CIVIL AVIATION GUIDANCE MATERIAL – 1009

GUIDELINES ON FLIGHT INSTRUCTOR TRAINING

CIVIL AVIATION AUTHORITY OF MALAYSIA

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Introduction

This Civil Aviation Guidance Material 1009 (CAGM – 1009) is issued by the Civil Aviation Authority of Malaysia (CAAM) to provide guidelines for establishment of initial and renewal training courses for all Flight Instructors, pursuant to 2.8 and Appendix 11 of CAD 1 – PEL.

Organisations may use these guidelines to demonstrate compliance with the provisions of the relevant CAD's issued. Notwithstanding Regulation 204 and Regulation 205 of the Malaysian Civil Aviation Regulations 2016 (MCAR 2016), when the CAGMs issued by the CAAM are used, the related requirements of the CAD's are considered as met, and further demonstration may not be required.

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Chief Executive Officer
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Civil Aviation Guidance Material components and Editorial practices

This Civil Aviation Guidance Material is made up of the following components and are defined as follows:

Standards: Usually preceded by words such as *"shall"* or *"must"*, are any specification for physical characteristics, configuration, performance, personnel or procedure, where uniform application is necessary for the safety or regularity of air navigation and to which Operators must conform. In the event of impossibility of compliance, notification to the CAAM is compulsory.

Recommended Practices: Usually preceded by the words such as "*should"* or "*may*", are any specification for physical characteristics, configuration, performance, personnel or procedure, where the uniform application is desirable in the interest of safety, regularity or efficiency of air navigation, and to which Operators will endeavour to conform.

Appendices: Material grouped separately for convenience but forms part of the Standards and Recommended Practices stipulated by the CAAM.

Definitions: Terms used in the Standards and Recommended Practices which are not self-explanatory in that they do not have accepted dictionary meanings. A definition does not have an independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.

Tables and Figures: These add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

Notes: Included in the text, where appropriate, Notes give factual information or references bearing on the Standards or Recommended Practices in question but not constituting part of the Standards or Recommended Practices;

Attachments: Material supplementary to the Standards and Recommended Practices or included as a guide to their application.

It is to be noted that some Standards in this Civil Aviation Guidance Material incorporates, by reference, other specifications having the status of Recommended Practices. In such cases, the text of the Recommended Practice becomes part of the Standard.

The units of measurement used in this document are in accordance with the International System of Units (SI) as specified in CAD 5. Where CAD 5 permits the use of non-SI alternative units, these are shown in parentheses following the basic units. Where two sets of units are quoted it must not be assumed that the pairs of values are equal and interchangeable. It may, however, be inferred that an equivalent level of safety is achieved when either set of units is used exclusively.

Any reference to a portion of this document, which is identified by a number and/or title, includes all subdivisions of that portion.

Throughout this Civil Aviation Guidance Material, the use of the male gender should be understood to include male and female persons.

Record of Revisions

Revisions to this CAGM shall be made by authorised personnel only. After inserting the revision, enter the required data in the revision sheet below. The *'Initials'* has to be signed off by the personnel responsible for the change.

Rev No.	Revision Date	Revision Details	Initials
ISS01/REV01	15th November 2021	Refer to Summary of Changes	*CAAM*

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Summary of Changes

ISS/REV no.	Item no.	Revision Details
ISS01/REV01	1.2	Included FI (4)
	3.2	Included FI (4). Revised table 2.
	3.6	Included FI (4)
	3.7.1	Included FI (4)
	3.7.6	Revised consolidated training minimum hours
	3.8	Included FI (4)

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1 General

1.1 This CAGM is issued pursuant to 2.8 and Appendix 11 of CAD 1 – PEL.

1.2 Guidelines for FI (1) and FI (3) training are contained in Chapter 2, while guidelines for FI (2), AFI and FI (4) training are contained in Chapter 3.

2 The FI (1) and FI (3) Training Course

2.1 There should be two parts to a FI (1) and FI (3) course, as follows:

a) Part 1 – "Train The Trainer" training and exercises

b) Part 2 – Handling, take-over skills and simulator instructional practice to proficiency

2.2 Depending on the qualification of the instructor, he may not be required to complete certain parts of the course. The entry levels and the necessary parts of the course to be completed are indicated in Table 1.

Qualification	No FI Rating Experience, or FI Rating lapsed > 2 years.	FI Rating lapsed > 3 months but ≤ 2 years	FI rating current but aircraft type change
Parts of Course			
Part 1	Yes	No	No
Part 2	Yes	Yes	Yes

Table 1 – Required FI (1) and FI (3) training

2.3 Part 1 – "Train The Trainer" Training and Exercises

2.3.1 The core instructional training should comprise of lectures, exercises and tutorials.

2.3.2 The aim of Part 1 of the FI (1) and FI (3) course is to ensure that the instructor:

a) understands the concepts of Threat and Error Management (TEM), Multi Crew Cooperation (MCC) and Crew Resource Management (CRM), and be able to relate practical applications of TEM, MCC and CRM;

b) learns the techniques of briefing and debriefing and be able to facilitate effective learning for the students;

c) learns how to analyse problems and synthesise them into practical solutions for the students; and

d) learns how to write the student's report precisely and accurately.

2.3.3 The training should be conducted in no less than five (5) days while meeting the minimum number of hours required in 3.3.1 a) and b) in Appendix 11 of CAD 1 – PEL, consisting of at least the following:

a) lectures and discussion topics on the following topics:

1) Human factors and limitations
2) Threat and Error Management
3) Multi Crew Cooperation
4) Crew Resource Management

b) training of instructor competencies in the following areas:

1) Prepare resources

i) ensures adequate facilitation tools;
ii) prepares briefing material;
iii) plans training within training envelope of the training conducted.

2) Create climate conducive to learning

i) establishes credentials and appropriate behaviour;
ii) clarifies roles;
iii) states training objectives;
iv) ascertain and supports student needs.

3) Present knowledge

i) communicates clearly;
ii) creates and sustains realism;
iii) looks for training opportunities.

4) Manage time

i) allocates the appropriate time to achieve competency objective

5) Facilitate learning

i) encourages trainee participation;
ii) shows motivating, patient, confident and assertive mannerisms;
iii) conducts one-to-one coaching;
iv) encourages mutual support.

6) Conduct briefing and debriefing

i) elicits feedback from student;
ii) tracks training session processes against competency criteria;
iii) keeps appropriate records.

7) Assess performance

i) assesses and encourages trainee self-assessment of performance against competency standards;
ii) makes assessment decision and provides clear feedback;

iii) observes CRM behaviour.

8) Monitor and review progress

i) compares individual outcomes to defined objectives;
ii) identifies individual differences in learning rates;
iii) applies appropriate corrective action.

9) Write reports

i) Reports accurately using only observed actions and events

2.4 Part 2 – Handling, Take-Over Skills and Simulator Instructional Practice to Proficiency

2.4.1 The aim of Part 2 of the FI (1) and FI (3) course is to ensure the instructor is:

a) able to demonstrate and teach flying skills and techniques to the student from either pilot's seat; and

b) able to take-over appropriately from the student as if it was an actual flight for applicants of a FI (1) rating.

c) knowledgeable with the aircraft systems and its performance, normal and abnormal procedures;

d) able to make use of the simulator as a teaching tool through practicing of simulator instructional techniques and skills; and

e) capable of tailoring instructions according to each student's proficiency level (Tutoring skills).

2.4.2 To achieve competency in 2.4.1 a) and b), a sufficient number of hours shall be allocated to train and assess the instructor on the applicable aircraft simulator type. By the end of these sessions, the instructor should be able to:

a) demonstrate competent flying skills in normal and abnormal flight conditions on each pilot's seat;

b) instruct flying manoeuvres and techniques on each pilot's seat; and

c) be aware of the appropriate time to take over controls: not too early which may deprive the trainee of his learning opportunity yet not too late as to jeopardise the safety of the flight, for applicants of a FI (1) rating.

2.4.3 The instructor's training should be discontinued if he is found to be weak in his judgment during the critical phases of flight

2.4.4 The contents of this part should be related to the type of aircraft on which the applicant wishes to instruct and the contents of the training should cover all the significant exercises applicable to the aircraft type.

2.4.5 To achieve the aim of this part the training must consist of at least the minimum hours required in 3.3.1 c) in Appendix 11 of CAD 1 – PEL, however the amount of flight training will vary depending on the complexity of the aircraft type. Each session is to include the briefing, conduct of session, debriefing and report writing. The tutors may act as "students" and provide critique after each session. Appropriate intervention by tutors as "students" to demonstrate how it should be done, during the conduct of the session, is permissible. The tutors must at least be a FI qualified on the aircraft type.

2.4.6 The exercises chosen for the sessions are to be from the Type Rating training syllabus or Line Oriented Flight Training (LOFT) with at least one exercise on the demonstration and teaching of correct crosswind take-off and landing.

2.5 FI (1) and FI (3) Assessment of Competence

2.5.1 The aim of this assessment is to check if the instructor meets the standards required for the holder of a FI (1) or FI (3) rating. The instructor is also expected to demonstrate the required skills covered under 2.4.1 a) and b) as applicable.

2.5.2 This should be a 4-hour simulator session on two "students". It should be a training session from the Type Rating syllabus or Line Oriented Flight Training (LOFT). The "students" may be actual students on a Type Rating course or LOFT or tutors acting as "students". This session must be evaluated by a DFE (1), DFE (3) or CAAM Inspector as a test to assess if the instructor is competent to be issued a FI (1) or FI (3) rating.

2.5.3 A FI whose FI Rating lapsed for a period of not more than 3 months may not need to complete any training programme before taking the FI Assessment of Competence.

2.5.4 Where a simulator is not available for the training and assessment stated in the paragraphs in chapter 2, training and/or assessments may be carried out in the aircraft subject to the approval of CAAM. Requests for such approvals must be accompanied by an appropriate risk assessment.

3 The FI (2), AFI and FI (4) Course

3.1 There should be three parts to a FI (2), AFI and FI (4) course, as follows:

a) Part 1 – "Train The Trainer" Training and Exercises

b) Part 2 – Technical Theoretical Knowledge Instruction

c) Part 3 – Flight Instruction

3.2 Depending on the experience level of the candidate or period of lapse of the FI (2), AFI or FI (4) rating, the applicant may not be required to complete certain components

of the FI (2), AFI or FI (4) rating training course. The required FI (2), AFI or FI (4) rating training to be completed is as indicated in Table 2.

Note. – To simplify the table, FI Rating in Table 2 refers to FI (2), AFI or FI (4) ratings.

Qualification	FI Renewal or FI Rating lapsed <3 months	FI Rating lapsed >3 months but ≤2 years**	FI Rating lapsed >2 years but ≤10 years***	No previous FI experience or FI Rating lapsed >10 years	Current FI adding new aircraft type or class rating	Addition of training authorisations
Training Required						
Part 1	No	No	Yes	Yes	No	No
Part 2	No	Yes*	Yes*	Yes	Yes*	Yes*
Part 3	Yes*	Yes*	Yes*	Yes	Yes*	Yes*

* Training may be consolidated for candidates with acceptable instructing experience. Refer 3.7 of this CAGM.

** If the applicant has a previous FI (1) or FI (3) rating, he may be credited of Part 1 training provided his FI (1) or FI (3) rating has lapsed for a period of less than 2 years.

*** Only applicable to FI (2), AFI or FI (4) holder with more than 500 hours of flight instruction in the appropriate aircraft category. Applicants who do not possess at least 500 hours of flight instruction shall follow the column *'No previous FI experience or FI Rating lapsed > 10 years'*.

Table 2 – Required FI (2) and AFI training

Note. – Example of Addition of training authorisations: addition of Instrument Rating training, night flying training navigation training. Adding of training authorisation does not include AFI upgrade to FI (2). For AFI upgrade to FI (2), applicants must meet the requirements in CAD 1 – PEL Appendix 11 and pass an assessment of competence.

3.3 When extending privileges of the FI (2) or AFI Rating from one aeroplane class to another, the requirements stated in paragraph 2.8.3.2 and Appendix 11 paragraph 1.2 of CAD 1 – PEL shall be met.

3.4 Part 1 – "Train The Trainer" Training and Exercises

3.4.1 Where applicable, the content of the Part 1 of the FI (1) and FI (3) training course, as stated in paragraph 2.3 of this CAGM, should be used as guidance to develop the course syllabus.

3.4.2 The training should be conducted in no less than five (5) days while meeting the minimum number of hours required in 3.4.1 a) in Appendix 11 of CAD 1 – PEL.

3.5 Part 2 – Technical Theoretical Knowledge Instruction

3.5.1 This part of the course should cover the items stated in 3.5.2 while meeting the minimum number of hours required in 3.4.1 b) in Appendix 11 of CAD 1 – PEL.

3.5.2 The expanded table covering the minimum requirements for the technical theoretical knowledge instruction can be found in 4.1 (aeroplane) and 4.2 (helicopter) of this CAGM.

3.6 Part 3 – Flight Instruction

3.6.1 The aim of this part is to acquaint the FI (2), AFI or FI (4) with the teaching aspects of the operational procedures and handling of an aircraft with all engines operating and asymmetric flight.

3.6.2 To achieve the aim of this part the training must consist of at least the minimum hours required in 3.4.1 c) and 3.6.1 a) in Appendix 11 of CAD 1 – PEL, however the amount of flight training will vary depending on the complexity of the aircraft type. Each session is to include the briefing, conduct of session, debriefing and report writing.

3.6.3 The items that should be covered are the practical aspects of all topics covered in Part 2. This should be customised based on the type of aircraft.

3.7 Consolidated Training

3.7.1 With reference to Table 2, a FI (2), AFI or FI (4) may attend a consolidated training programme to renew or reactivate his FI (2), AFI or FI (4) rating.

3.7.2 The consolidated training content developed by ATOs must account the following factors:

a) The type of training required, whether the training is conducted for a renewal or renewal after expiry of the rating;

b) The amount of time lapsed since the last time the applicant has conducted training, in the case of renewal, or since the rating has lapsed, in the case of renewal after expiry. The amount of training needed to reach the desired level of competence should increase with the time lapsed.

3.7.3 The necessary hours required for each part of the training must commensurate with the required instructional knowledge and technique to be imparted to the applicant.

3.7.4 The consolidated content of the training for Part 2 should cover the following as a minimum:

a) new or current regulations and directives, with emphasis on knowledge of CAD 1 – PEL and operational requirements;

b) company policy and standard operating procedure;

c) summary of teaching and learning techniques;

d) summary of instructional flying techniques;

e) human factors (if FI (2) or AFI rating lapsed more than one year);

f) flight safety incidents and accidents awareness;

g) navigational skills including new or current radio navigation aids;

h) differences in aircraft variant (for FI (2), AFI or FI (4) adding a new aircraft type or class rating);

i) teaching instrument flying (for FI (2), AFI or FI (4) adding IR instructional privileges);

j) any additional topic deemed necessary by the CAAM.

Note. – The specific contents of the consolidated training should be aligned to the type of training required. E.g. lapsed rating of more than 3 months, would normally require emphasis on items (a) to (g). However, adding of training authorisation or new aircraft type or class rating may require less emphasis on the items (a) to (g).

3.7.5 The minimum hours for the consolidated training in Part 2 should be at least:

a) lapsed FI (2) or AFI rating – 20 hours;

b) adding new aircraft type or class rating – 20 hours;

c) adding training authorisation – 10 hours.

Note. – With reference to paragraph 3.7.5 (b), the minimum hours required may be reduced to 10 hours for Helicopters adding from a single engine type rating to another single engine type rating.

3.7.6 Where consolidated training for Part 3 is allowed (refer table 2), the minimum hours for the consolidated training should be at least:

a) lapsed FI (2) or AFI rating > 3 months but ≤ 2 years – 5 hours;

b) lapsed FI (2) or AFI rating > 2 years but ≤ 5 years – 10 hours

c) lapsed FI (2) or AFI rating > 5 years but ≤ 10 years – 20 hours

d) lapsed FI (4) rating – 3 hours

Note. – The amount of flight instruction will vary depending on the complexity of the aircraft type.

3.7.6.1 The consolidated training in paragraph 3.7.6 above should cover the following as a minimum:

a) Aeroplanes:

1) stalls;

2) precautionary landing;

3) forced landing without power;

4) UPRT;

5) circuits and landings;

6) any mandatory exercises when adding training authorisation (e.g. instrument flying or night flying)

b) Helicopters

1) autorotation;
2) hovering;
3) circuits and landings;
4) hover manoeuvring;
5) spot turns;
6) simulated engine off landing;
7) practice force landing;
8) quick stops;
9) sloping ground;
10) confined areas;
11) any mandatory exercises when adding training authorisation (e.g. instrument flying or night flying)

3.8 FI (2), AFI and FI (4) Assessment of Competence

3.8.1 The aim of this assessment is to check if the instructor meets the standards required for the holder of a FI (2), AFI or FI (4).

3.8.2 This should be a training session in an the appropriate class of aircraft on "student". It should be a training session from the approved training syllabus. The "students" may be actual students on a course or other FI (2)s, AFIs or FI (4)s acting as "students". This session must be evaluated by a CAAM Inspector, or delegated to a DFE (2) as a test to assess if the instructor is competent to be issued a FI (2), AFI or FI (4) rating.

3.8.3 A FI (2), AFI or FI (4) whose rating has lapsed for a period of not more than 3 months may not need to complete any training before taking the FI (2), AFI or FI (4) Assessment of Competence.

4 Appendices

4.1 Appendix 1: Technical Theoretical Knowledge Instruction (Aeroplane)

Note. – CAD 1 – PEL details all flight manoeuvres relevant to the issue of a licence/rating. The flight manoeuvre instructions outlined in this table must be read in conjunction with CAD 1 – PEL Appendix 4.

Topics	Details
Aeroplane Familiarisation	1. introduction to the aeroplane; 2. explanation of the cockpit layout; 3. aeroplane and engine systems; 4. checklists, drills and controls; 5. propeller safety; i) precautions general; ii) precautions before and during hand turning; iii) hand swinging technique for starting (if applicable to type). 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 as applicable to type; iii) escape drills: location and use of emergency equipment and exits.
Preparation For and Actions After Flight	1. flight authorisation and aeroplane 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 or rudder pedal adjustment; 6. starting and warming up checks; 7. power checks; 8. running down, system checks and switching off the engine; 9. leaving the aeroplane, parking, security and picketing; 10. completion of authorisation sheet and aeroplane serviceability documents.
Effects of Controls	1. function of primary flying controls: when laterally level and banked; 2. further effect of ailerons and rudder; 3. effect of inertia; 4. effect of air speed; 5. effect of slipstream; 6. effect of power; 7. effect of trimming controls; 8. effect of flaps; 9. operation of mixture control; 10. operation of carburettor heat control; 11. operation of cabin heat or ventilation systems.

Taxiing	1. pre-taxiing checks; 2. starting, control of speed and stopping; 3. engine handling; 4. control of direction and turning (including manoeuvring in confined spaces); 5. parking area procedures and precautions; 6. effect of wind and use of flying controls; 7. effect of ground surface; 8. freedom of rudder movement; 9. marshalling signals; 10. instrument checks; 11. ATC procedures; 12. emergencies: steering failure and brake failure.
Straight and Level Flight	1. the forces; 2. longitudinal stability and control in pitch; 3. relationship of CG to control in pitch; 4. lateral and directional stability (control of lateral level and balance); 5. attitude and balance control; 6. trimming; 7. power settings and air speeds; 8. drag and power curves; 9. range and endurance.
Climbing	1. the forces; 2. relationship between power or air speed and rate of climb (power curves maximum rate of climb (vy)); 3. effect of mass; 4. effect of flaps; 5. engine considerations; 6. effect of density altitude; 7. the cruise climb; 8. maximum angle of climb (vx).
Descending	1. the forces; 2. glide descent: angle, air speed and rate of descent; 3. effect of flaps; 4. effect of wind; 5. effect of mass; 6. engine considerations; 7. power assisted descent: power or air speed and rate of descent; 8. cruise descent; 9. sideslip.
Turning	1. the forces; 2. use of controls; 3. use of power; 4. maintenance of attitude and balance; 5. medium level turns; 6. climbing and descending turns; 7. slipping turns; 8. turning onto selected headings: use of gyro heading indicator and magnetic compass.

Slow Flight	1. aeroplane handling characteristics during slow flight at: i) v_{s1} & v_{so} + 10 knots; ii) v_{s1} & v_{so} + 5 knots. 2. slow flight during instructor induced distractions; 3. effect of overshooting in configurations where application of engine power causes a strong 'nose-up' trim change. *Note. – V_{S1} = Stall Speed, V_{SO} = Stall Speed in Landing Config.*
Stalling	1. characteristics of the stall; 2. angle of attack; 3. effectiveness of the controls at the stall; 4. factors affecting the stalling speed: i) effect of flaps, slats and slots; ii) effect of power, mass, CG and load factor. 5. effects of unbalance at the stall; 6. symptoms of the stall; 7. stall recognition and recovery; 8. stalling and recovery: i) without power; ii) with power on; iii) with flaps down; iv) maximum power climb (straight and turning flight to the point of stall with uncompensated yaw); v) stalling and recovery during manoeuvres involving more than 1 G (accelerated stalls, including secondary stalls and recoveries); vi) recovering from incipient stalls in the landing and other configurations and conditions; vii) recovering at the incipient stage during change of configuration; viii) stalling and recovery at the incipient stage with 'instructor induced' distractions.
Spin Recovery at the Incipient Stage	1. causes, stages, autorotation and characteristics of the spin; 2. recognition and recovery at the incipient stage: entered from various flight attitudes; 3. aeroplane limitations.
Spin Recovery at the Developed Stage	1. spin entry; 2. recognition and identification of spin direction; 3. spin recovery; 4. use of controls; 5. effects of power or flaps (flap restriction applicable to type); 6. effect of the CG upon spinning characteristics; 7. spinning from various flight attitudes; 8. aeroplane limitation; 9. safety checks.

Take-Off and Climb to Downwind Position	1. handling: factors affecting the length of take-off run and initial climb; 2. correct lift off speed, use of elevators (safeguarding the nose wheel), rudder and power; 3. effect of wind (including crosswind component); 4. effect of flaps (including the decision to use and the amount permitted); 5. effect of ground surface and gradient upon the take-off run; 6. effect of mass, altitude and temperature on take-off and climb performance; 7. pre take-off checks; 8. ATC procedure before take-off; 9. drills, during and after take-off; 10. noise abatement procedures; 11. tail wheel considerations (as applicable); 12. short or soft field take-off considerations or procedures; 13. emergencies: i) aborted take-off; ii) engine failure after take-off. 14. ATC procedures.
Circuit, Approach and Landing	1. downwind leg, base leg and approach: position and drills; 2. factors affecting the final approach and the landing run; 3. effect of mass; 4. effects of altitude and temperature; 5. effect of wind; 6. effect of flap; 7. landing; 8. effect of ground surface and gradient upon the landing run; 9. types of approach and landing: i) powered; ii) crosswind; iii) flapless (at an appropriate stage of the course); iv) glide; v) short field; vi) soft field. 10. missed approach; 11. engine handling; 12. wake turbulence awareness; 13. windshear awareness; 14. ATC procedures; 15. mislanding and go-around; 16. special emphasis on look-out.
First Solo and Consolidation	During the flights immediately following the solo circuit consolidation period the following should be covered: 1. procedures for leaving and rejoining the circuit; 2. local area (restrictions, controlled airspace, etc.); 3. compass turns; 4. QDM meaning and use.

Advanced Turning	1. the forces; 2. use of power; 3. effect of load factor: i) structural considerations ii) increased stalling speed. 4. physiological effects; 5. rate and radius of turn; 6. steep, level, descending and climbing turns; 7. stalling in the turn and how to avoid it; 8. spinning from the turn: recovery at the incipient stage; 9. spiral dive; 10. unusual attitudes and recoveries.
Forced Landing without Power	1. selection of forced landing areas; 2. provision for change of plan; 3. gliding distance: consideration; 4. planning the descent; 5. key positions; 6. engine failure checks; 7. use of radio: R/T 'distress' procedure; 8. base leg; 9. final approach; 10. go-around; 11. landing considerations; 12. actions after landing: aeroplane security; 13. causes of engine failure.
Precautionary Landing	1. occasions when necessary (in-flight conditions); 2. landing area selection and communication (R/T procedure); 3. overhead inspection; 4. simulated approach; 5. climb away; 6. landing area selection: i) normal aerodrome; ii) disused aerodrome; iii) ordinary field; 7. circuit and approach; 8. actions after landing; aeroplane security.
Navigation	1. flight planning; a. weather forecast and actual(s); b. map selection, orientation, preparation and use: i. choice of route; ii. regulated or controlled airspace; iii. danger, prohibited and restricted areas; iv. safety altitude. c. calculations: i. magnetic heading(s) and time(s) en-route; ii. fuel consumption; iii. mass and balance; iv. mass and performance. d. flight information: i. NOTAMs etc.; ii. noting of required radio frequencies; e. selection of alternate aerodrome(s).

	f. notification of the flight i. pre-flight administration procedures; ii. flight plan form (where appropriate). 2. departure; a. organisation of cockpit workload; b. departure procedures: i. altimeter settings; ii. setting heading procedures; iii. noting of ETA(s). c. en-route map reading: identification of ground features; d. maintenance of altitudes and headings; e. revisions to ETA and heading, wind effect, drift angle and groundspeed checks; f. log keeping; g. use of radio; h. minimum weather conditions for continuance of flight; i. 'in-flight' decisions; j. diversion procedures; k. operations in regulated or controlled airspace; l. procedures for entry, transit and departure; m. navigation at minimum level; n. uncertainty of position procedure, including R/T procedure; o. lost procedure; p. use of radio navaids. 3. arrival procedures and aerodrome circuit joining procedures: a. ATC liaison, R/T procedure, etc.; b. altimeter setting, c. entering the traffic pattern (controlled or uncontrolled aerodromes); d. circuit procedures; e. parking procedures; f. security of aircraft; g. refuelling; h. booking in.
Navigation at Lower Levels and in Reduced Visibility	1. general considerations: a. planning requirements before flight in entry or exit lanes; b. ATC rules, pilot qualifications and aircraft equipment; c. entry or exit lanes and areas where specific local rules apply. 2. low level familiarisation: a. actions before descending; b. visual impressions and height keeping at low altitude; c. effects of speed and inertia during turns; d. effects of wind and turbulence; 3. low level operation: a. weather considerations; b. low cloud and good visibility; c. low cloud and poor visibility; d. avoidance of moderate to heavy rain showers; e. effects of precipitation; f. joining a circuit;

	g. bad weather circuit, approach and landing.
Use of Radio Navigation Aids under VFR	1. use of VOR 2. use of ADF equipment 3. use of VHF 4. use of radar facilities 5. use of distance DME
Basic Instrument Flight	1. flight instruments; a. physiological sensations; b. instrument appreciation; c. attitude instrument flight; d. pitch indications; e. bank indications; f. different dial presentations; g. introduction to the use of the attitude indicator; h. pitch attitude; i. bank attitude; j. maintenance of heading and balanced flight; k. instrument limitations (inclusive system failures). 2. attitude, power and performance; a. attitude instrument flight: b. control instruments; c. performance instruments; d. effect of changing power and configuration; e. cross-checking the instrument indications; f. instrument interpretation; g. direct and indirect indications (performance instruments); h. instrument lag; i. selective radial scan; 3. basic flight manoeuvres (full panel); a. straight and level flight at various air speeds and aeroplane configurations; b. climbing; c. descending; d. standard rate turns onto pre-selected headings: i. level; ii. climbing; iii. Descending.
Night Flying	1. start-up procedures; 2. local procedures: including ATC liaison; 3. taxiing; 4. night circuits; 5. night navigation; 6. night emergencies.

4.2 Appendix 2: Technical Theoretical Knowledge Instruction (Helicopter)

Note. – CAD 1 – PEL details all flight manoeuvres relevant to the issue of a licence/rating. The flight manoeuvre instructions outlined in this table must be read in conjunction with CAD 1 – PEL Appendix 4.

Topics	Details
Helicopter Familiarisation	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: a. action if fire in the air and on the ground: engine, cockpit or cabin and electrical fire; b. system failure drills as applicable to type; c. escape drills: location and use of emergency equipment and exits.
Preparation For and Actions After Flight	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.
Effects of Controls	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.
Power and Attitude Changes	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.
Level Flight, Climbing, Descending and Turning	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.
Autorotation	1. characteristics of autorotation; 2. safety checks (including look-out and verbal warning); 3. entry and development of autorotation; 4. effect of mass, speed, disc loading, G forces and density altitude on Rotor Revolutions Per Minute (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 Engine Revolutions Per Minute (ERPM) or RRPM during re-engagement (as applicable); 9. danger of vortex condition during recovery.
Hovering and Hover Taxiing	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.
Take-Off and Landing	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.
Transitions From Hover to Climb and Approach to Hover	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.

Circuit, Approach and Landing	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 in ground effect(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.
First Solo	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.
Sideways and Backwards Hover Manoeuvring	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.
Spot Turns	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 turnabout pilot position; 8. spot turnabout tail rotor position; 9. spot turnabout helicopter geometric centre; 10. square (safe visibility) and clearing turn.

Hover Out of Ground Effect and Vortex Ring	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.
Simulated Engine Off Landings (EOL)	1. revision of basic autorotation; 2. effect of mass, 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.
Advanced Autorotations	1. effect of air speed or mass 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.
Practice Force Landings	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.
Steep Turns	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.
Transitions	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.
Quick Stops	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; 9. danger of holding flare when downwind, (vortex ring) - (minimum speed 70 knots);

	10. to revise danger of high disc loading.
Navigation	1. flight planning: a. weather forecasts and actuals; b. map selection, orientation, preparation and use: i) choice of route; ii) regulated or controlled airspace; iii) danger, prohibited and restricted areas; iv) safety altitude. c. calculations: i) magnetic heading(s), time(s) en route; ii) fuel consumption; iii) mass and balance. d. flight information: i) NOTAMs etc; ii) noting of required radio frequencies; iii) selection of alternate landing sites. e. helicopter documentation; f. notification of the flight: i) pre-flight administration procedures; ii) flight plan form (where appropriate). 2. departure: a. organisation of cockpit workload; b. departure procedures; c. procedure for revisions of ETA and headings; d. amending an ETA; e. log keeping; f. use of radio; g. use of navaids; h. weather monitoring and minimum weather conditions for continuation of flight; i. significance of in-flight decision making; j. technique for transiting controlled or regulated airspace; k. uncertainty of position procedure; l. lost procedure. 3. arrival a. aerodrome joining procedure, in particular ATC liaison in controlled or regulated airspace; b. parking procedures; c. post flight administrative procedures. 4. navigation problems at low heights and reduced visibility: a. actions before descending; b. significance of hazards, (for example obstacles and other traffic); c. difficulties of map reading; d. effects of wind and turbulence; e. significance of avoiding noise sensitive areas; f. procedures for joining a circuit from low level; g. procedures for a bad weather circuit and landing; h. actions in the event of encountering DVE; i. appropriate procedures and choice of landing area for precautionary landings; j. decision to divert or conduct precautionary landing;

	k. precautionary landing. 5. Radio Navigation a. use of VOR b. use of ADF equipment c. use of VHF d. use of radar facilities e. use of distance DME
Advanced Take-off, Landing and Transitions	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.
Sloping Ground	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.
Limited Power	1. use of appropriate helicopter performance graphs; 2. selection of technique according to available power; 3. effect of wind on available power.
Confined Areas	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. take-off procedures.
Basic Instrument Flight	1. physiological sensations; 2. instrument appreciation; 3. attitude instrument flight;

	4. instrument scan; 5. instrument limitations; 6. basic manoeuvres by sole reference to instruments: a. straight and level flight at various air speeds and configurations; b. climbing and descending; c. standard rate turns, climbing and descending, onto selected headings; b. recoveries from climbing and descending turns (unusual attitudes).
Night Flying	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.)