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# Study and Reference Guide

for written examinations  
for the

## **Private Pilot Licence**

Aeroplane

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## **GENERAL**

### **EXAMINATION PREREQUISITES**

Prior to taking a written examination, an applicant for a flight crew permit, licence or rating shall meet the prerequisites for the examination set out in the personnel licensing standards with respect to CAR 401.13(1)

- a) medical fitness;
- b) identification;
- c) a recommendation from the flight instructor who is responsible for the training of the applicant; and
- d) experience.

### **KNOWLEDGE REQUIREMENTS**

All subjects in this guide are considered to be important to applicants for the Private Pilot Licence–Aeroplane and may appear on the exam. Subject areas identified by a bullet (•) are essential knowledge areas that will be emphasized on the written examination.

### **EXAMINATION RULES**

#### **CAR 400.02 (1)**

Except as authorized by an invigilator, no person shall, or shall attempt to, in respect of a written examination,

- a) copy or remove from any place all or any portion of the text of the examination;
  - b) give to or accept from any person a copy of all or any portion of the text of the examination;
  - c) give help to or accept help from any person during the examination;
  - d) complete all or any portion of the examination on behalf of any other person;  
or
  - e) use any aid or written material during the examination.
- (2) A person who commits an act prohibited under subsection (1) fails the examination and may not take any other examination for a period of one year.

### **TIME LIMITS**

Examinations, including all sections of a sectionalized examination, that are required for the issuance of a permit or licence or for the endorsement of a permit or licence with a rating shall be completed during the 24-month period immediately preceding the date of the application for the permit, licence or rating.

## **REWRITING OF EXAMINATIONS**

### **CAR 400.04 (1)**

Subject to subsections (2) and (6), a person who fails an examination or a section of a sectionalized examination required for the issuance of a flight crew permit, licence, rating or foreign licence validation certificate is ineligible to rewrite the examination or the failed section for a period of

- a) in the case of a first failure, 14 days;
- b) in the case of a second failure, 30 days; and
- c) in the case of a third or subsequent failure, 30 days plus an additional 30 days for each failure in excess of two failures, up to a maximum of 180 days.

### **EXAMINATION FEEDBACK**

Feedback statements on the results letter will inform the candidate which questions were answered incorrectly.

Example of a Feedback Statement: Identify the atmospheric conditions favorable for thunderstorm formation.

## **EXAMINATIONS**

### **FULL EXAMINATION**

Applicants for the Private Pilot Licence–Aeroplane Category shall demonstrate their knowledge by writing a Transport Canada multiple-choice examination on subjects contained in this guide. Applicants must be able to read the examination questions in either English or French without assistance.

<b>Examination</b>	<b>Questions</b>	<b>Time Limit</b>	<b>Pass Mark</b>
Private Pilot–Aeroplane (PPAER)	100	3 hours	60%

This examination is sectionalized into four mandatory subject areas and requires an overall pass mark of 60%. As well, the candidate must achieve 60% in the following four subject areas:

### **Mandatory Subjects**

AIR LAW	Air Law and Procedures
NAVIGATION	Navigation and Radio Aids
METEOROLOGY	Meteorology
AERONAUTICS - GENERAL KNOWLEDGE	Airframes, Engines, and Systems Theory of Flight Flight Instruments Flight Operations Human Factors

Questions fall under one of the four mandatory subject areas. However, there may be occasions where knowledge from another section is required to arrive at the correct response. For example, a practical question on fuel calculations under NAVIGATION may require knowledge of VFR fuel requirements under AIR LAW.

Applicants who obtain less than 60% on the overall examination will, for licensing purposes, be required to rewrite the complete exam, as specified in CARs 421.26.

### **SUPPLEMENTARY EXAMINATIONS**

Applicants who obtain 60% or more on the main examination (PPAER), but who fail one or more mandatory subject areas will be assessed a partial pass. During one sitting, they will be required to write supplementary examinations for each subject area failed. Details on the mandatory subject area supplementary examinations are as follows:

<b>Examination</b>	<b>Questions</b>	<b>Time Limit</b>	<b>Pass Mark</b>
AIR LAW (PALAW)	20	1 hour	60%
NAVIGATION (PANAV)	20	2 hours	60%
METEOROLOGY (PAMET)	30	1½ hours	60%
AERONAUTICS– GENERAL KNOWLEDGE (PAGEN)	30	1½ hours	60%

**NOTE:** When writing more than one supplementary examination, the maximum time allowed shall be the sum of the times indicated for each examination, not to exceed 3 hours.

### **HELICOPTER TO AEROPLANE EXAMINATION**

Pilots who hold a valid Private, Commercial or Airline Transport Pilot Licence in the Helicopter Category and who wish to apply for a Private Pilot Licence–Aeroplane shall demonstrate their knowledge by writing the following Transport Canada multiple choice examination.

<b>Examination</b>	<b>Questions</b>	<b>Time Limit</b>	<b>Pass Mark</b>
Private Pilot Aeroplane –Alternate Category (PARAC)	35	1½ hours	60%

The PARAC examination is based on subjects contained in AIR LAW and AERONAUTICS - GENERAL KNOWLEDGE (Airframes, Engines and Systems, Theory of Flight, Flight Instruments and Flight Operations).

## **CONVERSION EXAMINATION, UNITED STATES OF AMERICA FAA PILOT CERTIFICATE – AEROPLANE**

Pilots who hold an FAA Private Pilot Certificate, Commercial or Airline Transport Pilot Certificate – Aeroplane, shall demonstrate their knowledge by writing the following Transport Canada multiple choice examination:

<b>Examination</b>	<b>Questions</b>	<b>Time Limit</b>	<b>Pass Mark</b>
Conversion - Private Pilot Licence – Aeroplane, (FAAPA)	20	1 hour	60%

The FAAPA examination is based on subjects contained in the following sections of this guide: AIR LAW and PROCEDURES.

# **AIR LAW**

## **AIR LAW AND PROCEDURES**

### **CANADIAN AVIATION REGULATIONS (CARs)**

Some *Canadian Aviation Regulations* (CARs) refer to their associated standards. Questions from the CARs may test knowledge from the regulation or the standard.

### **PART I – GENERAL PROVISIONS**

#### 101 – INTERPRETATION

101.01 Interpretation

#### 103 – ADMINISTRATION AND COMPLIANCE

103.02 Inspection of Aircraft, Requests for Production of Documents and Prohibitions

103.03 Return of Canadian Aviation Documents

103.04 Record Keeping

### **PART II – AIRCRAFT IDENTIFICATION AND REGISTRATION AND OPERATION OF A LEASED AIRCRAFT BY A NON-REGISTERED OWNER**

**202.01** Requirements for Marks on Aircraft

**202.26** Carrying Certificate of Registration on Board the Aircraft

### **PART III – AERODROMES AND AIRPORTS**

#### 300 – INTERPRETATION

300.01 Interpretation

#### 301 – AERODROMES

301.01 Application

- 301.04 Markers and Markings
- 301.06 Wind Direction Indicator
- 301.07 Lighting
- 301.08 Prohibitions
- 301.09 Fire Prevention

#### 302 – AIRPORTS

302.10 Prohibitions

302.11 Fire Prevention

### **PART IV – PERSONNEL LICENSING AND TRAINING**

#### 400 – GENERAL

400.01 Interpretation



## 401 – FLIGHT CREW PERMITS, LICENSES AND RATINGS

- 401.03 Requirement to Hold a Flight Crew Permit, Licence or Rating
- 401.04 Flight Crew Members of Aircraft Registered in Contracting States other than Canada
- 401.05 Recency Requirements
- 401.08 Personal Logs
- 401.26 Aeroplane - Privileges (Private Pilot Licence)
- 401.45 Privileges (Visual Flight Rules (VFR) Over-the-Top)

## 404 – MEDICAL REQUIREMENTS

- 404.03 Requirement to Hold a Medical Certificate
- 404.04 Issuance, Renewal and Validity Period of Medical Certificate
- 404.06 Prohibition Regarding Exercise of Privileges
- 404.18 Permission to Continue to Exercise the Privileges of a Permit, Licence or Rating

## **PART VI – GENERAL OPERATING AND FLIGHT RULES**

### 600 – INTERPRETATION

- 600.01 Interpretation

### 601 – AIRSPACE STRUCTURE, CLASSIFICATION AND USE

- 601.01 Airspace Structure
- 601.02 Airspace Classification
- 601.03 Transponder Airspace
- 601.04 IFR or VFR Flight in Class F Special Use Restricted Airspace or Class F Special Use Advisory Airspace
- 601.06 VFR Flight in Class A Airspace
- 601.07 VFR Flight in Class B Airspace
- 601.08 VFR Flight in Class C Airspace
- 601.09 VFR Flight in Class D Airspace
- 601.15 Forest Fire Aircraft Operating Restrictions
- 601.16 Issuance of NOTAM for Forest Fire Aircraft Operating Restrictions

### 602 – OPERATING AND FLIGHT RULES

#### GENERAL

- 602.01 Reckless or Negligent Operation of Aircraft
- 602.02 Fitness of Flight Crew Members
- 602.03 Alcohol or Drugs – Crew Members
- 602.04 Alcohol or Drugs – Passengers
- 602.05 Compliance with Instructions
- 602.06 Smoking
- 602.07 Aircraft Operating Limitations
- 602.08 Portable Electronic Devices
- 602.09 Fuelling with Engines Running
- 602.10 Starting and Ground Running of Aircraft Engines
- 602.11 Aircraft Icing

- 602.12 Overflight of Built-up Areas or Open-Air Assemblies of Persons during Take-offs, Approaches and Landings
- 602.13 Take-offs, Approaches and Landings within Built-up Areas of Cities and Towns
- 602.14 Minimum Altitude and Distances
- 602.15 Permissible Low Altitude Flight
- 602.19 Right-of-Way – General
- 602.20 Right-of-Way – Aircraft Manoeuvring on Water
- 602.21 Avoidance of Collision
- 602.22 Towing
- 602.23 Dropping of Objects
- 602.24 Formation Flight
- 602.25 Entering or Leaving an Aircraft in Flight
- 602.26 Parachute Descents
- 602.27 Aerobatic Manoeuvres – Prohibited Areas and Flight Conditions
- 602.28 Aerobatic Manoeuvres with Passengers
- 602.31 Compliance with Air Traffic Control Instructions and Clearances
- 602.32 Airspeed Limitations
- 602.34 Cruising Altitudes and Cruising Flight Levels
- 602.35 Altimeter-setting and Operating Procedures in the Altimeter-setting Region
- 602.36 Altimeter-setting and Operating Procedures in the Standard Pressure Region
- 602.37 Altimeter-setting and Operating Procedures in Transition between Regions
- 602.40 Landing at or Take-off from an Aerodrome at Night

#### OPERATIONAL AND EMERGENCY EQUIPMENT REQUIREMENTS

- 602.58 Prohibition
- 602.59 Equipment Standards
- 602.60 Requirements for Power-driven Aircraft
- 602.61 Survival Equipment – Flights over Land
- 602.62 Life Preservers and Flotation Devices
- 602.63 Life Rafts and Survival Equipment – Flight over Water

#### FLIGHT PREPARATION, FLIGHT PLANS AND FLIGHT ITINERARIES

- 602.70 Interpretation
- 602.71 Pre-flight Information
- 602.72 Weather Information
- 602.73 Requirements to File a Flight Plan or a Flight Itinerary
- 602.74 Contents of a Flight Plan or a Flight Itinerary
- 602.75 Filing of a Flight Plan or a Flight Itinerary
- 602.76 Changes in the Flight Plan
- 602.77 Requirement to File an Arrival Report
- 602.78 Contents of an Arrival Report
- 602.79 Overdue Aircraft Report

#### PRE-FLIGHT AND FUEL REQUIREMENTS

- 602.86 Carry-on Baggage, Equipment and Cargo
- 602.88 Fuel Requirements
- 602.89 Passenger Briefings

## OPERATIONS AT OR IN THE VICINITY OF AN AERODROME

- 602.96 General
- 602.97 VFR and IFR Aircraft Operations at Uncontrolled Aerodromes within a MF Area (Mandatory Frequency Area)
- 602.98 General MF Reporting Requirements
- 602.99 MF Reporting Procedures before Entering Manoeuvring Area
- 602.100 MF Reporting Procedures on Departure
- 602.101 MF Reporting Procedures on Arrival
- 602.102 MF Reporting Procedures when Flying Continuous Circuits
- 602.103 Reporting Procedures when Flying through an MF Area

## VISUAL FLIGHT RULES

- 602.114 Minimum Visual Meteorological Conditions for VFR Flight in VFR Flight in Controlled Airspace
- 602.115 Minimum Visual Meteorological Conditions for VFR Flight in Uncontrolled Airspace
- 602.116 VFR Over-the-Top
- 602.117 Special VFR Flight

## RADIOCOMMUNICATIONS

- 602.136 Continuous Listening Watch
- 602.138 Two-way Radiocommunication Failure in VFR Flight

## EMERGENCY COMMUNICATIONS AND SECURITY

- 602.143 Emergency Radio Frequency Capability
- 602.144 Interception Signals, Interception of Aircraft and Instructions to Land
- 602.145 ADIZ
- 602.146 ESCAT Plan

## 605 – AIRCRAFT REQUIREMENTS

### GENERAL

- 605.03 Flight Authority
- 605.04 Availability of Aircraft Flight Manual
- 605.05 Markings and Placards
- 605.08 Unserviceable and Removed Equipment – General

### AIRCRAFT EQUIPMENT REQUIREMENTS

- 605.14 Power-driven Aircraft – Day VFR
- 605.15 Power-driven Aircraft – VFR OTT (Over-the-Top)
- 605.16 Power-driven Aircraft – Night VFR
- 605.17 Use of Position and Anti-collision Lights
- 605.22 Seat and Safety Belt Requirements
- 605.24 Shoulder Harness Requirements
- 605.25 General use of Safety Belts and Restraint Systems
- 605.28 Child Restraint System

- 605.29 Flight Control Locks
- 605.31 Oxygen Equipment and Supply
- 605.32 Use of Oxygen
- 605.35 Transponder and Automatic Pressure-altitude Reporting Equipment
- 605.38 ELT
- 605.40 ELT Activation

#### AIRCRAFT MAINTENANCE REQUIREMENTS

- 605.84 Aircraft Maintenance – General
- 605.85 Maintenance Release and Elementary Work
- 605.86 Maintenance Schedule
- 605.88 Inspection after Abnormal Occurrences

#### TECHNICAL RECORD

- 605.92 Requirement to Keep Technical Records
- 605.93 Technical Records – General
- 605.94 Journey Log Requirements
- 605.95 Journey Log – Carrying on Board
- 605.97 Transfer of Records

#### 606 – MISCELLANEOUS

- 606.02 Liability Insurance

## **TRANSPORTATION SAFETY BOARD OF CANADA (TSB) – (AIM GEN 3.0)**

- 1 Definitions
- 2 Reporting an aviation occurrence
- 3 Protection of occurrence site

## **AIR TRAFFIC SERVICES AND PROCEDURES**

- 1 Air Traffic Services and Advisory Services
- 2 Communication procedures
- 3 Radar service – clock position system
- 4 ATC clearances and instructions
- 5 Wake turbulence separation
- 6 Controlled and uncontrolled aerodrome operations
- 7 Mandatory (MF) and Aerodrome Traffic Frequencies (ATF)
- 8 VFR en route procedures
- 9 VFR holding procedures
- 10 Operations on intersecting runways including (LAHSO)
- 11 Procedures for the prevention of runway incursion

# **NAVIGATION**

## **NAVIGATION AND RADIO AIDS**

### **DEFINITIONS**

- 1 Meridian
- 2 Prime Meridian
- 3 Longitude
- 4 Equator
- 5 Latitude
- 6 Rhumb Line/Great Circle
- 7 Variation
- 8 Isogonal
- 9 Agonic Line
- 10 Deviation
- 11 Track
- 12 Heading
- 13 Airspeed
- 14 Ground Speed
- 15 Air Position
- 16 Ground Position
- 17 Bearing
- 18 Wind Velocity
- 19 Drift

### **MAPS AND CHARTS**

- 1 VTA – Transverse Mercator Projection
- 2 VNC – Lambert Conformal Conic Projection
- 3 Topographical symbols
- 4 Elevation and contours (relief)
- 5 Aeronautical information
- 6 Scale and units of measurement
- 7 Locating position by latitude and longitude
- 8 Navigation aids

### **TIME AND LONGITUDE**

- 1 24 hour system
- 2 Time Zones and relation to longitude
- 3 Conversion of UTC to local and vice versa

### **PILOT NAVIGATION**

- 1 Use of Aeronautical Charts
- 2 Measurement of track and distance
- 3 Map reading
- 4 Setting heading – visual angle of departure
- 5 Check-points and pin-points
- 6 Use of position lines to obtain a fix
- 7 Ground Speed checks and ETA revisions
- 8 Variation/deviation
- 9 True track/magnetic track
- 10 Determining drift by 10° lines
- 11 Double track error method to regain track
- 12 Opening and closing angles method
- 13 Visual alteration method of correcting to track
- 14 Diversion to alternate destination
- 15 Return to departure point (Reciprocal Track)
- 16 Low Level Navigation
- 17 Dead reckoning (DR navigation), triangle of velocity
- 18 In-flight log and mental calculations
- 19 Procedures when lost
- 20 True, magnetic and compass headings
- 21 Indicated airspeed, calibrated airspeed
- 22 True airspeed, ground speed
- 23 Compass errors
- 24 Radio communications

## **NAVIGATION COMPUTERS**

- 1 Heading and ground speed
- 2 Pressure, density and true altitudes
- 3 Indicated, calibrated and true airspeed
- 4 Time, ground speed and distance
- 5 Fuel consumption and conversions

## **PRE-FLIGHT PREPARATION**

- 1 Factors affecting choice of route
- 2 Map preparation
- 3 Meteorological information
- 4 NOTAM
- 5 Selection of check-points
- 6 Fuel requirements
- 7 Weight and balance
- 8 Use of Canada Flight Supplement
- 9 Documents to be carried in aircraft
- 10 Flight Plans, itineraries
- 11 Flight log forms
- 12 Aircraft serviceability

## **RADIO THEORY**

- 1 Characteristics of low, high and very high frequency radio waves
- 2 Frequency bands used in navigation and communication
- 3 Reception limitations

## **VHF OMNIDIRECTION RANGE (VOR)**

- 1 Aircraft equipment
- 2 Tuning and identifying
- 3 Serviceability check
- 4 Interpretation, orientation and homing
- 5 Voice feature

## **AUTOMATIC DIRECTION FINDER (ADF)**

- 1 Aircraft equipment
- 2 Tuning and identifying
- 3 Serviceability check
- 4 Interpretation, orientation and homing
- 5 Voice feature

## **GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS/GPS)**

- 1 Basic principles, use and limitations

## **OTHER RADIO AND RADAR AIDS – BASIC PRINCIPLES AND USE**

- 1 Transponder
- 2 Emergency Locator Transmitter (ELT)
- 3 VHF Direction Finding (DF) assistance
- 4 Airport Surveillance Radar (ASR) (primary and secondary)

# **METEOROLOGY**

## **METEOROLOGY**

### **THE EARTH'S ATMOSPHERE**

- 1 Composition and physical properties
- 2 Vertical structure
- 3 Standard atmosphere
- 4 Density and pressure
- 5 Expansion and compression

### **ATMOSPHERIC PRESSURE**

- 1 Units of measurement
- 2 Station pressure
- 3 Sea level pressure
- 4 Pressure systems and their variations
- 5 Effects of temperature
- 6 Isobars

### **METEOROLOGICAL ASPECTS OF ALTIMETRY**

- 1 Pressure altitude
- 2 Density altitude
- 3 Altimeter settings
- 4 Considerations when flying to/from high to low pressure or temperature areas

### **TEMPERATURE**

- 1 Heating and cooling of the atmosphere – convection, advection and radiation
- 2 Horizontal differences
- 3 Temperature variations with altitude
- 4 Inversions
- 4 Isothermal layers

### **MOISTURE**

- 1 Relative humidity and dewpoint
- 2 Sublimation and condensation
- 3 Cloud formation
- 4 Precipitation
- 5 Saturated and dry adiabatic lapse rate

### **STABILITY AND INSTABILITY**

- 1 Lapse rate and stability
- 2 Modification of stability
- 3 Characteristics of stable and unstable air
- 4 Surface heating and cooling
- 5 Lifting processes
- 6 Subsidence and convergence

### **CLOUDS**

- 1 Classification
- 2 Formation and structure
- 3 Types and recognition
- 4 Associated precipitation and turbulence

### **SURFACE BASED LAYERS**

- 1 Fog formation
- 2 Fog types (including mist)
- 3 Haze and smoke
- 4 Blowing obstruction to vision

### **TURBULENCE**

- 1 Convection
- 2 Mechanical
- 3 Orographic
- 4 Wind shear
- 5 Reporting criteria

### **WIND**

- 1 Definition
- 2 Pressure gradient
- 3 Deflection caused by the earth's rotation
- 4 Low level winds – variation in surface wind
- 5 Friction
- 6 Veer/back
- 7 Squall/gusts
- 8 Diurnal effects
- 9 Land and sea breezes
- 10 Katabatic and anabatic effects
- 11 Topographical effects
- 12 Wind shear – types, causes



## **AIR MASSES**

- 1 Definition and characteristics
- 2 Formation and classification
- 3 Modification
- 4 Factors that determine weather
- 5 Seasonal and geographic effects
- 6 Air masses affecting North America

## **FRONTS**

- 1 Structure
- 2 Types
  - 3 Formation
  - 4 Cross-sections
- 5 Cold front weather
  - 6 Warm front weather
  - 7 Trowal and upper front

## **AIRCRAFT ICING**

- 1 In-flight – freezing rain
- 2 Hoar frost
- 3 Impact icing (engine)

## **THUNDERSTORMS**

- 1 Requirements for development
- 2 Structure and development
- 3 Types – air mass and frontal
- 4 Hazards – Updrafts, downdrafts, gust fronts, downbursts, microbursts, hail and lightning
- 5 Squall lines

## **HURRICANES AND TORNADOES**

- 1 Hazards

## **METEOROLOGICAL SERVICES AVAILABLE TO PILOTS**

- 1 Aviation Weather Information Services (AWIS)
- 2 Aviation Weather Briefing Service (AWBS)
- 3 Flight Service Stations (FSS) and Flight Information Centres
- 4 Pilot's Automatic Telephone Weather Answering Service (PATWAS)
- 5 Aviation Weather Web Site (AWWS)
- 6 Automatic Terminal Information Service (ATIS)

## **AVIATION WEATHER REPORTS**

- 1 Aviation Routine Weather Report (METAR) – decoding
- 2 Automated Weather Observation Station (AWOS)
- 3 Pilot Reports (PIREP)

## **AVIATION FORECASTS**

- 1 Times issued and period of coverage
- 2 Decoding
- 3 Graphical Area Forecast (GFA)
- 4 Terminal Area Forecast (TAF)
- 5 Upper Winds and Temperature Forecast (FD)
- 6 Airman's Meteorological Advisory (AIRMET)
- 7 Significant In-flight Weather Warning Message (SIGMET)

## **WEATHER MAPS AND PROGNOSTIC CHARTS**

- 1 Times issued and period of coverage
- 2 Symbols and decoding
- 3 Surface weather map
- 4 Upper air charts – weather Information to 700 mb Level
- 5 Prognostic surface charts

# **AERONAUTICS - GENERAL KNOWLEDGE**

## **AIRFRAMES, ENGINES AND SYSTEMS**

### **AIRFRAMES**

- 1 Types of construction

### **LANDING GEAR, BRAKES AND FLAPS**

- 1 Mechanical
- 2 Hydraulic
- 3 Electric

### **ENGINES**

- 1 Two and four stroke cycle
- 2 Methods of cooling
- 3 Principle of the magneto
- 4 Dual ignition
- 5 Exhaust systems
- 6 Auxiliary controls
- 7 Turbo-charging
- 8 Effects of density altitudes and humidity
- 9 Limitations and operations
- 10 Instruments

### **CARBURATION**

- 1 Theory of operation
- 2 Fuel-air mixture
- 3 Mixture controls
- 4 Carburettor icing
- 5 Use of Carb heat and its effects on mixture

### **FUEL INJECTION**

- 1 Principle and operation
- 2 Icing
- 3 Alternate air

### **ELECTRICAL SYSTEM**

- 1 Generator, alternator and battery
- 2 Lighting
- 3 Ammeter and load meter
- 4 Bus bars
- 5 Circuit breakers and fuses
- 6 Grounding and bonding

### **LUBRICATING SYSTEMS AND OILS**

- 1 Types, viscosity, grades and seasonal use
- 2 Purposes
- 3 Methods of lubrication
- 4 Venting
- 5 Filters
- 6 Oil Cooler

### **FUEL SYSTEM AND FUELS**

- 1 Types – Colour and properties
- 2 Density and weight
- 3 Additives
- 4 Contamination and deterioration
- 5 Tank location
- 6 Venting
- 7 Fuel line – filters and drains
- 8 Induction manifold
- 9 Detonation – causes and effects
- 10 Vapour lock
- 11 Primers
- 12 Fuel management
- 13 Fuel handling – fuelling aircraft

### **OTHER AIRCRAFT SYSTEMS**

- 1 Oxygen
- 2 Vacuum

## **THEORY OF FLIGHT**

### **PRINCIPLES OF FLIGHT**

- 1 Bernoulli's Theorem
- 2 Newton's Laws

### **FORCES ACTING ON AN AEROPLANE**

- 1 Lift
- 2 Drag – induced and parasite
- 3 Relationship of lift and drag to angle of attack
- 4 Thrust
- 5 Weight
- 6 Equilibrium
- 7 Centre of pressure
- 8 Centrifugal and centripetal
- 9 Forces acting on an aircraft during manoeuvres
- 10 Relationship of load factor to stalling speed
- 11 Structural limitations
- 12 Gust loads

### **AEROFOILS**

- 1 Pressure distribution about an aerofoil
- 2 Relative airflow and angle of attack
- 3 Downwash
- 4 Wing tip vortices
- 5 Angle of incidence

### **PROPELLERS**

- 1 Propeller efficiency at various speeds
- 2 Fixed and variable pitch
- 3 Torque, slipstream, gyroscopic effect and asymmetric thrust

### **DESIGN OF THE WING**

- 1 Wing planform
- 2 Area, span, chord
- 3 Aspect ratio
- 4 Streamlining
- 5 Camber
- 6 Laminar flow
- 7 Dihedral, anhedral
- 8 Wash in, wash out
- 9 Slots, slats
- 10 Wing fences, stall strips
- 11 Spoilers
- 12 Flaps
- 13 Canards

### **STABILITY**

- 1 Longitudinal, lateral and directional stability
- 2 Inherent stability
- 3 Methods of achieving stability

### **FLIGHT CONTROLS**

- 1 Aeroplane axes and planes of movement
- 2 Functions of controls
- 3 Relationship between effects of yaw and roll
- 4 Adverse yaw, aileron drag
- 5 Static and dynamic balancing of controls
- 6 Trim and trimming devices

## **FLIGHT INSTRUMENTS**

### **PITOT STATIC SYSTEM**

- 1 Pitot
- 2 Static
- 3 Anti-icing
- 4 Alternate static – source, errors

### **AIRSPEED INDICATOR**

- 1 Principles of Operation
- 2 Errors
- 3 Markings
- 4 Definitions (IAS/CAS/TAS)

### **VERTICAL SPEED INDICATOR**

- 1 Principles of operation
- 2 Errors
- 3 Lag

### **ALTIMETER/ENCODING ALTIMETER**

- 1 Principles of operation
- 2 Errors

### **MAGNETIC COMPASS**

- 1 Principles of operation
- 2 Magnetic dip
- 3 Turning, acceleration and deceleration errors
- 4 Deviation
- 5 Compass correction card
- 6 Compass serviceability

### **GYROSCOPE**

- 1 Principles of operation
- 2 Inertia
- 3 Precession

### **HEADING INDICATOR**

- 1 Principles of operation
- 2 Errors
- 3 Limitations
- 4 Power sources

### **ATTITUDE INDICATOR**

- 1 Principles of operations
- 2 Errors
- 3 Limitations
- 4 Power sources

### **TURN AND BANK INDICATOR/TURN CO-ORDINATOR**

- 1 Principles of operations
- 2 Errors
- 3 Limitations
- 4 Power sources

### **INSTRUMENT FLYING**

- 1 Loss of visual reference
- 2 The control and performance instruments
- 3 Instrument scan and interpretation
- 4 Aircraft control
- 5 Unusual attitudes and recoveries

## FLIGHT OPERATIONS

### GENERAL

- 1 Pilot-In-Command responsibilities
- 2 Winter operations
- 3 Thunderstorms avoidance
- 4 Mountain flying operations
- 5 Collision avoidance – use of landing lights
- 6 Runway numbering
- 7 Airport rotating beacon
- 8 VASIS/PAPI
- 9 Obstruction marking and lighting
- 10 Units of measurements and conversion
- 11 Radio communications
- 12 Wheelbarrowing
- 13 Hydro-planning
- 14 Taxiing
- 15 Effects of wind and wind shear
- 16 Side-slips

### USE OF PERFORMANCE CHARTS

- 1 Take-off charts
- 2 Cross-wind charts
- 3 Canadian Runway Friction Index (CRFI)
- 4 Cruise charts
- 5 Fuel burn charts
- 6 Landing charts
- 7 Performance (V) speeds –  $V_a$ ,  $V_{no}$ ,  $V_{fe}$ ,  $V_{lo}$ ,  $V_{ne}$ ,  $V_s$ ,  $V_x$ ,  $V_y$
- 8 Effect of ice, snow, frost, slush, water on take-off and landing distance
- 9 Effect of various runway surfaces on take-off and landing distance
- 10 Upslope, downslope runway

### AIRCRAFT PERFORMANCE

- 1 Effects of aircraft critical surface contamination
- 2 Lift/drag ratio
- 3 Effects of density altitude and humidity
- 4 Attitude plus power equals performance
- 5 Normal, short, soft and rough field take-offs and landing
- 6 Ground effect
- 7 Best angle of climb ( $V_x$ )
- 8 Best rate of climb ( $V_y$ )
- 9 Manoeuvring speed ( $V_a$ )
- 10 Normal operating limit speed ( $V_{no}$ )
- 11 Never exceed speed ( $V_{ne}$ )
- 12 Maximum flap speed ( $V_{fe}$ )
- 13 Maximum gear operating speed ( $V_{lo}$ )
- 14 Gliding for range
- 15 Flying for range
- 16 Flying for endurance
- 17 Slow flight
- 18 Stalls
- 19 Indicated and true stalling speed
- 20 Stall speed vs altitude
- 21 Spins
- 22 Spirals
- 23 Recommended safe recovery altitudes
- 24 Bank/speed vs rate/radius of turn
- 25 Effects of change of weight or centre of gravity (CG) on performance
- 26 Use of aircraft flight manual and approved operational information
- 27 Use of unapproved operational information

## **WEIGHT AND BALANCE**

- 1 Terms – e.g. datum, arm and moment
- 2 Locating CG
- 3 CG limits
- 4 Empty weight and gross weight
- 5 Load adjustment
- 6 Cargo tie-down and passenger loading
- 7 Normal and utility category

## **WAKE TURBULENCE**

- 1 Causes
- 2 Effects
- 3 Avoidance

## **SEARCH AND RESCUE (SAR) (AIM Canada – SAR Information)**

- 1 Types of service available
- 2 ELT (exclude categories)
- 3 Aircraft emergencies
- 4 Survival – basic techniques

## **AIRCRAFT CRITICAL SURFACE CONTAMINATION**

- 1 Clean aircraft concept
- 2 Frozen contaminants and removal techniques
- 3 Cold soaking phenomenon
- 4 Pre-take-off contamination inspection
- 5 De-ice/Anti-ice fluids - Type I, II, III, IV
- 6 Correct use of fluids

## **HUMAN FACTORS**

### **AVIATION PHYSIOLOGY**

- 1 Hypoxia and hyperventilation
- 2 Gas expansion effects
- 3 Decompression (including SCUBA diving)
- 4 Visual scanning techniques
- 5 Hearing
- 6 Orientation and disorientation (Including visual and vestibular illusions)
- 7 Positive and negative “G”
- 8 Sleep and fatigue
- 9 Anaesthetics
- 10 Blood donations

### **THE PILOT AND THE OPERATING ENVIRONMENT**

- 1 Personal health and fitness
- 2 Diet and nutrition
- 3 Medications (prescribed and over-the-counter)
- 4 Substance abuse (alcohol and drugs)
- 5 Pregnancy
- 6 Heat and cold
- 7 Noise and vibration
- 8 Effects of smoking
- 9 Toxic hazards (including carbon monoxide)

### **AVIATION PSYCHOLOGY**

- 1 The decision-making process
- 2 Factors that influence decision-making
- 3 Situational awareness
- 4 Stress
- 5 Managing risk
- 6 Attitudes
- 7 Workload – attention and information processing

### **PILOT – EQUIPMENT/MATERIALS RELATIONSHIP**

- 1 Controls and displays – errors in interpretation and control
- 2 Errors in the interpretation and use of maps and charts
- 3 Correct use of check-lists and manuals

### **INTERPERSONAL RELATIONS**

- 1 Communications with maintenance personnel, air traffic services and passengers
- 2 Operating pressures – family relationships and peer group

## **RECOMMENDED STUDY MATERIAL**

- Sample Examination for Private Pilot Licence (TP 13014E)
- Student Pilot Permit or Private Pilot Licence for Foreign and Military Applicants, Air Regulations (PSTAR) (TP 11919E)
- When in Doubt... Small and Large Aircraft - Aircraft Critical Surface Contamination Training (TP 10643E)
- Air Command Weather Manual (TP 9352E)
- Air Command Weather Manual (Supplement) (TP 9353E)
- Flight Training Manual
- Human Factors for Aviation - Basic Handbook (TP 12863E)
- Aeronautical Information Manual (TC AIM) (TP 14371E )
- *Canadian Aviation Regulations* (CARs)
- VFR Navigation Charts (VNC) / VFR Terminal Area Charts (VTA)
- Canada Flight Supplement (CFS)

The Study Guide (RIC-21) for the Radiotelephone Operator's Restricted Certificate (Aeronautical) is available free of charge from district offices of Industry Canada - Examination and Radio Licensing (<http://www.strategis.gc.ca>).

Information on textbooks and other publications produced by commercial publishers can be obtained through local flying training organizations, bookstores and similar sources.

## **ENQUIRIES**

Information concerning the location of pilot training organizations and matters pertaining to flight crew licensing may be obtained by contacting the appropriate Regional Offices. A complete listing may be found at: <http://www.tc.gc.ca/CivilAviation/General/Exams/Centres.htm>