

DDC No. 5-2009-PEL

Flight Engineer Knowledge Test Guide

January 20th, 2009





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Decision Director CASAS

Subject: Flight Engineer Knowledge Test Guide

PREFACE

This Decision Director CASAS No. 5-2009-PEL, dated January 20th, 2009, Flight Engineer Knowledge Test Guide, provides information for applicants preparing to take flight engineer knowledge tests. Appendices provide lists for each aircraft category of flight engineer licensing with subject matter outlines, reference materials, and sample questions with learning statement codes. This guide can be purchased from the Civil Aviation Safety Authority Suriname, P.O. Box 12587, Airfield Zorg & Hoop. Paramaribo, Suriname or downloaded from the CASAS web site at <http://www.casas.sr>.

Comments and/or questions regarding this guide should be sent to the following address: Civil Aviation Safety Authority Suriname, P.O. Box 12587, Airfield Zorg & Hoop. Paramaribo, Suriname.

/s/ January 20th, 2009

V. Hanenberg
Director CASAS

FLIGHT ENGINEER KNOWLEDGE TEST GUIDE

PURPOSE

The purpose of this Decision Director CASAS (DDC) is to provide guidance for applicants preparing to take the flight engineer knowledge tests. Appendices provide subject matter outlines, reference material, and sample questions with learning statements.

Civil Aviation Regulations Suriname (CARS) can be obtained from the Civil Aviation Safety Authority Suriname, P.O. Box 12587, Airfield Zorg & Hoop. Paramaribo, Suriname. CARS Part 2 Personnel Licensing regulations cover the requirements for personnel licensing.

This DDC can be purchased from the Civil Aviation Safety Authority Suriname, P.O. Box 12587, Airfield Zorg & Hoop. Paramaribo, Suriname or downloaded from the CASAS website at <<http://www.casas.sr>>.

Comments and/or questions regarding this DDC should be sent to Civil Aviation Safety Authority Suriname, P.O. Box 12587, Airfield Zorg & Hoop. Paramaribo, Suriname.

INTRODUCTION

At one time, the flight engineer functioned as an in-flight maintenance person. Today, the flight engineer is a technical expert, who must be thoroughly familiar with the operation and function of various aeroplane components. The principal function of the flight engineer is to assist the pilots in the operation of the aeroplane. Specific duties vary with different aeroplanes and operators.

This knowledge test guide should answer most questions about taking the flight engineer knowledge tests by covering the following areas: knowledge test eligibility requirements; knowledge areas on the tests; descriptions of the tests; process for taking a knowledge test; validity of Airman Knowledge Test Reports; use of test aids and materials; cheating or other unauthorised conduct; retesting procedures; and obtaining training and testing publications and general information.

This guide will help applicants in preparing to take one or all of the following tests:

- Flight Engineer Turbojet – Basic FEX
- Flight Engineer Turbojet – Added Rating FEJ
- Flight Engineer Turboprop – Basic FET
- Flight Engineer Turboprop – Added Rating FEP
- Flight Engineer Reciprocating Engine – Basic FEN
- Flight Engineer Reciprocating Engine – Added Rating FER

This guide is not offered as an easy way to obtain the necessary information for passing the knowledge tests. Rather, the intent of this guide is to define and narrow the field of study to the required knowledge areas included in the tests.

CASAS airman knowledge tests are a very effective instrument for aviation safety and regulatory compliance. However, these tests can only sample the vast amount of knowledge every flight engineer needs to operate safely in an ever increasingly complex airspace system.

KNOWLEDGE TEST ELIGIBILITY REQUIREMENTS

Individuals pursuing a flight engineer licence should review: Civil Aviation Regulations Suriname (CARS), Part 2, section 2.4.2, General rule concerning Flight Engineer Licences and Ratings; section 2.4.3, Authority to act as a flight crew member; and section 2.4.4, Flight Engineer Licence and Class Rating Requirements. The applicant for a flight engineer licence knowledge test must be at least 18 years old and have a CASAS Class 1 medical certificate.

KNOWLEDGE AREAS ON THE TESTS

Flight engineer knowledge tests are comprehensive because they must test the applicant's knowledge in many subject areas.

Applicants pursuing a flight engineer licence or added rating should review the appropriate regulations in CARS Part 2, section 2.4.4.2 (c), Knowledge, for the knowledge areas on the tests.

DESCRIPTIONS OF THE TESTS

All test questions are the objective, multiple-choice type. Each question can be answered by the selection of a single response. Each test question is independent of other questions; therefore, a correct response to one does not depend upon, or influence, the correct response to another. **The minimum passing score is 75 percent.**

The following tests each contain **80 questions**, and applicants are allowed a **maximum of 3.0 hours** to complete each test.

- Flight Engineer Turbojet – Basic
- Flight Engineer Turboprop – Basic
- Flight Engineer Reciprocating Engine – Basic

The following tests each contain **50 questions**, and applicants are allowed a **maximum of 2.0 hours** to complete each test.

- Flight Engineer Turbojet – Added Rating
- Flight Engineer Turboprop – Added Rating
- Flight Engineer Reciprocating Engine – Added Rating

Communication between individuals through the use of words is a complicated process. In addition to being an exercise in the application and use of aeronautical knowledge, a knowledge test is also an exercise in communication since it involves the use of the written language. Since the tests involve written rather than spoken words, communication between the test writer and the person being tested may become a difficult matter if care is not exercised by both parties. Consequently, considerable effort is expended to write each question in a clear, precise manner. Test applicants should be sure to carefully read the instructions given with each test, as well as the statements in each test item.

When taking a test, keep the following points in mind:

- Answer each question in accordance with the latest regulations and guidance publications.
- Read each question carefully before looking at the possible answers. Test applicants should clearly understand the problem before attempting to solve it.
- After formulating an answer, determine which choice corresponds with that answer. The answer chosen should completely resolve the problem.
- From the answers given, it may appear there is more than one possible answer; however, there is only one answer that is correct and complete. The other answers are either incomplete, erroneous, or represent common misconceptions.
- If a certain question is difficult, it is best to mark it for review and proceed to the next question. After answering the less difficult questions, return to those marked for review and answer them. The review marking procedure will be explained to test applicants prior to starting the test. Although the computer should alert test applicants to unanswered questions, test applicants should make sure every question has an answer recorded. This procedure will enable test applicants to use the available time to maximum advantage.
- When solving a calculation problem, the answer closest to the applicant's solution should be selected. The problem has been checked with various types of calculators; therefore, if the problem has been solved correctly, the applicant's answer will be closer to the correct answer than any of the other choices.

PROCESS FOR TAKING A KNOWLEDGE TEST

The first step in the process of taking a knowledge test is to contact the CASAS office. They can provide applicants with information relating to knowledge test prerequisites, required authorisations and endorsements, testing locations, and the appropriate fees. In addition, applicants should visit the CASAS website at <<http://www.casas.sr>>.

The second step in the process of taking a knowledge test is for the applicant to complete the required training and receive an endorsement from an authorised instructor or aviation training organisation.

Acceptable forms of endorsement are:

- A certificate of graduation or a statement of accomplishment certifying the satisfactory completion of the ground school portion of a course for the licence or rating sought. The certificate or statement may be issued by an approved aviation training organisation.
- A written statement or logbook endorsement from an authorised ground or flight instructor certifying the applicant has completed an applicable ground training or home study course and is prepared to take the knowledge test.
- A failed, passed, or expired Airman Knowledge Test Report, provided the airman still has the original Airman Knowledge Test Report in his/her possession.
- An "expired test/credit" letter issued by the CASAS (in lieu of a duplicate Airman Knowledge Test Report).

The third step in the process of taking a knowledge test is for the applicant to receive written authorisation from CASAS.

The fourth step in taking a knowledge test is to proceed to the CASAS test center. An applicant for a knowledge test must provide proper identification. Testing center personnel will not begin the test until the test applicant's identification is verified.

Upon completion of the knowledge test, the applicant will receive an Airman Knowledge Test Report showing the test score. The Airman Knowledge Test Report is certified with an embossed seal to authenticate the validity of the document.

The Airman Knowledge Test Report lists the learning statement codes for questions answered incorrectly. The total number of codes shown on the Airman Knowledge Test Report is not necessarily an indication of the total number of questions answered incorrectly.

The appendices of this Knowledge Test Guide contain a list of reference materials for applicants to study during their training for a flight engineer licence. The questions on the knowledge test will come from these reference materials. Decision Director CASAS, No. 2-2006-PEL Revision 1, Learning Statement Reference Guide for Airman Knowledge Testing, contains learning statements and their corresponding codes for airman knowledge testing. Applicants should match the learning statement codes on the Airman Knowledge Test Report to these codes to review their areas of deficiency.

A list of reference materials has been prepared by CASAS to establish specific references for all knowledge standards and is to be used when preparing for an airman knowledge test. The list of reference materials is contained in the appendices to this Knowledge Test Guide.

An applicant's instructor is required to provide instruction on each of the knowledge areas listed on the Airman Knowledge Test Report and to complete an endorsement of this instruction. The Airman Knowledge Test Report must be presented to the test examiner prior to taking the skill test. During the oral portion of the skill test, the test examiner is required to evaluate the noted areas of deficiency.

Applicants requiring a duplicate Airman Knowledge Test Report due to loss or destruction of the original should send a signed request to Civil Aviation Safety Authority Suriname, Personnel Licensing Division, P.O. Box 12587, Paramaribo, Suriname.

VALIDITY OF AIRMAN KNOWLEDGE TEST REPORTS

Airman Knowledge Test Reports for a flight engineer licence are valid for 24 calendar months. The applicant should plan to complete the skill test during the 24 calendar month validity period. If the Airman Knowledge Test Report expires before completion of the skill test, the applicant must retake the knowledge test.

USE OF TEST AIDS AND MATERIALS

Knowledge test applicants may use aids, reference materials, and test materials within the guidelines listed below. All models of aviation-oriented calculators may be used, including small electronic calculators that perform only arithmetic functions (add, subtract, multiply, and divide). Simple programmable memories, which allow addition to, subtraction from, or retrieval of one number from the memory, are permissible. Also, simple functions, such as square root and percent keys are permissible. The following guidelines apply:

1. Applicants may use any reference materials provided with the test. In addition, applicants may use scales, straightedges, protractors, plotters, navigation computers, log sheets, holding

pattern entry aids, and electronic or mechanical calculators that are directly related to the test.

2. Manufacturers permanently inscribed instructions on the front and back of such aids, e.g., formulas, conversions, regulations, signals, weather data, holding pattern diagrams, frequencies, mass and balance formulas, and air traffic control procedures are permissible.
3. CASAS personnel may provide a calculator to applicants and/or deny use of the applicant's personal calculator based on the following limitations:
 - (a) Prior to, and upon completion of the test, while in the presence of the test examiner, applicants must actuate the ON/OFF switch and perform any other function that ensures erasure of any data stored in memory circuits, including removal of batteries.
 - (b) The use of electronic calculators incorporating permanent or continuous type memory circuits without erasure capability is prohibited. The test examiner may refuse the use of the applicant's calculator when unable to determine the calculator's erasure capability.
 - (c) Printouts of data must be surrendered at the completion of the test if the calculator incorporates this design feature.
 - (d) The use of magnetic cards, magnetic tapes, modules, computer chips, or any other device upon which pre-written programs or information related to the test can be stored and retrieved is prohibited.
 - (e) Applicants are not permitted to use any booklet or manual containing instructions related to use of test aids.
4. Dictionaries are not permitted in the testing area.
5. The CASAS test examiner makes the final determination relating to test materials and personal possessions the applicant may take into the testing area.

CHEATING OR OTHER UNAUTHORISED CONDUCT

Knowledge testing must be carried out in accordance with the strictest security procedures to avoid test compromise. The CASAS test examiner will terminate a test at any time that he/she suspects that a cheating incident has occurred. A CASAS investigation will be conducted. If the investigation determines that cheating or unauthorised conduct has occurred, any airman licence, certificate, or rating the applicant holds may be revoked, and the applicant will be prohibited for 1 year from applying for or taking any test for a licence, certificate or rating under CARS Part 2.

RETESTING PROCEDURES

Applicants who receive a grade lower than 75 percent and who wish to retest must present the following to CASAS testing center personnel when appearing for the purpose of retesting:

- A failed Airman Knowledge Test Report.
- A written endorsement from an authorised instructor certifying that additional instruction has been given, and the instructor finds the applicant competent to pass the test.
- A written authorisation from CASAS to retake the test.

Applicants possessing an Airman Knowledge Test Report with a score of 75 percent or higher who decide to retake the test in anticipation of a better score, may retake the test after 30 days from the date their last test was taken. CASAS will not allow applicants to retake a passed test before the 30-day period has lapsed. Prior to retesting, applicants will be required to surrender their current

Airman Knowledge Test Report to the test examiner. The last test taken will reflect the official final score.

OBTAINING TRAINING AND TESTING PUBLICATIONS AND GENERAL INFORMATION

Most of the current CASAS airman training and testing publications can be obtained in electronic format from CASAS at the CASAS website at <<http://www.casas.sr>>.

AIRMAN KNOWLEDGE TEST ITEMS

Sample questions and their corresponding learning statements are contained in the appendices to this test guide. They are representative of questions for airman knowledge tests. These will help airmen become familiar with similar questions found on the airman knowledge tests. The knowledge test is not designed to intimidate any prospective airman; it is designed to measure the level of competency required to receive a CASAS licence or authorisation. The list of reference materials contained in the appendices to this test guide is provided to ensure that instructors and students are able to determine the importance of the subject matter to be taught and learned.

COMPUTER TESTING SUPPLEMENTS

The computer testing supplements contain the graphics, legends, and maps that are needed to successfully respond to certain knowledge test items. These supplements will be provided by CASAS test center personnel during the airman knowledge test.

KNOWLEDGE TEST GUIDES

The knowledge test guides describe the knowledge testing policy and procedures for each licence area.

OTHER KNOWLEDGE TESTING INFORMATION

Other knowledge testing information provides specific test information, such as test name, test code (three-digit test identifiers), number of questions, and the time (hours) allotted for each knowledge test. The test identifiers will assist airmen in selecting the proper test for the licence or rating being sought.

REFERENCE MATERIALS / LEARNING STATEMENT CODES

The appendices of this guide contain the listings of reference materials and sample test questions with related learning statements used for airman knowledge testing. The listings of reference materials and sample questions have been prepared by CASAS to establish specific references for all knowledge standards. The listings contain reference materials to be used when preparing for all airman knowledge tests. The learning statements contained in Decision Director CASAS, No. 2-2006-PEL Revision 1, should be referred to when reviewing areas of deficiency on airman knowledge test reports.

APPENDIX 1

LIST OF FLIGHT ENGINEER REFERENCE MATERIALS FOR ALL CERTIFICATIONS

The publications listed below contain study material applicants need to be familiar with when preparing for flight engineer knowledge tests. Most of these publications can be purchased from CASAS or be downloaded from the CASAS web site at <http://www.casas.sr>. ICAO publications can be purchased from ICAO at: <http://www.icao.int>. The latest revision of the listed references should be requested.

- ❑ The Suriname Civil Aviation Safety and Security Act of March 12, 2002
- ❑ Civil Aviation Regulations Suriname (CARS), in particular:
 - CARS Part 1 – General Policies, Procedures, and Policies
 - CARS Part 8 – Operations
- ❑ Implementing Standards, Part 7
- ❑ A&P Mechanics Airframe – Jeppeson Sanderson
- ❑ A&P Technician Powerplant – Jeppeson Sanderson
- ❑ Aeronautical Information Manual (AIM)
- ❑ Aeronautical Information Publication (AIP) for Suriname
- ❑ Aircraft Basic Science - Glencoe Division, Macmillian/McGraw-Hill Publication Company
- ❑ Aircraft Gas Turbine Powerplants – Jeppeson Sanderson
- ❑ Aircraft Maintenance and Repair - Glencoe Division, Macmillian/McGraw-Hill Publication Company
- ❑ Aircraft Powerplants - Glencoe Division, Macmillian/McGraw-Hill Publication Company
- ❑ Aviation Maintenance Technician Series Airframe - Aviation Suppliers and Academics (ASA), Inc.
- ❑ Aviation Maintenance Technician Series General - Aviation Suppliers and Academics (ASA), Inc.
- ❑ Aviation Maintenance Technician Series Powerplant - Aviation Suppliers and Academics (ASA), Inc.
- ❑ Dictionary of Aeronautical Terms - Aviation Supplies and Academics (ASA) Publications

APPENDIX 1 (CONTINUED)

LIST OF FLIGHT ENGINEER REFERENCE MATERIALS FOR ALL CERTIFICATIONS

- Flight Theory for Pilots – Aviation Book Co.
- The Aircraft Gas Turbine Engine and its Operation – Pratt Whitney
- Transport Category Aircraft Systems – Jeppesen Sanderson
- FAA AC 00-6 – Aviation Weather (adopted in cooperation with FAA)
- FAA AC 20-117 – Hazards Following Ground Deicing and Ground Operations (adopted in cooperation with FAA)
- FAA AC 65-9 – Airframe & Powerplant Mechanics General Handbook (adopted in cooperation with FAA)
- FAA AC 65-12 – Airframe & Powerplant Mechanics Powerplant Handbook (adopted in cooperation with FAA)
- FAA AC 65-15 – Airframe & Powerplant Mechanics Airframe Handbook (adopted in cooperation with FAA)
- FAA AC 120-58 – Pilot Guide – Large Aircraft Ground Deicing (adopted in cooperation with FAA)
- FAA-H-8083-1 – Aircraft Weight and Balance Handbook (adopted in cooperation with FAA)
- FAA-H-8083-25 – Pilot's Handbook of Aeronautical Knowledge (adopted in cooperation with FAA)

APPENDIX 2

FLIGHT ENGINEER TURBOJET - BASIC (FEX)

SUBJECT MATTER OUTLINE

The following outlines the major topics and underlying content areas on the Flight Engineer Turbojet—Basic knowledge test.

1. Air Law:
 - a. Rules and regulations relevant to the holder of a flight engineer licence;
 - b. Rules and regulations governing the operations of civil aircraft pertinent to the duties of a flight engineer.

2. Aircraft General Knowledge:
 - a. Basic principles of powerplants - turbojet engines;
 - b. Characteristics of fuels, fuel systems including fuel control;
 - c. Lubricants and lubrication systems;
 - d. Afterburners and injection systems, function and operation of engine ignition and starter systems;
 - e. Principles of operation, handling procedures and operation limitations of aircraft powerplants; effects of atmospheric conditions on engine performance;
 - f. Airframes, flight controls, structures, wheel assemblies, brakes and anti-skid units, corrosion and fatigue life and the identification of structural damage and defects;
 - g. Ice and rain protection systems;
 - h. Pressurization, air-conditioning systems and oxygen systems;
 - i. Hydraulic and pneumatic systems;
 - j. Basic electrical theory, electric systems (AC and DC), aircraft wiring systems, bonding and screening;
 - k. Principles of operation of instruments, compasses, autopilots, radio communication equipment, radio and radar navigation aids, flight management systems, displays and avionics;
 - l. Limitations of turbojet aircraft;
 - m. Fire protection, detection suppression and extinguishing systems;
 - n. Use and serviceability checks of equipment and systems of turbojet aircraft.

3. Flight Performance, Planning and Loading:
 - a. Effects of loading and mass distribution on aircraft handling, flight characteristics and performance; mass and balance calculations;
 - b. Use of practical application of performance data including procedures for cruise control.

4. Human Performance:
 - a. Human performance relevant to the flight engineer.

5. Meteorology:
 - a. Operational aspects of meteorology.

APPENDIX 2 (CONTINUED)

FLIGHT ENGINEER TURBOJET - BASIC (FEX)

SUBJECT MATTER OUTLINE

6. Navigation:
 - a. Fundamentals of navigation;
 - b. Principles and operation of self-contained systems.

7. Operational Procedures:
 - a. Principles of maintenance procedures for the maintenance of airworthiness, defect reporting, pre-flight inspections, precautionary procedures for fueling and use of external power; installed equipment and cabin systems;
 - b. Normal, abnormal and emergency procedures;
 - c. Operational procedures for carriage of freight and dangerous goods.

8. Principles of Flight:
 - a. Principles of maintenance procedures for the maintenance of airworthiness, defect reporting, pre-flight inspections, precautionary procedures for fueling and use of external power; installed equipment and cabin systems;
 - b. Normal, abnormal and emergency procedures;
 - c. Operational procedures for carriage of freight and dangerous goods.

9. Radiotelephony:
 - a. Radiotelephony procedures and phraseology.

APPENDIX 2 (CONTINUED)

FLIGHT ENGINEER TURBOJET - BASIC (FEX)

SAMPLE QUESTIONS, ANSWERS AND LEARNING STATEMENTS

1. A flight engineer operating a commercial air transport aircraft must receive recurrent training on

A – normal operation of the aeroplane flight systems within the preceding 6 calendar months.

B – emergency operation of all aeroplane flight systems within the preceding 12 calendar months.

C – alternate operation of the aeroplane flight systems within the preceding 24 calendar months.

Answer B – Learning Statement: Recall regulations - training programs

2. If the landing gear of an aeroplane moves rearward upon gear retraction, the CG will

A – move aft.

B – move forward.

C – remain the same.

Answer A – Learning Statement: Calculate aircraft performance - center of gravity

3. An in-flight condition necessary for structural icing to form is

A – visible moisture.

B – stratiform clouds.

C – cirrostratus clouds.

Answer A – Learning Statement: Recall icing - formation / characteristics

4. Which is the most effective extinguishing agent for use on an electrical fire?

A – Carbon dioxide.

B – Methyl bromide.

C – Carbon tetrachloride (Halon 04).

Answer A – Learning Statement: Recall fire extinguishing systems - components / operating principles / characteristics

5. What is the relationship between altitudes when the altimeter setting is higher than standard while flying at 15,000 feet indicated altitude?

A – Indicated altitude is higher than true altitude.

B – Indicated altitude is lower than pressure altitude.

C – Indicated altitude is higher than pressure altitude.

Answer C – Learning Statement: Interpret altimeter - readings / settings

APPENDIX 3

FLIGHT ENGINEER TURBOJET - ADDED RATING (FEJ)

SUBJECT MATTER OUTLINE

The following outlines the major topics and underlying content areas on the Flight Engineer Turbojet – Added Rating knowledge test.

1. Air Law:
 - a. Rules and regulations relevant to the holder of a flight engineer licence;
 - b. Rules and regulations governing the operations of civil aircraft pertinent to the duties of a flight engineer.

2. Aircraft General Knowledge:
 - a. Basic principles of powerplants – turbojet engines;
 - b. Characteristics of fuels, fuel systems including fuel control;
 - c. Lubricants and lubrication systems;
 - d. Afterburners & injection systems, function & operation of engine ignition & starter systems;
 - e. Principles of operation, handling procedures and operation limitations of aircraft powerplants; effects of atmospheric conditions on engine performance;
 - f. Airframes, flight controls, structures, wheel assemblies, brakes and anti-skid units, corrosion and fatigue life and the identification of structural damage and defects;
 - g. Ice and rain protection systems;
 - h. Pressurization and air-conditioning systems and oxygen systems;
 - i. Hydraulic and pneumatic systems;
 - j. Basic electrical theory, electric systems (AC and DC), aircraft wiring systems, bonding and screening;
 - k. Principles of operation of instruments, compasses, autopilots, radio communication equipment, radio and radar navigation aids, flight management systems, displays and avionics;
 - l. Limitations of turbojet aircraft;
 - m. Fire protection, detection suppression and extinguishing systems;
 - n. Use and serviceability checks of equipment and systems of turbojet aircraft.

3. Flight Performance, Planning and Loading
 - a. Effects of loading and mass distribution on aircraft handling, flight characteristics and performance; mass and balance calculations;
 - b. Use of practical application of performance data including procedures for cruise control.

4. Human Performance:
 - a. Human performance relevant to the flight engineer.

5. Meteorology:
 - a. Operational aspects of meteorology.

APPENDIX 3 (CONTINUED)

FLIGHT ENGINEER TURBOJET - ADDED RATING (FEJ)

SUBJECT MATTER OUTLINE

6. Navigation:
 - a. Fundamentals of navigation;
 - b. Principles and operation of self-contained systems.

7. Operational Procedures:
 - a. Principles of maintenance procedures for the maintenance of airworthiness, defect reporting, pre-flight inspections, precautionary procedures for fueling and use of external power; installed equipment and cabin systems;
 - b. Normal, abnormal and emergency procedures;
 - c. Operational procedures for carriage of freight and dangerous goods.

8. Principles of Flight:
 - a. Fundamentals of aerodynamics.

9. Radiotelephony:
 - a. Radiotelephony procedures and phraseology.

APPENDIX 3 (CONTINUED)

FLIGHT ENGINEER TURBOJET - ADDED RATING (FEJ)

SAMPLE QUESTIONS, ANSWERS AND LEARNING STATEMENTS

1. How long may a flight engineer use a facsimile (fax) in lieu of a lost or destroyed medical certificate?

A – 30 days.

B – 60 days.

C – 120 days.

Answer B – Learning Statement: Recall regulations - replacement of lost certificate

2. Which of the following are considered primary flight controls?

A – Tabs.

B – Flaps.

C – Outboard ailerons.

Answer C – Learning Statement: Recall primary flight controls - types / purpose / functionality

3. The CG of an aeroplane is computed along the

A – lateral axis.

B – vertical axis.

C – longitudinal axis.

Answer C – Learning Statement: Calculate aircraft performance - center of gravity

4. What is the ICAO standard temperature for 5,000 feet?

A – +5° C.

B – +10° C.

C – +59° F.

Answer A – Learning Statement: Recall weather conditions - temperature / moisture / dewpoint

5. Which is an advantage of a one-step over a two-step process when deicing/anti-icing an aeroplane?

A – It is quicker.

B – The holding time is minimized.

C – Less fluid is used with the one-step method when large deposits of ice and snow must be flushed off the aeroplane.

Answer A – Learning Statement: Recall aircraft anti-icing / deicing - methods / fluids

APPENDIX 4

FLIGHT ENGINEER TURBOPROP - BASIC (FET)

SUBJECT MATTER OUTLINE

The following outlines the major topics and underlying content areas on the Flight Engineer Turboprop – Basic knowledge test.

1. Air Law:
 - a. Rules and regulations relevant to the holder of a flight engineer licence;
 - b. Rules and regulations governing the operations of civil aircraft pertinent to the duties of a flight engineer.
2. Aircraft General Knowledge:
 - a. Basic principles of powerplants - turboprop engines;
 - b. Characteristics of fuels, fuel systems including fuel control;
 - c. Lubricants and lubrication systems;
 - d. Afterburners and injection systems, function and operation of engine ignition and starter systems;
 - e. Principles of operation, handling procedures and operation limitations of aircraft powerplants; effects of atmospheric conditions on engine performance;
 - f. Airframes, flight controls, structures, wheel assemblies, brakes and anti-skid units, corrosion and fatigue life and the identification of structural damage and defects;
 - g. Ice and rain protection systems;
 - h. Pressurization, air-conditioning, and oxygen systems;
 - i. Hydraulic and pneumatic systems;
 - j. Basic electrical theory, electric systems (AC and DC), aircraft wiring systems, bonding and screening;
 - k. Principles of operation of instruments, compasses, autopilots, radio communication equipment, radio and radar navigation aids, flight management systems, displays and avionics;
 - l. Limitations of turboprop aircraft;
 - m. Fire protection, detection suppression and extinguishing systems;
 - n. Use and serviceability checks of equipment and systems of turboprop aircraft.
3. Flight Performance, Planning and Loading:
 - a. Effects of loading and mass distribution on aircraft handling, flight characteristics and performance; mass and balance calculations;
 - b. Use of practical application of performance data including procedures for cruise control.
4. Human Performance:
 - a. Human performance relevant to the flight engineer.
5. Meteorology:
 - a. Operational aspects of meteorology.

APPENDIX 4 (CONTINUED)

FLIGHT ENGINEER TURBOPROP - BASIC (FET)

SUBJECT MATTER OUTLINE

6. Navigation:
 - a. Fundamentals of navigation;
 - b. Principles and operation of self-contained systems.

7. Operational Procedures:
 - a. Principles of maintenance procedures for the maintenance of airworthiness, defect reporting, pre-flight inspections, precautionary procedures for fueling and use of external power; installed equipment and cabin systems;
 - b. Normal, abnormal and emergency procedures;
 - c. Operational procedures for carriage of freight and dangerous goods.

8. Principles of Flight:
 - a. Fundamentals of aerodynamics.

9. Radiotelephony:
 - a. Radiotelephony procedures and phraseology.

APPENDIX 4 (CONTINUED)

FLIGHT ENGINEER TURBOPROP - BASIC (FET)

SAMPLE QUESTIONS, ANSWERS AND LEARNING STATEMENTS

1. What minimum amount of fuel should remain for turbine-powered aeroplanes after jettisoning with the main fuel control? Forty-five minutes at

A – 75 percent maximum continuous power.

B – maximum continuous power with the critical engine inoperative.

C – maximum range speed after climbing from sea level to 10,000 feet.

Answer C – Learning Statement: Recall regulations - fuel requirements

2. What is the ICAO standard temperature for 5,000 feet?

A – +5° C.

B – +10° C.

C – +59° F.

Answer A – Learning Statement: Recall weather - temperature / moisture / dewpoint

3. If the landing gear on an aeroplane moves forward during retraction, the

A – total moments will decrease.

B – total moments will increase.

C – total moments will remain the same.

Answer A – Learning Statement: Recall forces acting on aircraft - CG / flight characteristics

4. The CG of an aeroplane is computed along the

A – lateral axis.

B – vertical axis.

C – longitudinal axis.

Answer C – Learning Statement: Calculate aircraft performance - center of gravity

5. During flight with zero angle of attack, the pressure along the upper surface of the wing will be

A – equal to atmospheric pressure.

B – less than atmospheric pressure.

C – greater than the pressure below the wing.

Answer B – Learning Statement: Recall angle of attack - characteristics / forces / principles

APPENDIX 5

FLIGHT ENGINEER TURBOPROP - ADDED RATING (FEP)

SUBJECT MATTER OUTLINE

The following outlines the major topics and underlying content areas on the Flight Engineer Turboprop – Added Rating knowledge test.

1. Air Law:
 - a. Rules and regulations relevant to the holder of a flight engineer licence;
 - b. Rules and regulations governing the operations of civil aircraft pertinent to the duties of a flight engineer.
2. Aircraft General Knowledge:
 - a. Basic principles of powerplants – turboprop engines;
 - b. Characteristics of fuels, fuel systems including fuel control;
 - c. Lubricants and lubrication systems;
 - d. Afterburners and injection systems, function and operation of engine ignition and starter systems;
 - e. Principles of operation, handling procedures and operation limitations of aircraft powerplants; effects of atmospheric conditions on engine performance;
 - f. Airframes, flight controls, structures, wheel assemblies, brakes and anti-skid units, corrosion and fatigue life and the identification of structural damage and defects;
 - g. Ice and rain protection systems;
 - h. Pressurization, air-conditioning, and oxygen systems;
 - i. Hydraulic and pneumatic systems;
 - j. Basic electrical theory, electric systems (AC and DC), aircraft wiring systems, bonding and screening;
 - k. Principles of operation of instruments, compasses, autopilots, radio communication equipment, radio and radar navigation aids, flight management systems, displays and avionics;
 - l. Limitations of turboprop aircraft;
 - m. Fire protection, detection suppression and extinguishing systems;
 - n. Use and serviceability checks of equipment and systems of turboprop aircraft.
3. Flight Performance, Planning and Loading:
 - a. Effects of loading and mass distribution on aircraft handling, flight characteristics and performance; mass and balance calculations;
 - b. Use of practical application of performance data including procedures for cruise control.
4. Human Performance:
 - a. Human performance relevant to the flight engineer.
5. Meteorology:
 - a. Operational aspects of meteorology.

APPENDIX 5 (CONTINUED)

FLIGHT ENGINEER TURBOPROP - ADDED RATING (FEP)

SUBJECT MATTER OUTLINE

6. Navigation:
 - a. Fundamentals of navigation;
 - b. Principles and operation of self-contained systems.
7. Operational Procedures:
 - a. Principles of maintenance procedures for the maintenance of airworthiness, defect reporting, pre-flight inspections, precautionary procedures for fueling and use of external power; installed equipment and cabin systems;
 - b. Normal, abnormal and emergency procedures;
 - c. Operational procedures for carriage of freight and dangerous goods.
8. Principles of Flight:
 - a. Fundamentals of aerodynamics.
9. Radiotelephony:
 - a. Radiotelephony procedures and phraseology.

APPENDIX 5 (CONTINUED)

FLIGHT ENGINEER TURBOPROP - ADDED RATING (FEP)

SAMPLE QUESTIONS, ANSWERS AND LEARNING STATEMENTS

1. What minimum amount of fuel should remain for turbine-powered aeroplanes after jettisoning with the main fuel control? Forty-five minutes at

A – 75 percent maximum continuous power.

B – maximum continuous power with the critical engine inoperative.

C – maximum range speed after climbing from sea level to 10,000 feet.

Answer C – Learning Statement: Recall regulations - fuel requirements

2. Which of the following are considered primary flight controls?

A – Tabs.

B – Flaps.

C – Outboard ailerons.

Answer C – Learning Statement: Recall primary flight controls - types / purpose / functionality

3. How much mass can be added at Station 1600 without exceeding the aft CG limit?

Aircraft mass 83,000 lb

CG location Station 900

Aft CG limit Station 905

A – 166 pounds.

B – 597 pounds.

C – 697 pounds.

Answer B – Learning Statement: Calculate mass and balance

4. To which position should the oxygen regulator be set when symptoms of hypoxia or hyperventilation are experienced?

A – Normal.

B – Emergency.

C – 100 percent oxygen.

Answer C – Learning Statement: Recall oxygen system - components / operating principles / characteristics

5. The true airspeed at which an aeroplane stalls varies with

A – load factor and angle of attack.

B – load factor, mass, and density altitude.

C – density altitude, mass, and angle of attack.

Answer B – Learning Statement: Recall forces acting on aircraft - stalls / spins

APPENDIX 6

FLIGHT ENGINEER RECIPROCATING - BASIC (FEN)

SUBJECT MATTER OUTLINE

The following outlines the major topics and underlying content areas on the Flight Engineer Reciprocating Engine – Basic knowledge test.

1. Air Law:
 - a. Rules and regulations relevant to the holder of a flight engineer licence;
 - b. Rules and regulations governing the operations of civil aircraft pertinent to the duties of a flight engineer.

2. Aircraft General Knowledge:
 - a. Basic principles of powerplants - reciprocating engines;
 - b. Characteristics of fuels, fuel systems including fuel control;
 - c. Lubricants and lubrication systems;
 - d. Afterburners and injection systems, function and operation of engine ignition and starter systems;
 - e. Principles of operation, handling procedures and operation limitations of aircraft powerplants; effects of atmospheric conditions on engine performance;
 - f. Airframes, flight controls, structures, wheel assemblies, brakes and anti-skid units, corrosion and fatigue life and the identification of structural damage and defects;
 - g. Ice and rain protection systems;
 - h. Pressurization, air-conditioning, and oxygen systems;
 - i. Hydraulic and pneumatic systems;
 - j. Basic electrical theory, electric systems (AC and DC), aircraft wiring systems, bonding and screening;
 - k. Principles of operation of instruments, compasses, autopilots, radio communication equipment, radio and radar navigation aids, flight management systems, displays and avionics;
 - l. Limitations of reciprocating aircraft;
 - m. Fire protection, detection suppression and extinguishing systems;
 - n. Use and serviceability checks of equipment and systems of reciprocating aircraft.

3. Flight Performance, Planning and Loading:
 - a. Effects of loading and mass distribution on aircraft handling, flight characteristics and performance; mass and balance calculations;
 - b. Use of practical application of performance data including procedures for cruise control.

4. Human Performance:
 - a. Human performance relevant to the flight engineer.

5. Meteorology:
 - a. Operational aspects of meteorology.

APPENDIX 6 (CONTINUED)

FLIGHT ENGINEER RECIPROCATING - BASIC (FEN)

SUBJECT MATTER OUTLINE

6. Navigation:
 - a. Fundamentals of navigation;
 - b. Principles and operation of self-contained systems.

7. Operational Procedures:
 - a. Principles of maintenance procedures for the maintenance of airworthiness, defect reporting, pre-flight inspections, precautionary procedures for fueling and use of external power; installed equipment and cabin systems;
 - b. Normal, abnormal and emergency procedures;
 - c. Operational procedures for carriage of freight and dangerous goods.

8. Principles of Flight:
 - a. Fundamentals of aerodynamics.

9. Radiotelephony:
 - a. Radiotelephony procedures and phraseology.

APPENDIX 6 (CONTINUED)

FLIGHT ENGINEER RECIPROCATING - BASIC (FEN)

SAMPLE QUESTIONS, ANSWERS AND LEARNING STATEMENTS

1. What are the minimum flight engineer operating experience requirements for reciprocating-powered aeroplanes when common carriage is involved?

A – Flight engineer duties performed for 5 flights under the supervision of a check airman in flight.

B – Flight engineer duties performed for 10 hours under the supervision of a qualified flight engineer.

C – Flight engineer duties performed for 12 hours under the supervision of a qualified pilot in command.

Answer A – Learning Statement: Recall regulations - flight engineer qualifications / privileges / responsibilities

2. What is the sequence of events for a reciprocating engine to convert chemical to mechanical energy?

A – Ignition, compression, power, and exhaust.

B – Compression, ignition, intake, power, and exhaust.

C – Intake, compression, ignition, power, and exhaust.

Answer C – Learning Statement: Recall powerplant - operating principles / operational characteristics / inspecting

3. The CG of an aeroplane is computed along the

A – lateral axis.

B – vertical axis.

C – longitudinal axis.

Answer C – Learning Statement: Calculate aircraft performance - center of gravity

4. The temperature and dewpoint spread is small and decreasing, and the temperature is +62° F. Which type of weather is most likely to develop?

A – Rain showers.

B – Thunderstorms.

C – Fog or low clouds.

Answer C – Learning Statement: Recall fog - types / formation / resulting weather

5. Anti-icing fluid should provide freezing point protection to

A – -20° F ambient temperature.

B – +32° F outside temperature or below.

C – a freezing point no greater than 20° F below the ambient or aeroplane surface temperature.

Answer C – Learning Statement: Recall aircraft anti-icing / deicing - methods / fluids

APPENDIX 7

FLIGHT ENGINEER RECIPROCATING - ADDED RATING (FER)

SUBJECT MATTER OUTLINE

The following outlines the major topics and underlying content areas on the Flight Engineer Reciprocating Engine – Added Rating knowledge test.

1. Air Law:
 - a. Rules and regulations relevant to the holder of a flight engineer licence;
 - b. Rules and regulations governing the operations of civil aircraft pertinent to the duties of a flight engineer.
2. Aircraft General Knowledge:
 - a. Basic principles of powerplants - reciprocating engines;
 - b. Characteristics of fuels, fuel systems including fuel control;
 - c. Lubricants and lubrication systems;
 - d. Afterburners and injection systems, function and operation of engine ignition and starter systems;
 - e. Principles of operation, handling procedures and operation limitations of aircraft powerplants; effects of atmospheric conditions on engine performance;
 - f. Airframes, flight controls, structures, wheel assemblies, brakes and anti-skid units, corrosion and fatigue life and the identification of structural damage and defects;
 - g. Ice and rain protection systems;
 - h. Pressurization, air-conditioning, and oxygen systems;
 - i. Hydraulic and pneumatic systems;
 - j. Basic electrical theory, electric systems (AC and DC), aircraft wiring systems, bonding and screening;
 - k. Principles of operation of instruments, compasses, autopilots, radio communication equipment, radio and radar navigation aids, flight management systems, displays and avionics;
 - l. Limitations of reciprocating aircraft;
 - m. Fire protection, detection suppression and extinguishing systems;
 - n. Use and serviceability checks of equipment and systems of reciprocating aircraft.
3. Flight Performance, Planning and Loading:
 - a. Effects of loading and mass distribution on aircraft handling, flight characteristics and performance; mass and balance calculations;
 - b. Use of practical application of performance data including procedures for cruise control.
4. Human Performance:
 - a. Human performance relevant to the flight engineer.
5. Meteorology:
 - a. Operational aspects of meteorology.

APPENDIX 7 (CONTINUED)

FLIGHT ENGINEER RECIPROCATING - ADDED RATING (FER)

SUBJECT MATTER OUTLINE

6. Navigation:
 - a. Fundamentals of navigation;
 - b. Principles and operation of self-contained systems.
7. Operational Procedures:
 - a. Principles of maintenance procedures for the maintenance of airworthiness, defect reporting, pre-flight inspections, precautionary procedures for fueling and use of external power; installed equipment and cabin systems;
 - b. Normal, abnormal and emergency procedures;
 - c. Operational procedures for carriage of freight and dangerous goods.
8. Principles of Flight:
 - a. Fundamentals of aerodynamics.
9. Radiotelephony:
 - a. Radiotelephony procedures and phraseology.

APPENDIX 7 (CONTINUED)

FLIGHT ENGINEER RECIPROCATING - ADDED RATING (FER)

SAMPLE QUESTIONS, ANSWERS AND LEARNING STATEMENTS

1. How long may a flight engineer use a facsimile (FAX) in lieu of a lost or destroyed medical certificate?

A – 30 days.

B – 60 days.

C – 120 days.

Answer B – Learning Statement: Recall regulations - replacement of lost certificate

2. Preignition is indicated by

A – intermittent firing and low cylinder temperatures.

B – explosions from the exhaust system with torching or afterburning.

C – engine roughness and a sudden increase in cylinder head temperatures.

Answer C – Learning Statement: Recall aircraft engine - detonation cause / characteristics

3. Based on this information, the CG will be located how far aft of datum?

Mass X 1,330 lb at 117 in. aft of datum

Mass Y 1,110 lb at 110 in. aft of datum

Mass Z 750 lb at 210 in. aft of datum

A – 126.43 inches

B – 136.43 inches.

C – 142.43 inches.

Answer B – Learning Statement: Calculate mass and balance

4. The temperature and dewpoint spread is small and decreasing, and the temperature is +62° F. Which type of weather is most likely to develop?

A – Rain showers.

B – Thunderstorms.

C – Fog or low clouds.

Answer C – Learning Statement: Recall fog - types / formation / resulting weather

5. Which is an advantage of a one-step over a two-step process when deicing/anti-icing an aeroplane?

A – It is quicker.

B – The holding time is minimized.

C – Less fluid is used with the one-step method when large deposits of ice and snow must be flushed off the aeroplane.

Answer A – Learning Statement: Recall aircraft anti-icing / deicing - methods / fluids