation relative to beacon;

- (D) homing.
- (iii) use of VHF/DF
 - (A) availability, AIP and frequencies;
 - (B) R/T procedures and ATC liaison;
 - (C) obtaining a QDM and homing.
- (iv) use of en-route or terminal radar:
 - (A) availability and AIP;
 - (B) procedures and ATC liaison;
 - (C) pilots responsibilities;
 - (D) secondary surveillance radar:
 - (a) transponders;
 - (b) code selection;
 - (E) interrogation and reply.
- (v) use of DME:
 - (A) station selection and identification;
 - (B) modes of operation: distance, groundspeed and time to run.
- (vi) use of GNSS:
 - (A) selection of waypoints;
 - (B) to or from indications and orientation;
 - (C) error messages;
 - (D) hazards of over-reliance in the continuation of flight in DVE.
- (b) Air exercise:
 - (1) navigation procedures as necessary;
 - (2) to advise student and correct errors as necessary;
 - (3) map reading techniques;
 - (4) the significance of calculations;
 - (5) revision of headings and ETA's;
 - (6) use of radio;
 - (7) use of nav aids: ADF/NDB, VOR, VHF/DF, DME and transponder;

(8) cross-country flying by using visual reference, DR, GNNS and, where available, radio navigation aids; simulation of deteriorating weather conditions and actions to divert or conduct precautionary landing;

(9) log keeping;

(10) importance of decision making;

(11) procedure to deal with uncertainty of position;

(12) lost procedure;

(13) appropriate procedures and choice of landing area for precautionary landings;

(14) aerodrome joining procedure;

(15) parking and shut-down procedures;

(16) post-flight administration procedures.

EXERCISE 23: ADVANCED TAKE-OFF, LANDINGS AND TRANSITIONS

(a) Long briefing objectives:

(1) revision of landing and take-off out of wind (performance reduction);

(2) revision of wind limitations;

(3) revision of directional stability variation when out of wind;

(4) revision of power required diagram;

(5) technique for downwind transitions;

(6) technique for vertical take-off over obstacles;

(7) reconnaissance technique for landing site;

(8) power checks;

(9) technique for running landing;

(10) technique for zero speed landing;

(11) technique for crosswind and downwind landings;

(12) steep approach, including dangers;

(13) revision of go-around procedures.

(b) Air exercise

(1) technique for downwind transition;

(2) technique for vertical take-off over obstacles;

- (3) reconnaissance technique for landing site;
- (4) power check and assessment;
- (5) technique for running landing;
- (6) technique for zero speed landing;
- (7) technique for crosswind and downwind landings;
- (8) technique for steep approach;
- (9) go-around procedures.

EXERCISE 24: SLOPING GROUND

- (a) Long briefing objectives:
 - (1) limitations;
 - (2) wind and slope relationship, including blade and control stops;
 - (3) effect of CG when on slope;
 - (4) ground effect and power required when on slope;
 - (5) landing technique when on slope, left, right and nose-up;
 - (6) avoidance of dynamic rollover, dangers of soft ground and sideways movement;
 - (7) dangers of over controlling near ground on slope;
 - (8) danger of striking main or tail rotor on up slope.
- (b) Air exercise
 - (1) technique for assessing slope angle;
 - (2) technique for landing and take-off left skid up slope;
 - (3) technique for landing and take-off right skid up slope;
 - (4) technique for landing nose up slope;
 - (5) dangers of over controlling near ground.

EXERCISE 25: LIMITED POWER

- (a) Long briefing objectives:
 - (1) use of appropriate helicopter performance graphs;
 - (2) selection of technique according to available power;
 - (3) effect of wind on available power.

- (b) Air exercise: to revise and refine techniques demonstrated in exercise 23.

EXERCISE 26: CONFINED AREAS

- (a) Long briefing objectives:

- (1) revision of use of helicopter performance graphs;
- (2) procedure for locating landing site and selecting site marker;
- (3) procedures for assessing wind speed and direction;
- (4) landing site reconnaissance techniques;
- (5) reason for selecting landing markers;
- (6) procedure for selecting direction and type of approach;
- (7) dangers of out of wind approach;
- (8) circuit procedures;
- (9) reason for approach to committal point and go-around, (practice approach);
- (10) approach technique;
- (11) revision of clearing turn and landing (sloping ground technique);
- (12) hover power check or performance assessment IGE and OGE (if necessary);
- (13) take-off procedures.

- (b) Air exercise

- (1) procedures for locating landing site and selecting site marker;
- (2) procedures for assessing wind speed and direction;
- (3) landing site reconnaissance techniques;
- (4) selecting landing markers, direction and type of approach;
- (5) circuit procedure;
- (6) practice approach, go-around and approach technique;
- (7) revision of clearing turn and landing (sloping ground technique);
- (8) hover power check or performance assessment IGE and OGE (if necessary);
- (9) take-off procedures.

EXERCISE 27: BASIC INSTRUMENT FLIGHT

- (a) Long briefing objectives:
- (1) physiological sensations;
 - (2) instrument appreciation;
 - (3) attitude instrument flight;
 - (4) instrument scan;
 - (5) instrument limitations;
 - (6) basic manoeuvres by sole reference to instruments:
 - (i) straight and level flight at various air speeds and configurations;
 - (ii) climbing and descending;
 - (iii) standard rate turns, climbing and descending, onto selected headings;
 - (iv) recoveries from climbing and descending turns (unusual attitudes).
- (b) Air exercise:
- (1) attitude instrument flight and instrument scan;
 - (2) basic manoeuvres by sole reference to instruments:
 - (i) straight and level flight at various air speeds and configurations;
 - (ii) climbing and descending;
 - (iii) standard rate turns, climbing and descending, onto selected headings;
 - (iv) recoveries from climbing and descending turns (unusual attitudes).

EXERCISE 28: NIGHT FLYING (if night instructional qualification required)

- (a) Long briefing objectives:
- (1) medical or physiological aspects of night vision;
 - (2) requirement for torch to be carried (pre-flight inspection, etc.);
 - (3) use of the landing light;
 - (4) take-off and hover taxi procedures at night;
 - (5) night take-off procedure;
 - (6) cockpit procedures at night;

- (7) approach techniques;
- (8) night landing techniques;
- (9) night autorotation techniques (power recovery at safe height);
- (10) technique for practice forced landing at night (using appropriate illumination);
- (11) emergency procedures at night;
- (12) navigation principles at night;
- (13) map marking for night use (highlighting built up or lit areas with thicker lines, etc.).

(b) Air exercise:

- (1) use of torch for pre-flight inspection;
- (2) use of landing light;
- (3) night take-off to hover (no sideways or backwards movement);
- (4) night hover taxi (higher and slower than by day);
- (5) night transition procedure;
- (6) night circuit;
- (7) night approach and landing (including use of landing light);
- (8) night autorotation (power recovery at safe height);
- (9) practice forced landing at night (using appropriate illumination);
- (10) night emergency procedures;
- (11) night cross country techniques, as appropriate.

~~END~~

**PART 3 CHAPTER 1 HONG KONG COMMERCIAL PILOT'S LICENCES
(AEROPLANES) CPL(A)**

1.1 GENERAL

1.1.1 The privileges of a Hong Kong CPL(A) are given in Schedule 9 to the AN(HK)O.

1.1.2 An application for the issue of a Hong Kong CPL(A) will not normally be processed until the applicant can show evidence of a genuine requirement to hold a Hong Kong professional pilot's licence and exercise the privileges of the licence on a Hong Kong registered aircraft.

1.1.3 In order for the operator to properly discharge their safety oversight responsibility as required by the CAD, the operator may in the process of licence application collect any information, including test and examination results, expiry dates, etc., as contained in their employees' licence and the related documents.

1.2 FLYING EXPERIENCE REQUIREMENTS

1.2.1 The minimum flying experience requirement for the issue of a Hong Kong CPL(A) is 250 hours of flight time as a pilot of aeroplanes, including at least:

- (a) 100 hours as pilot-in-command (PIC) or PIC under supervision, including at least 70 hours as pilot-in-command (PIC)
- (b) 20 hours of cross-country flight time as PIC including a cross-country flight of at least 540 km (300 nm), in the course of which full stop landings at two aerodromes different from the aerodrome of departure should be made
- (c) 10 hours of instrument flight time as pilot under instruction (P U/T) in aeroplanes, of which not more than 5 hours may be instrument ground time in an approved flight simulator or approved procedures trainer
- (d) 5 hours of night flight time that includes 5 solo take-offs and 5 solo full stop landings, and 3 hours of dual instruction of which 1 hour must be cross-country navigation.

1.2.2 In addition to paragraph 1.2.1, applicants should also meet the flying experience requirements as stipulated in Part 3 Chapter 10 paragraph 10.4.1 if they apply for a Hong Kong CPL(A) with IR(A).

1.2.3 Where an applicant has completed a Hong Kong CAD approved integrated course of flight and ground training for the issue of a Hong Kong CPL(A) with IR(A) under the auspices of a Flight Training Organization so approved in accordance with CAD 509(A) requirements, the minimum flying experience should be in compliance with the requirements described in CAD 509(A).

1.2.4 Applicants should produce evidence, as required, of having received dual instructions from an authorised flight instructor covering the following areas to the level of performance required for a commercial pilot:

- (a) Recognise and manage threats and errors
- (b) Pre-flight operations, including mass and balance determination, aeroplane inspection and servicing

- (c) Aerodrome and traffic pattern operations, collision avoidance precautions and procedures
- (d) Control of the aeroplane by external visual reference
- (e) Flight at critically slow airspeeds; spin avoidance; recognition of, and recovery from, incipient and full stalls
- (f) Flight with asymmetrical power for multi-engine aircraft group or type ratings
- (g) Flight at critically high airspeeds; recognition of, and recovery from, spiral dives
- (h) Normal and cross-wind take-offs and landings
- (i) Maximum performance (short field and obstacle clearance) take-offs; short-field landings
- (j) Basic flight manoeuvres and recovery from unusual attitudes by reference solely to basic flight instruments
- (k) Cross-country flying using visual reference, dead reckoning and radio navigation aids; diversion procedures
- (l) Abnormal and emergency procedures and manoeuvres including simulated aeroplane equipment malfunctions
- (m) Operations to, from and transiting controlled aerodromes, compliance with air traffic services procedures
- (n) Communication procedures and phraseology

1.2.5

The applicant should produce evidence, as required, of having received, in actual flight, an approved upset prevention and recovery training.

1.3 OTHER REQUIREMENTS

1.3.1 To qualify for the issue of a Hong Kong CPL(A), the applicant should also meet the following requirements as stipulated in other CAD 54 provisions.

Requirements for issue of CPL(A)	Relevant CAD 54 Provisions
Age	Part 1 Chapter 1 Section 1.2
Medical Certificate	Part 1 Chapter 2
Language Proficiency Endorsement	Part 1 Chapter 3
Theoretical Knowledge Examinations	Part 3 Chapter 7
General Flight Test	Part 3 Chapter 8
Aircraft Rating	Part 3 Chapter 9
Instrument Rating	Part 3 Chapter 10

1.4 HOLDERS OF A FOREIGN PROFESSIONAL PILOT'S LICENCE (AEROPLANES)

1.4.1 Holders of a foreign CPL(A) or ATPL(A) should refer to Part 3 Chapter 3 for the terms for conversion.

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**PART 3 CHAPTER 2 HONG KONG AIRLINE TRANSPORT PILOT'S
LICENCES (AEROPLANES) ATPL(A)**

2.1 GENRAL

2.1.1 The privileges of a Hong Kong ATPL(A) are given in Schedule 9 to the AN(HK)O.

2.1.2 An application for the issue of a Hong Kong ATPL(A) will not normally be processed until the applicant can show evidence of a genuine requirement to hold a Hong Kong professional pilot's licence and exercise the privileges of the licence on a Hong Kong registered aircraft.

2.1.3 In order for the operator to properly discharge their safety oversight responsibility as required by the CAD, the operator may in the process of licence application collect any information, including test and examination results, expiry dates, etc., as contained in their employees' licence and the related documents.

2.2 FLYING EXPERIENCE REQUIREMENTS

2.2.1 The minimum flying experience requirement for the issue of a Hong Kong ATPL(A) is 1500 hours of flight time as a pilot of aeroplanes, including at least:

- (a) 500 hours in multi-crew operations on civil registered transport aircraft that are certificated for multi-crew operations according to the manufacturer's aircraft flight manual
- (b) (i) 500 hours as pilot-in-command (PIC) under supervision; or
 (ii) 250 hours as PIC; or
 (iii) 250 hours, including at least 70 hours as PIC, and the remaining as PIC under supervision
- (c) 200 hours of cross-country flight time of which at least 100 hours must be as PIC or PIC under supervision
- (d) 100 hours of night flight time as PIC or co-pilot
- (e) 75 hours of instrument flight time of which not more than 30 hours may be instrument ground time in an approved flight simulator or approved procedures trainer.

2.2.2 Of the 1 500 hours of flight time mentioned in paragraph 2.2.1, up to 100 hours of flight time may have been completed as a pilot under instruction in an approved flight simulator or approved procedures trainer, of which not more than 25 hours may be acquired in an approved procedures trainer.

2.2.3 Holders of a helicopter pilot's licence may be credited with flight time up to a maximum of 50% of all the experience requirements stated in paragraph 2.2.1.

2.2.4 When counting the flying experience recorded in personal flying log book(s), flight time logged by a pilot licence holder when acting as a co-pilot at a pilot station of an aircraft certificated for multi-crew operations, i.e. under the capacity of P2 and/or P2X, is counted at full rate for the grant of an ATPL(A).

2.2.5 The applicant should produce evidence, as required, of having received the dual instructions from an authorised flight instructor required for the issue of his CPL(A) specified in Part 3 Chapter 1 Paragraphs 1.2.4 and 1.2.5.

2.3 **OTHER REQUIREMENTS**

2.3.1 To qualify for the issue of a Hong Kong ATPL(A), the applicant should also meet the following requirements as stipulated in other CAD 54 provisions.

Requirements for issue of ATPL(A)	Relevant CAD 54 Provisions
Age	Part 1 Chapter 1 Section 1.2
Medical Certificate	Part 1 Chapter 2
Language Proficiency Endorsement	Part 1 Chapter 3
Theoretical Knowledge Examinations	Part 3 Chapter 7
General Flight Test	Part 3 Chapter 8
Aircraft Rating	Part 3 Chapter 9
Instrument Rating	Part 3 Chapter 10

2.4 **HOLDERS OF A FOREIGN PROFESSIONAL PILOT'S LICENCE (AEROPLANES)**

2.4.1 Holders of a foreign CPL(A) or ATPL(A) should refer to Part 3 Chapter 3 for the terms for conversion.

2.5 **UPGRADING FROM CPL(A) TO ATPL(A)**

2.5.1 Where an applicant already holds a Hong Kong CPL(A), aeroplane types endorsed in the Aircraft Rating and Instrument Rating, together with the valid C of T and C of E, will be included in his Hong Kong ATPL(A) on issue.

**PART 3 CHAPTER 3 TERMS FOR THE CONVERSION OF A FOREIGN
PROFESSIONAL PILOT'S LICENCE
(AEROPLANES) TO A HONG KONG LICENCE**

3.1 GENERAL

3.1.1 An application for licence conversion will not normally be processed until the applicant can show evidence of a genuine requirement to hold a Hong Kong professional pilot's licence and exercise the privileges of the licence on a Hong Kong registered aircraft.

3.1.2 Before a licence is accepted for conversion, the DGCA must be satisfied that the applicant is a fit person to hold an equivalent Hong Kong licence, and is qualified by reason of his knowledge, experience, competence, skill, language ability, and physical and mental fitness to act in the capacity to which the licence relates. For these purposes, the applicant should provide such information and evidence as is required by the DGCA and should also undergo such examinations and tests as the DGCA may require.

3.1.3 The terms under which an applicant may convert his licence to a Hong Kong licence will be assessed individually and he will be notified in writing. Each issue of conversion terms will be valid for the period stated thereon.

3.1.4 Notwithstanding the preceding paragraphs, in cases where the DGCA has reasonable doubt as to the equivalence of the licence presented for conversion, he may require the licence holder to meet certain experience requirements, examinations and tests, in addition to those set out in this chapter, before granting an equivalent Hong Kong licence.

3.2 PREREQUISITES

3.2.1 The conversion terms set out in this chapter are not applicable to existing holders of Hong Kong professional pilot's licences (aeroplanes).

3.2.2 Applicants should:

- (a) hold a professional pilot's licence (aeroplanes) issued by an ICAO Contracting State in accordance with ICAO Annex 1 through examination but not by conversion
- (b) hold an Aircraft Rating and Instrument Rating on a multi-engine civil registered aeroplane type endorsed in a foreign professional pilot's licence
- (c) hold a valid Language Proficiency Endorsement as deemed appropriate by the Hong Kong CAD
- (d) hold a valid Flight Radiotelephony Operator's Licence (or equivalent) unless the privileges of the foreign licence include radiotelephony communication
- (e) hold a valid Class 1 Medical Certificate
- (f) have passed the theoretical knowledge examinations that are appropriate for the respective class of licence being sought, provided that:
 - (i) evidence of examination results showing passes must be provided

- (ii) all examination results offered for conversion must be taken with the licensing authority that issued the licence offered for conversion.

3.2.3 Items (b) to (e) in paragraph 3.2.2 above should be issued by the same licensing authority that issued the pilot's licence.

3.3 **MEDICAL REQUIREMENTS**

3.3.1 For the issue of a Hong Kong professional pilot's licence, the applicant must hold a valid Hong Kong Class 1 Medical Certificate. No exemption for Medical Certificate will be granted.

3.3.2 Full details concerning medical requirements are given in Part 1 Chapter 2.

3.4 **LANGUAGE PROFICIENCY REQUIREMENTS**

3.4.1 For the issue of a Hong Kong professional pilot's licence, the applicant should be assessed for his language proficiency under the English Language Proficiency Assessment Programme (ELPAP) accepted by the CAD, and have at least ICAO Operational Level (Level 4). No exemption for English Language Proficiency Assessment will be granted.

3.4.2 Full details concerning language proficiency requirements are given in Part 1 Chapter 3.

3.5 **FLYING EXPERIENCE REQUIREMENTS**

3.5.1 **Commercial Pilot's Licences (Aeroplanes)**

To qualify for a Hong Kong CPL(A), the applicant should have met the minimum flying experience requirement stated in Part 3 Chapter 1 Section 1.2.

3.5.2 **Airline Transport Pilot's Licences (Aeroplanes)**

To qualify for a Hong Kong ATPL(A), the applicant should have met the minimum flying experience requirement stated in Part 3 Chapter 2 Section 2.2.

3.5.3 **Instrument Ratings (Aeroplanes)**

To qualify for an IR(A) to be included in a Hong Kong professional pilot's licence, the applicant should have met the minimum flying experience requirements as specified in Part 3 Chapter 10 Section 10.4.

3.6 **THEORETICAL KNOWLEDGE EXAMINATION REQUIREMENTS**

3.6.1 Examinations for professional pilot's licences are specified in Part 3 Chapter 7 Section 7.1. Applicants will be informed in writing of the particular examination papers needed to pass in order to qualify for the licence applied for.

3.6.2 Applicants who fail to obtain a full pass within an examination cycle will have his licence conversion terms reassessed and may lose the exemptions previously granted. A time bar before re-sitting any examination may also be imposed.

- 3.6.3 All required examinations must be passed before the last calendar day of the 12th month from the month in which the first examination for licence conversion was taken, failing which, the applicant may lose the exemptions previously granted.
- 3.6.4 Other details concerning the theoretical knowledge examinations requirements are given in Part 3 Chapter 7.

Exemptions from Theoretical Knowledge Examinations

- 3.6.5 Applications for exemptions from theoretical knowledge examinations will not be considered upon an exemption previously granted by another licensing authority.
- 3.6.6 Exemptions from examinations may be granted either on the basis of flight experience or on previous examination results. Military experience may be considered if the applicant can produce evidence (e.g. syllabus of the training) showing that the standard of his military training is consistent with the level of knowledge required for the grant of the licence being applied for.
- 3.6.7 Exemptions from examinations may be granted, subject to the following qualifying conditions:

Qualifying Conditions	Examinations that may be Exempted
Produce evidence of examination results showing passes in equivalent subjects prescribed by the licensing authority	<ul style="list-style-type: none"> • Flight Planning and Flight Monitoring • Navigation • Instruments • Meteorology Theory • Meteorology Practical • Radio Aids • Human Performance • Loading
Have at least 500 hours of experience on aircraft that are certificated in the manufacturer's flight manual for multi-crew operation	<ul style="list-style-type: none"> • Loading
Have military experience of, or hold a licence that is endorsed for, transport aircraft types that are pressurised and have an MTWA of more than 5700 kg, and on which the applicant has 100 hours of experience	<ul style="list-style-type: none"> • Airframe Systems • Electrics and Automatic Flight
Have military experience of, or hold a licence that is endorsed for, a turbine engine aircraft on which he has at least 100 hours of experience	<ul style="list-style-type: none"> • Engines
Hold a foreign professional pilot's licence	<ul style="list-style-type: none"> • Principles of Flight • Radiotelephony
Hold a foreign professional pilot's licence that is valid or expired for less than 5 years with Instrument Rating	<ul style="list-style-type: none"> • Signals

3.7 **THE GENERAL FLIGHT TEST**

3.7.1 Exemptions from GFT will normally be given to applicants who hold a valid professional pilot's licence issued by an ICAO Contracting State.

3.8 **AIRCRAFT RATING REQUIREMENTS**

3.8.1 The Aircraft Ratings endorsed in the foreign licence will not be accepted for conversion to Hong Kong professional licences.

3.8.2 To qualify for the inclusion of an Aircraft Rating in a Hong Kong professional pilot's licence, the applicant should pass the theoretical knowledge examinations as specified in Part 3 Chapter 7 Paragraph 7.1.1 and the Hong Kong Aircraft Rating flight test. No exemption from the Aircraft Rating flight test will be granted. The Aircraft Rating requirements are detailed in Part 3 Chapter 9.

3.8.3 A Hong Kong CPL(A) will not be issued where the applicant is only qualified for a P2X rating. In this case the applicant is additionally required to include an Aircraft Rating, in either Part 1 or Part 2, of an aeroplane type registered in Hong Kong or approved in accordance with the CAD 509.

3.8.4 A Hong Kong ATPL(A) will not be issued unless the applicant is qualified for the inclusion, in Part 1 of the Aircraft Rating of his licence, of a multi-engine aeroplane type which:

- (a) is currently registered in Hong Kong
- (b) is required to be operated by not less than two pilots.

3.9 **INSTRUMENT RATING REQUIREMENTS**

3.9.1 The Instrument Rating endorsed in the foreign licence may be accepted for conversion.

3.9.2 To qualify for converting his foreign IR(A), the applicant should have met the theoretical knowledge examinations requirements as specified in Part 3 Chapter 10 Section 10.3 and pass a Hong Kong Instrument Rating renewal flight test. The renewal flight test may be flown in either a multi-engine aircraft or an appropriate flight simulator which has been specifically approved for the purpose by the CAD. No exemption for the Instrument Rating renewal flight test will be granted.

3.9.3 Full details concerning the Instrument Rating (Aeroplanes) requirements are stated in Part 3 Chapter 10.

3.10 **APPLICATIONS FOR LICENCE CONVERSION**

3.10.1 The application for licence conversion must include the following:

- (a) Forms DCA 605, DCA 607 and DCA530
- (b) Proof of identity and nationality
- (c) Certified true copy of the foreign professional pilot's licence(s) that contains the rating, endorsements or medical certificate required for conversion
- (d) Certified true copy of the associated multi-engine Aircraft Rating
- (e) Certified true copy of the associated Instrument Rating with indication of its validity period, or the applicant may produce evidence of the most recent Instrument Rating flight test or equivalent flight test which must cover testing for both precision and non-precision approach, taken in a multi-engine civil registered aircraft, a military multi-engine transport type aircraft with an equivalent civil version or an approved civilian flight simulator. The check or flight test must be conducted by a civil aviation authorized person of the same licensing authority that issued the licence and with a validity not lapsed for more than 5 years
- (f) Certified true copy of the Flight Radiotelephony Operator's Licence (or equivalent) unless the privileges of the foreign licence include radiotelephony communication
- (g) Certified true copy of the applicant's personal flying log book as required
- (h) Evidence of examinations passed
- (i) Certified true copy of a licence verification letter or official record, which must be issued within 12 months preceding the date of application, from the licensing authority that issued the licence offered for conversion
- (j) Any other proof of experience, qualification, knowledge as deemed appropriate by the Hong Kong CAD
- (k) An administrative fee as specified in Cap.448D
- (l) A recent full face photograph sized 25mm x 30mm

3.10.2 It is the applicant's responsibility to provide the required evidence of experience and qualifications in support of his application. The CAD is not prepared to address other licensing authorities in order to obtain information on an applicant's behalf. Applications that do not conform with the above requirements will not normally be processed.

3.10.3 Before a licence is issued, original documents may be required for verification.

3.11 APPLICATIONS FOR CERTIFICATE OF VALIDATION (C of V)

3.11.1 A C of V is normally issued to applicants who are holders of a valid foreign professional pilot's licence for the following purposes:

- (a) Undergoing training and testing in a Hong Kong registered aircraft for the purpose of completing the requirements for the issue of a Hong Kong professional pilot's licence
- (b) Conducting training and line supervision flights in a Hong Kong registered aircraft of the type that is newly introduced into Hong Kong by the operator
- (c) Conducting overseas delivery flight or short term specialized operations in a Hong Kong registered aircraft

3.11.2 The application for a C of V must include the following:

- (a) Form DCA 634
- (b) Certified true copy of the foreign professional pilot's licence being validated
- (c) Certified true copy of the Flight Radiotelephony Operator's Licence (or equivalent) unless the privileges of the foreign licence include radiotelephony communication
- (d) Certified true copy of the Medical Certificate
- (e) Certified true copy of the Language Proficiency Endorsement as deemed appropriate by the Hong Kong CAD
- (f) Certified true copy of a valid Aircraft Rating and Instrument Rating if the applicant wishes to exercise the privileges of such ratings
- (g) Certified true copy of a licence verification letter or official record, which must be issued within 12 months preceding the date of application, from the licensing authority that issued the licence offered for validation
- (h) An administrative fee as specified in Cap.448D

3.11.3 Items (b) to (f) specified in paragraph 3.11.2 above must be valid to cover the required period of validation (normally 60 days), issued or recognized by the issuing State of the foreign licence being validated.

3.11.4 In addition to the requirements stated in paragraphs 3.11.2 and 3.11.3 above, applicants who plan to operate a Hong Kong registered aircraft as PIC for public transport under the privileges of the Certificate of Validation will, subject to any assessment otherwise, be required to pass the Hong Kong Aviation Law (Papers A and B) examinations at professional pilot's licence level.

3.11.5 When the C of V is issued on the basis of a foreign pilot's licence issued by an ICAO Contracting State, such pilot's licence is considered to be valid during the specified period as if the licence has been granted under the AN(HK)O. The holder is also considered to have satisfied the equivalent Hong Kong medical standards appropriate to the class of the foreign pilot's licence held.

3.11.6 A C of V includes conditions detailing the purpose and privileges of the validation. The C of V must be carried with the applicable foreign licence when exercising its privileges.

3.12 **UPGRADING FROM CPL(A) TO ATPL(A)**

3.12.1 Applicants who hold a foreign ATPL(A) but cannot meet the flying experience requirements for a Hong Kong ATPL(A) will be granted a Hong Kong CPL(A) if the corresponding requirements are met. A Hong Kong CPL(A) so granted may be upgraded to a Hong Kong ATPL(A) once the flying experience requirements are fulfilled.

3.12.2 Whereas a Hong Kong CPL(A) was issued based on a foreign CPL(A) with theoretical knowledge examination passes at ATPL level, his Hong Kong CPL(A) may subsequently be upgraded to a Hong Kong ATPL(A) when the applicant has:

- (a) fulfilled the flying experience requirements set out in Part 3 Chapter 2 Section 2.2
- (b) fulfilled the Aircraft Rating requirements set out in in Part 3 Chapter 9 Paragraph 9.1.6.

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**PART 3 CHAPTER 4 HONG KONG COMMERCIAL PILOT'S LICENCES
(HELICOPTERS) CPL(H)**

4.1 GENERAL

4.1.1 The privileges of the Hong Kong CPL(H) are given in Schedule 9 to the AN(HK)O.

4.1.2 An application for issue of a Hong Kong CPL(H) will not normally be processed until the applicant can show evidence of a genuine requirement to hold a Hong Kong professional pilot's licence and exercise the privileges of the licence on a Hong Kong registered aircraft.

4.1.3 In order for the operator to properly discharge their safety oversight responsibility as required by the CAD, the operator may in the process of licence application collect any information, including test and examination results, expiry dates, etc., as contained therein their employees' licence and the related documents.

4.2 FLYING EXPERIENCE REQUIREMENTS

4.2.1 The minimum flying experience requirement for the issue of a Hong Kong CPL(H) is 185 hours of flight time as a pilot of helicopters. However this may be reduced as follows:

- (a) 165 helicopter hours, of which 10 hours may be instrument ground time, if the applicant is a PPL(A) holder with a minimum of 20 hours as PIC in aeroplanes; or
- (b) 135 helicopter hours, of which 10 hours may be instrument ground time, if the applicant is a CPL(A) holder with a minimum of 50 hours as PIC in aeroplanes

4.2.2 The minimum hour requirements stated in paragraph 4.2.1 above must include the particular requirements specified below, each of which must be met in full:

- (a) 50 hours as PIC in helicopters
- (b) 10 hours of cross-country flight time as PIC in helicopters, including a cross-country flight totalling at least 100 nm in the course of which full-stop landings at two aerodromes different from the aerodrome of departure should be made
- (c) 10 hours of instrument dual instruction time in helicopters, of which not more than 5 hours is to be instrument ground time
- (d) 5 hours flight time in helicopters at night comprising at least 3 hours of dual instruction, including at least 1 hour of cross-country navigation, and 5 solo take-offs and 5 full-stop landings, each to include one circuit
- (e) The remainder may comprise helicopter flight time as either PIC, PU/T, P2 or PIC U/S counted in full

4.2.3 The instrument ground time stated in paragraphs 4.2.1 and 4.2.2 above must be obtained in a Hong Kong CAD approved level C or level D full flight helicopter simulator.

4.2.4 Where the applicant has completed a Hong Kong CAD approved integrated course of flight and ground training for the issue of a Hong Kong CPL(H) under the auspices of a Flight Training Organization so approved in accordance with CAD 509(H) requirements, the minimum flying experience should be in compliance with the requirements as described in CAD 509(H).

4.2.5 The applicant should produce evidence, as required, of having received dual instructions from an authorised flight instructor covering the following areas to the level of performance required for a commercial pilot:

- (a) Recognise and manage threats and errors
- (b) Pre-flight operations, including mass and balance determination, helicopter inspection and servicing
- (c) Aerodrome and traffic pattern operations, collision avoidance precautions and procedures
- (d) Control of the helicopter by external visual reference
- (e) Recovery at the incipient stage from settling with power: recovery techniques from low-rotor rpm within the normal range of engine rpm
- (f) Ground manoeuvring and run-ups; hovering; take-offs and landings – normal, out of wind and sloping ground; steep approaches
- (g) Take-offs and landings with minimum necessary power; maximum performance take-off and landing techniques; restricted site operations; quick stops
- (h) Hovering out of ground effect; operations with external load, if applicable, flight at high altitude
- (i) Basic flight manoeuvres and recovery from unusual attitudes by reference solely to basic flight instruments
- (j) Cross-country flying using visual reference, dead reckoning and where available, navigation aids; diversion procedures
- (k) Abnormal and emergency procedures, including simulated helicopter equipment malfunctions; autorotative approach and landing
- (l) Operations to, from and transiting controlled aerodromes, compliance with air traffic services procedures
- (m) Communication procedures and phraseology

4.3 **THEORETICAL KNOWLEDGE EXAMINATION REQUIREMENTS**

4.3.1 The theoretical knowledge examination requirements for the issue of CPL(H) are detailed in Part 3 Chapter 7.

4.3.2 Examination subject, Signals, as stipulated in Part 3 Chapter 7 Paragraph 7.1.1, may be exempted for the issue of a Hong Kong CPL(H) without an Instrument Rating subject to operational considerations by the CAD.

4.4 **OTHER REQUIREMENTS**

4.4.1 To qualify for the issue of a Hong Kong CPL(H), the applicant should also meet the following requirements as stipulated in other CAD 54 provisions.

Requirements for issue of CPL(H)	Relevant CAD 54 Provisions
Age	Part 1 Chapter 1 Section 1.2
Medical Certificate	Part 1 Chapter 2
Language Proficiency Endorsement	Part 1 Chapter 3
General Flight Test	Part 3 Chapter 8
Aircraft Rating	Part 3 Chapter 9
Instrument Rating	Part 3 Chapter 10

4.5 **HOLDERS OF A FOREIGN PROFESSIONAL PILOT'S LICENCE (HELICOPTERS)**

4.5.1 Holders of a foreign CPL(H) or ATPL(H) should refer to Part 3 Chapter 6 for the terms for conversion.

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**PART 3 CHAPTER 5 HONG KONG AIRLINE TRANSPORT PILOT'S
LICENCES (HELICOPTERS) ATPL(H)**

5.1 GENERAL

5.1.1 The privileges of a Hong Kong ATPL(H) are given in Schedule 9 to the AN(HK)O.

5.1.2 An application for issue of a Hong Kong ATPL(H) will not normally be processed until the applicant can show evidence of a genuine requirement to hold a Hong Kong professional pilot's licence and exercise the privileges of the licence on a Hong Kong registered aircraft.

5.1.3 In order for the operator to properly discharge their safety oversight responsibility under AN(HK)O, the operator may in the process of licence application collect any information, including test and examination results, expiry dates, etc., as contained in their employees' licence and the related documents.

5.2 FLYING EXPERIENCE REQUIREMENTS

5.2.1 The minimum flying experience requirement for the issue of a Hong Kong ATPL(H) is 1200 accountable hours of flight time, of which 1000 hours must be in helicopters. The helicopter flying must include the particular requirements specified below, each of which must be met in full:

- (a) 250 hours as PIC of which a maximum of 150 hours may be as PIC U/S
- (b) 200 hours of cross-country flying as PIC of which a maximum of 100 hours may be as PIC U/S. A flight completed in one day during which landings were made at two intermediate points, both of which were more than 50 nm from the point of departure or landing must be included
- (c) 50 hours of night flying as PIC, PIC U/S or PU/T to include a cross-country flight of 50 nm
- (d) 30 hours of instrument flying

5.2.2 The remainder may comprise flight time in helicopters or aeroplanes. Flight time as either PIC, PIC U/S, P2 or PU/T is counted in full, except the flight time as P2 in aeroplanes which is counted at half rate.

5.2.3 The applicant should produce evidence, as required, of having received the flight instructions from an authorised flight instructor required for the issue of his CPL(H) as specified in Part 3 Chapter 4 Paragraph 4.2.5.

5.3 OTHER REQUIREMENTS

5.3.1 To qualify for the issue of a Hong Kong ATPL(H), the applicant should also meet the following requirements as stipulated in other CAD 54 provisions.

Requirements for issue of ATPL(H)	Relevant CAD 54 Provisions
Age	Part 1 Chapter 1 Section 1.2
Medical Certificate	Part 1 Chapter 2
Language Proficiency Endorsement	Part 1 Chapter 3
Theoretical Knowledge Examinations	Part 3 Chapter 7
General Flight Test	Part 3 Chapter 8
Aircraft Rating	Part 3 Chapter 9
Instrument Rating	Part 3 Chapter 11

5.4 HOLDERS OF A FOREIGN PROFESSIONAL PILOT'S LICENCE (HELICOPTERS)

5.4.1 Holders of a foreign CPL(H) or ATPL(H) should refer to Part 3 Chapter 6 for the terms for conversion.

5.5 UPGRADING FROM CPL(H) TO ATPL(H)

5.5.1 Where an applicant already holds a Hong Kong CPL(H), aeroplane types endorsed in the Aircraft Rating and Instrument Rating, together with the valid C of T and C of E, will be included in his Hong Kong ATPL(H) on issue.

**PART 3 CHAPTER 6 TERMS FOR THE CONVERSION OF A FOREIGN
PROFESSIONAL PILOT'S LICENCE
(HELICOPTERS) TO A HONG KONG LICENCE**

6.1 GENERAL

6.1.1 An application for licence conversion will not normally be processed until the applicant can show evidence of a genuine requirement to hold a Hong Kong professional pilot's licence and exercise the privileges of the licence on a Hong Kong registered aircraft.

6.1.2 Before a licence is accepted for conversion, the DGCA must be satisfied that the applicant is a fit person to hold an equivalent Hong Kong licence, and is qualified by reason of his knowledge, experience, competence, skill, language ability, and physical and mental fitness to act in the capacity to which the licence relates. For these purposes, the applicant should provide such information and evidence as is required by the DGCA and should also undergo such examinations and tests as the DGCA may require.

6.1.3 The terms under which an applicant may convert his licence to a Hong Kong licence will be assessed individually and he will be notified in writing. Each issue of conversion terms will be valid for the period stated thereon.

6.1.4 Notwithstanding the preceding paragraphs, in cases where the DGCA has reasonable doubt as to the equivalence of the licence presented for conversion, he may require the licence holder to meet certain experience requirements, examinations and tests, in addition to those set out in this chapter, before granting an equivalent Hong Kong licence.

6.2 PREREQUISITES

6.2.1 The conversion terms set out in this chapter are not applicable to existing holders of Hong Kong professional pilot's licences (helicopters).

6.2.2 Applicants should:

- (a) hold a professional pilot's licence (helicopters) issued by an ICAO Contracting State in accordance with ICAO Annex 1 through examination but not by conversion
- (b) hold an Aircraft Rating and Instrument Rating on a multi-engine civil registered helicopter type endorsed in a foreign professional pilot's licence if an Instrument Rating is required on the Hong Kong licence (helicopters)
- (c) hold a valid Language Proficiency Endorsement as deemed appropriate by the Hong Kong CAD
- (d) hold a valid Flight Radiotelephony Operator's Licence (or equivalent) unless the privileges of the foreign licence include radiotelephony communication
- (e) hold a valid Class 1 Medical Certificate
- (f) have passed the theoretical knowledge examinations that are appropriate for the respective class of licence being sought, provided that:
 - (i) evidence of examination results showing passes must be provided

- (ii) all examination results offered for conversion must be taken with the licensing authority that issued the licence offered for conversion.

6.2.3 Items (b) to (e) in paragraph 6.2.2 above should be issued by the same licensing authority that issued the pilot's licence.

6.3 **MEDICAL REQUIREMENTS**

6.3.1 For the issue of a Hong Kong professional pilot's licence, the applicant must hold a valid Hong Kong Class 1 Medical Certificate. No exemption for Medical Certificate will be granted.

6.3.2 Full details concerning medical requirements are given in Part 1 Chapter 2.

6.4 **LANGUAGE PROFICIENCY REQUIREMENTS**

6.4.1 For the issue of a Hong Kong professional pilot's licence, the applicant should be assessed for his language proficiency under the English Language Proficiency Assessment Programme (ELPAP) accepted by the CAD, and have at least ICAO Operational Level (Level 4). No exemption for English Language Proficiency Assessment will be granted.

6.4.2 Full details concerning language proficiency requirements are given in Part 1 Chapter 3.

6.5 **FLYING EXPERIENCE REQUIREMENTS**

6.5.1 **Commercial Pilot's Licences (Helicopters)**

To qualify for a Hong Kong CPL(H), the applicant should have met the minimum flying experience requirement stated in Part 3 Chapter 4 Section 4.2.

6.5.2 **Airline Transport Pilot's Licences (Helicopters)**

To qualify for a Hong Kong ATPL(H), the applicant should have met the minimum flying experience requirement stated in Part 3 Chapter 5 Section 5.2.

6.5.3 **Instrument Ratings (Helicopters)**

To qualify for an IR(H) to be included in a Hong Kong professional pilot's licence, the applicant should have met the minimum flying experience requirements as specified in Part 3 Chapter 11 Section 11.4.

6.6 **THEORETICAL KNOWLEDGE EXAMINATION REQUIREMENTS**

6.6.1 Examinations for professional pilot's licences are specified in Part 3 Chapter 7 Section 7.1. Applicants will be informed in writing of the particular examination papers needed to pass in order to qualify for the licence applied for.

6.6.2 Applicants who fail to obtain a full pass within an examination cycle will have his licence conversion terms reassessed and may lose the exemptions previously granted. A time bar before re-sitting any examination may also be imposed.

- 6.6.3 All required examinations must be passed before the last calendar day of the 12th month from the month in which the first examination for licence conversion was taken, failing which, the applicant may lose the exemptions previously granted.
- 6.6.4 Other details concerning the theoretical knowledge examinations requirements are given in Part 3 Chapter 7.

Exemptions from Theoretical Knowledge Examinations

- 6.6.5 Applications for exemptions from theoretical knowledge examinations will not be considered upon an exemption previously granted by another licensing authority.
- 6.6.6 Exemptions from examinations may be granted either on the basis of flight experience or on previous examination results. Military experience may be considered if the applicant can produce evidence (e.g. syllabus of the training) showing that the standard of his military training is consistent with the level of knowledge required for the grant of the licence being applied for.
- 6.6.7 Exemptions from examinations may be granted, subject to the following qualifying conditions:

Qualifying Conditions	Examinations that may be Exempted
Produce evidence of examination passes in equivalent subjects prescribed by the licensing authority	<ul style="list-style-type: none"> • Flight Planning and Flight Monitoring • Navigation • Instruments • Meteorology Theory • Meteorology Practical • Radio Aids • Human Performance • Loading
Have at least 500 hours on multi-engine turbine civilian helicopters	<ul style="list-style-type: none"> • Loading
Hold a licence endorsed for and have at least 100 hours of experience on multi-engine turbine civilian helicopters, or equivalent military experience	<ul style="list-style-type: none"> • Airframe Systems • Electrics and Automatic Flight
Hold a licence endorsed for and have at least 100 hours of experience on a turbine engine aircraft, or equivalent military experience	<ul style="list-style-type: none"> • Engines
Hold a foreign professional pilot's licence	<ul style="list-style-type: none"> • Principles of Flight • Radiotelephony
Hold a foreign professional pilot's licence that is valid or expired for less than 5 years with Instrument Rating	<ul style="list-style-type: none"> • Signals

6.7 **THE GENERAL FLIGHT TEST**

6.7.1 Exemptions from GFT will normally be given to applicants who hold a valid professional pilot's licence issued by an ICAO Contracting State.

6.8 **AIRCRAFT RATING REQUIREMENTS**

6.8.1 The Aircraft Ratings endorsed in foreign licences will not be accepted for conversion to Hong Kong professional pilot's licences.

6.8.2 To qualify for the inclusion of an Aircraft Rating in a Hong Kong professional pilot's licence, the applicant should pass the theoretical knowledge examinations as specified in Part 3 Chapter 7 Paragraph 7.1.1 and the Hong Kong Aircraft Rating flight test. No exemption from the Aircraft Rating flight test will be granted. The Aircraft Rating requirements are detailed in Part 3 Chapter 9.

6.8.3 A Hong Kong ATPL(H) will not be issued unless the applicant is qualified for inclusion, in Part 1 of the Aircraft Rating of his licence, of a multi-engine helicopter type which:

- (a) is currently registered in Hong Kong
- (b) is required to be operated by not less than two pilots.

6.9 **INSTRUMENT RATING REQUIREMENTS**

6.9.1 The Instrument Rating endorsed in the foreign licence may be accepted for conversion.

6.9.2 To qualify for converting his foreign IR(H), the applicant should have met the theoretical knowledge examinations requirements as specified in Part 3 Chapter 11 Section 11.3 and pass a Hong Kong Instrument Rating flight test. The flight test required will normally be at renewal level, but may be at initial level as decided by the CAD. The flight test may be flown in either a multi-engine helicopter or an appropriate flight simulator which has been specifically approved for the purpose by the CAD. No exemption for the Instrument Rating flight test will be granted.

6.9.3 Full details concerning the Instrument Rating (Helicopters) requirements are stated in Part 3 Chapter 11.

6.10 APPLICATIONS FOR LICENCE CONVERSION

6.10.1 The application for licence conversion must include the following:

- (a) Forms DCA 605, DCA 607 and DCA530
- (b) Proof of identity and nationality
- (c) Certified true copy of the foreign professional pilot's licence(s) that contains the rating, endorsements or medical certificate required for conversion
- (d) Certified true copy of the associated multi-engine Aircraft Rating
- (e) Certified true copy of the associated Instrument Rating with indication of its validity period, or the applicant may produce evidence of the most recent Instrument Rating flight test or equivalent flight test, taken in a multi-engine civil registered helicopter or an approved civilian flight simulator. The check or flight test must be conducted by a civil aviation authorized person of the same licensing authority that issued the licence and with a validity not lapsed for more than 5 years
- (f) Certified true copy of the Flight Radiotelephony Operator's Licence (or equivalent) unless the privileges of the foreign licence include radiotelephony communication
- (g) Certified true copy of the applicant's personal flying log book as required
- (h) Evidence of examinations passed
- (i) Certified true copy of a licence verification letter or official record, which must be issued within 12 months preceding the date of application, from the licensing authority that issued the licence offered for conversion
- (j) Any other proof of experience, qualification, knowledge as deemed appropriate by the Hong Kong CAD.
- (k) An administrative fee as specified in Cap.448D
- (l) A recent full face photograph sized 25mm x 30mm

6.10.2 It is the applicant's responsibility to provide the required evidence of experience and qualifications in support of his application. The CAD is not prepared to address other licensing authorities in order to obtain information on an applicant's behalf. Applications that do not conform with the above requirements will not normally be processed.

6.10.3 Before a licence is issued, original documents may be required for verification.

6.11 APPLICATIONS FOR CERTIFICATE OF VALIDATION (C of V)

6.11.1 A C of V is normally issued to applicants who are holders of a valid foreign professional pilot's licence for either of the following purposes:

- (a) Undergoing training and testing in a Hong Kong registered aircraft for the purpose of completing the requirements for the issue of a Hong Kong professional pilot's licence
- (b) Conducting training and line supervision flights in a Hong Kong registered aircraft of the type that is newly introduced into Hong Kong by the operator
- (c) Conducting overseas delivery flight or short term specialized operations in a Hong Kong registered aircraft

6.11.2 The application for a C of V must include the following:

- (a) Form DCA 634
- (b) Certified true copy of the foreign professional pilot's licence being validated
- (c) Certified true copy of the Flight Radiotelephony Operator's Licence (or equivalent) unless the privileges of the foreign licence include radiotelephony communication
- (d) Certified true copy of the Medical Certificate
- (e) Certified true copy of the Language Proficiency Endorsement as deemed appropriate by the Hong Kong CAD
- (f) Certified true copy of a valid Aircraft Rating and Instrument Rating if the applicant wishes to exercise the privileges of such ratings
- (g) Certified true copy of a licence verification letter or official record, which must be issued within 12 months preceding the date of application, from the licensing authority that issued the licence offered for validation
- (h) An administrative fee as specified in Cap.448D

6.11.3 Items (b) to (f) specified in paragraph 6.11.2 above must be valid to cover the required period of validation (normally 60 days), issued or recognized by the issuing State of the foreign licence being validated.

6.11.4 In addition to the requirements stated in paragraphs 6.11.2 and 6.11.3 above, applicants who plan to operate a Hong Kong registered aircraft as PIC for public transport under the privileges of the Certificate of Validation will, subject to any assessment otherwise, be required to pass the Hong Kong Aviation Law (Papers A and B) examinations at professional pilot's licence level.

6.11.5 When the C of V is issued on the basis of a foreign pilot's licence issued by an ICAO Contracting State, such pilot's licence is considered to be valid during the specified period as if the licence has been granted under the AN(HK)O. The holder is also considered to have satisfied the equivalent Hong Kong medical standards appropriate to the class of the foreign pilot's licence held.

6.11.6 A C of V includes conditions detailing the purpose and privileges of the validation. The C of V must be carried with the applicable foreign licence when exercising its privileges.

6.12 **UPGRADING FROM CPL(H) TO ATPL(H)**

6.12.1 Applicants who hold a foreign ATPL(H) but cannot meet the flying experience requirements for a Hong Kong ATPL(H) will be granted a Hong Kong CPL(H) if the corresponding requirements are met. A Hong Kong CPL(H) so granted may be upgraded to a Hong Kong ATPL(H) once the flying experience requirements are fulfilled.

6.12.2 Whereas a Hong Kong CPL(H) was issued based on a foreign CPL(H) with theoretical knowledge examination passes at ATPL level, his Hong Kong CPL(H) may subsequently be upgraded to a Hong Kong ATPL(H) when the applicant has:

- (a) fulfilled the flying experience requirements set out in Part 3 Chapter 5 Section 5.2
- (b) fulfilled the Aircraft Rating requirements set out in in Part 3 Chapter 9 Paragraph 9.1.6.

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**PART 3 CHAPTER 7 THEORETICAL KNOWLEDGE EXAMINATIONS
FOR PROFESSIONAL PILOT'S LICENCES**

7.1 EXAMINATION PAPER CLASSIFICATION

7.1.1 The examinations for professional pilot's licences are classified under two Examination Groups:

(a) Group 1 (Navigation), which comprises examinations in the following subjects:

- (i) Aviation Law (Paper A) (Aeroplanes or Helicopters)
- (ii) Aviation Law: Flight Rules and Procedures (Paper B)
- (iii) Flight Planning and Flight Monitoring*
- (iv) Navigation*
- (v) Instruments*
- (vi) Meteorology Theory*
- (vii) Meteorology Practical*
- (viii) Radio Aids*
- (ix) Radiotelephony
- (x) Human Performance (Aeroplanes or Helicopters)
- (xi) Signals

(b) Group 2 (Technical), which comprises examinations in the following subjects:

- (i) Principles of Flight (Aeroplanes or Helicopters)*
- (ii) Airframe Systems (Aeroplanes or Helicopters)*
- (iii) Engines*
- (iv) Electrics and Automatic Flight*
- (v) Loading
- (vi) Aircraft Performance and Technical appropriate to the Aircraft Rating to be included in the licence

7.1.2 Where an applicant has completed a Hong Kong CAD approved integrated course of flight and ground training for the issue of a CPL or MPL with Instrument Rating (IR) under the auspices of a Flight Training Organization so approved in accordance with CAD 509 requirements, passes in all the theoretical knowledge examinations as listed under the Alternative Means of Compliance to the Theoretical Knowledge Requirements in CAD 509 may be accepted in lieu of examinations listed in paragraph 7.1.1 (a)(iii) to (a)(xi) and (b)(i) to (b)(v).

7.2 EXAMINATION CONDITIONS

7.2.1 Examinations are based on the system of three attempts per cycle.

7.2.2 Groups 1 (Navigation) and 2 (Technical) may be taken separately.

7.2.3 Where examinations are annotated *, the candidate must apply to take all the examinations in either Group at one sitting.

7.3 EXAMINATION PASS RULES

7.3.1 Candidates are required to pass all the relevant papers in each Group, unless exemptions are granted.

7.3.2 The examination pass mark is 75%, except that for the subject of Signals which is 90%. Allocated marks are rounded to the nearest whole number to determine the examination result.

7.3.3 The examination papers will be scored by the marks awarded for correct answers. No adjustment will be made for incorrect answers or unanswered questions.

7.4 EXAMINATION PARTIAL PASS RULE

7.4.1 Subjects marked * in paragraph 7.1.1 are subject to a partial pass rule. Candidates who pass 50% of those papers in a Group will be granted a partial pass.

7.4.2 A candidate with a partial pass will be allowed two further attempts to pass the outstanding papers with the following conditions:

- (a) All outstanding papers in any Group must be taken at each attempt.
- (b) A time bar of one month will be imposed between each sitting.

7.5 EXAMINATION FAILURE

7.5.1 The following candidates will be deemed to have failed an examination cycle:

- (a) Candidates who do not achieve a partial pass when sitting for all the required examinations
- (b) Candidates who obtained a partial pass in a Group but failed to obtain a full pass in a Group within 3 attempts

7.5.2 Candidates who failed an examination cycle will be required to re-take all papers in that Group.

7.5.3 Following the failure of the second examination cycle onwards, there will be a minimum period of time during which the candidates is barred from re-sitting for examinations in that Group. The barred period commences immediately after the examination cycle is failed. The ends of the barred periods are as follows:

Failure of Examination Cycle	End of Barred Period
2 nd	Last calendar day of the 3 rd month
3 rd	Last calendar day of the 3 rd month
4 th and after	Last calendar day of the 6 th month

7.6

VALIDITY PERIODS OF EXAMINATION RESULTS

7.6.1

Under normal circumstances, the validity period of an HKCAD examination pass commences immediately after the pass is obtained until the end of the validity period as stated below:

Purpose	Exam	End of Validity Period
Initial issue of a professional pilot's licence	Aircraft (Type), Aircraft Technical (Type), Performance (Type/Group)	Last day of the 6 th month from the month when the pass is obtained
	All others	Last day of the 12 th month from the month when the pass is obtained
Licence upgrade / Fulfilling the ATPL knowledge pre-requisite for multi-crew operations	Aircraft (Type), Aircraft Technical (Type), Performance (Type/Group) (ATPL level)	Last day of the 6 th month from the month when the pass is obtained
	All others (ATPL level)	Last day of the 12 th month from the month when the pass is obtained
Licence conversion	Aircraft (Type), Aircraft Technical (Type), Performance (Type/Group)	Last day of the 6 th month from the month when the first examination attempt is made
	All others	Last day of the 12 th month from the month when the first examination attempt is made

7.6.2

The results of HKCAD ATPL(A) examination papers are accepted for licence upgrade for a period of 7 years from the end of the year of the last validity date of either the Aircraft Rating of a multi-engine aeroplane or the IR(A) corresponding to that particular aircraft type, whichever is earlier.

7.6.3

Where the HKCAD ATPL examination results are used for the initial issue of a CPL, these are acceptable for the subsequent upgrade to an ATPL provided that all the examination passes required for a CPL are obtained within the 12 months prior to the issue of CPL.

7.6.4

For applicants who have completed a Hong Kong CAD approved integrated course as in paragraph 7.1.2 above with passes in all the theoretical knowledge examinations and accepted by the CAD as an Alternative Means of Compliance to the Theoretical Knowledge Requirements in CAD 509. The validity period for those examination subjects accepted by the CAD as an Alternative Means of Compliance (including Aviation Law (Paper A) (Aeroplanes or Helicopters) and Aviation Law: Flight Rules and Procedures (Paper B)) is 36 months from the day when the pass is obtained.

7.7

SYLLABUS

7.7.1

The syllabus for radiotelephony examination can be found in Part 1 Chapter 4 Paragraph 4.3. The syllabi for other examination subjects listed under paragraph 7.1.1 are given in Part 3 Appendix A for CPL(A), CPL(H) and ATPL(H) and Appendix B for ATPL(A). A list of reference material is given in Appendix C.

7.7.2 The syllabi and the level of knowledge needed for the examinations under paragraph 7.1.2 are the same as the European Aviation Safety Agency (EASA) requirements for the issue of Airline Transport Pilot Licence (Aeroplane) (ATPL(A)).

7.8 **AIRCRAFT TECHNICAL AND FLIGHT PERFORMANCE EXAMINATION (AEROPLANES)**

7.8.1 Applicants for the grant of an aircraft rating whose MTWA exceeds 5700 kg must pass the Aircraft Technical and Performance examinations as follows:

- (a) Paper A – Aircraft Technical (Type) examination
- (b) Paper B – Flight Performance examination comprising two parts:
 - (i) Performance (Transport) – Applicants for the initial grant of an aircraft rating whose MTWA exceeds 5700 kg will be required to pass this examination. The examination contains 20 multiple-choice questions. The duration is 1 hour.
 - (ii) Performance (Type) – Applicants are required to pass this examination at each application for an aircraft rating. The examination contains 10 multiple-choice questions. The duration is 1 hour.

7.8.2 Examination formalities:

- (a) Candidates are required to pass both Paper A and Paper B in order to pass the whole examination. A maximum of 2 re-sits for Paper A and Paper B Performance (Type) will be allowed within 6 months of the first attempt, failing which the candidate will have to re-sit both papers.
- (b) Paper B Performance (Transport) may be taken at any time during the course of licence application and the re-sit restriction stated at paragraph 7.8.2(a) above does not apply. However, repeated failures of the Performance (Transport) examination will require re-assessment of the aircraft rating endorsement.
- (c) Paper B Performance (Type) is normally taken immediately after Paper A unless by prior arrangement agreed with the Personnel Licensing Office.

7.9 **EXAMINATION ARRANGEMENTS**

7.9.1 Dates for examinations are published as an Aeronautical Information Circular (AIC).

7.9.2 Applications must be submitted no later than 7 working days prior to the required examination date.

7.9.3 Examination results are normally published within 5 working days of the examination date.

7.9.4 Results are either dispatched by post or are available for personal collection from the PELO. Results will not be passed to telephone enquirers.

7.9.5 The fees for taking each examination in connection with a licence to act as a flight crew member will be charged in accordance with Cap.448D Hong Kong Air Navigation (Fees) Regulations.

**PART 3 CHAPTER 8 GENERAL FLIGHT TESTS (PROFESSIONAL
PILOT'S LICENCES)
(AEROPLANES AND HELICOPTERS)**

8.1 GENERAL FLIGHT TEST (GFT)

8.1.1 An applicant for a professional pilot's licence is required to pass a General Flight Test (GFT) conducted by a CAD authorised flight examiner, which comprises the assessment of the following:

- Section 1: Preparation for flight
- Section 2: Cross-country flight
- Section 3: Basic aircraft handling
- Section 4: Instrument flying
- Section 5: Night flying (if such privilege is to be included in the professional pilot's licence)

8.1.2 The test may be conducted in a single-engine or multi-engine aircraft.

8.1.3 The detailed content of the GFT is specified in Form DCA 527 and the syllabus in Part 3 Appendix D.

8.1.4 The applicant will be briefed by the flight examiner before the test. The applicant will be responsible for ensuring that he has all the equipment and documentation for the planning and execution of the test.

Completion of Form DCA 527

8.1.5 On satisfactory completion of the flight test the flight examiner will certify to that effect against each of the test items specified in Form DCA 527.

8.1.6 The flight examiner and the applicant should refer to the Important Notes in Form DCA 527 prior to the completion of the form.

8.1.7 All the test items in Form DCA 527 must be satisfactorily completed within the six months immediately preceding the date of application. All tests including any retest must be completed within a period of 28 days.

Helicopter GFT

8.1.8 Where the test is conducted on a single-engine helicopter and the applicant wishes that type to be included in the Aircraft Rating of the licence, Section 3 of the GFT may be regarded as the Aircraft Rating flight test.

8.2 EXEMPTIONS

8.2.1 Exemptions from all or part of the GFT that may be granted to applicants are as follows:

- (a) Holders of a Hong Kong PPL(A) with a valid FI rating seeking a CPL(A) or an ATPL(A) will normally be exempt from Section 3.
- (b) Holders of a Hong Kong PPL(H) with a valid FI rating seeking a CPL(H) or an ATPL(H) will normally be exempt from Section 3.
- (c) Holders of a Hong Kong CPL(H) or ATPL(H) seeking a CPL(A) or an ATPL(A) will normally be exempt from Section 2.
- (d) Holders of a Hong Kong CPL(A) or ATPL(A) seeking a CPL(H) or an ATPL(H) will normally be exempt from Section 2.
- (e) Holders of a Hong Kong CPL seeking an upgrade to a Hong Kong ATPL will normally be exempt from all sections of the GFT.
- (f) Holders of a foreign professional pilot's licence seeking a Hong Kong licence will normally be exempt from all sections of the GFT.

PART 3 CHAPTER 9 AIRCRAFT RATINGS FOR PROFESSIONAL PILOT'S LICENCES

9.1 INTRODUCTION

- 9.1.1 The privileges of a professional pilot's licence may only be exercised in aircraft types specified in the Aircraft Rating of the licence, in conjunction with an appropriate and valid Certificate of Test (C of T) or Certificate of Experience (C of E).
- 9.1.2 Entries in Part 1 entitle the holder to fly as PIC, whereas entries in Part 2 entitle the holder to fly as co-pilot.
- 9.1.3 Entries in Part 2 will only be made in respect of an aircraft certificated for multi-crew operations, or, which the DGCA requires to be flown by not less than two pilots.
- 9.1.4 Aircraft ratings will only be issued in respect of aircraft types which are currently registered in Hong Kong or approved in accordance with the CAD 509.
- 9.1.5 A CPL(A) or CPL(H) will not be issued unless the applicant has qualified for inclusion in the Aircraft Rating of the licence, either in Part 1 or Part 2 (excluding P2X), of at least one aircraft type.
- 9.1.6 A Hong Kong ATPL(A) or ATPL(H) will not be issued unless the applicant is qualified for inclusion in the Aircraft Rating of his licence in Part 1 of a multi-engine aircraft type which is:
- (a) currently registered in Hong Kong
 - (b) required to be operated by not less than two pilots.

9.2 INCLUSION OF AIRCRAFT TYPES IN THE AIRCRAFT RATING

- 9.2.1 To qualify for the inclusion of an aircraft type in the Aircraft Rating on the issue of a Hong Kong professional pilot's licence, the applicant will normally be required to:
- (a) pass the Aircraft Technical and the appropriate Performance examinations (see Part 3 Chapter 7 Paragraph 7.1.1)
 - (b) pass the Aircraft Rating flight test that is taken on the same variant of aircraft on which the relevant Aircraft Technical and Performance examinations are taken, notwithstanding that the Aircraft Rating, once issued, may entitle the holder to exercise privileges on other variants.
- 9.2.2 The theoretical knowledge examinations and flight test may be taken in any order, but must both be satisfactorily completed within the six months immediately preceding the date of application.
- 9.2.3 Where the applicant wishes to include a single-engine helicopter in the Aircraft Rating of the licence, Section 3 of the General Flight Test stipulated in Part 3 Chapter 8 may be regarded as the Aircraft Rating flight test.
- 9.2.4 On satisfactory completion of the theoretical knowledge examinations and flight test, the applicant should submit the completed Form DCA 528, together with his licence, to the PELO.

Aircraft Rating for Multi-Crew Operations

- 9.2.5 For the inclusion of an Aircraft Rating for an aircraft which is certificated for operation with at least two pilots, the applicant must have demonstrated knowledge at ATPL level. A Hong Kong CPL that meets this requirement is where the holder has met at least one of the following:
- (a) Passed all the relevant Hong Kong theoretical knowledge examinations at ATPL level (see Part 3 Chapter 7 Section 7.1)
 - (b) Hold a Hong Kong CPL that was issued by the conversion of a foreign ATPL(A)
 - (c) Hold a Hong Kong CPL that was issued by the conversion of a foreign CPL(A) with theoretical knowledge examination passes at ATPL level

P2X Ratings

- 9.2.6 P2X rating is applicable to:
- (a) pilots of certain Hong Kong Air Operators with specific approval granted by the CAD to conduct such operations and/or training on certain aircraft types (refer to the relevant sections in Part One of CAD 360 - Air Operator's Certificates Requirements Document (CAD 360) for requirements on P2X rating)
 - (b) CAD approved self-sponsored students who completed a CAD509 integrated course.
- 9.2.7 The holder of a P2X rating is restricted to operations above 20,000 ft only. When a co-pilot with only P2X rating on the type is at the controls, the other pilot at the controls must be fully qualified as Captain or F/O acting as PIC with line flying experience of at least 3 months.
- 9.2.8 A Hong Kong professional pilot's licence will not be issued where the applicant is only qualified for a P2X rating. In this case the applicant is additionally required to include an Aircraft Rating in Part 1 of an aeroplane type registered in Hong Kong or approved in accordance with the CAD 509.

Upgrading from Part 2 to Part 1

- 9.2.9 If the holder of a licence which includes an aircraft type in Part 2 (including P2X) wishes to have that type included in Part 1, he will be required to pass the Aircraft Rating flight test as specified under Part 1 of Form DCA 528.
- 9.2.10 To apply for an Aircraft Rating of business jets certificated for a passenger seating capacity not exceeding 19, the Aircraft Technical and Performance examinations may be waived on the basis of theoretical knowledge examination results achieved in a CAD-approved type conversion course (including a mini course for pilots with previous experience on type).

9.3 THE AIRCRAFT RATING FLIGHT TESTS

- 9.3.1 Aircraft Rating flight tests are conducted by Type Rating Examiners (TREs) authorized by the CAD to conduct such tests, and to sign C's of T or C's of E in respect of the aircraft type.
- 9.3.2 The test requires that the applicant demonstrate to the TRE his competence in carrying out normal and emergency manoeuvres and drills appropriate to the aircraft type in question. The detailed content of the test is specified in Form DCA 528 for different aircraft types.
- 9.3.3 In aircraft which are required to be flown by not less than two pilots, the test may be conducted with the applicant acting in either:
- (a) the capacity of PIC for entries in Part 1 and Part 2; or
 - (b) the capacity of co-pilot for an entry in Part 2.

Completion of Form DCA 528

- 9.3.4 Certain items of the flight test included in Form DCA 528 may be conducted in an appropriate flight simulator which has been specifically approved for the purpose by the CAD.
- 9.3.5 On the satisfactory completion of the flight test, the TRE will certify to that effect against each of the test item specified in Form DCA 528.
- 9.3.6 Certain items detailed in Form DCA 528 are enclosed in a heavily outlined box. These boxed items must be completed in a test in relation to a C of T. The Aircraft Rating C of T in respect of that type will be completed with the date of effect being the date on which the boxed items in Form DCA 528 are completed.
- 9.3.7 The TRE and the applicant should refer to the Important Notes in Form DCA 528 prior to the completion of the form.
- 9.3.8 Refer to the Forms DCA 528 (CCQ) and DCA 528 (ZFT) and the relevant sections in Part One of CAD 360 for requirements for Mixed Fleet Flying (MFF), Cross Crew Qualification (CCQ) conversion trainings and Zero Flight Time (ZFT) conversion trainings. MFF, CCQ and ZFT conversion trainings are only applicable to pilots of certain Hong Kong Air Operators with approval granted by the CAD to conduct such operations and/or training on certain aircraft types.

Applications to PELO

- 9.3.9 The following licensing applications must be submitted to the PELO with a fully completed Form DCA 528 (covering all test items of the relevant Part):
- (a) Inclusion of the first or additional aircraft types in the Aircraft Rating, either in Part 1 or Part 2
 - (b) Upgrade of a type in the Aircraft Rating from Part 2 (including P2X) to Part 1
- 9.3.10 The PELO will issue the licence with the appropriate type of aircraft entered in the appropriate Part in the Aircraft Rating. The Aircraft Rating C of T in respect of that type will be completed by the PELO at the time of making the entry in the rating, with a date of effect being the date on which the boxed items are satisfactorily completed.

9.3.11 Subsequent tests on an aircraft already included in the rating will comprise only the boxed items in the relevant Form DCA 528. On satisfactory completion of the test the C of T will be signed in respect of the aircraft type by the TRE who conducted the test and be effective from the date on which the test is completed.

9.4 **CERTIFICATES OF TEST AND EXPERIENCE**

9.4.1 The privileges of a professional pilot's licence may only be exercised in the aircraft types specified in the Aircraft Rating of the licence, in conjunction with an appropriate and valid C of T or C of E. This must be signed on the appropriate page by either an officer of the CAD or an authorised person. The purposes and period of validity are set out in Part C of Schedule 9 to the AN(HK)O. The cases concerning professional pilot's licences are summarized in general terms as follows:

CASE A Private Pilot's Licence – Requirements and validity periods are same as Case E.

CASE B For carriage of passengers on a flight in respect of which the holder of the licence receives remuneration other than a public transport flight, the following is required:

A C of T in respect of the type of aircraft in which the flight is made and the capacity (PIC or co-pilot) in which the licence holder is acting. The maximum validity period of a C of T for this purpose is 13 months.

CASE C For flights for public transport, the following is required:

A C of T in respect of the type of aircraft in which the flight is made and the capacity in which the licence holder is acting. The period of validity of a C of T for this purpose is six months, provided that when two C's of T are held for the same type of aircraft and pilot capacity and the dates of effect of which are separated by not less than four months, the maximum period of validity is deemed to be 13 months from the date of effect of the earlier certificate.

CASE D For flights for aerial work, either of the following is required:

- (a) A C of T in respect of the type of aircraft in which the flight is made and the capacity in which the licence holder is acting of which the maximum period of validity is same as that for Case C
- (b) A C of E certifying not less than five hours of experience as PIC or co-pilot as appropriate to the capacity in which the licence holder is acting, in the type of aircraft on which the flight is to be made, in the six months immediately preceding the date of effect of the certificate. The maximum period of validity of a C of E for this purpose is six months.

CASE E For flights within the privileges of a PPL, either of the following is required:

- (a) A C of T in respect of the aircraft Class, Group and Type of which the test aircraft is a part and in respect of the capacity in which the licence holder is acting. The maximum period of validity of a C of T for this purpose is 13 months.

A C of T for a Group C type will revalidate or renew Group A in the case of a single-engine Group C type, or Group A and B for a multi-engine Group C type, provided the pilot has made at least 1 flight as PIC on each Group to

be revalidated or renewed within the 13 months preceding the test. Similarly, a C of T for a Group B aircraft will revalidate or renew Group A provided he has made at least 1 flight as PIC in a Group A aeroplane within the 13 months immediately preceding the test.

- (b) A C of E certifying not less than 5 hours as pilot in an aircraft of the same Group or Type, as required, as the rating in the 13 months preceding the date of issue of the new C of E.

For PIC privileges, of the 5 hours as pilot, not less than 3 hours must have been as PIC with the remaining time made up of dual instruction with a flying instructor but only if, at the end of the dual flights, the instructor considered the pilot was fit to fly as PIC and so certified in the pilot's flying log book, or PIC U/S flight time gained on a successful check flight with a flying instructor or a successful flight test flown with an authorized examiner for licensing purposes.

Pilots wishing to revalidate or renew more than one Group of aeroplane must include at least 1 flight as PIC in an aeroplane of each Group (or type in the case of Group C) as part of the overall minimum of 5 hours.

- 9.4.2 Where exemptions have been granted for mixed fleet flying (MFF), the procedures and requirements for C of T renewal are detailed in CAD360 Part 1. Pilots holding a P2X rating are not eligible for the MFF scheme.

9.5 **RENEWAL OF A LAPSED C OF T OR C OF E**

- 9.5.1 If the validity of the most recent C of T or C of E for the type of aircraft upon which the licence holder wishes to exercise the licence privileges has expired for more than 5 years, then before the C of T or C of E may be renewed in respect of that type, the applicant will normally be required to:

- (a) hold a valid Hong Kong Class 1 Medical Certificate
- (b) pass the required Aircraft Technical (Type) and the appropriate Performance examinations (see Part 3 Chapter 7 Paragraph 7.1.1)
- (c) pass the Aircraft Rating flight test of that type
- (d) pass the Aviation Law (Papers A and B) examinations unless the applicant holds a C of T or C of E for another type of aircraft, which is current or has expired for 5 years or less, on the licence.

- 9.5.2 If the validity of the most recent Aircraft Rating C of T or C of E contained in the licence has expired for more than 10 years, then before the C of T or C of E may be renewed, the applicant will be required to

- (a) hold a valid Hong Kong Class 1 Medical Certificate
- (b) pass all theoretical knowledge examinations for that class of licence
- (c) pass the General Flight Test
- (d) pass the required Aircraft Technical (Type) and the appropriate Performance examinations

- (e) pass the Aircraft Rating flight test of that type.

9.5.3 The requirements in paragraph 9.5.3 may be modified subject to the following conditions:

- (a) The applicant possesses a professional pilot licence (at the same or a higher level) that is valid or has expired for less than 5 years at the time of application issued by another ICAO Contracting State.
- (b) The Flight Radiotelephony Operator's Licence, ICAO Language Proficiency Endorsement, Medical Certificate, Aircraft Rating and Instrument Rating attached to the licence in paragraph (a) are valid.
- (c) The Aircraft Rating in paragraph (b) is one of the aircraft types included in Part 1 of the Aircraft Rating (A) of the Hong Kong professional pilot's licence.

9.5.4 On satisfactory completion of the theoretical knowledge examinations and the flight test, the applicant should submit to the PELO with a full Form DCA 528 (covering all the test items), together with all the supporting information for assessment.

PART 3 CHAPTER 10 INSTRUMENT RATINGS (AEROPLANES) [IR(A)]

10.1 GENERAL

10.1.1 The privileges of a Hong Kong Instrument Rating (Aeroplanes) are given in Schedule 9 to the AN(HK)O.

10.1.2 In certain circumstances, a Hong Kong CPL(A) may be issued without an IR.

10.1.3 The grant of a Hong Kong IR(A) on initial issue terms is only available for applicants who have completed an integrated course of flight and ground training approved by the CAD.

10.1.4 Otherwise, a foreign multi-engine Instrument Rating (Aeroplanes) may be accepted for conversion. The applicant must also produce evidence that his Instrument Rating is valid or has expired for less than 5 years at the time of application.

10.2 INCLUSION OF INSTRUMENT RATINGS

10.2.1 To qualify for the inclusion of an IR(A) on the issue of a Hong Kong professional pilot's licence, the applicant is normally required to:

- (a) pass the theoretical knowledge examinations stated in Section 10.3 below
- (b) pass the Instrument Rating flight test
- (c) meet the flying experience requirements stated in Section 10.4 below.

10.3 THEORETICAL KNOWLEDGE EXAMINATION REQUIREMENTS

10.3.1 Applicants for an IR(A) are required to have passed the Navigation Group examinations at CPL level or above, unless exemptions are granted.

10.3.2 Exemption from the theoretical knowledge examinations is normally given to:

- (a) applicants that have passed the Hong Kong ATPL examinations
- (b) applicants holding a foreign professional pilot's licence with theoretical knowledge examination passes at ATPL level.

10.4 FLYING EXPERIENCE REQUIREMENTS

10.4.1 The minimum flying experience required for the grant of an IR(A) is 250 hours as a pilot of aeroplanes that include:

- (a) at least 100 hours as PIC or PIC U/S, of which a minimum of 50 hours must be cross-country flying as PIC
- (b) 40 hours as pilot by sole reference to instruments, of which 20 hours may be in an approved flight simulator or approved procedure trainer under the supervision of an instructor acceptable to the CAD.

10.4.2 Where the applicant has completed a Hong Kong CAD approved integrated course of flight and ground training for the issue of a Hong Kong CPL(A) under the auspices of a Flight Training Organization so approved in accordance with CAD 509(A) requirements, the minimum flying experience should be in compliance with the requirements as described in CAD 509(A).

10.5 **INSTRUMENT RATING FLIGHT TESTS**

10.5.1 The initial Instrument Rating flight test (IRT) should generally be conducted on a multi-engine aeroplane, but is not normally available in Hong Kong due to airspace and geographical constraints.

10.5.2 Renewal Instrument Rating flight tests may be conducted in an appropriate flight simulator which has been approved for the purpose by the CAD.

10.5.3 An applicant for a renewal flight test must hold an Aircraft Rating and an Instrument Rating on a multi-engine aeroplane. Both ratings must not be expired for 5 years or more.

10.5.4 The detailed content of the flight test is specified in:

- (a) Initial IRT – Form DCA 78
- (b) Renewal IRT – Form DCA 80

10.5.5 The syllabus for the test, the conditions under which it will be conducted and the level of acceptable performance are detailed in Part 3 Appendix E.

10.5.6 Instrument Rating flight tests are conducted by Instrument Rating Examiners (IREs) authorized by the CAD to conduct such tests and to sign C of T's in respect of the Instrument Rating.

10.5.7 The applicant, together with the remainder of the flight crew in the case of a test on a multi-crew aeroplane, will be briefed by the IRE before the test. The applicant will be responsible for ensuring that he has all the equipment and documentation for the planning and execution of the test.

10.5.8 On satisfactory completion of the flight test, the IRE will certify to that effect against each of the test items specified in Form DCA 78/80.

10.5.9 Before completing the Form DCA 78, the IRE and applicant should refer to the Important Notes in the form.

10.5.10 The privileges conferred as a result of such test may only be exercised in the aircraft type (or aircraft family if appropriate) covered by such rating.

Application to the PELO

10.5.11 On successful completion of the Instrument Rating flight test, the applicant should submit the completed Form DCA 78/80 to the PELO.

10.5.12 All the test items in Form DCA 78/80 must be satisfactorily completed within the six months immediately preceding the date of application. All tests including any retest must be completed within a period of 28 days.

10.5.13 The PELO will issue the licence with the appropriate type of aircraft entered in the Instrument Rating. The Instrument Rating C of T in respect of that type will be completed by the PELO at the time of making the entry in the rating, with the date of effect being the date on which the test is satisfactorily completed.

- 10.5.14 In subsequent tests, the C of T will be signed in respect of the aircraft type in question by the IRE who conducted the test and be effective from the date on which the test is completed.

Multi-Crew

- 10.5.15 For an aircraft certificated for operation with one pilot, the flight test is conducted as if it was being flown by a single flight crew member. He will occupy the position of PIC but the flight examiner will be the designated PIC.
- 10.5.16 For an aircraft certificated for operation with not less than two pilots, the test may be taken with the applicant as the handling pilot in either the PIC or co-pilot position. He will be expected to call upon the other flight crew members to assist him in the conduct of the flight in accordance with the normal crew drills for that type of aeroplane. Where the IRE occupies the position of PIC or co-pilot, he will be designated as PIC. Where he does not occupy either of these positions, the pilot occupying either one who is not undergoing the test will be designated as PIC. In such cases, the pilot designated as PIC must be a person authorized by the operator of the aeroplane to act as either a training captain or check captain on the type.
- 10.5.17 The same test syllabus is pertinent for a flight test for single-pilot and for multi-crew operations but there may be minor variations in the conduct of the test which will be explained by the IRE before the test.

10.6 **CERTIFICATES OF TEST**

- 10.6.1 The privileges of an IR(A) may not be exercised unless the licence contains a valid C of T. The maximum period of validity of a C of T in relation to an Instrument Rating is 13 months from the date of effect of the C of T.
- 10.6.2 An Instrument Rating that is valid for a specific type or types of aircraft will be endorsed accordingly. A type specific IR(A) is only valid when the holder has a valid Aircraft Rating C of T or C of E of a relevant type.

10.7 **INCLUSION OF ADDITIONAL TYPES**

- 10.7.1 To extend the IR(A) privileges to another type or types of aeroplanes, the licence holder will be required to pass a flight test for each additional type or types.
- 10.7.2 On satisfactory completion of the flight test, the additional aeroplane type or types will be added to the rating by the PELO, who will also completed the C of T in respect of that type or types effective from the date on which the test was successfully completed.

10.8 **RENEWAL OF A LAPSED C OF T**

10.8.1 If the validity of the C of T has expired for more than 5 years, then before the C of T may be renewed in respect of that type, the applicant is normally required to:

- (a) hold a valid Hong Kong Class 1 Medical Certificate
- (b) produce evidence that he has recently passed an initial Instrument Rating flight test. This requirement may be waived where the licence holder has remained in instrument flying practice with a foreign professional pilot's licence and IR(A), which must remain valid or has expired for less than 5 years at the time of application
- (c) pass the Instrument Rating flight test of that type.

10.8.2 In addition to Paragraph 10.8.1, if the validity of the most recent Instrument Rating C of T contained in the licence has expired for more than 5 years, the applicant will be required to pass the theoretical knowledge examinations in Aviation Law, Flight Rules and Procedures, before the C of T or C of E may be renewed.

10.8.3 On satisfactory completion of the theoretical knowledge examinations and the flight test, the applicant should submit to the PELO a completed Form DCA 80, together with all the supporting information for assessment.

10.9 **HOLDERS OF A HONG KONG PPL OR APPLICANTS TO EXERCISE PPL PRIVILEGES ONLY**

10.9.1 The applicant should apply to the PELO for the terms for issue of an IR(A).

PART 3 CHAPTER 11 INSTRUMENT RATINGS (HELICOPTERS) [IR(H)]

11.1 GENERAL

11.1.1 The privileges of a Hong Kong Instrument Rating (Helicopters) are given in Schedule 9 to the AN(HK)O.

11.1.2 A Hong Kong professional pilot's licence (helicopters) may be issued without an instrument rating.

11.1.3 The grant of a Hong Kong IR(H) on initial issue terms is only available for applicants who have completed an integrated course of flight and ground training approved by the CAD.

11.1.4 Otherwise, a foreign multi-engine Instrument Rating (Helicopters) may be accepted for conversion. The applicant must also produce evidence that his Instrument Rating is valid or has expired for less than 5 years at the time of application.

11.2 INCLUSION OF INSTRUMENT RATINGS

11.2.1 To qualify for the inclusion of an IR(H) on the issue of a Hong Kong professional pilot's licence, the applicant is normally required to:

- (a) pass the theoretical knowledge examinations stated in Section 11.3 below
- (b) pass the Instrument Rating flight test
- (c) meet the flying experience requirements stated in Section 11.4 below.

11.3 THEORETICAL KNOWLEDGE EXAMINATION REQUIREMENTS

11.3.1 Applicants for an IR(H) are required to have passed the Navigation Group examinations at CPL level, unless exemptions are granted.

11.3.2 Exemption from the theoretical knowledge examinations is normally given to:

- (a) applicants that have passed the Hong Kong ATPL examinations
- (b) applicants holding a foreign professional pilot's licence with theoretical knowledge examination passes at ATPL level.

11.4 FLYING EXPERIENCE REQUIREMENTS

11.4.1 The minimum flying experience required for the grant of an IR(H) is:

- (a) 200 hours as a pilot of helicopters that include:
 - (i) at least 100 hours as PIC, which may include up to 65 hours as PIC U/S provided that the applicant has 250 hours as pilot of helicopters

- (ii) 40 hours as pilot by sole reference to instruments, of which up to 20 hours may be in an approved helicopter flight simulator or approved procedure trainer under the supervision of an instructor acceptable to the CAD
- (iii) 5 hours as pilot by sole reference to instruments in the type of helicopter in respect of which the applicant wishes to qualify for
- (b) 50 hours of cross-country flying as PIC or PIC U/S, of which at least 35 hours must be obtained in helicopters.

11.4.2 Where the applicant has completed a Hong Kong CAD approved integrated course of flight and ground training for the issue of a Hong Kong CPL(H) under the auspices of a Flight Training Organization so approved in accordance with CAD 509(H) requirements, the minimum flying experience should be in compliance with the requirements as described in CAD 509(H).

11.5 INSTRUMENT RATING FLIGHT TESTS

11.5.1 The initial Instrument Rating flight test (IRT) must be conducted on a multi-engine helicopter, but is not normally available in Hong Kong due to airspace and geographical constraints.

11.5.2 Renewal Instrument Rating flight tests may be conducted in an appropriate flight simulator which has been approved for the purpose by the CAD.

11.5.3 An applicant for a renewal flight test must also hold an Aircraft Rating and an Instrument Rating on a multi-engine helicopter. Both ratings must not be expired for 5 years or more.

11.5.4 The detailed content of the flight test is specified in:

- (a) Initial IRT – Form DCA 78
- (b) Renewal IRT – Form DCA 80

11.5.5 The syllabus for the test, the conditions under which it will be conducted and the level of acceptable performance are detailed in Part 3 Appendix E.

11.5.6 Instrument Rating flight tests are conducted by Instrument Rating Examiners (IREs) authorized by the CAD to conduct such tests and to sign C of T's in respect of the Instrument Rating.

11.5.7 The applicant, together with the remainder of the flight crew in the case of a test on a multi-crew aeroplane, will be briefed by the IRE before the test. The applicant will be responsible for ensuring that he has all the equipment and documentation for the planning and execution of the test.

11.5.8 On satisfactory completion of the flight test, the IRE will certify to that effect against each of the test items specified in Form DCA 78/80.

11.5.9 Before completing the Form DCA 78, the IRE and applicant should refer to the Important Notes in the form.

11.5.10 The privileges conferred as a result of such test may only be exercised in the aircraft type covered by such rating.

Application to the PELO

- 11.5.11 On successful completion of the Instrument Rating flight test, the applicant should submit the completed Form DCA 78/80 to the PELO.
- 11.5.12 All the test items in Form DCA 78/80 must be satisfactorily completed within the six months immediately preceding the date of application. All tests including any retest must be completed within a period of 28 days.
- 11.5.13 The PELO will issue the licence with the appropriate type of aircraft entered in the Instrument Rating. The Instrument Rating C of T in respect of that type will be completed by the PELO at the time of making the entry in the rating, with the date of effect being the date on which the test is satisfactorily completed.
- 11.5.14 In subsequent tests, the C of T will be signed in respect of the aircraft type in question by the IRE who conducted the test and be effective from the date on which the test is completed.

Multi-Crew

- 11.5.15 For an aircraft certificated for operation with one pilot, the flight test is conducted as if it was being flown by a single flight crew member. He will occupy the position of PIC but the flight examiner will be the designated PIC.
- 11.5.16 For an aircraft certificated for operation with not less than two pilots, the test may be taken with the applicant as the handling pilot in either the PIC or co-pilot position. He will be expected to call upon the other flight crew members to assist him in the conduct of the flight in accordance with the normal crew drills for that type of helicopter. Where the IRE occupies the position of PIC or co-pilot, he will be designated as PIC. Where he does not occupy either of these positions, the pilot occupying either one who is not undergoing the test will be designated as PIC. In such cases, the pilot designated as PIC must be a person authorized by the operator of the aeroplane to act as either a training captain or check captain on the type.
- 11.5.17 The same test syllabus is pertinent for a flight test for single-pilot and for multi-crew operations but there may be minor variations in the conduct of the test which will be explained by the IRE before the test.

11.6 **CERTIFICATES OF TEST**

- 11.6.1 The privileges of an IR(H) may not be exercised unless the licence contains a valid C of T. The maximum period of validity of a C of T in relation to an Instrument Rating is 13 months from the date of effect of the C of T.
- 11.6.2 An Instrument Rating that is valid for a specific type or types of aircraft will be endorsed accordingly. A type specific IR(H) is only valid when the holder has a valid Aircraft Rating C of T of a relevant type.

11.7 **INCLUSION OF ADDITIONAL TYPES**

- 11.7.1 To extend the IR(H) privileges to another type of helicopters, the licence holder will be required to pass a flight test for each additional type.
- 11.7.2 Before the flight test may be taken, the applicant is be required to have obtained two hours as pilot by sole reference to instruments on the type of helicopter in which the test is to be taken, or in an approved helicopter flight simulator representative of the type.

11.7.3 On satisfactory completion of the flight test, the additional helicopter type will be added to the rating by the PELO, who will also completed the C of T in respect of that type effective from the date on which the test was successfully completed.

11.8 **RENEWAL OF A LAPSED C OF T**

11.8.1 If the validity of the C of T has expired for more than 5 years, then before the C of T may be renewed in respect of that type, the applicant is normally required to:

- (a) hold a valid Hong Kong Class 1 Medical Certificate
- (b) produce evidence that he has recently passed an initial Instrument Rating flight test. This requirement may be waived where the licence holder has remained in instrument flying practice with a foreign professional pilot's licence and IR(H) given the licence and IR(H) must remain valid or has expired for less than 5 years at the time of application
- (c) pass the Instrument Rating flight test of that type.

11.8.2 In addition to Paragraph 11.8.1, if the validity of the most recent Instrument Rating C of T contained in the licence has expired for more than 5 years, the applicant will be required to also pass the theoretical knowledge examinations in Aviation Law, Flight Rules and Procedures, before the C of T may be renewed.

11.8.3 On satisfactory completion of the theoretical knowledge examinations and the flight test, the applicant should submit to the PELO a completed Form DCA 80, together with all the supporting information for assessment.

11.9 **HOLDERS OF A HONG KONG PPL OR APPLICANTS TO EXERCISE PPL PRIVILEGES ONLY**

11.9.1 The applicant should apply to the PELO for the terms for issue of IR(H).

PART 3 CHAPTER 12 INSTRUCTOR RATINGS

Refer to Part 2 Chapter 3 for details on Instructor Ratings.

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**PART 3 CHAPTER 13 HONG KONG COMMERCIAL PILOT'S LICENCES
(BALLOONS) CPL(B)**

Pilot's Licence (Balloons and Airships) is not currently available.

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**PART 3 CHAPTER 14 HONG KONG MULTI-CREW PILOT'S LICENCES
(AEROPLANES) MPL(A)**

14.1 GENERAL

14.1.1 The privileges of a Hong Kong MPL(A) are given in Schedule 9 to the AN(HK)O.

14.1.2 When the holder of an ATPL(A) has previously held only an MPL(A), the privileges of the licence shall be restricted to multi-pilot operations.

14.1.3 An application for the first issue of a Hong Kong MPL(A) will not normally be processed until the applicant can show evidence of a genuine requirement to hold a Hong Kong professional pilot's licence and exercise the privileges of the licence on a Hong Kong registered aircraft.

14.1.4 In order for the air operator to properly discharge their safety oversight responsibility as required by the CAD, the air operator may in the process of licence application collect any information, including test and examination results, expiry dates, etc., as contained therein their employees' licence and the related documents.

14.2 FLYING EXPERIENCE REQUIREMENTS

14.2.1 The applicant must have successfully completed a Hong Kong CAD approved integrated course of flight and ground training for the issue of a Hong Kong MPL(A) with IR(A) under the auspices of a Flight Training Organization so approved in accordance with CAD 509(MPL) requirements. The minimum flying experience should be in compliance with the requirements as described in CAD 509(MPL).

14.3 OTHER REQUIREMENTS

14.3.1 To qualify for the issue of a Hong Kong MPL(A), the applicant should also meet the following requirements as stipulated in other CAD 54 provisions.

Requirements for issue of MPL(A)	Relevant CAD 54 Provisions
Age	Part 1 Chapter 1 Section 1.2
Medical Certificate	Part 1 Chapter 2
Language Proficiency Endorsement	Part 1 Chapter 3

Theoretical Knowledge Examinations	The theoretical knowledge examination requirements for the grant of a Hong Kong MPL(A) are the same as that for a Hong Kong ATPL(A). Part 3 Chapter 7 Section 7.1
Flight Test	The necessary flight tests should be included in the approved training course.
Aircraft Rating	Part 3 Chapter 9
Instrument Rating	Part 3 Chapter 10

14.4 **HOLDERS OF A FOREIGN MPL(A)**

14.4.1 Conversion of foreign MPL(A) is not normally considered.

**PART 3 APPENDIX A CPL(A), CPL(H), ATPL(H)
THEORETICAL KNOWLEDGE EXAMINATION
SYLLABUS**

A.1 AVIATION LAW, FLIGHT RULES AND PROCEDURES

A.1.1 Paper A: Aviation law

Publications may not be consulted during this examination.

A.1.1.1 *Air Navigation (Hong Kong) Order*

Subject	Provisions of AN(HK)O
Certificate of airworthiness to be in force	Article 7
Certificate of maintenance review	Article 9(1),(5),(6)
Technical log	Article 10(1),(2)
Inspection, overhaul, repair, replacement and modification	Article 11(1),(4),(5),(6)
Equipment of aircraft	Article 13(1),(2),(5)
Radio equipment of aircraft	Article 14(1)
Aircraft, engine and propeller log books	Article 15
Aircraft weight schedule	Article 16
Composition of crew of aircraft	Article 18
Members of flight crew - requirement of licences	Article 19(1),(4),(7)
Grant, renewal and effect of flight crew licences	Article 20(1),(2),(3),(4)(a),(5),(6)(7)(a),(7)(b),(8),(9),(10),(11)
Endorsement in respect of language proficiency	Article 20A
Validation of licences	Article 21
Personal flying log book	Article 22
Instruction in flying	Article 23
Operations manual	Article 25(1),(2)
Training manual	Article 26(1),(2)
Public transport - operator's responsibilities	Article 27
Loading - public transport aircraft and suspended loads	Article 28
Public transport - operating conditions	Article 29
Aircraft registered in Hong Kong – aerodrome operating minima	Article 30(16),(4),(5),(6),(7)
Pre-flight action by pilot in command of aircraft	Article 32
Pilots to remain at controls	Article 33
Public transport of passengers - duties of pilot in command	Article 34
Operation of radio in aircraft	Article 35(1),(2),(3),(4),(5),(8)
Minimum navigation performance	Article 36
Use of flight recording systems and preservation of records	Article 37(1)

Subject	Provisions of AN(HK)O
Towing of gliders	Article 38
Towing, picking up and raising of persons and articles	Article 39
Dropping of animals and articles	Article 40
Dropping of persons	Article 41
Carriage of weapons and munitions of war	Article 43
Carriage of dangerous goods	Article 44
Method of carriage of persons	Article 45
Exits and break-in markings	Article 46
Endangering safety of aircraft	Article 47
Endangering safety of any person or property	Article 48
Passengers and crew members not to be under influence of psychoactive substances	Article 49
Exhibition of notices indicating prohibition of smoking	Article 50
Authority of pilot in command of aircraft	Article 51
Stowaways	Article 52
Application and interpretation of Part VI	Article 53
Fatigue of crew - operator's responsibilities	Article 54
Fatigue of crew - responsibilities of crew	Article 55
Flight times - responsibilities of flight crew	Article 56
Documents to be carried	Article 57
Production of documents and records	Article 59(1),(3),(4)
Preservation of documents, etc.	Article 61(c)
Revocation, suspension and variation of certificates, licences and other documents	Article 62(1),(2),(3)
Offences in relation to documents and records	Article 63(1),(2),(3),(4),(5)
Rules of the Air	Article 64(2),(3),(4),(5)
Power to prohibit or restrict flying	Article 69
Aerodromes: public transport of passengers and instruction in flying	Article 71
Mandatory reporting	Article 86(1),(5)
Power to prevent aircraft flying	Article 87
Obstruction of persons	Article 89
Enforcement of directions	Article 90
Penalties	Article 91
Extra-territorial effect of the Order	Article 92
Application of Order to aircraft registered outside Hong Kong	Article 93
Exemption from Order	Article 95
Interpretation	Article 98(1),(4),(5),(6),(7)
Table of general classification of aircraft	Schedule 1 - Part A
Categories of aircraft	Schedule 3
Radio equipment to be carried in aircraft	Schedule 6 - 2(3)(a)

Subject	Provisions of AN(HK)O
Flight crew of aircraft: licences and ratings	Schedule 9
(a) Aeroplane pilots	Part A1
(b) Helicopter pilots	Part A2
(c) Other flight crew	Part A5
(d) Ratings	Part B
(e) Certificate of test or experience	Part C
Documents to be carried by aircraft registered in Hong Kong	Schedule 12
Rules of the air and air traffic control	Schedule 14 Section I to VIII
Air Navigation (General) Regulations	Schedule 15
(a) Load sheets	Regulation 1
(b) Aeroplanes flying for the purpose of public transport of passengers – aerodrome facilities for approach to landing and landing	Regulation 14
(c) Mandatory reporting – prescribed reportable occurrences, time and manner of reporting and information to be reported	Regulation 16

Where an Article of the AN(HK)O refers to a Schedule that is not listed in the syllabus, a detailed knowledge of that Schedule is not required.

A.1.1.2 ***Hong Kong Civil Aviation (Investigation of Accidents) Regulation***

Subject	Provisions of AN(HK)O
Interpretation	Regulation 2
Application of regulations	Regulation 3
Duty to furnish information	Regulation 5
Removal of damaged aircraft	Regulation 7

A.1.2 **Paper B - Flight Rules and Procedures**

A detailed knowledge of the contents of:

- Hong Kong Aeronautical Information Publication
- Hong Kong Aeronautical Information Circulars

Both publications will be provided to the candidate for use during the examination.

A.2 FLIGHT PLANNING AND FLIGHT MONITORING

A.2.1 Flight Plans for Cross-Country Flights

A.2.1.1 Navigation Plan

- Terrain and obstacle clearance
- Cruising levels
- Navigation check points, visual or radio
- Measurement of tracks and distances
- Obtaining wind velocity forecast for each leg
- Computation of heading, ground speeds and times enroute from tracks, true airspeed and wind velocities
- Use of wind component, tables for drift and ground speeds
- Completion of navigation flight plan

A.2.2 Fuel Plan

A.2.2.1 Computation of planned fuel usage for each leg and total fuel usage for the flight

A.2.2.2 Flight manual figures for fuel flow during climb, cruise, and descent. Mid weights or instantaneous weights

A.2.2.3 Navigation plan for times enroute

A.2.2.4 Fuel for holding or diversion to alternate airfield

A.2.2.5 Reserves

A.2.2.6 Total fuel requirements for flight

- Take-off weight; maximum take-off weight, fuel load, payload
- Landing weight, maximum landing weight, fuel load, payload

A.2.2.7 Completion of pre-flight portion of fuel log

- A.2.3 **Flight Monitoring and in-Flight Replanning**
- A.2.3.1 In-flight computations
- Comparison of actual and planned fuel consumption and fuel state
 - Calculation of PNR and CP
- A.2.3.2 Revision of fuel reserves
- A.2.3.3 In-flight replanning in case of problems
- Selection of cruise altitude for new destination
 - Fuel state, fuel requirements, fuel reserves
- A.2.4 **Radio Communications and Navigational Aids**
- A.2.4.1 Communication frequencies and call signs for appropriate control agencies and in-flight service facilities, weather stations
- A.2.4.2 Radio navigation and approach aids
- Types
 - Frequencies
 - Identification
- A.2.5 **Air Traffic Flight Plans**
- A.2.5.1 Types of flight plan - CA48
- A.2.5.2 ICAO flight plan
- Formats
 - Information included
 - Repetitive flight plans
- A.2.5.3 Completion of flight plans
- A.2.5.4 Information for flight plan obtained from:
- Navigation flight plans
 - Fuel endurance
 - Operators records for basic information

A.2.6 **Practical Flight Planning**

A.2.6.1 Chart usage

- Checking AIP and Notams for latest information
- Selection of altitudes or flight levels for each leg of flight

A.2.6.2 Plot tracks and measure directions and distances

A.2.6.3 Completing navigation plans using:

- Tracks and distances from prepared charts
- Application of wind velocity on each leg to obtain headings and ground speeds
- Calculations of enroute times for each leg to destination and alternates to determine total time enroute
- Wind velocities as provided
- True airspeed as appropriate

A.2.6.4 Simple fuel plans

A.2.6.5 Preparation of fuel loads showing planned values for:

- Fuel used on each leg including climb, cruise and descent
- Fuel remaining at end of each leg
- Total time and fuel required to destination
- Completion of fuel plan
- Fuel required for missed approach, climb and cruise to alternate
- Reserve fuel

A.2.7 **Radio Planning Practice**

A.2.7.1 Communications

- Frequencies and call signs of ATC agencies and facilities and information for in-flight weather

A.2.7.2 Navigation aids

- Frequencies and identifiers of enroute and terminal facilities

A.2.8 **IFR (Airways) Flight Planning**

A.2.8.1 Meteorological considerations

A.2.8.2 Selection of routes to destination and alternates

- Preferred airways routes
- Extraction of tracks/distances from radio/nav charts
- Frequencies and identifiers of enroute radio/nav aids
- Minimum enroute altitudes, minimum crossing and reception altitudes
- Standard instrument departures (SIDs) and standard arrival routes (STARs)
- Interpretation and use of aerodrome charts; landing charts; instrument approach charts; visual approach charts; noise abatement charts; special procedure charts.

A.3 NAVIGATION

A.3.1 The Earth

- A.3.1.1 Form of the earth; rotation; great circles, small circles; rhumb lines; geographic poles
- A.3.1.2 Position on earth; latitude and longitude, use of co-ordinates to find position; difference of latitude and longitude
- A.3.1.3 Direction on earth; true north, magnetic north, compass north, variation, deviation, isogonals
- A.3.1.4 Convergency and conversion angle; definitions; formula for calculation; derivation of necessary factors; application on earth
- A.3.1.5 Distance on earth; units of measurement, nautical miles, kilometres; statute miles with conversion one to another; relationship to latitude
- A.3.1.6 Speed; units of measurement; knots, mph; kilometres per hour; rectified airspeed, true airspeed, mach number relationship; ground speed
- A.3.1.7 Time: distance, speed and time solutions

A.3.2 The Triangle of Velocities

- A.3.2.1 Vectors; heading; track; drift; TAS, ground speed
- A.3.2.2 Computer solution (also to be covered during plotting)
- A.3.2.3 Solution of multi drift wind velocities, head and crosswind components; Maximum and minimum wind components for take-off and landing

A.3.3 Fuel

- A.3.3.1 Use of computer for fuel conversions, kilograms, litres, pounds, imperial gallons, US gallons
- A.3.3.2 Solution of fuel flow problems; fuel units in relation to time

A.3.4 Pilot Navigation

- A.3.4.1 The 1 in 60 rule; track error, closing angles; distance gone; regaining and parallelling track; altering heading to destination. D.R. navigation

A.3.5 Charts

- A.3.5.1 Types of projection; general properties, orthomorphism; scale; chart convergency

- A.3.5.2 Properties of the:
- Mercator
 - Lambert Conformal
- A.3.5.3 Use of the charts; calculation of bearings at various positions
- A.3.5.4 Topographical maps; conventional signs
- A.3.6 **Emergency Data**
- A.3.6.1 Calculation and application of critical point and point of no return
- A.3.6.2 Calculation and application of radius of action or latest time to divert
- A.3.7 **Relative Velocity**
- A.3.7.1 Principles of relative velocity
- A.3.7.2 Assessment of collision risk (not interception)
- A.3.8 **Time and Time Conversions**
- A.3.8.1 Solar system, seasonal and apparent movements of the sun
- A.3.8.2 Basis of mean time; civil day; the years
- A.3.8.3 LMT; ST; UTC; using air almanac extracts
- A.3.8.4 Sunrise, sunset and twilight using air almanac extracts
- A.3.9 **Navigation Plotting**
- A.3.9.1 Calculation factors affecting accuracy and plotting of dead reckoning position
- A.3.9.2 Measurement of track and distance, assessment of magnetic variation
- A.3.9.3 Plotting of position lines from radio facilities, establishment of aircraft position by transference of straight and curved position lines by track and ground speed
- A.3.9.4 Use of single position lines, fixing by position lines
- A.3.9.5 Calculation of actual track and ground speed by reference to plotted position, calculation of actual wind velocity. Revision of ETA and fuel endurance
- A.3.9.6 Navigation on climb and descent
- A.3.9.7 Maintaining a flight log

A.4 INSTRUMENTS

A.4.1 Air Data Sources

A.4.1.1 Pitot and Static Systems

- Pitot tube
 - Construction and principle of operation
 - Errors and faults
- Static source
 - Construction, principle of operation and siting
 - Errors and faults
- Combined pressure head
 - Construction, principle of operation and siting
 - Errors and faults
- Alternate static source
 - Siting
 - Errors normally associated with use of alternate vent

A.4.1.2 Air Temperature Measurement

- Types of thermometer used
- Ram air temperature
- Corrected outside air temperature
- Errors

A.4.2 Air Data Instruments

A.4.2.1 The Altimeter

- Relationship of pressure and height
- Principle of operation and construction of sensitive and servo altimeters
- Height encoding
- Subscale settings, standard settings; QFE; QFE (threshold) QNH; procedures
- Interpretation of instrument
- Errors
- Corrections and tolerances
- Altimeter correction; determination of corrections due to surface pressure variation

A.4.2.2 *Airspeed Indicators (ASI)*

- Effect of motion of body through atmosphere
- Ram air pressure
- Dynamic pressure
- Compressibility
- Speed terms EAS; RAS/CAS; TAS
- Construction and principle of operation
- Interpretation of instrument

- Use of coloured arcs and other markers
- Errors and corrections
- Conversion of IAS to TAS

A.4.2.3 Vertical Speed Indicator (VSI)

- Rate of descent as a rate of change of pressure
- Aneroid vertical speed indicator
 - Principle
 - Presentation
 - Use
 - Errors and limitations
- Instantaneous/instant lead VSI
 - Principle
 - Presentation
 - Advantages
 - Errors and limitations

A.4.2.4 Mach Meter

- Significance of Mach number
- Mach number formula
- Measurement of Mach No. as a ratio of pressures
- Construction and principles of operation of a machmeter
- Presentation, interpretation and use
- Errors

A.4.2.5 Mach/IAS Indicator

- Principle of operation
- Presentation, interpretation and use
- Errors

NB: Details of mechanical/electrical linkages need not be known

A.4.3 Gyroscopic Instruments

A.4.3.1 Gyroscopic Principles

- Theory of gyroscopic principles
- Rigidity in space; apparent drift, apparent tilt
- Precession; real (random) drift, real (random) tilt
- Factors affecting precession rates
- Types of gyro; their construction, drive types, and principles of operation of the following:
 - Vertical gyro
 - Directional gyro
 - Rate gyro
 - Rate integrating gyro
 - Single degree of freedom gyro
 - Solid state gyro

A.4.3.2 Directional Gyro

- Construction and principles of operation
- Errors
- Need to set and re-set

A.4.3.3 Slaved Gyro Compass

- Construction and principles of operation
- Principles of the flux valve
- The transmission and slaving systems
- Advantages of the slaved gyro compass.
- Output data, use and application
- Pre-flight check
- Remote transmission systems

A.4.3.4 Artificial Horizon

- Construction and principle of operation
- Remote vertical gyro
- Types of display
- Errors and limitations
- Output data, use and applications

A.4.3.5 Turn and Balance Indicator

- Construction and principle of operation
- Display types and interpretation
- Errors and limitations
- Output data, use and applications

A.4.3.6 Turn Co-ordinator

- Construction and principles of operation
- Display and interpretation
- Errors, cautions and limitations

A.4.4 **Magnetism and Compasses**

A.4.4.1 Principles of magnetism

- Terrestrial magnetism
- Earth's total magnetic field
- 'H' and 'Z' components and their values as governed by magnetic latitude
- Directive force, magnetic dip, variation
- Aircraft magnetism
- Permeability of materials, hard iron and soft iron
- Magnetic field of an aircraft, effect on directive force
- Deviation effect, change of deviation with heading, change of deviation with magnetic latitude
- Compass safe distances
- BCAR/JAR limits

A.4.4.2 Direct Reading Magnetic

- Principles of construction of a typical compass
- Errors and limitations of a magnetic compass
- Examples of a magnetic compass
- Serviceability tests
- The deviation card

A.5 METEOROLOGY (THEORY)

A.5.1 Composition and Properties of the Atmosphere

A.5.2 Pressure, temperature and density of the Atmosphere

A.5.2.1 Barometric pressure, isobars, isallobars

A.5.2.2 Diurnal variation of pressure, pressure variation with height

A.5.2.3 Determination of QFF

A.5.2.4 Transfer of heat, solar and terrestrial radiation, conduction, turbulence, convection, radiation

A.5.2.5 Temperature near earth's surface, surface effects, diurnal variation, effect of clouds, effect of wind and humidity

A.5.2.6 Elementary heat balance in atmosphere

A.5.2.7 Adiabatic processes, dry air, evaporation, condensation, latent heat, saturated air, simple temperature/height diagram

A.5.2.8 Vertical distribution of temperature, troposphere, tropopause, stratosphere, lapse rate, influence of inversions on the weather, types of inversions, influence on the weather

A.5.2.9 Stability and instability, stability changes caused by radiation, turbulence, convection, advection, subsidence, convergence and divergence

A.5.2.10 Density, variation at surface and with height.

A.5.2.11 Aircraft performance and air density

A.5.3 Humidity

A.5.3.1 Water vapour in the atmosphere

A.5.3.2 Dry/wet bulb temperature, dewpoint and relative humidity

A.5.3.3 Condensation, precipitation, sublimation and freezing in the atmosphere

A.5.3.4 Relationship between density, pressure, temperature and humidity, the International Standard Atmosphere (ISA)

A.5.4 **Clouds and Precipitation**

- A.5.4.1 Composition of cloud, methods of formation height of base and vertical extent. International nomenclature and classification of cloud types
- A.5.4.2 Turbulence, orographic, stratiform and convection cloud. Structure and classification.
- A.5.4.3 Thunderstorms, development and structure, development and effect of micro bursts, associated flight hazards, atmospheric electricity (lightning and static)
- A.5.4.4 Types of precipitation, drizzle, rain, snow, hail
- A.5.4.5 General causes of precipitation, precipitation associated with different types of cloud
- A.5.4.6 Operating hazards associated with various types of cloud and precipitation

A.5.5 **Wind**

- A.5.5.1 Relationship between isobars and wind, Buys Ballots Law
- A.5.5.2 Primary cause of wind, pressure gradient, geostrophic force and geostrophic wind. Coriolis force, gradient wind, convergence and divergence effects (NO FORMULAE)
- A.5.5.3 Diurnal variation of wind at the surface and on top of the friction layer.
- A.5.5.4 Local variation of wind with topography; ravine wind; anabatic and katabatic effects, Fohn effect, land and sea breezes
- A.5.5.5 Airflow over mountains, standing waves and conditions favourable for their development, rotor streaming
- A.5.5.6 Turbulence, gustiness and squalls, factors affecting turbulence
- A.5.5.7 Low level wind shear. Effect on aircraft operation. Weather situations favourable for low level windshear.

Methods of recognition. Action to be taken on encountering turbulence or low level wind shear
- A.5.5.8 Variation of wind with height

A.5.6 **Visibility**

- A.5.6.1 Fog, mist, haze and their difference
- A.5.6.2 Formation and clearance of radiation fog, advection fog, steam fog and frontal fog: diurnal and seasonal variation

- A.5.6.3 Reduction of visibility caused by mist, smoke, dust, sand, snow and sea spray
- A.5.6.4 Vertical and oblique visibility: visual illusions in flight caused by precipitation
- A.5.6.5 RVR (Runway Visual Range) and IRVR (Instrumented Runway Visual Range)

- A.5.7 **Ice Accretion**
 - A.5.7.1 Forms of airframe icing: airframe icing in relation to cloud types; factors affecting form and severity of icing; hazards of ice accretion
 - A.5.7.2 Action to take on encountering icing conditions
 - A.5.7.3 Power plant icing

- A.5.8 **Airmasses and Fronts**
 - A.5.8.1 Description, classification and characteristic of airmass affecting the UK including warm fronts, cold fronts and occlusions
 - A.5.8.2 Depressions, anticyclones, cols and their associated weather.

- A.5.9 **The Weather Map**
 - A.5.9.1 Interpretation of symbols and figures used on weather charts
 - A.5.9.2 The development and movement of simple pressure systems and fronts
 - A.5.9.3 Interpretation of synoptic charts and use of the synoptic chart for the preparation of a route forecast and landing forecasts.
 - A.5.9.4 Effects of topographical features and diurnal variation on development of weather

- A.5.10 **Observations**
 - A.5.10.1 Knowledge of standard methods of measuring visibility and cloud height also pressure, temperature, humidity and wind at the surface and in the upper air. (A knowledge of the mechanics of the various instruments is not required)
 - A.5.10.2 The Q code groups QFE, QNE, QNH, QFF and Regional QNH

- A.5.11 **Flight Documentation**
 - A.5.11.1 Comprehension and interpretation of all flight forecast documents available for departures from Hong Kong and the United Kingdom. (Changes in documentation take place from time to time, examination questions will reflect current practice)

A.5.11.2 Decoding of TAF, METAR and SIGMET messages. TREND type landing forecasts and the criteria for their use

A.6 METEOROLOGY (PRACTICAL)

A test in the practical application covered by paragraph A.5

A.7 RADIO AIDS

A.7.1 Electro magnetic radiation

A.7.1.1 Speed of propagation

A.7.1.2 Frequency / wavelength

A.7.1.3 Phase / phase difference

A.7.1.4 Frequency bands

A.7.2 Basic radio transmitter

A.7.2.1 Signal generation

A.7.2.2 Feeding and emission of R F signals

A.7.3 Antennas

A.7.3.1 Characteristics

A.7.3.2 Polarisation

A.7.3.3 Use of antennas

A.7.4 Modulation of Radio waves

A.7.4.1 Amplitude, frequency and pulse modulation

A.7.4.2 Classification of emission

A.7.5 Wave propagation

A.7.5.1 Factors affecting range and propagation of ground, direct and sky waves

A.7.5.2 Height of ionospheric layers

A.7.5.3 Ducted propagation, tropospheric scatter

A.7.6 Radio communications

A.7.6.1 Long and short range communications systems

A.7.6.2 Frequencies/frequency bands used

A.7.6.3 S S B

- A.7.6.4 Selcal
- A.7.6.5 Satcom

- A.7.7 **Ground D/F**
 - A.7.7.1 Principles
 - A.7.7.2 Coverage and range
 - A.7.7.3 Errors and accuracy (including classification of bearing accuracy)
 - A.7.7.4 Factors affecting range and accuracy

- A.7.8 **ADF/NDB**
 - A.7.8.1 Principles
 - A.7.8.2 Coverage and range (including protection)
 - A.7.8.3 Errors and accuracy
 - A.7.8.4 Factors affecting range and accuracy
 - A.7.8.5 Presentation and interpretation (including use of the RMI)

- A.7.9 **VOR (Conventional and Doppler)**
 - A.7.9.1 Principles
 - A.7.9.2 Coverage and range (including DOC)
 - A.7.9.3 Errors and accuracy
 - A.7.9.4 Factors affecting range and accuracy
 - A.7.9.5 Presentation and interpretation (including use of the RMI)

- A.7.10 **ILS**
 - A.7.10.1 Principles
 - A.7.10.2 Coverage and range
 - A.7.10.3 Errors and accuracy
 - A.7.10.4 Factors affecting range and accuracy (including categories)
 - A.7.10.5 Presentation and interpretation

- A.7.11 **MLS**
- A.7.11.1 Principles
- A.7.11.2 Coverage and range
- A.7.11.3 Errors and accuracy
- A.7.11.4 Factors affecting range and accuracy
- A.7.11.5 Presentation and interpretation

- A.7.12 **Basic Radar Principles**
- A.7.12.1 Advantages/disadvantages of primary/secondary radars
- A.7.12.2 Pulse techniques and associated terms

- A.7.13 **DME**
- A.7.13.1 Principles
- A.7.13.2 Coverage and range
- A.7.13.3 Errors and accuracy
- A.7.13.4 Factors affecting range and accuracy
- A.7.13.5 Presentation and interpretation

- A.7.14 **VOR/DME Area Navigation (RNAV)**
- A.7.14.1 Principle of operation
- A.7.14.2 Advantages and disadvantages
- A.7.14.3 Accuracy, reliability and coverage
- A.7.14.4 Presentation and interpretation
- A.7.14.5 Use of DME to update INS/FMS

- A.7.15 **SSR**
- A.7.15.1 Application for navigation
- A.7.15.2 Principles, (including Mode 'S' data link)
- A.7.15.3 Presentation and interpretation

A.7.16 **Ground Radar**

A.7.16.1 Principles

A.7.16.2 Coverage and range

A.7.16.3 Presentation and interpretation

A.7.16.4 Errors and accuracy

A.7.16.5 Factors affecting range and accuracy

A.7.17 **Airborne Weather Radar**

A.7.17.1 Principles

A.7.17.2 Coverage and range

A.7.17.3 Errors and accuracy

A.7.17.4 Factors affecting range and accuracy

A.7.17.5 Presentation and interpretation

A.7.18 **Doppler**

A.7.18.1 Principle of operation

A.7.19 **Radio Altimeter**

A.7.19.1 Principles

A.7.19.2 Errors and accuracy

A.7.19.3 Presentation and interpretation

A.7.20 **Ground Proximity Warning System (GPWS)**

A.7.20.1 Function

A.7.20.2 Data inputs

A.7.20.3 Warning modes

A.7.20.4 Mode limits

A.7.20.5 Integrity testing

- A.7.21 **Satellite Assisted Navigation**
- A.7.21.1 Basic principles
- A.7.21.2 Derivation of position line
- A.7.21.3 Accuracy, reliability, range and coverage
- A.7.21.4 Automatic systems

- A.7.22 **Traffic Collision Avoidance System**
- A.7.22.1 Principles
- A.7.22.2 Warnings

A.8 RADIOTELEPHONY

Refer to the syllabus in Part 1 Chapter 4 Paragraph 4.3.

A.9 HUMAN PERFORMANCE

A.9.1 Basic Aviation Physiology and Health Maintenance

A.9.1.1 Basic Physiology and the Effects of Flight

- Anatomy and physiology of the eye, ear, vestibular, circulatory, and respiratory systems
- Composition of the atmosphere, gas laws and the nature of the human requirement of oxygen
- Effects of reduced ambient pressure and of sudden decompression; times of useful consciousness
- Recognising and coping with hypoxia and hyperventilation
- Entrapped gases and barotrauma
- Diving and flying
- Effects of acceleration (+/-G) on circulatory system, vision and consciousness
- Mechanism, Effects and management of motion sickness

A.9.1.2 Flying and Health

- Noise and age-induced hearing loss
- Visual defects and their correction
- Arterial disease and coronary risk factors, ECG, blood pressure, stroke
- Diet, exercise, obesity
- Fits, faints and the EEG
- Psychiatric diseases; drug dependence and alcoholism
- Tropical diseases and their prophylaxis, hepatitis and sexually transmitted diseases
- Common ailments and fitness to fly; gastro-enteritis, colds, use of common drugs and their side effects
- Toxic hazards
- Causes and management of in-flight incapacitation

A.9.3 Basic Aviation Psychology

A.9.3.1 Basic plan of human information processing, including the concepts of sensation, attention, memory, central decision-making and the creation of mental models.

A.9.3.2 Limitations of central decision channel and mental workload

A.9.3.3 Function of attention is selecting information sources, attention-getting stimuli

A.9.3.4 Types of memory; peripheral or sensory memory, long term (semantic and episodic) memory, short term or working memory, motor memory (skills)

A.9.3.5 Memory limitations and failures

A.9.3.6 Perception, the integration of sensory information to form a mental model

- A.9.3.7 Effects of experience and expectation on perception
- A.9.3.8 Erroneous mental models; visual, vestibular and other illusions
- A.9.3.9 Recognising and managing spatial disorientation
- A.9.3.10 Use of visual cues in landing
- A.9.3.11 Eye movements, visual search techniques, mid-air collisions
- A.9.3.12 Skill-, rule- and knowledge-based behaviours
- A.9.3.13 The nature of skill acquisition, the exercise of skill, conscious and automatic behaviour, errors of skill
- A.9.3.14 Rule-based behaviour, procedures, simulator training, failures in rule-based behaviour
- A.9.3.15 Knowledge-based behaviour, problem solving and decision making, inference formation, failures in knowledge-based behaviour
- A.9.3.16 Maintaining accurate mental models, situational awareness, conformation bias

A.9.4 **Stress, Fatigue and their Management**

A.9.4.1 Models and Effects of Stress

- Definitions, concepts and models of stress
- Arousal; concepts of over- and under-arousal
- Environmental stresses and their effects; heat, noise, vibration, low humidity
- Domestic stress, home relationships, bereavement, financial and time commitments
- Work stress, relationships with colleagues and management
- Effects of stress on attention, motivation and performance
- Life stress and health, other clinical effects of stress
- Defence mechanisms, identifying stress and stress management

A.9.4.2 Sleep and Fatigue

- Biological clocks and circadian rhythms, sleep/wakefulness and temperature rhythms, 'zeitgebers'
- Sleep stages, sleep at abnormal times of day, required quantity of sleep
- Work-induced fatigue
- Shift work
- Time zone crossing, circadian dysrhythmia, re-synchronisation
- Rostering problems, sleep management and naps
- Sleep hygiene
- Management of sleep with drugs

A.9.5 **Social Psychology and Ergonomics of the Flight Deck**

A.9.5.1 Individual Differences, Social Psychology and Flight Deck Management

- Individual differences, definitions of intelligence and personality
- Assessing personality
- Main dimensions of personality; extroversion and anxiety. Other important traits: warmth and sociability, impulsivity, tough-mindedness, dominance, stability and boldness.
- Goal-directed, person-directed types of behaviour
- Autocratic and democratic leadership styles
- Individual personality related problems of flying, especially risk-taking
- Personality interaction on the flight deck, and the interaction of personality with status or seniority, role (e.g. handling/non-handling) and perceived ability of crew members
- Concepts of conformity, compliance and risky shift. Implications of these concepts for the flight deck with regard to effects of crew size (especially 2 v 3 crew)
- Communication, verbal and non-verbal communication, one and two way communication, different communication styles
- Methods of maximising crew effectiveness and improving flight deck, or cockpit resource, management
- Interacting with cabin crew, air traffic services, maintenance personnel and passengers

A.9.5.2 The Design of Flight Decks, Documentation and Procedures

- Basic principles of control, display and workspace design
- Eye datum, anthropometry and workspace constraints, external vision requirements, reach, comfort and posture
- Display size, legibility, scale design, colour and illumination. Common errors in display interpretation
- Control size, loading, location and compatibility of controls with displays
- The presentation of warning information and misinterpretation of warnings
- The design and appropriate use of checklists and manuals
- Effects of automation and the 'glass cockpit'. Integration of information from many data sources on one display, and automatic selection of displayed information. Mode and status representation
- Machine intelligence and relationship between aircraft decisions and pilot decisions
- The avoidance of complacency and boredom, and maintaining situational awareness. Maintaining basic flying skills

A.9.5.3 Judgement

- Making decisions
- Assessing risk

A.10 SIGNALS

A.10.1 Decoding of aural three-letter groups from the Morse Code.

NOTE: Applicant will be expected to identify the Morse symbols when transmitted and to write the appropriate letters on the answer page. The Morse symbols must not be entered in the answer page. An applicant who does so will be failed this subject.

A.11 AIRCRAFT TECHNICAL GROUP EXAMINATIONS

The Aircraft Technical Group Examinations comprise the following papers:

A.11.1 Principles of Flight (Aeroplanes)

A.11.1.1 Subjects; principles of flight (subsonic aeroplanes), flying controls, fixed and variable pitch propellers

A.11.1.2 The syllabus for propellers is contained partly within flying controls and partly within piston engines but will be examined only in the examination detailed at 9.1.1. This is because helicopter pilots take a separate Principles of Flight paper which will not include propellers whereas the engines paper is common to all candidates

A.11.2 Principles of Flight (Helicopters)

A.11.2.1 Subjects; principles of flight (helicopters), helicopter controls, rotors and transmissions

A.11.3 Engines

A.11.3.1 Subjects; piston engines and supercharging/turbocharging, gas turbines

A.11.4 Electrics and Automatic Flight

A.11.4.1 Subjects; DC electrics, AC electrics, semi conductors, logic circuits, electronic display systems. autopilots and autoland

A.11.5 Airframe Systems (Aeroplanes)

A.11.5.1 Subjects; air conditioning and pressurisation, hydraulics, fuel, including refuelling and de-fuelling, landing gear and wheel brakes, ice and rain protection, ground de-icing, oxygen, auxiliary power unit, emergency equipment

A.11.6 Airframe Systems (Helicopters)

A.11.6.1 Subjects; hydraulics, fuel, refuelling, de-fuelling, landing gear and brakes, emergency equipment

A.11.7 For initial grant of a licence a candidate will be told, when his application is acknowledged, which of the papers he will be required to take and pass

- A.11.8 When the holder of a licence, obtained under the Aircraft General examination syllabus in existence before the 1st January 1991, wishes to add another aircraft type rating to that licence and/or to change the licence class it may be necessary to take and pass such other papers as are appropriate to that aircraft type and/or licence class (such a licence holder should make application to the PLO for assessment)
- A.11.9 Those already holding licences obtained under the Aircraft General examination syllabus in existence before 1st January 1991 will be free to apply, if they so wish, to take any further papers not in association with an application to add an aircraft type or change the licence class. This requirement will be additional to any requirement for a theoretical knowledge examination and flight test on a specific type.
- A.11.10 A guide to the area of knowledge required in each of the subjects to be examined is given in paragraphs A.12 to A.16 below
- A.11.11 The following is illustrative of a 'depth of knowledge' classification. Ability to arrive at the correct answer by:
- | | |
|--------|--|
| Code 1 | factual recall |
| Code 2 | comprehension and logical combination of separate items of factual recall |
| Code 3 | logical combination of all relevant items of factual recall and a sound knowledge of the principles involved |
| Code 4 | a thorough knowledge of the subject and the principles involved, and their application to the problem |
- A.11.12 The depth of knowledge classification for the Aircraft (Technical Group) subjects is Code 3
- A.11.13 Papers will include, at appropriate points, questions to test the candidate's knowledge of: the various types of emergency equipment used in aircraft and the suitability of different types of fire extinguishers for different types of fire.

A.12 PRINCIPLES OF FLIGHT (AEROPLANES)

A.12.1 Definitions

- A.12.1.1 Components of aeroplane; stress terms, structural terms, materials used, fatigue
- A.12.1.2 Aeroplane configurations; definitions of shape and reference
- A.12.1.3 Units of measurement; length, area, volume, velocity, mass, weight, pressure (static, dynamic, total), temperature, density, force, power, energy
- A.12.1.4 Airspeeds, IAS, RAS/CAS, EAS, TAS.
- A.12.1.5 Reference speeds
- A.12.1.6 Terms used to describe aerodynamic phenomena; boundary layer, laminar flow, turbulent flow, separated flow, ground effect
- A.12.1.7 Abbreviations

A.12.2 Derivation of Lift

- A.12.2.1 Equation of continuity; mass flow
- A.12.2.2 Bernoulli's theorem
- A.12.2.3 Streamline flow
- A.12.2.4 Angle of attack; 'incidence'
- A.12.2.5 Pressure distribution about a wing (transverse and longitudinal)
- A.12.2.6 Centre of pressure; pitching moment
- A.12.2.7 Wing shape (plan and section); its effect on lift
- A.12.2.8 Lift formula

A.12.3 Drag

- A.12.3.1 Profile drag; causes, boundary layer, variation with speed, methods of minimising it
- A.12.3.2 Induced drag; causes, vortices, variation with speed, design factors affecting it
- A.12.3.3 Interference drag
- A.12.3.4 Total effect of the combination of profile and Induced drag

- A.12.3.5 Lift/drag ratio; variation with angle of attack, implications, operational considerations

- A.12.4 **Distribution of Forces - Balance**
 - A.12.4.1 Lift/weight and thrust/drag couples
 - A.12.4.2 Necessity to achieve balance
 - A.12.4.3 Methods of achieving balance; cp/cg relationship, trim fuselage bending (tailplane loading)
 - A.12.4.4 Trim drag
 - A.12.4.5 Force and power situations in various phases of flight; thrust required/available, power required/available, take-off, manoeuvre, climb, cruise (range, endurance, propeller/let), descent, landing
 - A.12.4.6 Turning
 - A.12.4.7 Lateral force distribution; wing bending

- A.12.5 **Stability**
 - A.12.5.1 Aircraft axes and planes of rotation
 - A.12.5.2 Static stability
 - A.12.5.3 Dynamic stability
 - A.12.5.4 Effects of design features on stability; longitudinal, lateral, directional
 - A.12.5.5 Inter-action between stability in different planes
 - A.12.5.6 Effect of altitude/speed on stability
 - A.12.5.7 Speed stability
 - A.12.5.8 Yaw and roll
 - A.12.5.9 Autostabilisation; yaw and roll dampers, autothrottle
 - A.12.5.10 Asymmetric effects

- A.12.6 **Stalling**
 - A.12.6.1 Angle of attack
 - A.12.6.2 Boundary layer and reasons for stalling

- A.12.6.3 Variation of lift and drag in the stall
- A.12.6.4 Movement of the centre of pressure
- A.12.6.5 Symptoms of the stall; stall detection, desirable characteristics
- A.12.6.6 Tip stalling; its dangers and methods of minimising them
- A.12.6.7 Effect of separated flow over horizontal stabiliser; design configuration
- A.12.6.8 Stall warning devices
- A.12.6.9 Stall recovery
- A.12.6.10 Stick pushers
- A.12.6.11 Stalling speed variations; manoeuvres, weight, configuration
- A.12.6.12 The spin (autorotation)

- A.12.7 **Lift Augmentation**
- A.12.7.1 Trailing-edge devices; terminology, effects, advantages and disadvantages
- A.12.7.2 Leading-edge devices; terminology, effects, advantages and disadvantages
- A.12.7.3 Effect of lift augmentation devices on lift/drag ratio
- A.12.7.4 Flight deck controls and indicators

- A.12.8 **Flying Controls**
- A.12.8.1 Ailerons, elevators, rudder, spoilers/airbrakes, elevons, flying tail, trimming tailplane etc
- A.12.8.2 Effects; primary, secondary, primary and secondary control surfaces
- A.12.8.3 Flutter; causes, mass balance
- A.12.8.4 Actuation; manual controls, aerodynamic balance and methods used, powered controls, methods of transmitting demands to control surfaces, feedback of control surface hinge moment, feel (natural/artificial), feel systems
- A.12.8.5 Trim; mechanical, aerodynamic, flight deck controls and indicators

- A.12.9 **Autopilots**
- A.12.9.1 Function and application
- A.12.9.2 Types; different axes

- A.12.9.3 Component diagram
- A.12.9.4 Modes; lateral, longitudinal, common
- A.12.9.5 System concepts for autoland; go around, take-off, fail passive, fail operational (redundant)
- A.12.9.6 Control mode
- A.12.9.7 System monitoring

- A.12.10 **Asymmetric Flight**
- A.12.10.1 Minimum control speeds
- A.12.10.2 Effect of ambient conditions

- A.12.11 **Propellers**
- A.12.11.1 Conversion of engine torque to thrust
- A.12.11.2 Meaning of geometric pitch; effective pitch
- A.12.11.3 Angle of attack; blade angle
- A.12.11.4 Reasons for blade twist
- A.12.11.5 Propeller efficiency
- A.12.11.6 Windmilling drag
- A.12.11.7 Propeller effects; torque reaction, gyroscopic effect, asymmetric blade effect, slipstream effect
- A.12.11.8 Forces acting on a propeller; centrifugal twisting moment, aerodynamic twisting moment, thrust, torque
- A.12.11.9 Fixed pitch propeller disadvantages
- A.12.11.10 Materials; fatigue

- A.12.12 **Transonic Flight**
- A.12.12.1 Shock waves; the reasons for their formation at subsonic aircraft speeds, effect on handling and operation, sonic buffet and its similarity to aerodynamic stall, wave drag, MCRIT, 'supercritical' terminology

A.12.13 **Aerodynamic Limitations**

A.12.13.1 IAS/EAS/TAS/M; dynamic pressure, margins

A.12.13.2 Manoeuvring and gust envelope

A.12.14 **Performance Degradation**

A.12.14.1 Adverse effect on performance due to profile contamination including; icing, rain, modification to and condition of the airframe

A.13 PRINCIPLES OF FLIGHT (HELICOPTERS)

A.13.1 Principles of Flight

- A.13.1.1 Units of measurement; length, area, volume, speed, velocity, acceleration, mass, weight, pressure, temperature, density, force, work, energy (kinetic, potential, pressure), power
- A.13.1.2 Newton's 'laws of motion'; inertia, momentum
- A.13.1.3 Resolution of forces; moments, couples, torque, vectors, resultants, equilibrium, centre of gravity
- A.13.1.4 Airflow; flat plate (airflow around), turbulence (force from), streamlining (streamlines and flow), Bernoulli's theorem, the venturi, aerofoil (airflow over, pressure distribution transverse and longitudinal, centre of pressure, stagnation point, transition point, separation point)
- A.13.1.5 Lift; Bernoulli's theorem (relevance of), angle of attack, total reaction, lift formula, wing shape (plan and sections, and its effects on lift and centre of pressure movement), coefficient of lift curve
- A.13.1.6 Drag; zero lift drag (surface friction, form drag, interference drag, variation with speed), induced or lift dependent drag (causes, vortices, variation with speed, design factors affecting), laminar flow, boundary layer, fineness ratio/aspect ratio, viscosity, total drag and drag formula, coefficient of drag curve, lift/drag ratio and curve, compressibility/wave drag
- A.13.1.7 Stalling; angle of attack (CL curve), boundary layer reasons for stall, lift and drag variation at the stall, movement of centre of pressure at the stall, wing tip stall (dangers and methods of minimising), stall symptoms, stall (recovery from), effect of manoeuvre on the stall speed
- A.13.1.8 Forces on fixed wing aircraft in flight; level flight (four forces, pitching moments and couples, effect of weight and speed for a given angle of attack, tailplane and elevator), climbing (four forces, angle and rate of climb, effect of weight), gliding flight and the three forces involved, relevance of lift/drag ratio, effect of wind on range, effect of weight on range and endurance, turning flight (four forces, load factor)
- A.13.1.9 Stability; static stability, dynamic stability, aircraft axes and planes of rotation, effects of design features, inter-action between stability in different planes, effect of altitude and speed

A.13.2 Helicopter principles

- A.13.2.1 The helicopter and associated terminology; comparison with fixed wing and autogyro, plane of rotation, axes of rotation, rotor shaft axis, tip path plane, rotor disc, disc loading, blade loading

- A.13.2.2 The forces diagram and associated terminology; pitch angle rotational airflow, induced airflow, relative airflow to the blade, angle of attack, lift (blade), drag (blade), total reaction (blade), rotor thrust, rotor drag, torque, weight
- A.13.2.3 Uniformity of rotor thrust along blade span; washout, taper, coning angle, centrifugal force, limits of rotor rpm, centrifugal turning moments
- A.13.2.4 Helicopter controls; collective lever (collective pitch changes), relationship with rotor thrust and rotor drag, cyclic stick, cyclic pitch changes, rotor disc attitude, rotor thrust tilt, yaw pedals, fuselage torque, tail rotor drift, tail rotor roll, fenestron tail, tandem rotors, co-axial rotors, notar
- A.13.2.5 Rotor blade freedom of movement; feathering (the feathering hinge, pitch angle), flapping (the flapping hinge, alleviation of bending stresses, flapping to equality, dragging, the drag hinge, drag dampers, leading/lagging, periodic drag changes, blade C of G including conservation of angular momentum, Hookes joint effect)
- A.13.2.6 Phase lag and advance angle; the control orbit, pitch operating arm movement, rate of pitch change, rate of blade flapping, resulting disc attitude, phase lag (definition) advance angle (definition)
- A.13.2.7 Vertical flight; take off, vertical climb, vertical descent hover outside ground effect, ground effect, factors effecting ground cushion, ground resonance (causes and recovery actions), dynamic roll over (avoidance of)
- A.13.2.8 Forces in balance; at the hover, in forward flight, influence of centre of gravity, influence of stabilisers, influence of rotor shaft tilt
- A.13.2.9 Translational lift; effect of horizontal airflow on induced flow, variation of total flow through the disc with forward flight, the relationship between pitch angle and angle of attack
- A.13.2.10 Power requirements; rotor profile power, power absorption (tail rotor and ancillary equipment), rotor profile power variation with forward speed, induced power, parasite power, total power required, power available
- A.13.2.11 Further aerodynamics of forward flight; transition from/to the hover, symmetry and dissymmetry of rotor thrust, main rotor flapback, tail rotor flapback and methods of removal, factors affecting maximum forward speed (design limits of cyclic stick, airflow reversal, retreating blade stall, symptoms and recovery actions, compressibility including flow separation, the shock stall and the 'G' Stall), inflow roll
- A.13.2.12 Factors affecting cyclic stick limits; all up weight, density altitude, centre of gravity position
- A.13.2.13 The flare - powered flight; thrust reversal, effect on aircraft attitude, increase in rotor thrust, decrease in rotor drag, increase in rotor rpm, effect of deceleration
- A.13.2.14 Vortex ring; tip vortices, comparison of induced flow and external flow, development, change in relative airflow along blade span (root stall and turbulence), effect of increasing power, symptoms and recovery action, avoidance

- A.13.2.15 Blade sailing; rotor rpm and blade rigidity, effect of adverse wind, minimising the danger
- A.13.2.16 Autorotation (vertical); rate of descent airflow, effective airflow, relative airflow, inflow and inflow angle, autorotative force, rotor drag, effect of weight and altitude, control of rotor rpm with lever, rotor rpm stability
- A.13.2.17 Autorotation (forward flight); factors affecting inflow angle, effect of forward speed on rate of descent, dissymmetry of autorotative disc area in forward flight, turning, the flare (rotor rpm increase from movement of autorotative section, increase in rotor thrust, reduction in rate of descent), range and endurance, autorotative landing, height/velocity avoid graph
- A.13.2.18 Stability; hover, forward flight, rearward flight, stability aids (stabilisers and effects of centre of gravity, gyro controlled stabiliser systems, stabiliser bars, delta hinge effect), effect of lever application on attitude in translational flight
- A.13.2.19 Control power; the teetering head, fully articulated head, the rigid rotor, effect on stability, effect on dynamic rollover
- A.13.2.20 Power requirements (graphs); power required/power available graph, maximum rate of climb speed, operating with limited power, best angle of climb speed, maximum speed, range and endurance, overpitching, overtorquing, turning, comparison of piston and turbine engined helicopters (range and endurance, effect of density altitude, effect of aircraft weight)
- A.13.3 **Rotor Control Systems**
- A.13.3.1 Types of control system; push-pull rods and bell cranks, cables and pulleys, chains, teleflex, bowden cables
- A.13.3.2 Adjustments; end fittings, turnbuckles and tensiometers, primary and secondary stops
- A.13.3.3 Primary controls; cyclic, collective, directional, throttle, swash plate, spiders, cross coupling, correlation, mode of actuation (manual, hydraulic), friction, feel, trim
- A.13.3.4 Types of rotor head and components; fully articulated (hubs, flapping hinges/elastomerics, lead/lag hinges/elastomerics, feathering hinges/bearings/elastomerics, dampers, pitch operating rods, pitch control arms/advance angle, droop stops/flapping restrainers), semi-rigid (hubs, teetering/flapping hinges, feathering hinges, blade sleeve retention, drag bracing, pitch operating rods, pitch control arms/advance angle, droop stops/flapping restrainers, bump stops), rigid/hingeless description and materials, tail rotors (fenestron etc., Delta 3 hinges, Delta 3 effect)
- A.13.3.5 Main rotor blades; lift distribution (taper, washout), section (symmetrical, droop snoot, BERP), construction (extruded spar, fabricated, composite), balancing (chordwise, spanwise), tracking (flag method, Chadwick Helmuth, adjustments)
- A.13.3.6 Tail rotor blades; construction, balancing

A.13.4 **Transmission Systems**

A.13.4.1 Functions; drive to all rotors, speed changes, direction of drive, necessary angles of drive, accessory drives

A.13.4.2 Components; gearboxes, construction (gear types, lubrication, magnetic plugs, chip detectors, oil sampling), clutches/free turbines, freewheel units, drive shafts/support bearings, flexible couplings, rotor brakes

A.13.4.3 Indications; rpm, torque, oil temperatures, chip warnings

A.13.4.4 Checking; run-out, balancing, vibration

A.13.4.5 Hazardous Incidents; overspeed, overtorque, sudden stoppages

A.14 AIRFRAME SYSTEMS

A.14.1 Hydraulics

A.14.1.1 Basic Principles of Hydromechanics

- The general principles of transmission of force by fluid under pressure
- The means by which pressure is produced and controlled in a system
- Schematic construction and functioning of hydraulic systems
- Hydraulic fluids; the requirements of hydraulic fluids, the characteristics of hydraulic fluids, safety consideration

A.14.1.2 Hydraulic Systems

- Main, standby and emergency systems; constant pressure and constant delivery, engine driven, air driven, electrically driven, ram air turbines
- Accumulators; function, role as a safety feature
- Filters; indications and maintenance
- Valves; associated with normal system operation, incorporated as a safety feature
- Seals; function and failures
- Operation, indicators and warning systems
- Fluids; storage, reservoirs, supply, replenishment and quantity indications, temperature and pressure control and indications, safety precautions
- Systems operated by hydraulic power; flying controls (including artificial feel, flaps, spoilers, speedbrakes, trim and autopilot), landing gear, wheelbrakes, nosewheel and body gear steering

A.14.2 Pneumatics

A.14.2.1 Power Sources

- The compression process
- Engine driven compressors
- Engine bleed air (gas turbines)
- Turbocharger compressor bleed air, displacement blower (piston engines)
- APU
- Emergency supplies; air bottles, 'cross-bleed starting'
- Schematic construction of the foregoing system/components including operation, indication, protection, failures, warning and safety devices

A.14.2.2 Air Conditioning System

- Requirements; human factors, altitude physiology
- Supplies; bleed air 'bootstep' system (air cycle machine), displacement blower, vapour cycle, and ram air systems
- Schematic construction and operation
- Distribution and temperature control; automatic/manual, indicators, protection failures, warning and safety devices
- Ram air ventilation
- Avionics and cargo hold(s) air conditioning

A.14.2.3 Pressurisation

- Requirements, human factors
- Aircraft pressurised zones; pressurisation cycles, stresses
- Pressure control; automatic, semi-automatic, manual and standby modes: schematic construction, operation and indication
- Cabin altitude; relationship to cruise (flight) pressure altitude, maximum cabin altitude, maximum and nominal cabin differential pressure, positive and negative differential pressure, rate of change of differential pressure, flight profiles
- Monitoring; controls, indication, failures, warning, design safety features (safety valves) safety devices
- Cabin altitude warning; incipient decompression, rapid and explosive decompression, emergency procedures

A.14.2.4 Systems Actuation

- Landing gear; operation of, including nose wheel steering and brakes, control and indication, failures and warning devices
- Flight controls; leading and trailing edge flaps, control and indication
- Wing and engine anti/de-icing; leading edges, control surfaces and engine intakes, control and indication, limitations failures and warning devices
- Schematic construction of the foregoing
- Other requirements; doors, cargo compartment and hydraulic pressurisation

A.14.3 **Fuel Systems**

A.14.3.1 Fuel Tanks

- Structural; components and types
- Location; single- and multi-engine aircraft
- Sump drains
- Tank vents

A.14.3.2 Re-Fuelling/De-Fuelling

- Grades of fuel; MOGAS (implications of use), AVGAS, AVTUR (JP1/JP4)
- Colour coding of aircraft fuelling points and ground installations
- Density of various fuels
- Characteristics of fuels; octane rating, flash point, waxing point, colour coding, additives
- Sequence and types of re-fuelling; underwing/overwing, precautions to be observed

A.14.3.3 Fuel Feed

- Location of fuel pumps
- Gravity and pressure feed
- Pump(s); failure in flight
- Precautions to be observed when using MOGAS/JP4
- Crossfeed system
- Knowledge of schematic system
- Unusable fuel

A.14.3.4 Fuel Dumping (Jettisoning)

- National legislation; aircraft performance aspects
- Knowledge of schematic system
- Precautions to be observed
- Procedures; prior/during/after dumping
- Minimum fuel

A.14.3.5 Fuel System Monitoring

- Importance of fuel management
- Operation of system; indicators, warning system(s), system schematic knowledge
- Balancing of fuel; operational imbalance (lateral and longitudinal), engine out configuration.
- Fuel temperature; anti-waxing precautions
- Fuel de-icing procedure(s)

A.14.4 **Ice and Rain Protection**

A.14.4.1 Requirements

- Anti-ice, De-ice

A.14.4.2 Ice Warning

A.14.4.3 Pneumatic Ice Protection Systems

- Leading edges of flying surfaces
- Schematic construction and functioning
- Operation of the system; limitations
- Initiation; timing
- Controls; indicators, protection, warnings

A.14.4.4 Thermal Ice Protection Systems

- Propeller blades, air intakes, flying surfaces, pitot and other sensors, windshields
- Methods; electrical, air, oil
- Schematic construction and functioning
- Operation of the system; limitations

- Initiation; timing
- Controls; indicators, protection, warnings

A.14.4.5 Fluid Ice Protection Systems

- Leading edges of flying surfaces, propellers
- Schematic construction and functioning
- Operation of the system; limitations
- Initiation; timing
- Controls; indicators, protection, warnings

A.14.4.6 Rain Removal

A.14.4.7 Ground De-icing

A.14.4.8 Effects on Aircraft Performance

A.14.5 **Landing Gear and Wheel Braking Systems**

A.14.5.1 Landing Gear

- Types; fixed, retractable
- Construction; main components
- Sources of power; normal operation, alternate and emergency operation
- Locking devices and emergency extension systems
- Accidental retraction prevention devices
- Air/ground logic; sensor systems
- Position; movement lights and indicators
- Steering; nosewheel steering, body gear steering, turning radius
- Wheels and tyres; construction, condition (creep, wear, cuts, pressure, contamination), limitations including tyre limiting speed

A.14.5.2 Wheel Braking Systems

- Types
- Construction; main components
- Parking brake; operation and indications
- Alternate and reserve braking systems
- Sources of power; normal braking system, alternative and reserve braking systems
- Operation (indications, warning systems); brake system pressure, brake wear indicators, brake overheat, brake energy and cooling data, performance limitations
- Anti-skid systems; principles and operation, controls and indications, limitations in the event of failure
- Auto brake systems; principles and operation, controls and indications, rejected take-off auto brake

A.14.6 **Emergency Equipment**

A.14.6.1 As State Regulations

A.14.6.2 Doors and Emergency Exits

- Accessibility, location
- Normal and emergency operation
- Crew and passenger emergency exits
- Aircraft emergency lighting and marking; cockpit/flight deck, passenger cabin, cabin floor
- Evacuation slides; general use or as life rafts or flotation devices
- Aircraft cut-in areas.

A.14.6.3 Smoke Detection

- Location of detector units; toilets, cargo holds, electrical and equipment bays
- System operation
- Indicators and warnings
- Functional test
- Location and use of smoke protection devices; masks/smoke hood

A.14.6.4 Fire Detection

- Type of system
- Location of detector units in relation to protection; engine nacelles, wheel wells, APU
- System functional/continuity test
- Warnings

A.14.6.5 Fire Protection (Aircraft Systems Equipment)

- Location of components; bottles etc
- Pre-flight check of components; gauge pressure, temperature (effects on pressure), indication of system integrity (used bottle), functional test
- System operation; warnings
- A.P.U; pre-flight check, gauge pressure, temperature and its effects, system integrity, functional test.

A.14.6.6 Oxygen System and Equipment

- Effects of hypoxia
- Components; location, checks, system tests (crew, passenger)
- Principles of operation of systems in relation to; cabin altitude, automatic, manual
- Protection and surveillance devices
- Drills; use of equipment (normal operations, rapid decompression)
- Comparison of constant flow and demand outlet masks
- Use of oxygen generators
- Dangers of oxygen use; safety measures
- Replenishment of oxygen system

A.14.6.7 Emergency Equipment

- Types of portable hand held fire extinguishers
- Portable oxygen
- Life jackets and life rafts
- Survival packs; types of survival equipment, emergency locator beacon, transmitter
- Emergency torch
- Megaphone
- Crash axe
- Fireproof gloves

A.15 ENGINES

A.15.1 Piston Engines

- A.15.1.1 Basic gas laws; Boyles law, Charles law
- A.15.1.2 Heat; conversion of heat energy to mechanical energy, transfer of heat (conduction, convection, radiation)
- A.15.1.3 Newton's laws of motion; mass, force, weight, momentum, inertia
- A.15.1.4 Power; units of power (watt), horsepower (brake horse power, indicated horse power, thrust horse power, shaft horse power), factors which effect power output, controlling power output rpm/mp
- A.15.1.5 Piston engine construction and operation; engine nomenclature (major parts and assembles, cylinder terminology), principle of operation (four stroke cycle, valve timing, ignition timing), schematic construction and functioning
- A.15.1.6 Engine efficiencies; mechanical efficiency, thermal efficiency, volumetric efficiency
- A.15.1.7 Carburation; fuels (types, grades), automobile fuel (MOGAS), combustion process (mixture ratios), detonation (contributing factors, effects and indications, stopping and prevention), pre-ignition (contributing factors, effects and indications, stopping and prevention)
- A.15.1.8 Carburettors; basic float carburettor (float chamber, jets, air bleeds, idling system, accelerator pump, economiser system, mixture control system), direct fuel injection (fuel injection pump, fuel/air control unit, fuel manifold valve, fuel discharge nozzle), carburettor icing (vaporisation, laws of evaporation, carburettor ice formation, carburettor intake heating, effect of ice on engine performance), carburettor induction system (alternate air, air filter, intake blockage indication and symptoms)
- A.15.1.9 Power augmentation devices; turbo-charger, controllers, waste-gate, secondary effects of turbo-charging, supercharging
- A.15.1.10 Fuel delivery; simple aircraft fuel system, engine priming, fuel system controls
- A.15.1.11 Lubrication and cooling; oil types and grades, oil functions, lubrication methods, system components (filters, relief valves, temperature control, wet sump system, dry sump system), air cooling (importance of cooling, control of cylinder airflow and temperature)
- A.15.1.12 Ignition system; high tension magneto (points, capacitor, distribution), reasons for pressurising magnetos, impulse coupling, low tension coil
- A.15.1.13 Engine instruments; gauges - rpm, manifold pressure, oil pressure, oil temperature, cylinder head temperature, exhaust gas temperature, fuel flow and pressure, induction system temperature gauge

- A.15.1.14 Engine controls; throttle, rpm, mixture, carburettor heat, cowl flap, ignition switch, engine priming pump and prime switch, alternate air
- A.15.1.15 Engine handling; pre-start inspection, starting procedure and precautions, shut down procedure, after start checks and testing, procedure for changing power settings
- A.15.1.16 Engine performance; manifold pressure versus rpm, propeller load, effect of altitude/temperature on performance, effects of fuel/air ratio, best power, best economy, carburettor air temperature, exhaust back pressure, cruise control (range and speed charts, power setting)
- A.15.1.17 Engine running faults; incorrect temperature and pressures, rough running, vibration, loss of power, trouble shooting procedure
- A.15.1.18 Propellers (reason for variable/constant speed propellers); blade pitch positions (flight fine pitch, ground fine pitch, coarse pitch, feather, reverse pitch), propeller efficiency, construction and operation (single acting propeller, double acting propeller), constant speed unit (on-speed, over-speed, under-speed, feather/unfeather, unfeathering accumulator, feathering pump, automatic feathering, Beta control, negative torque sensing, synchronisation, synchrophase), design features for power absorption
- A.15.2 **Turbine Engines**
- A.15.2.1 Basic principles; theory of jet propulsion (Newton's laws of motion), working cycle (gas flow, changes in pressure, velocity, temperature, constant pressure cycle)
- A.15.2.2 Engine developments; engine efficiencies (propulsive efficiency, thermal efficiency, overall efficiency), basic mechanical arrangements (turbo-jets, turboprops, turbo-shafts, by-pass engines, spool arrangements-single/twin/triple), relative propulsive efficiencies (advantages/disadvantages, mechanical arrangement)
- A.15.2.3 Engine construction; intakes (subsonic), compressors (centrifugal, axial, spool arrangements-single/twin/triple, compressor characteristics, effects of blade damage and/deterioration), combustion systems (multichamber, turbo-annular, annular, air fuel ratios, cooling and dilution flows, method of atomisation and vapourisation), turbines (single/twin/triple spool, impulse/reaction, shrouding/unshrouding, active clearance control, blade and disc cooling, creep/thermal fatigue/thermal shock, free power turbines), exhausts (collectors, jet pipe, propelling nozzles, pressure thrust, methods of noise reduction), external gearbox (drives, accessories), schematic construction and functioning
- A.15.2.4 Operation and requirements of engine systems; oil system (types of approved oils/mixing, full flow system, relief valve system, system components, control/inspection MCD'S, instrumentation/interpretation), internal air systems (cooling and sealing flows, turbine overheat-action/drills), fuel systems (types of fuel and requirements, fuel flow versus rpm/engine pressure ratio, normal demand, acceleration/deceleration control, surge and extinction, system components, principles of control systems, pressure control/electronic full and

limited authority, automatic control for ambient temp/press, temp/rpm limiters), starting (air starters, electric starters, system components, typical start procedure/instruments, start problems-hot/wet/hung, dry motoring, relighting-relight envelope), thrust augmentation (water-methanol, water injection, system components)

- A.15.2.5 Pod/nacelle; cooling and ventilation, zones, air supplies, fire protection (detection, extinguisher, instrumentation-action/drills), anti-icing (hot air, electrical, combined systems, instrumentation), thrust reverse (hot stream spoilers, hot stream reversal, cold stream reversal, instrumentation, safety features)
- A.15.2.6 Operation of gas turbines; selection and control of thrust (control parameters), instrumentation (thrust/EPR, rpm, turbine gas temperature, vibration, electronic displays - ECAM, EICAS), performance (effect of OAT/pressure altitude/environmental envelope, effect of changes in rpm/TGT/EPR etc, TGT/rpm/epr limitations effect of bleed air on thrust/exhaust temp/rpm/pressure, flat rating), airflow control (blade stall, stage stall, rotating stall, surge, pressure ratio v mass flow, control systems bleed valves, VIGVs, electronic control systems)
- A.15.2.7 Auxiliary power unit (APU); function and types, operation and monitoring

A.16 ELECTRICS AND AUTOMATIC FLIGHT

A.16.1 Direct Current (DC)

- A.16.1.1 Definitions; electron, potential difference, electromotive force, voltage, current, resistance, power
- A.16.1.2 Ohm's law
- A.16.1.3 Resistance calculations; series circuit, parallel circuit and series parallel circuits
- A.16.1.4 Resistance (as a function of); temperature, conductor cross sectional area and length
- A.16.1.5 Kirchoff 's laws
- A.16.1.6 Current and voltage calculations; series circuit, parallel circuit
- A.16.1.7 Electrical power and work; derivation of power formulae
- A.16.1.8 Basic circuit components and symbols; generator, battery, switch, relay, earth, fuse, circuit breaker, resistance, condenser/capacitor, etc
- A.16.1.9 Electrical unit prefixes; megohm, kilovolt, milliamp, microvolt, etc
- A.16.1.10 Batteries; lead acid (construction, electrolyte composition, cell terminal voltage, electrolyte specific gravity indications of battery charge state, amperehour ratings), nickel cadmium battery (construction, electrolyte composition, electrolyte S.G. characteristics-indications of battery charge state, cell terminal voltage, thermal runaway and cockpit indications, ampere-hour ratings)
- A.16.1.11 Aircraft systems; purpose, checking for serviceability-Pilot orientated, effects of overcharging, effects of leaving a battery in a discharged state, voltage resulting from series and parallel connection and series-parallel connection, spilt electrolyte neutralising agents
- A.16.1.12 Aircraft wiring and circuit protection; unipole, di-pole, earth return, bonding and discharge wicks, screening, short circuit, open circuit, fuses, current limiters, circuit breakers, trip free, non trip free, reverse current circuit breaker
- A.16.1.13 Permanent magnetism
- A.16.1.14 Electromagnetism; solenoid, relay(contactor), reverse current cut out
- A.16.1.15 Electromagnetic induction
- A.16.1.16 Electromagnetic power; direct current generators (construction - rotating armature with commutator, the electrical field, shunt wound, series wound, compound wound, voltage control and indications), alternators producing direct current by rectification (construction, the electrical field-external excitation, slip rings and brushes, voltage control and indications)

- A.16.1.17 Generator control; voltage regulator, reverse current cut out, monitoring instruments (ammeter, loadmeter, voltmeter, magnetic indicators), field flashing and reset facility, paralleling, differential voltage control, load sharing and equalising circuit, normal indications and operation, emergency indications and follow up actions
- A.16.1.18 Bus bar distribution and protection; essential consumers, non essential consumers, emergency consumers, battery supplied consumers (fire detection and protection, emergency lights, emergency instruments)
- A.16.1.19 Direct current motors; construction, field windings (shunt, series, compound)
- A.16.1.20 Starter generator; control function and application
- A.16.1.21 Inverter; control function and application
- A.16.1.22 Actuators; rotary (control function and application), Linear (control function and application)
- A.16.1.23 Ground power unit (D.C.); purpose, aircraft circuit protection

- A.16.2 **Alternating Current (A.C.)**
- A.16.2.1 Nature of alternating E.M.F. and current; sine wave format, rms value
- A.16.2.2 Advantages and disadvantages compared to direct current
- A.16.2.3 Inductance; inductive reactance, current and voltage phase relation, frequency variation and effect, definition of units and formula
- A.16.2.4 Capacitance; capacitive reaction, current and voltage phase relation, frequency variation and effect, definition of units and formula
- A.16.2.5 Power in A.C. circuits; true and apparent power (units (kVA) and (kW) defined), reactive power, unit (kVAR) defined
- A.16.2.6 Impedance defined
- A.16.2.7 Alternating current generator three phase brushless; construction-internal excitation (stators and terminal connections, rotor and field winding, field excitation, number of rotor poles in general use, determination of frequency)
- A.16.2.8 Power derivation; star wound stators (phase voltage- 115v, line voltage- 200v, current value), delta wound stators, (phase current, line current, voltage value)
- A.16.2.9 Generator control and protection unit (G.C.P.U.); voltage sensing and regulation (over and under frequency monitoring, over and under voltage monitoring, field excitation and control-sampling circuit)
- A.16.2.10 Multiple A.C. generator operation; paralleling and load sharing (constant speed drive unit-CSDU-and cooling method, integrated drive system and cooling method, fault indication and disconnect facility)

- A.16.2.11 Power distribution and application (A.C.); split bus bar (frequency wild supply), tied bus bar (synchronised generator output), combining bus bar (independent or synchronised generator output), Single/multi-phase consumer equipment
- A.16.2.12 Monitoring equipment; phase discriminator, synchronising lights, voltmeter, frequency meter, kW/kVAR meter (true and reactive loads), failure warning lights (field trip, overheat, constant speed drive unit (CSDU) oil pressure and temperature)
- A.16.2.13 Transformers and function in A.C. electrical units
- A.16.2.14 Transformer rectifier unit (TRU); direct current distribution
- A.16.2.15 Use of inverters in A.C. circuits
- A.16.2.16 Fault diagnosis and in flight emergency operation; essential consumers, non-essential consumers, emergency supply consumers, load shedding
- A.16.2.17 Alternating current motors; control function and application of general purpose (series), induction (three phase and single phase), and synchronous
- A.16.2.18 Ram air turbine (RAT); construction and control, application
- A.16.2.19 Ground power unit (A.C.); purpose and control, aircraft protection circuits, external power connection method

- A.16.3 **Semiconductors**
 - A.16.3.1 Principle and application to; resistors, rectifiers, transistors, etc

- A.16.4 **Logic Circuits**
 - A.16.4.1 Principle and application to aircraft systems; logic symbols, switching circuits, etc

- A.16.5 **Electronic Display Systems**
 - A.16.5.1 Electronic flight instrument system (EFIS)

A.17 LOADING

A.17.1 Introduction

A.17.1.1 State Legislation

A.17.1.2 Centre of Gravity (CG)

- Associated definitions and abbreviations; importance in relation to aircraft stability

A.17.1.3 Mass/Weight and Balance Limits

- Associated definitions and abbreviations; approved flight manual mass/weight and CG limits (towing, taxi, take-off, landing, cruise, airspeed/Mach. No.)
- Maximum floor load; location, running load, use of spreaders
- Maximum ramp and taxi mass/weight in relation to stability
- Factors determining maximum permissible mass/weight; structural limitations (taxi, take-off, landing, maximum zero fuel weight), performance limitations (available distances for take-off and landing, rate of climb and performance ceiling, requirements in relation to obstacle clearance, WAT limits, one engine inoperative), weather conditions, ambient and runway conditions, minimum equipment list (aircraft unserviceabilities)
- Factors determining CG limits; stability, flight control considerations in respect of mass/weight and pitching moments, CG changes in flight due to fuel consumption, landing gear configuration, wing configuration, movement of centre of lift due to changes in airspeed/Mach. No.

A.17.2 Weight and Balance

A.17.2.1 Terminology

- Associated definitions & abbreviations; empty mass/weight, basic operating mass/weight maximum zero fuel weight, use of standard or actual mass/weight in accordance with state legislation; fluids (volume/mass/weight conversion), useful load, allowed traffic load

A.17.2.2 Aircraft Mass Checks

- Procedures; determination of mass/weight, documentation, requirements for re-weighing, equipment list

A.17.2.3 Determination of Aircraft's Loaded Mass/Weight

- Procedures; load and trim sheet, trim slide-rule, documentation

A.17.2.4 Effects of Improper Loading

- Overloading
- Incorrect loading; CG out of limits fwd & aft

A.17.3 **Centre of Gravity**

A.17.3.1 Basic Calculations

- Terms used; associated definitions, abbreviations, explanations
- Expression of CG in terms of percentage of mean aerodynamic chord (%MAC) and station

A.17.3.2 CG Checks

- When aircraft weighed
- Documentation
- Practical methods of calculation; units used, mathematical, trim slide-rule, computer, graph, tabular

A.17.3.3 Procedures for Determining Loaded CG

- Load and trim sheet, slid rule, computer, graph, tabular, documentation
- CG limits NOT exceeded; check
- CG out of limits; re-location of load, use of ballast (dead load/fuel)
- Determination of stabiliser pitch trim for take-off

A.17.3.4 Re-capitulation of Effects of CG Out of Limits, Fwd/Aft

A.17.3.5 Effects of CG Within Limits

- Towards fwd limit
- Towards aft limit
- In flight control of CG, fuel consumption, fuel transfer, retention and/or jettisoning of fuel

A.17.3.6 Securing of load

- Importance of location and adequate 'tie down', types of securing equipment
- Effect of load shift; movement of CG (possible out of limits), structural damage due to inertia

A.17.4 **Checking of Load and Trim Sheet**

A.17.4.1 Computer and Manually Determined

- Flight No. and date
- Aircraft type and registration
- Correct units used
- All calculations correct
- Pitch trim in relation to CG
- Mass & CG within limits
- Additional checks for manually determined; mathematical errors, correct graph usage, correct use of tables, correct use of trim slide rule

A.18 AIRCRAFT (TYPE) AEROPLANES

Applicants are required to have satisfactory knowledge of items in this part of the syllabus only insofar as they relate to the aeroplane type for which the rating is sought.

SYLLABUS (AEROPLANES)

A.18.1 Limitations

A.18.1.1 Weight and load; definition of datum, CG limits (questions of a general nature if limits shown by graph), speeds, engine operation, temperature, altitude and cabin

A.18.2 Engine Operation

A.18.2.1 Management of engine, propeller and associated installations, digital and electronic displays; effect of changes of ambient conditions on performance, starting procedure and determination of satisfactory power output, normal, abnormal and emergency operations involving forward and reverse thrust, precautions to be observed during engine run-up, taxiing, take-off, cruise, landing, closing down and/or airborne restarting/relighting

A.18.3 Auxiliary Power Units (APU) (When approved for use in flight)

A.18.3.1 Management under normal, abnormal and emergency conditions; action in event of fire in flight and on the ground

A.18.4 Auxiliary Power Units (APU) (when approved for ground use only)

A.18.4.1 Management under normal, abnormal and emergency conditions; action in event of fire

A.18.5 Fuel System(s) (including engine coolants eg water/water-methanol)

A.18.5.1 Fuel grade(s). Specified coolant(s). Refuelling and defuelling; management, location of water/sediment drainage points. Tank capacities; usable/unusable fuel, determination of contents on the ground and airborne, determination of fuel consumption en route. System management; normal, abnormal and emergency conditions. Effects of altitude changes in flight.

A.18.6 Oil System(s) (Engine)

A.18.6.1 Capacity; tank, sump or usable, grade to be used, location of replenishing and drain points, determination of contents in flight and on the ground. System management under normal, abnormal and emergency conditions

- A.18.7 **Flight Controls (including Flags, Slats, Spoilers, Air Brakes and Equivalent Devices, Gust Alleviation and Direct Lift Control)**
- A.18.7.1 Direction of movement of controls; functioning of trimming, servo and balance tabs or alternative devices. Management under normal, abnormal and emergency conditions. Feel simulation system(s); operation and associated checking procedures. Stall protection/prevention systems; operation and associated checking procedures
- A.18.8 **Automatic Stabilisation Systems (Stability Augmentation in Flight, eg Mach Trim and Yaw Damper etc.)**
- A.18.8.1 Management under normal, abnormal and emergency conditions. Indication(s) of system malfunction
- A.18.9 **Automatic Pilot and Flight Management Systems (including Electronic Displays)**
- A.18.9.1 Management under normal, abnormal and emergency conditions and indication(s) of system malfunction. Switching arrangements with associated systems.
- A.18.9.2 Pitot, static and vacuum supplies; normal and alternative. Electrical supplies; normal, alternative and emergency, associated circuit protection, switching and warning devices. Instrument and compasses; operation of associated controls and effect on given presentation, warning devices associated with the presentation. Switching arrangements with associated systems
- NOTE: Only type knowledge to the extent detailed above is covered. It is emphasised that this examination is NOT concerned with either general or type knowledge of how instruments and compasses work, nor with their operational use.
- A.18.10 **Pneumatic, Pressure and Vacuum Systems**
- A.18.10.1 Purpose of principal components. Management under normal, abnormal and emergency conditions
- A.18.11 **Hydraulic Systems**
- A.18.11.1 Replenishing; grade(s) which may be used, capacity, location of replenishment points, procedure, determination of contents in flight and on the ground. Management under normal, abnormal and emergency conditions
- A.18.12 **Landing Gear, Wheel Brakes and Braking Devices Not Associated with the Engines**
- A.18.12.1 Management under normal, abnormal and emergency conditions

A.18.13 **Electrical Systems**

A.18.13.1 Meaning of terms used. Batteries; condition, determination of voltage and charge. Generating System(s); elementary knowledge thereof, including ground power supplies. Circuit Protection; location and functioning of circuit protection devices. Lights; internal and external. Management under normal, abnormal and emergency conditions

A.18.14 **Radio and Radar System**

A.18.14.1 Normal, Alternative and Emergency Power Supplies; associated circuit protection, switching and warning devices.

NOTE: Only type knowledge to the extent detailed above is covered. It is emphasised that this examination is NOT concerned with either general or type knowledge of how radio and radar systems work, nor with the use of such systems

A.18.15 **Air Conditioning and Pressurisation Systems**

A.18.15.1 Purpose of principal components. Indication(s) of system malfunction. Management under normal, abnormal and emergency conditions

A.18.16 **Ice and Rain Protection Systems**

A.18.16.1 Indications of Icing; management under icing conditions or when expected under normal, abnormal and emergency conditions. Achieving and maintaining clear vision. Replenishment and duration of supplies

A.18.17 **Additional Aspects**

A.18.17.1 Emergency Equipment and Procedures:

- Location and management of emergency exits and equipment, including oxygen. Action in the event of fire (other than engine or APU fire which is included in the appropriate section). Methods of dispersal of smoke from compartments.

A.18.17.2 Fuselage Apertures (doors, hatches etc):

- Security procedures and indications for fuselage apertures and associated devices eg air stairs.

A.18.17.3 Equipment for Specified Roles (spray gear, freight etc):

- Management under normal, abnormal and emergency conditions.

A.18.17.4 Flight Recorders:

- Indications of abnormal functioning. Management under normal, abnormal and emergency conditions

A.19 AIRCRAFT (TYPE) HELICOPTERS

Applicants are required to have a satisfactory knowledge of items in this part of the syllabus only insofar as they relate to the helicopter type for which the rating is being sought.

SYLLABUS (HELICOPTERS)

A.19.1 Limitations

Weight and load; definition of datum, CG limits (questions of a general nature if limits shown by graph), speeds, engine operation, rotor, temperature and altitude

A.19.2 Engine Operation

A.19.2.1 Management of engine and associated installations, digital and electronic displays; effect of changes of ambient conditions on performance, starting procedure and determination of satisfactory power output, normal, abnormal and emergency operations, precautions to be observed during engine run-up, taxiing, lift-off, hover, cruising, landing, closing down and/or airborne restarting/relighting and autorotation. Action in the event of fire in flight and on the ground

A.19.3 Auxiliary Power Units (APU) (When Approved for Use in Flight)

A.19.3.1 Management under normal, abnormal and emergency conditions; action in event of fire in flight and on the ground

A.19.4 Auxiliary Power Units (APU) (When Approved for Ground Use Only)

A.19.4.1 Management under normal, abnormal and emergency conditions; action in event of fire

A.19.5 Fuel System(s) (Including Engine Coolants e.g. Water/Water-Methanol)

A.19.5.1 Fuel grade(s). Specified coolant(s). Refuelling and defuelling; management, location of water/sediment drainage points. Tank capacities; usable/unusable fuel, determination of contents on the ground and airborne, determination of fuel consumption en route. System management; normal, abnormal and emergency conditions. Effects of altitude changes in flight

A.19.6 Oil System(s) (Engine)

A.19.6.1 Capacity; tank, sump or usable, grade to be used, location of replenishing and drain points, determination of contents in flight and on the ground. System management; normal, abnormal and emergency conditions

- A.19.7 **Control and Transmission Systems**
- A.19.7.1 Knowledge of; main and anti-torque rotors, collective, cyclic and directional control systems, trimming devices, stabilisers and rotor brakes, the system provided for converting engine output into rotor rotation. Management under normal, abnormal and emergency conditions and precautions to be observed. Oils and Fluids; grades, location of replenishing point and determination of contents. Associated indication and warning devices
- A.19.8 **Automatic Stabilisation Systems (Flight Stability Augmentation)**
- A.19.8.1 Indication(s) of system malfunction. Management under normal, abnormal and emergency conditions
- A.19.9 **Automatic Pilot**
- A.19.9.1 Management under normal, abnormal and emergency conditions and indication(s) of system malfunction. Switching arrangements with associated systems
- A.19.10 **Instrument and Compass Systems (Including Digital and/or Electronic Flight Systems)**
- A.19.10.1 Pitot, Static and Vacuum supplies; normal and alternative. Electrical Supplies; normal, alternative and emergency, associated circuit protection, switching and warning devices. Instrument and Compasses; operation of associated controls and effect on given presentation, warning devices associated with the presentation. Switching arrangements with associated systems
- A.19.11 **Pneumatic, Pressure and Vacuum Systems**
- A.19.11.1 Purpose of principal components. Management under normal, abnormal and emergency conditions
- A.19.12 **Hydraulic Systems**
- A.19.12.1 Replenishing; grade(s) which may be used, capacity, location of replenishment points, procedure, determination of contents in flight and on the ground. Management under normal, abnormal and emergency conditions
- A.19.13 **Landing Gear (land and water) and wheel brakes systems**
- A.19.13.1 Management under normal, abnormal and emergency conditions

A.19.14 **Electrical Systems**

A.19.14.1 Meaning of terms used. Batteries; condition, determination of voltage and charge. Generating System(s); elementary knowledge thereof, including ground power supplies. Circuit Protection; location and functioning of circuit protection devices. Lights; internal and external. Management under normal, abnormal and emergency conditions

A.19.15 **Radio and Radar Systems**

A.19.15.1 Normal, Alternative and Emergency Power Supplies; associated circuit protection, switching and warning devices.

NOTE: Only type knowledge to the extent detailed above is covered. it is emphasised that this examination is NOT concerned with either general or type knowledge of how radio and radar systems work, nor with the use of such systems.

A.19.16 **Air Conditioning System(s)**

A.19.16.1 Interpretation of terms used. Purpose of principal components. Indication(s) of system malfunction. Management under normal, abnormal and emergency conditions

A.19.17 **Ice and Rain Protection Systems**

A.19.17.1 Indications of icing; management under icing conditions or when expected under normal, abnormal and emergency conditions. Achieving and maintaining clear vision. Replenishment and duration of supplies

A.19.18 **Additional Aspects**

A.19.18.1 Emergency Equipment and Procedures:

- Location and management of emergency exits and equipment, including oxygen. Action in the event of fire (other than engine or APU fire which is included in the appropriate section). Methods of dispersal of smoke from compartments.

A.19.18.2 Fuselage Apertures (doors, hatches etc):

- Security procedures and indications for fuselage apertures and associated devices eg air stairs.

A.19.18.3 Equipment for Specified Roles (spray gear, freight etc):

- Management under normal, abnormal and emergency conditions.

A.19.18.4 Flight Recorders:

- Indications of abnormal functioning. Management under normal, abnormal and emergency conditions

A.19.19 **Flight Characteristics**

A.19.19.1 In accordance with data in the appropriate flight manual; take-off techniques, regulation of weight with special regard to the characteristics of the take-off and landing areas. En-route flight conditions. Behaviour of the aircraft following engine failure and emergency landing techniques

A.20**AIRCRAFT TECHNICAL AND FLIGHT PERFORMANCE**

Applicants are required to have satisfactory technical knowledge in regard to the aircraft type for which the rating is sought together with a general knowledge of aircraft performance and with the ability to calculate performance problems for that specific type using given data. Applicants for the initial grant of an aircraft rating whose MTWA exceeds 5700 kg must pass the Aircraft Technical and Flight Performance examinations which consists of Paper A - Aircraft Technical and Paper B - Flight Performance.

A.21 AIRCRAFT TECHNICAL

A.21.1 Limitations

A.21.1.1 Weight and load; definition of datum, CG limits (questions of a general nature if limits shown by graph), speeds, engine operation, temperature, altitude and cabin.

A.21.2 Engine Operation

A.21.2.1 Management of engine, propeller and associated installations, digital and electronic displays; effect of changes of ambient conditions on performance, starting procedure and determination of satisfactory power output, normal, abnormal and emergency operations involving forward and reverse thrust, precautions to be observed during engine run-up, taxiing, take-off, cruise, landing, closing down and/or airborne restarting/relighting.

A.21.3 Auxiliary Power Units (APU) (When approved for use in flight)

A.21.3.1 Management under normal, abnormal and emergency conditions; action in event of fire in flight and on the ground.

A.21.4 Auxiliary Power Units (APU) (when approved for ground use only)

A.21.4.1 Management under normal, abnormal and emergency conditions; action in event of fire.

A.21.5 Fuel System(s) (including Engine Coolants e.g. Water/Water-Methanol)

A.21.5.1 Fuel grade(s). Specified coolant(s). Refuelling and defuelling; management, location of water/sediment drainage points. Tank capacities; usable/unusable fuel, determination of contents on the ground and airborne, determination of fuel consumption en route. System management; normal, abnormal and emergency conditions. Effects of altitude changes in flight.

A.20.6 Oil System(s) (Engine)

A.21.6.1 Capacity; tank, sump or usable, grade to be used, location of replenishing and drain points, determination of contents in flight and on the ground. System management under normal, abnormal and emergency conditions.

A.21.7 Flight Controls (including Flaps, Slats, Spoilers, Air Brakes and Equivalent Devices, Gust Alleviation and Direct Lift Control)

A.21.7.1 Direction of movement of controls; functioning of trimming, servo and balance tabs or alternative devices. Management under normal, abnormal and emergency conditions. Feel simulation system(s); operation and associated checking

procedures. Stall protection/prevention systems; operation and associated checking procedures.

A.21.8 **Automatic Stabilisation Systems (stability augmentation in flight, e.g. Mach Trim and Yaw Damper etc)**

A.21.8.1 Management under normal, abnormal and emergency conditions; indication(s) of system malfunction

A.21.9 **Automatic Pilot and Flight Management Systems (including electronic displays)**

A.21.9.1 Management under normal, abnormal and emergency conditions and indication(s) of system malfunction; switching arrangements with associated systems.

A.21.9.2 Pitot, static and vacuum supplies; normal and alternative. Electrical supplies; normal, alternative and emergency, associated circuit protection, switching and warning devices. Instrument and compasses; operation of associated controls and effect on given presentation, warning devices associated with the presentation. Switching arrangements with associated systems

NOTE: Only type knowledge to the extent detailed above is covered. This examination is NOT concerned with either general or type knowledge of how instruments and compasses work, nor with their operational use.

A.21.10 **Pneumatic, Pressure and Vacuum Systems**

A.21.10.1 Purpose of principal components. Management under normal, abnormal and emergency conditions

A.21.11 **Hydraulic Systems**

A.21.11.1 Replenishing; grade(s) which may be used, capacity, location of replenishment points, procedure, determination of contents in flight and on the ground. Management under normal, abnormal and emergency conditions

A.21.12 **Landing Gear, Wheel Brakes and Braking Devices Not Associated with the Engines**

A.21.12.1 Management under normal, abnormal and emergency conditions

A.21.13 **Electrical Systems**

A.21.13.1 Meaning of terms used. Batteries; condition, determination of voltage and charge. Generating System(s); elementary knowledge thereof, including ground power supplies. Circuit Protection; location and functioning of circuit protection

devices. Lights; internal and external. Management under normal, abnormal and emergency conditions.

A.21.14 Radio and Radar System

A.21.14.1 Normal, Alternative and Emergency Power Supplies; associated circuit protection, switching and warning devices.

NOTE: Only type knowledge to the extent detailed above is covered. This examination is NOT concerned with either general or type knowledge of how radio and radar systems work, nor with the use of such systems.

A.21.15 Air Conditioning and Pressurisation Systems

A.21.15.1 Purpose of principal components; indication(s) of system malfunction, management under normal, abnormal and emergency conditions

A.21.16 Ice and Rain Protection Systems

A.21.16.1 Indications of Icing; management under icing conditions or when expected under normal, abnormal and emergency conditions; achieving and maintaining clear vision; replenishment and duration of supplies

A.21.17 Additional Aspects

A.21.17.1 Emergency Equipment and Procedures:

- Location and management of emergency exits and equipment, including oxygen. Action in the event of fire (other than engine or APU fire which is included in the appropriate section). Methods of dispersal of smoke from compartments

A.21.17.2 Fuselage Apertures (doors, hatches etc):

- Security procedures and indications for fuselage apertures and associated devices e.g. air stairs

A.21.17.3 Equipment for Specified Roles (spray gear, freight etc):

- Management under normal, abnormal and emergency conditions

A.21.17.4 Flight Recorders:

- Indications of abnormal functioning. Management under normal, abnormal and emergency conditions

**A.22 FLIGHT PERFORMANCE -
PERFORMANCE TRANSPORT: PERFORMANCE OF AEROPLANES
OVER 5700 kg MTWA**

A.22.1 Objectives

- A.22.1.1 The basis and importance of aeroplane performance assessment.
- A.22.1.2 The relationship between performance assessment, flight planning and loading.

A.22.2 Definitions, Abbreviations and Terms Used

- A.22.2.1 Altitude/height; pressure/density altitude, gross/net, height, screen height, re-light altitude, stabilizing altitude.
- A.22.2.2 Temperature; ISA, OAT, TAT, reasons for difference, declared temperature.
- A.22.2.3 Performance; net/gross, gradient/slope.
- A.22.2.4 Speeds associated with basic and scheduled aeroplane performance
V_{ef} (engine failure speed), V₁, V_r, V₂, V_{mbe}, V_{mcg}, V_{mca}, definition of balanced field length (BFL).
- A.22.2.5 Weights associated with aeroplane performance.
- A.22.2.6 Distances; definitions of distances available associated with aeroplane performance including stopway and clearway.

A.22.3 National Legislation

- A.22.3.1 An understanding of derivation and legislation for the provision of flight safety.
- A.22.3.2 Operational and airworthiness requirements.
- A.22.3.3 Scheduling of performance data.

A.22.4 Elements of Performance Assessment

- A.22.4.1 The aerodrome; distances, slope (methods of determination), obstructions, runway surface, sources of data.
- A.22.4.2 Meteorological data; determination of pressure/density altitude, and temperatures (those to be used appropriate to phase of flight) winds (including regulatory factors), runway state, sources of data.

A.22.5 **Take-off Requirements**

- A.22.5.1 WAT limit; climb gradient, effect of pressure altitude and temperature, effect of engine bleed air when applicable and different flap configurations.
- A.22.5.2 Take-off distances; Derivation of V_1 , V_r and V_2 , V_{mbe} , V_{mcg} , V_s speed; the relationship between various speeds.
- A.22.5.3 Take-off Distances; Derivation of take-off distance available, take-off run available, accelerate stop distance available, take-off distance required, take-off run required, accelerate stop distance required, and the configurations used in the certification requirements, including multiple V_1 concept.
- A.22.5.4 Minimum ground control speed; Determining factors affecting V_{mcg} , V_{mcg} limited weight requirements, and variables affecting V_{mcg} limited weight. Brake energy limit and Tyre speed limit; V_{mbe} and tyre speed limited weight requirement.
- A.22.5.5 Determination of Regulated Take-off Weight; variables affecting the RTOW and associated take-off speeds.
- A.22.5.6 Contaminated runway take-off performance; Definition of contaminants, regulatory requirements on contaminated runway take-off, effect of various contaminants on take-off performance.

A.22.6 **Climb Performance**

- A.22.6.1 Climb Limit; Definition of take-off climb segments, gradient requirements for these climb segments, variables affecting climb limited weight, improved climb technique.
- A.22.6.2 Obstacle Limit; Obstacle clearance requirements, gross and net gradient difference, variables affecting obstacle limited weight.
- A.22.6.3 Obstacle clearance requirements; obstacle identification (take-off flight path funnel), obstacle clearance (options and limitations), effect of reduction of aeroplane weight (reduction of TODR), rate of climb/gradient, sloping runway effect on relative height of obstacle, effect of turns on climb performance.
- A.22.6.4 Climb (one engine inoperative); net take-off flight path.

A.22.7 **In-Flight Performance**

- A.22.7.1 Altitude capability; Definition of all engine and engine inoperative altitude capability, gross and net performance difference, variables affecting altitude capability.
- A.22.7.2 Terrain clearance requirements, Regulatory requirements for en route terrain clearance, thrust usage during emergency.

A.22.8 **Landing Performance**

A.22.8.1 Landing field length limit; Regulatory requirement on landing distance requirements for a dry or wet runway, landing speed and threshold crossing height requirements, variables affecting landing distance.

A.21.8.2 Landing climb limit; Regulatory requirement on climb limited landing weight, variables affecting climb limited landing weight.

A. 21.8.3 Contaminated runway landing; Regulatory requirements for landing distance on a contaminated runway, variables affecting contaminated runway landing weight

A.22.9 **Optional Procedures**

A.22.9.1 Noise abatement procedures; effect on climb performance

A.22.9.2 Variable thrust take-off; principles of variable thrust take-off, limitations. methods of determining thrust required with regard to ambient conditions at a given aerodrome, effect of reduced thrust on take-off distances, effect of reduced thrust on take-off speeds (V_1 , V_r), effect of reduced thrust on climb performance and obstacle clearance, procedures to be used

A.22.9.3 Increased V_2 procedure; principles, limitations, effect on take-off distances (take-off speeds climb performance; obstacle clearance), significant speeds involved

**A.23 PERFORMANCE (TYPE):
PERFORMANCE OF AEROPLANES OVER 5700 kg MTWA**

A.23.1 Objectives

A.23.1.1 An understanding of the structure and use of Company Operations Manuals for the determination of aircraft performance data

A.23.2 Take-off Performance

A.23.2.1 Determination of Take-off weight, take-off speeds, take-off thrust (e.g. EPR/N1), take-off flap settings for a dry, wet or contaminated runway from the RTOW charts

A.23.2.2 Usage of maximum thrust and reduced thrust for a normal configuration or an abnormal configuration take-off

A.23.3 Climb Performance

A.23.3.1 Determination of recommended and optimum climb speeds, flap retraction speeds, time-to-climb calculations for reaching cruise altitude.

A.23.3.2 As for A.23.3.1 above for maximum cruise altitude with one engine inoperative

A.23.4 In-Flight Performance

A.23.4.1 Determination of altitude capability, buffet limited altitude, thrust and speed for all engine and engine(s) inoperative operations; standard strategy / drift down procedures.

A.23.4.2 Determination of fuel and time requirement for all engine and engine(s) inoperative operations

A.23.5 Landing Performance

A.23.5.1 Determination of landing weight, landing distance and landing speeds for a normal landing configuration, abnormal landing configuration, and for runways that are wet or contaminated. Determination of landing performance data relating to brake cooling times.

A.24 PERFORMANCE

A.24.1 General Principles

A.24.1.1 Objectives

- The basis and importance of aeroplane performance assessment
- The relationship between performance assessment, flight planning and loading

A.24.1.2 Definitions, abbreviations and terms used

- Altitude/height; pressure/density altitude, gross/net, height, screen height, relight altitude, stabilizing altitude
- Temperature; ISA, OAT, TAT, reasons for difference, declared temperature
- Performance; net/gross, gradient/slope
- Speed; all speeds associated with basic and scheduled aeroplane performance
- Weight; all weights associated with aeroplane performance.
- Distances; definitions of distances available associated with aeroplane performance including stopway and clearway

A.24.1.3 National Legislation

- Differences according to State
- Performance probabilities; a basic understanding of derivation and legislation for the provision of flight safety, to include EROPS and ETOPS where applicable
- Operational and airworthiness requirements; introduction to appropriate AN(G)R, BCAR and JAR
- Scheduling of performance data
- Performance groups; a basic understanding of the relevance and differences between performance groups (according to state)

A.24.1.4 Elements of Performance Assessment

- The aerodrome; distances (refer 12.1.2.), slope (methods of determination), obstructions, runway surface, sources of data
- Meteorological data; pressure/density altitude, temperatures (those to be used appropriate to phase of flight) winds (including regulatory factors), runway state, sources of data

A.24.2 Performance of Light Aeroplanes. Singles and Twins up to 5700 kgs.

A.24.2.1 Definitions, Abbreviations and Terms Used

- Any which are new to this Performance Group

A.24.2.2 Take-off Requirements.

- Operational and airworthiness requirements
- WAT limit; climb gradient, effect of pressure altitude and temperature, engine bleed air when applicable and different flap configurations
- Take-off distances; effect of aeroplane weight, pressure altitude and temperature, runway slope, wind velocity and different flap configurations; definition of balanced field length (BFL)
- Runways; effect of grass runways and soil, contaminated runways
- Use of aeroplane flight manual data, determination of maximum permitted take-off weight (MTOW), and associated critical speeds

A.24.2.3 Climb Performance

- Use of aeroplane flight manual data (all engines operating); effect of aeroplane weight, pressure altitude, temperature and wind; determination of rate of climb/gradient, recommended power settings, and recommended and/or optimum climb speeds, designation of climb segments
- Use of aeroplane flight manual data (one engine inoperative); as for 12.3.3.1 with emphasis on climb segments in relation to obstacle clearance.
- Take-off flight path: take-off flight path 'funnel', identification of obstacle, effect of turns
- Determination of obstacle clearance weight

A.24.2.4 Cruise performance

- Use of aeroplane flight manual data (all engines operating); stabilizing altitude determined in accordance with national regulations, effect of aeroplane weight and ambient temperature, understanding aspects of payload/range and economy/speed trade
- Use of aeroplane flight manual data (one engine inoperative); as for 12.3.4.1, determination of drift-down (recommended speed for descent, effect of wind on drift-down), effect of engine bleeds and/or anti-ice selection on drift-down
- Regulations (one engine inoperative); regulations pertaining to fuel jettisoning, regulations pertaining to en-route terrain/obstacle clearance.

A.24.2.5 Descent and landing performance

- WAT limit; effect of pressure altitude and temperature, effect of engine bleeds
- Landing distance; effect of aeroplane weight. effect of pressure altitude and temperature, runway slope and wind velocity, State regulatory factors pertaining to the foregoing
- Runways; effect of grass runways and soil, contaminated runways
- Use of aeroplane flight manual data; determination of maximum permitted planned landing weight (regulatory safety factors), determination of V_{at} , reassessment of landing performance overhead destination aerodrome (parameters to be used)
- Optional procedures; short field landing technique

**PART 3 APPENDIX B ATPL(A)
THEORETICAL KNOWLEDGE EXAMINATION
SYLLABUS**

The applicant should have a knowledge of the use of graphs, simple algebra, trigonometrical ratios (sin., cos., tan., etc), the solution of right-angled plane triangles and elementary plan spherical geometry sufficient to cover the syllabus.

B.1 AVIATION LAW, FLIGHT RULES AND PROCEDURES

As detailed in A.1 in Part 3 Appendix A.

B.2 FLIGHT PLANNING AND FLIGHT MONITORING

B.2.1 Flight Plans for Cross-Country Flights

B.2.1.1 Navigation Plan

- Terrain and obstacle clearance
- Cruising levels
- Navigation check points, visual or radio
- Measurement of tracks and distances
- Obtaining wind velocity forecast for each leg
- Computation of heading, ground speeds and times en route from tracks, true airspeed and wind velocities
- Use of wind component, tables for drift and ground speeds
- Completion of navigation flight plan

B.2.2 Fuel Plan

B.2.2.1 Computation of planned fuel usage for each leg and total fuel usage for the flight

B.2.2.2 Flight manual figures for fuel flow during climb, cruise, and descent. Mid weights or instantaneous weights

B.2.2.3 Navigation plan for times enroute

B.2.2.4 Fuel for holding or diversion to alternate airfield

B.2.2.5 Reserves

B.2.2.6 *Total fuel requirements for flight*

- Take off weight
- Landing weight

B.2.2.7 Completion of pre-flight portion of fuel log

- B.2.3 Flight Monitoring and In-Flight Replanning**
- B.2.3.1 In-flight computations
- Recording of fuel quantities recalculation at navigational checkpoints, flight
 - progress chart
 - Calculation of actual rate of consumption
 - Comparison of actual and planned fuel consumption and fuel state, flight progress chart; PNR and CP
- B.2.3.2 Revision of fuel reserves
- B.2.3.3 In-flight replanning in case of problems
- Selection of cruise altitude for new destination
 - Fuel state, fuel requirements, fuel reserves
- B.2.4 Radio Communications and Navigational Aids**
- B.2.4.1 Communication frequencies and call signs for appropriate control agencies and in-flight service facilities, weather stations
- B.2.4.2 Radio navigation and approach aids
- Type
 - Frequencies
 - Identification
- B.2.5 Air Traffic Flight Plan**
- B.2.5.1 Type of flight plan - CA48
- B.2.5.2 ICAO flight plan
- Format
 - Information included
 - Repetitive flight plan
- B.2.5.3 Completion of flight plan - UK CAA form CA 48
- B.2.5.4 Information for flight plan obtained from:
- Navigation flight plan
 - Fuel endurance
 - Operators records for basic information
- B.2.6 Practical Flight Planning**
- B.2.6.1 Chart usage

- Checking AIP and Notams for latest information
- Selection of altitudes or flight levels for each leg of flight

B.2.6.2 Plot tracks and measure directions and distances

B.2.6.3 Completing navigation plans using.

- Tracks and distances from prepared charts
- Application of wind velocity on each leg to obtain headings and ground speeds
- Calculations of enroute times for each leg to destination and alternates to determine total time enroute.
- Wind velocities as provided
- True airspeed as appropriate

B.2.6.4 Simple fuel plans

B.2.6.5 Preparation of fuel loads showing planned values for.-

- Fuel used on each leg including climb, cruise and descent
- Fuel remaining at end of each leg
- Total time and fuel required to destination
- Endurance, based on fuel remaining and planned rate of consumption at end of each leg
- Completion of fuel plan
- Fuel required for missed approach, climb and cruise to alternate
- Reserve fuel

B.2.7 **Radio Planning Practice**

B.2.7.1 Communications

- Frequencies and call signs of ATC agencies and facilities and information for in-flight weather

B.2.7.2 Navigation aids

- Frequencies and identifiers of enroute and terminal facilities

B.2.8 **IFR (Airways) Flight Planning**

B.2.8.1 Meteorological considerations

B.2.8.2 Selection of routes to destination and alternates

- Preferred airways routes
- Extraction of tracks/distances from radio/nav charts
- Frequencies and identifiers of enroute radio/nav aids
- Minimum enroute altitudes, minimum crossing and reception altitudes
- Standard instrument departures (SIDs) and standard arrival routes (STARs)
- Interpretation and use of aerodrome charts; landing charts; instrument approach charts; visual approach charts; noise abatement charts; special procedure charts.

B.2.9 **Jet Aircraft Flight Planning (Additional considerations)**

B.2.9.1 Additional flight planning aspects for jet aircraft (advanced planning)

- Cruise technique

B.2.9.2 Fuel planning

- En route contingency fuel
- Destination holding and diversion fuel
- Reserves
- Importance of altitude selection when planning for diversion
- Use of performance charts to plan fuel usage based on planned climbs, enroute cruise and descent
- Reserve fuel requirements

B.2.9.3 Calculation of critical point (CP), Point of no return (PNR)

B.2.9.4 Difference between equi-fuel and equi-time points

- General Consideration of EROPS, point of equal time (PET) and point of safe return (PSR)

B.2.10 **Computerized Flight Planning**

B.2.10.1 General principles of present systems

- Advantages
- Shortcomings and limitations

B.3 NAVIGATION

B.3.1 The Earth

- B.3.1.1 Form of the earth; rotation; great circles, small circles; rhumb lines; geographic poles
- B.3.1.2 Position on earth; latitude and longitude, use of co-ordinates to find position; difference of latitude and longitude
- B.3.1.3 Direction on earth; true north, magnetic north, compass north, grid north; variation, deviation, grivation, isogonals, isogrivs
- B.3.1.4 Convergency and conversion angle; definitions; formula for calculation; derivation of necessary factors; application on earth
- B.3.1.5 Departure, definition; formula for calculation; derivation of necessary factors; application
- B.3.1.6 Distance on earth; units of measurement, nautical miles, kilometers; statute miles with conversion one to another; relationship to latitude
- B.3.1.7 Speed; units of measurement; knots, mph; kilometers per hour; rectified airspeed, true airspeed, mach number relationship; ground speed
- B.3.1.8 Time: distance, speed and time solutions

B.3.2 The Triangle of Velocities

- B.3.2.1 Vectors; heading; track; drift; TAS, ground speed
- B.3.2.2 Computer solution (also to be covered during plotting)
- B.3.2.3 Solution of multi drift wind velocities, head and crosswind components; Maximum and minimum wind components for take-off and landing

B.3.3 Fuel

- B.3.3.1 Use of computer for fuel conversions, kilograms, liters, pounds, imperial gallons, US gallons
- B.3.3.2 Solution of fuel flow problems; fuel units in relation to time

B.3.4 Pilot Navigation

- B.3.4.1 The 1 in 60 rule; track error, closing angles; distance gone; regaining and paralleling track; altering heading to destination. D.R. Navigation

- B.3.5 **Charts**
- B.3.5.1 Types of projection; general properties, orthomorphism; scale; chart convergency
- B.3.5.2 Properties of the:
- Mercator
 - Transverse mercator
 - Oblique mercator
 - Lambert conformal
 - Polar stereographic; to include representation of great circles; rhumb lines; parallels of latitude and meridians; scale problems; chart convergency
- B.3.5.3 Use of the charts; calculation of bearings at various positions
- B.3.5.4 Topographical Maps; Conventional signs
- B.3.6 **Navigation Requirement for Long Range Flights**
- B.3.6.1 Route selection, choice of speed and flight level; minimum time tracks
- B.3.6.2 Polar Flights
- Gridded charts; grivation, convergency, variation relationship; use in north and south polar areas
- B.3.7 **Emergency Data**
- B.3.7.1 Calculation and application of critical point and point of no return
- B.3.7.2 Calculation and application of radius of action or latest time to divert
- B.3.8 **Relative Velocity**
- B.3.8.1 Principles of relative velocity
- B.3.8.2 Assessment of collision risk (not interception)
- B.3.9 **Time and Time Conversions**
- B.3.9.1 Solar system, seasonal and apparent movements of the sun
- B.3.9.2 Basis of mean time; civil day; the years
- B.3.9.3 LMT; ST; UTC; using air almanac extracts
- B.3.9.4 Sunrise, sunset and twilight using air almanac extracts

- B.3.10 **Navigation Plotting**
- B.3.10.1 Calculation factors affecting accuracy and plotting of Dead Reckoning position
- B.3.10.2 Measurement of track and distance, assessment of Magnetic variation
- B.3.10.3 Plotting of position lines from radio facilities, establishment of aircraft position by transference of straight and curved position lines by track and ground speed. Use of single position lines, fixing by position lines
- B.3.10.4 Calculation of actual track and groundspeed by reference to plotted position, calculation of actual wind velocity. Revision of ETA and fuel endurance
- B.3.10.5 Use of external aids for INS cross checks
- B.3.10.6 Navigation on climb and descent
- B.3.10.7 Maintaining a flight log

B.4 INSTRUMENTS

B.4.1 Air Data Sources

B.4.1.1 Pitot and Static Systems

- Pitot tube
 - Construction and principle of operation
 - Errors and faults
- Static source
 - Construction, principle of operation and siting
 - Errors and faults
- Combined pressure head
 - Construction, principle of operation and siting
 - Errors and faults
- Alternate static source
 - Siting
 - Errors normally associated with use of alternate vent

B.4.1.2 Air Temperature Measurement

- Types of thermometer used
- Ram air temperature
- Corrected outside air temperature
- Errors

B.4.1.3 Angle of Attack Sensor (Blade angle sensors/dial - helicopters)

- Principle of operation
- Types in use
- Outputs
- Use and application
- Displays

B.4.2 Air Data Instruments

B.4.2.1 The Altimeter

- Relationship of pressure and height
- Principle of operation and construction of sensitive and servo altimeters
- Height encoding
- Subscale settings, standard settings; QFE; QFE (threshold) QNH; procedures
- Interpretation of instrument
- Errors
- Corrections and tolerances
- Altimeter correction; determination of corrections due to surface pressure variation

B.4.2.2 Airspeed Indicators (ASI)

- Effect of motion of body through atmosphere
- Ram air pressure
- Dynamic pressure
- Compressibility
- Speed terms EAS; RAS/CAS; TAS
- Construction and principle of operation
- Interpretation of instrument
- Use of colored arcs and other markers
- Errors and corrections
- Conversion of IAS to TAS

B.4.2.3 Vertical Speed Indicator (VSI)

- Rate of descent as a rate of change of pressure
- Aneroid vertical speed indicator
 - Principle
 - Presentation
 - Use
 - Errors and limitations
- Instantaneous/instant lead VSI
 - Principle
 - Presentation
 - Advantages
 - Errors and limitations

B.4.2.4 Mach Meter

- Significance of Mach number
- Mach number formula
- Measurement of Mach No. as a ratio of pressures
- Construction and principles of operation of a machmeter
- Presentation, interpretation and use
- Errors

B.4.2.5 Mach/IAS Indicator

- Principle of operation
- Presentation, interpretation and use
- Errors

B.4.2.6 Air Data Computers (ADC)

- Principles of operation
- Sources of input data
- Output data, uses and systems fed
- Block diagram
- System monitoring

NB: Details of mechanical/electrical linkages need not be known.

B.4.3 Gyroscopic Instruments

B.4.3.1 Gyroscopic Principles

- Theory of gyroscopic principles
- Rigidity in space; apparent drift, apparent tilt
- Precession; real (random) drift, real (random) tilt
- Factors affecting precession rates
- Types of gyro; their construction, drive types, and principles of operation of the following:
 - Vertical gyro
 - Directional gyro
 - Rate gyro
 - Rate integrating gyro
 - Single degree of freedom gyro
 - Solid state gyro

B.4.3.2 Directional Gyro

- Construction and principles of operation
- Errors
- Need to set and re-set

B.4.3.3 Slaved Gyro Compass

- Construction and principles of operation
- Principles of the flux valve
- The slaving system
- Advantages of the slaved gyro compass.
- Output data, use and application
- Pre-flight check
- Remote transmission systems

B.4.3.4 Artificial Horizon

- Construction and principle of operation
- Remote vertical gyro
- Types of display
- Errors and limitations
- Output data, use and applications

B.4.3.5 Turn and Balance Indicator

- Construction and principle of operation
- Display types and interpretation
- Errors and limitations
- Output data, use and applications

B.4.3.6 Turn Co-ordinator

- Construction and principles of operation
- Display and interpretation
- Errors, cautions and limitations

B.4.3.7 Accelerometers

- Principles of measurement of acceleration
- Construction of typical force rebalanced accelerometer
- Errors and limitations of measurement
- Output data, uses

B.4.3.8 Gyro Stabilized Gimballed Platform

- Construction and principle of operation
- Platform levelling and gyro compassing
- Platform alignment
- Types of platform
- Output data, uses and applications

B.4.3.9 'Strapped Down' Systems

- Construction and principles of operation
- Types in use
- Advantages/disadvantages

B.4.3.10 Inertial Navigation

- Use of accelerometers and platforms
- Schuler - tuned platforms
- Principles of integration
- Navigation computer
- Use of equipment
- MSU and CDU. HSI display
- Accuracy, reliability and errors
- INS operational use

B.4.4 **Magnetism and Compasses**

B.4.4.1 Principles of magnetism

- Terrestrial magnetism
- Earth's total magnetic field
- 'H' and 'Z' components and their values as governed by magnetic latitude
- Directive force, magnetic dip, variation
- Aircraft magnetism
- Permeability of materials, hard iron and soft iron
- Magnetic field of an aircraft, effect on directive force
- Deviation effect, change of deviation with heading, change of deviation with magnetic latitude
- Compass safe distances
- BCAR/JAR limits

B.4.4.2 Direct Reading Magnetic

- Principles of construction of a typical compass
- Errors and limitations of a magnetic compass
- Examples of a magnetic compass
- Serviceability tests
- An appreciation of the methods and devices used to compensate a direct reading magnetic compass. Determination of coefficients A, B and C
- The deviation card

B.4.5 **Electronic Displays and Systems**

B.4.5.1 Area Navigation Systems

- Typical flight deck equipment
- Input sources, use, crew interface
- Precautions
- Interpretation, checking and up-dating

B.4.5.2 Electronic Displays and Systems (EFIS)

- Information display types
- Block diagrammatic data input
- Control panel, data unit
- Typical installation
- Interpretation and use of information

B.4.5.3 Flight Management System (FMS)

- General function and principles
- Inputs and outputs
- Use and application
-

B.4.5.4 Flight Director

- Function and application
- Block diagram, components and display
- Mode of operation
- Operational setup for various flight phases
- Command modes (bars)
- Mode indicator
- System monitoring
- Limitations, operational restrictions

B.5 METEOROLOGY (THEORY)

B.5.1 Composition and Properties of the Atmosphere

B.5.2 Pressure, Temperature and Density of the Atmosphere

B.5.2.1 Barometric pressure, isobars, isallobars

B.5.2.2 Diurnal variation of pressure, pressure variation with height

B.5.2.3 Determination of QFF

B.5.2.4 Transfer of heat, solar and terrestrial radiation, conduction, turbulence, convection, radiation

B.5.2.5 Temperature near earth's surface, surface effects, diurnal variation, effect of clouds, effect of wind and humidity

B.5.2.6 Elementary heat balance in atmosphere

B.5.2.7 Adiabatic processes, dry air, evaporation, condensation, latent heat, saturated air, simple temperature/height diagram

B.5.2.8 Vertical distribution of temperature, troposphere, tropopause, stratosphere, lapse rate, atmospheric equilibrium, development of inversions, types of inversions, influence on the weather

B.5.2.9 Stability and instability, stability changes caused by radiation, turbulence, convection, advection, subsidence, convergence, divergence and precipitation

B.5.2.10 Density, variation at surface and with height. Aircraft performance and air density

B.5.3 Humidity

B.5.3.1 Water vapor in the atmosphere

B.5.3.2 Vapour pressure, effect of humidity on density

B.5.3.3 Dry/wet bulb temperature, dewpoint, humidity mixing ratio, absolute, and relative humidity

B.5.3.4 Condensation, precipitation, sublimation and freezing in the atmosphere

B.5.3.5 Relationship between density, pressure, temperature and humidity, the International Standard Atmosphere (ISA)

B.5.4 Clouds and Precipitation

B.5.4.1 Composition of cloud, methods of formation height of base and vertical extent. International nomenclature and classification of cloud types

- B.5.4.2 Turbulence, orographic, stratiform and convection cloud. Conditions favourable for formation. Structure and classification. Diurnal and seasonal variation
- B.5.4.3 Thunderstorms, development and structure, development and effect of microbursts, associated flight hazards, atmospheric electricity (lightning and static)
- B.5.4.4 Types of precipitation, drizzle, rain, snow, hail
- B.5.4.5 General causes of precipitation, precipitation associated with different types of cloud
- B.5.4.6 Characteristics of orographic, frontal and shower precipitation
- B.5.4.7 Operating hazards associated with various types of cloud and precipitation
- B.5.5 **Wind**
- B.5.5.1 Relationship between isobars and wind, Buys Ballots Law
- B.5.5.2 Primary cause of wind, pressure gradient, geostrophic force and geostrophic wind. Coriolis force, gradient wind, convergence and divergence effects (NO FORMULAE)
- B.5.5.3 Diurnal variation of wind at the surface and on top of the friction layer. Winds and isobars near the equator
- B.5.5.4 Local variation of wind with topography; ravine wind; anabatic and katabatic effects, Fohn effect, land and sea breezes
- B.5.5.5 Airflow over mountains, standing waves and conditions favourable for their development, rotor streaming
- B.5.5.6 Turbulence, gustiness and squalls, factors affecting turbulence, effect of turbulence on lapse rates
- B.5.5.7 Low level wind shear. Effect on aircraft operation. Weather situations favourable for low level windshear. Methods of recognition. Action to be taken on encountering turbulence or low level wind shear
- B.5.5.8 Variation of wind with height; elementary knowledge of thermal component of the wind, contour charts, jet streams in all parts of the world and their seasonal variation
- B.5.6 **Flights at higher levels (upper troposphere and stratosphere)**
- B.5.6.1 Upper clear air turbulence (CAT). Cause, location and effect on aircraft. Description for met reports
- B.5.6.2 Stratospheric conditions: tropopause influence on aircraft performance, jetstreams, CAT and clouds, effects of ozone, radioactivity

- B.5.7 **Visibility**
- B.5.7.1 Fog, mist, haze and their difference
- B.5.7.2 Formation and clearance of radiation fog, advection fog, steam fog and frontal fog:
 diurnal and seasonal variation
- B.5.7.3 Reduction of visibility caused by mist, smoke, dust, sand, snow and sea spray
- B.5.7.4 Vertical and oblique visibility: visual illusions in flight caused by precipitation
- B.5.7.5 RVR (Runway Visual Range) and IRVR (Instrumented Runway Visual Range)

- B.5.8 **Ice accretion**
- B.5.8.1 Forms of airframe icing: airframe icing in relation to cloud types; factors affecting form and severity of icing; hazards of ice accretion
- B.5.8.2 Action to take on encountering icing conditions
- B.5.8.3 Power plant icing

- B.5.9 **Airmasses**
- B.5.9.1 Description, factors affecting the properties of an airmass
- B.5.9.2 Classification of airmasses, modifications to airmasses due to advection, areas of origin

- B.5.10 **Fronts**
- B.5.10.1 Boundaries between airmasses, general situation
- B.5.10.2 Warm front associated clouds and weather
- B.5.10.3 Cold front, associated clouds and weather
- B.5.10.4 Weather in the warm sector, hazards for aviation, associated clouds and weather
- B.5.10.5 Occlusion, associated clouds and weather
- B.5.10.6 Quasi-stationary front, associated clouds and weather

- B.5.11 **Airmasses and Frontal Analysis**
- B.5.11.1 Frontal depressions, formation of warm and cold fronts, occlusion process, distribution of weather, depression families, troughs, flight conditions in and over depressions

- B.5.11.2 Non-frontal depressions: thermal, orographic (lee) and secondary depressions, tropical revolving storms, tornadoes, water-spouts
- B.5.11.3 Anticyclones, types, general properties cold and warm anticyclones, ridges and cols
- B.5.11.4 Prognostic rules, movement of fronts and developments of fronts, movement of pressure systems and development of pressure systems
- B.5.12 **Climatology**
- B.5.12.1 The average surface pressure and temperature distribution over the world
- B.5.12.2 Average circulation patterns in the troposphere and lower stratosphere and their seasonal variation
- B.5.12.3 Upper winds, stream lines and seasonal variation
- B.5.12.4 The Inter Tropical Convergence Zone (ITCZ) and associated weather in different areas
- B.5.12.5 Winds and weather of the monsoon regions
- B.5.12.6 Tropical storms, origin and local names, periods of occurrence, easterly waves and hurricane development
- B.5.12.7 Flying conditions in the vicinity of tropical storms
- B.5.12.8 Meteorological phenomena of special interest to aviators with reference to the synoptic situations giving rise to such phenomena (e.g. tropical cyclones, tornadoes, dust and sandstorms, freezing precipitation)
- B.5.12.9 Aviation climatology of the principal air routes and areas
 - Europe
 - The Atlantic / Polar Routes
 - Mediterranean & Middle East
 - India & Far East
 - N.W. Africa
 - Tokyo - Singapore - Darwin
 - Australia and New Zealand
 - Trans Pacific
- B.5.12.10 Local winds by name such as Mistral, Bora, Scirocco, Harmattan, Etesian
- B.5.13 **The Weather Map**
- B.5.13.1 Interpretation of symbols and figures used on weather charts
- B.5.13.2 The development and movement of simple pressure systems and fronts, including significance of isallobaric changes

- B.5.13.3 Interpretation of synoptic charts and use of the synoptic chart for the preparation of a route forecast and landing forecasts. Effects of topographic features and diurnal variation on development of weather
- B.5.14 **Observations**
- B.5.14.1 Knowledge of standard methods of measuring visibility and cloud height also pressure, temperature, humidity and wind at the surface and in the upper air. (A knowledge of the mechanics of the various instruments is not required)
- B.5.14.2 The Q code groups QFE, QNE, QNH, QFF and Regional QNH
- B.5.14.3 Inflight observations by members of the crew; reporting criteria; form and circumstances in which observations are made and reported
- B.5.14.4 The use of satellite photographs (visual and infra-red) to recognize and describe weather systems and air masses
- B.5.15 **Flight Documentation**
- B.5.15.1 Comprehension and interpretation of all flight forecast documents available for departures from Hong Kong and the United Kingdom. (Changes in documentation take place from time to time, examination questions will reflect current practice)
- B.5.15.2 Decoding of TAF, METAR and SIGMET messages. TREND type landing forecasts and the criteria for their use

B.6 METEOROLOGY (PRACTICAL)

A test in the practical application covered by paragraph B5.

B.7 RADIO AIDS

B.7.1 Electro magnetic radiation

B.7.1.1 Speed of propagation

B.7.1.2 Frequency / wavelength

B.7.1.3 Phase / phase difference

B.7.1.4 Frequency bands

B.7.2 Basic radio transmitter

B.7.2.1 Signal generation

B.7.2.2 Feeding and emission of R F signals

B.7.3 Antennas

B.7.3.1 Characteristics

B.7.3.2 Polarization

B.7.3.3 Use of antennas

B.7.4 Modulation of radio waves

B.7.4.1 Amplitude, frequency and pulse modulation

B.7.4.2 Classification of emission

B.7.4.3 Basic principles of Doppler effect

B.7.5 Wave Propagation

B.7.5.1 Factors affecting range and propagation of ground, direct and sky waves

B.7.5.2 Height of ionospheric layers

B.7.5.3 Ducted propagation, tropospheric scatter

B.7.6 Radio Communications

B.7.6.1 Long and short range communications systems

B.7.6.2 Frequencies/frequency bands used

- B.7.6.3 S S B
- B.7.6.4 Selcal
- B.7.6.5 Satcom

- B.7.7 **Ground D/F**
- B.7.7.1 Principles
- B.7.7.2 Coverage and range
- B.7.7.3 Errors and accuracy (including classification of bearing accuracy)
- B.7.7.4 Factors affecting range and accuracy

- B.7.8 **ADF/NDB**
- B.7.8.1 Principles
- B.7.8.2 Coverage and range (including protection)
- B.7.8.3 Errors and accuracy
- B.7.8.4 Factors affecting range and accuracy
- B.7.8.5 Presentation and interpretation (including use of the RMI)

- B.7.9 **VOR (Conventional and Doppler)**
- B.7.9.1 Principles
- B.7.9.2 Coverage and range (including DOC)
- B.7.9.3 Errors and accuracy
- B.7.9.4 Factors affecting range and accuracy
- B.7.9.5 Presentation and interpretation (including use of the RMI)

- B.7.10 **ILS**
- B.7.10.1 Principles
- B.7.10.2 Coverage and range
- B.7.10.3 Errors and accuracy
- B.7.10.4 Factors affecting range and accuracy (including categories)

- B.7.10.5 Presentation and interpretation

- B.7.11 **MLS**
- B.7.11.1 Principles
- B.7.11.2 Coverage and range
- B.7.11.3 Errors and accuracy
- B.7.11.4 Factors affecting range and accuracy
- B.7.11.5 Presentation and interpretation

- B.7.12 **Basic Radar Principles**
- B.7.12.1 Advantages/disadvantages of primary/secondary radars
- B.7.12.2 Pulse techniques and associated terms
- B.7.12.3 Cathode ray tube
- B.7.12.4 Production of a basic time-base

- B.7.13 **DME**
- B.7.13.1 Principles
- B.7.13.2 Coverage and range
- B.7.13.3 Errors and accuracy
- B.7.13.4 Factors affecting range and accuracy
- B.7.13.5 Presentation and interpretation

- B.7.14 **VOR/DME Area Navigation (RNAV)**
- B.7.14.1 Principle of operation
- B.7.14.2 Advantages and disadvantages
- B.7.14.3 Accuracy, reliability and coverage
- B.7.14.4 Presentation and interpretation
- B.7.14.5 Use of DME to update INS/FMS

- B.7.15 **SSR**
- B.7.15.1 Application for navigation
- B.7.15.2 Principles, (including Mode 'S' data link)
- B.7.15.3 Presentation and interpretation
- B.7.15.4 Method of producing modes and special codes

- B.7.16 **Ground Radar**

- B.7.16.1 Principles
- B.7.16.2 Coverage and range
- B.7.16.3 Presentation and interpretation
- B.7.16.4 Errors and accuracy
- B.7.16.5 Factors affecting range and accuracy

- B.7.17 **Airborne Weather Radar**

- B.7.17.1 Principles
- B.7.17.2 Coverage and range
- B.7.17.3 Errors and accuracy
- B.7.17.4 Factors affecting range and accuracy
- B.7.17.5 Presentation and interpretation

- B.7.18 **Doppler**

- B.7.18.1 Principle of operation

- B.7.19 **Radio Altimeter**

- B.7.19.1 Principles
- B.7.19.2 Errors and accuracy
- B.7.19.3 Presentation and interpretation

B.7.20 **Ground Proximity Warning System (GPWS)**

B.7.20.1 Function

B.7.20.2 Data inputs

B.7.20.3 Warning modes

B.7.20.4 Mode limits

B.7.20.5 Integrity testing

B.7.21 **Satellite Assisted Navigation**

B.7.21.1 Basic principles

B.7.21.2 Derivation of a position line

B.7.21.3 Accuracy, reliability, range and coverage

B.7.21.4 Automatic systems

B.7.22 **Traffic Collision Avoidance System**

B.7.22.1 Principles

B.7.22.2 Warnings

B.8 AIRCRAFT TECHNICAL GROUP AND AIRCRAFT (TYPE)

As detailed for the Commercial Pilot's Licence in Appendix A, paragraphs A18, A20 and A21 as appropriate.

B.9 PERFORMANCE

As detailed for the Commercial Pilot's Licence in Appendix A, paragraphs A22, A23 and A24 as appropriate.

B.10 LOADING

As detailed for the Commercial Pilot's Licence in Appendix A, paragraph A17.

B.11 HUMAN PERFORMANCE

As detailed for the Commercial Pilot's Licence in Appendix A, paragraph A9.

Note: Although the syllabus of this subject for the issue of ATPL(A) is the same as the one for the issue of CPL, the applicant should be aware that the examination papers for ATPL(A) may be different from the papers for CPL(A) in order to reflect the distinct level of knowledge required.

This list does not claim to be comprehensive, or necessarily to give the best treatment of particular subjects, but it is hoped that potential applicants will find it helpful in preparing themselves for the theoretical knowledge examinations. Most training organisations that conduct professional pilot licence courses also produce study notes. Those wishing to obtain copies of such notes should approach the training organisation concerned.

General

Aeronautical Information Circulars

Aeronautical Information Publication

The Air Navigation (Hong Kong) Order currently in force

Flight Planning and Flight Monitoring, Navigation, Instruments, Radio Aids

Air Almanac (AP 1602). MOD (HMSO)

Flight Briefing for Pilots, Volumes 1 to 7. N H Birch and A E Bramson (Pitman)

Ground Studies for Pilots, Vol 1: Radio Aids
 Vol 2: Plotting and Flight Planning. R B Underdown
 Vol 3: Navigation - General and Instruments (Blackwell)
 Vol 4: Meteorology

The Pilot in Command. M Cass (Airlife)

The VOR and ADF including DME. M Cass (Airlife)

Manual of Avionics: Introduction to the Electronics of Civil Aviation. B Kendall. (Granada)

Aircraft Instruments and Integrated Systems, E H J Pallett (Longman)

Instrument Flying, Radio Navigation and Instrument Approach Procedures. R D Campbell. (Granada)

Weather Radar for Pilots (CAP 448)

GPWS Guidance material (CAP 516)

Meteorology

Ground Studies for Pilots, Vol 4: Meteorology. RB Underdown (Blackwell)

Meteorology for Pilots, M Wickson (Airlife)

Observer=s Handbook (Met 0 933). (HMSO)

The Practice of Weather Forecasting (Met 0817). (HMSO)

Ice Accretion on Aircraft (Met 0768). (HMSO)

The Meteorological Glossary (Met 0 8420/AP 897). (HMSO)

ICAO Doc 8400 Codes (including the Q Code) (CAA, P&PS, Cheltenham).

MET Section of UK Aeronautical Information Publication (CAP 32) (CAA, P&PS, Cheltenham)

Handbook of Aviation Meteorology. (HMSO)

Atmosphere, Weather and Climate, R G Barry & R J Chorley (Methuen)

Fundamentals of Meteorology, L J Battan (Prebttice Hall)

Human Performance

Human Factors for Pilots, Roger G Green (Ashgate publishing)

Further reading:

Aviation Medicine Manual, CAP 567(CAA)

Aeromedicine for Aviators, K E E Reed (Pitman)

Aviation Medicine, R M Harding and F J Mills (BMA)

Fit to Fly, BALPA Medical Study Group (Granada Publishing)

Human Factors in Flight, F H Hawkins (Gower Technical Press)

Human Factors for General Aviation, S R Trollip and R S Jensen
(Jepperson Sanderson)

Aviation Medicine, J Ernsting and Pking (Butterworths)

Aviation Psychology, R S Jensen (Gower Technical)

Handbook of Human Factors, Gavriel Salvendy (John Wiley and Sons)

Human Factors in Air Transportation, McFarland
(McGraw-Hill Book Co)

Human Factors in Aviation, E L Wiener and D C Nagel
(Academic Press)

Tasks, Errors and Mental Models, Goodstein, Anderson and Olsen
(Taylor and Francis)

Human Factors Digest(s), ICAO

Aircraft (General) Technical Group

Principles of Flight (Aeroplanes)

Aerodynamics for Naval Aviators, H H Hurt Jr, US Navy

Aircraft Flight, R H Barnard and D R Philpott

Flight Theory and Aerodynamics, C E Dole

Flight Theory for Pilots, C E Dole

Mechanics of Flight 9th edition, A C Kermode

Handling the Big Jets, D P Davies
AP 3456A, MOD

The Illustrated Guide to Aerodynamics, H C 'Skip' Smith

The Air Pilot's Manual Vol 4, Trevor Thom

Joint Airworthiness Requirement JAR 25

BCAR Section K

Principles of Flight (Helicopters)

The Helicopter and How it Flies, J Fay

AP 3456A Part 2, MOD

Basic Helicopter Aerodynamics, J Seddon

Basic Helicopter Handbook AC 61-13B, US Dept of Transport/FAA

Helicopter Aerodynamics, R W Prowty

Piston and Gas Turbine Engines

Aircraft Powerplants, Bent/McKinley

The Jet Engine, Rolls Royce

Handling the Big Jets, D P Davies

Aircraft Instruments, E H J Pallett

The Professional Pilot's Study Guide Series Vols I to III. Mike Burton

Airframe and Powerplant Mechanics Handbook AC65-12A, US Dept of Transport/FAA

Fuel Systems

CAP 434 Aviation fuel at aerodromes

CAP 74 Aircraft Fuelling

Airframe and Powerplant Mechanics General Handbook AC65-9A, US Dept of Transport/FAA

Airframe and Powerplant Mechanics General Handbook AC65-15A, US Dept of Transport/FAA

The Air Pilot's Manual Vol 4, T Thom

Aircraft Powerplants, Bent and McKinley

AP 3456 Vol B, MOD

Aircraft Basic Science, Bent and McKinley

Aircraft Instruments, E H J Pallett

Aviation Fuel Properties. Coordinating Research Council Inc

BCAR 29 (Rotorcraft)

Transport Category Aircraft Systems, Thomas W Wild

Aircraft Systems, I Moir and A Seabridge

Aircraft Systems for Pilots, D D Remer

Aircraft Electrical Systems Ed 3, E H J Pallett

Door and Emergency Exits

Joint Airworthiness Requirement (JAR 25)

BCAR 29 (Rotorcraft)

Electronic Flight Instrument System (EFIS)

Aircraft Electricity and Electronics (4th edition), Eismann/Bent/McKinley

Aircraft Instruments and Integrated Systems, E H J Pallett

Automatic Flight

(a) Autopilots

Automatic Flight Control, E H J Pallett

A&P Airframe handbook AC 65-15A, US Dept of Transport/FAA

CAP 359 (all weather operations)

(b) Autoland

Automatic Flight Control, E H J Pallett

CAP 359 (all weather operations)

JAR AWO

Electrics (AC and DC) and Semiconductors

Aircraft Electrical Systems (3rd edition), E H J Pallett

Aircraft Electricity and Electronics (4th edition), Eismen/Bent/McKinley

AP 3456 Vol K (Part 3), MOD

Transport Category Aircraft Systems, Thomas W Wild

Aircraft Systems, IMOIR and A Seabridge

Aircraft Systems for Pilots. D D Remer

A P Books (Airframe and Powerplant Mechanics, General Book, US Dept of Transport/FAA

The Professional Pilot's Study Guide Services Vol IV, Mike Burton

Logic Circuits

Aircraft Electricity and Electronics (4th edition), Eismen/Bent/McKinley

Aircraft Electrical Systems (3rd edition), E H J Pallett

From Logic to Computers, P J Thewlis and B N T Foxon

Aircraft Instruments and Integrated Systems, E H J Pallett

Hydraulics

Aircraft Hydraulic Systems (3rd edition), William A Neese

Aircraft Hydraulic Systems EA-AH-1, Aviation Technician Trg Course/Series

AP 3456 Vol B, MOD

Transport Category Aircraft Systems, Thomas W Wild

Aircraft Systems, IMoir and A Seabridge

Aircraft Systems for Pilots, D D Remer

Hydraulics (Vol 1), H G Conway (published by The Royal Aeronautical Society)

Airconditioning and Pressurisation

Into Thin Air, E W Still (published by Normalair-Garrett Ltd, Yeovil)

Aircraft Electrical Systems (3rd edition), E H J Pallett

Aviation Technician Training Course EA-AAC-1

Transport Category Aircraft Systems, Thomas W Wild

Aircraft Systems, IMoir and A Seabridge

Aircraft Systems for Pilots, D D Remer

Airframe and Powerplant Mechanics Handbook AC65-15A, US Dept of Transport/FAA

Auxiliary Power Unit

Aircraft Powerplants, Bent/McKinley

Aircraft Electrical Systems (3rd edition), E H J Pallett

CAP 562 (CAAIP Part 5)

Transport Category Aircraft Systems, Thomas W Wild

Aircraft Systems, IMoir and A Seabridge

Aircraft Systems for Pilots, D D Remer

Landing Gear and Brakes

CAP 562 5-7 Tyres
 5-8 Wheels and brakes
 6-3 Structures

AP 3456 Vol B, MOD

Hydraulic/Undercarriages (Vol 2), H G Conway (published by The Royal Aeronautical Society)

Transport Category Aircraft Systems, Thomas W Wild

Aircraft Systems, IMoir and A Seabridge

Aircraft Systems for Pilots, D D Remer

Airframe and Powerplant Mechanics Handbook AC 65-15A, US Dept of Transport/FAA

The Air Pilot's Manual Vol 4, T Thom

Aircraft wheels, brakes and anti-skied systems, Aviation Technician Trg Course/Series EA AWB

Aircraft Hydraulic Systems EA-AH-1, Aviation Technician Trg Course/Series

Aircraft Electrical Systems, E H J Pallett

General Aviation Safety Information Leaflet

CAP 385 Spec Charts Group A aircraft

Performance Requirements Manual, R V Davies

BCAR 29 (Rotorcraft)

Aircraft Landing Gear Systems, J A Tanner

Ice and Rain Protection

Transport Category Aircraft Systems , Thomas W Wild

Aircraft Systems, IMoir and A Seabridge

Aircraft Systems for Pilots, D D Remer

Airframe and Powerplant Mechanics Handbook AC 65-15A, US Dept of Transport/FAA

CAP 512

The Jet Engine, Rolls Royce

UK CAA Aeronautical Information Circulars (pink)

Oxygen

Aircraft Oxygen Systems EA-AOS, Scheppler/Crane (A/T Trg Co.)

CAP 526 (CAAIP part 5)

Airframe and Powerplant Mechanics Handbook AC 65-15A, US Dept of Transport/FAA
Transport Category Aircraft Systems, Thomas W Wild
Aircraft Systems, IMoir and A Seabridge

Safety Equipment

CAP 562 (CAAIP part 5)

CAA Fire safety at work leaflet
Aircraft Powerplants. Bent/McKinley

Airframe and Powerplant Mechanics Handbook AC 65-15A, US Dept of Transport/FAA
Transport Category Aircraft Systems, Thomas W Wild
Aircraft Systems, AIMER and A Seabridge

The Jet Engine, Rolls Royce

ANO Schedule 4, CAP 393

JAR 25

AP 3456 Vol K, MOD

Aircraft Performance

Aircraft Flight Manual, or Company Operations Manual

The Aircraft Performance Requirements Manual, R V Davies

Performance (Transport) Guidance Document (CAD 385)

Loading

Weight and Balance of Aircraft, CAAIP Leaflet 1-4

BCAR Section A, CAP 553

Aircraft Systems for Pilots, D D Remer

Airframe and Powerplant Mechanics Handbook AC 65-15A, US Dept of Transport/FAA
Aircraft Basic Science, Bent and McKinley

ADDRESSES

Information about CAA Publications:

Printing and Publication Services
Civil Aviation Authority
Greville House
37 Gratton Road
Cheltenham
Glos.
GL50 2BN

Tel: (0)1242 235151

Central Library
Civil Aviation Authority
Floor GW
Aviation House
Gatwick Airport South
West Sussex
RH6 0YR

Tel: (0)1293 573725

Information about Aeronautical Information Circulars:

The Aeronautical Information Service
AIS 1c, 1st Floor
Control Tower Building
London/Heathrow Airport
Hounslow
Middle sex
TW6 1JJ

Tel: (0)181 745 3455

Information about HMSO Publications:

Her Majesty's Stationary Office (HMSO)
49 High Holborn
London
WC1V 6HB

Tel: (0)171 928 1321

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PART 3 APPENDIX D THE GENERAL FLIGHT TEST FOR A PROFESSIONAL PILOT'S LICENCE

Syllabus for the test for aeroplanes and helicopters

D.1 PREPARATION FOR FLIGHT AND PRE TAKE-OFF PROCEDURES

AEROPLANES AND HELICOPTERS

At the beginning of the test, or at the beginning of any Section of the test when Sections are taken separately, applicants will be assessed on their ability to perform the following actions leading up to the take-off:

Self briefing

- documentation, mass and balance determination, weather brief and performance consideration;
- departure procedure, aerodrome traffic pattern operations.

Attention to weather minima

Assessment of crosswind component

Document checking - aeroplane inspection and servicing

Preliminary and external checks

Checks before starting

Starting procedure (and rotor engagement - helicopters)

Checks after starting including instrument and radio

Taxying and instrument checks

Power check

Pre take-off checks

ATC liaison and compliance

D.2 GFT SECTION 1: CROSS-COUNTRY

AEROPLANES AND HELICOPTERS

Flight planning

DR and radio Navigation

Fixing position: By map reading

Fixing position: By radio bearings

Course steadiness, altitude and airspeed

Monitoring of flight, log-keeping

Assessment of track error and regain correct track

Observation of weather, diversion planning and implementation

Observance of Regulations

Liaison with ATC, altimeter setting

Engine handling

Range/endurance considerations

Airmanship

NOTE: At some suitable stage in Section 1 the applicant will be asked to carry out certain basic handling exercises from Section 2 and the instrument flying exercises from Section 3. Part of the navigation element will be conducted under simulated IMC.

D.3 GFT SECTION 2: BASIC AIRCRAFT HANDLING

D.3.1 AEROPLANES

Single-engine aircraft:

- Take-offs (including X-wind)
- Steep turns, steep gliding turns
- Precautions before stalls & spins
- Flight at critically low airspeed
- Recognition of and recovery from incipient and full stall
- Flight at critically high airspeed
- Recognition of and recovery from spiral dives
- Engine assisted approach glide approach and flapless approach & landings
- Shortfield landing and cross wind landing
- Go-around procedure
- Forced landings
- Engine failure after take-off
- Action in event of fire
- Engine handling
- Electrical and brake malfunctions and alternative gear extension if applicable

Multi-engine aircraft:

- Simulated engine failure during take off
- Asymmetric approach and go-around
- Asymmetric approach and full stop landing

D.3.2 HELICOPTERS

Vertical take-off and landing

Transition into forward flight/hover

Climbing, descending and steep turns

Engine failure and practice forced landing

An auto-rotative landing on a predetermined position

Action in the event of fire

Engine failure in hover flight

Crosswind/sloping ground landings and take-offs

Sideways and backward flight: hover turns

Partial power take-off and landing

Manual approach and landing (if helicopter servo-controlled)

Flight into and out of a restricted area

Emergency stop

Vortex ring recognition and recovery

Shut down procedures

Engine handling

ATC liaison and compliance

Airmanship

D.4 GFT SECTION 3: INSTRUMENT FLYING

D.4.1 AEROPLANES

Full panel straight and level
Full panel turns at given rate
Full panel turns onto given headings
Full panel climbing & descending turns
Limited panel straight & level
Limited panel turns onto given headings
Limited panel recovery from unusual attitudes

D.4.2 HELICOPTERS

Full panel
Straight and level with power and speed changes
Turns at given rates
Turns onto given headings
Climbing and descending turns
Recovery from unusual attitudes
Limited panel
Straight and level
Turns onto given headings
Auto-rotation
Entry, including heading and RPM control
Descent at optimum IAS
Turn into last known wind direction
Recovery to powered flight
Instrument approach procedures
Recovery to base (suitable let-down)

D.5 GFT SECTION 4: NIGHT FLYING (if applicable)

D.5.1 AEROPLANES

Take-offs
Landings
Go-around procedures
Circuit procedures
Liaison with A. T. C.
Engine handling

D.5.2 HELICOPTERS (MUST ONLY BE CONDUCTED IN HELICOPTERS CERTIFICATED FOR NIGHT OPERATIONS)

Normal take-off, visual circuit and landing
Take-off with simulated failure of one engine after Decision Point followed by single-engine circuit, approach, go-around and landing
Take-off with simulated failure of one engine before Decision Point, and landing

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**PART 3 APPENDIX E THE INSTRUMENT RATING INITIAL/RENEWAL
FLIGHT TEST SYLLABUS AND FLIGHT TEST
CONDITIONS**

E.1 FLIGHT TEST SYLLABUS

E.1.1 Section 1. Flight Preparation

All pre-departure checks and drills necessary to check and prepare the aircraft and its equipment for the safe conduct of the flight. Use of check lists should be in accordance with company policy. When visual checks are made of flight instruments etc, the candidate should point out each item to the examiner as it is checked.

E.1.2 Section 2. Take-off & Climb

A visual take-off followed by an instrument departure and climb to the initial cruising level following the published routing as amended by any ATC instructions.

E.1.3 Section 3. En-route

Flight along the planned route in accordance with ATC instructions and using tracking facilities as briefed by the examiner. The candidate must demonstrate his ability to maintain specified track.

E.1.4 Section 4. Holding

The holding pattern may be carried out either en-route or as part of the approach procedure, and should consist of a standard entry appropriate to the inbound track followed by at least one full hold as published for the facility. The candidate must comply with local regulations, particularly speed limits, and demonstrate his ability to achieve the inbound track to the facility.

E.1.5 Section 5. Precision Approach Procedures *

The initial approach should be flown without radar assistance. The candidate should then follow the published lateral and vertical patterns of the procedure down to normal company minima using both lateral and vertical navigation guidance. At decision height/altitude, a go-around should be initiated and the published missed approach procedure followed, unless otherwise directed by ATC.

For the initial instrument rating flight test, the precision approach and the subsequent go-around should be carried out with one engine simulated failed.

**E.1.6 Section 6A. Non-precision Approach Procedures *
(for Initial Instrument Rating Flight Test only)**

The initial approach should be flown without radar assistance. The candidate should then follow the published lateral and vertical patterns of the procedure down to minimum descent height/altitude using the relevant navigational aid(s) and then maintain this altitude thereafter. At missed approach point, a go-ground

should be initiated and the published missed approach procedure followed, unless otherwise directed by ATC.

- E.1.7 Section 6B. GNSS Approach Procedures *
(mandatory only for Initial Instrument Rating Flight Test of which Section 5 is conducted in an approved flight simulator)

The initial approach should be flown without radar assistance. The candidate should then follow the published lateral and vertical patterns of the procedure down to minimum descent height/altitude using the relevant navigational aid(s) and then maintain this altitude thereafter. At missed approach point, a go-ground should be initiated and the published missed approach procedure followed, unless otherwise directed by ATC.

** Test items in Section 5, 6A and 6B might be conducted in CAD approved flight simulators subjected to CAD's acceptance.*

E.2 TEST CONDITIONS

- E.2.1 Decision Heights and Minimum Descent Heights (or Altitudes) must be calculated by the applicant and agreed by the examiner.

- E.2.2 The test is intended to simulate a practical flight. An essential element is the ability to plan and conduct the flight from routine briefing material. Therefore, the use of expanded flight logs and other specialist written briefs developed specifically for the standard routes flown is not permitted.

- E.2.3 During the test the applicant will be expected to carry out all the duties appropriate to a sole flight crew member or, in the case of a test for a multi-crew rating, or a specific aircraft type rating, the handling pilot. He must indicate to the flight examiner the checks and the duties which he is carrying out, including the identification of radio facilities. Checks must be completed in accordance with the authorized check list for the aircraft on which the test is being taken. Power settings and speeds should be agreed with the examiner before the start of the flight and will normally conform with those given in the operations manual or in the flight manual for the aircraft type in question.

- E.2.4 The flight examiner may be called upon by the applicant to check for the presence of airframe icing but will otherwise take no part in the operation of the aircraft except where he considers it necessary to intervene in the interests of safety or to avoid unacceptable delay to other air traffic.

- E.2.5 The test will be assessed as if passengers were being carried with passenger comfort and reassurance in mind. It will be assumed that it is the first flight of the day, that the aircraft has been parked outside overnight in freezing conditions, that cloud is entered after take-off at 150 feet above aerodrome level, and that light icing conditions and cloud are forecast at all levels through which the test is conducted.

- E.2.6 To permit a proper assessment of the candidates ability to fly an ILS approach, the test should be conducted at an airfield that allows a decision height of 450 feet AAL or less to be used.

E.2.7 Use of an autopilot is not permitted during the conduct of a test except for a period during cruise flight for the purpose of briefing for the approach.

E.3 **ACCEPTABLE PERFORMANCE**

The applicant will be assessed in terms of his ability to conduct the flight safely and expeditiously in compliance with Air Traffic Control clearances and instructions, and to handle his aircraft smoothly and accurately. The limits below are for general guidance. Allowance will be made for turbulent conditions and the handling qualities and performance of the type of aircraft used.

Height	+ 100 feet - 100 feet
Height for starting missed approach at Decision Height	+ 50 feet - 0 feet
Maintenance of Minimum Descent Height	+ 100 feet - 0 feet
Tracking on radio navigation aids	+ 5 degrees - 5 degrees
ILS approach	half scale deflection On localiser and glidepath
Heading	+ 5 degrees - 5 degrees
Speed	+10 knots - 10 knots

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