Study and Reference Guide
for the written examinations for the

INSTRUMENT RATING –
AEROPLANE AND HELICOPTER

SEVENTEENTH EDITION
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GENERAL INFORMATION

The conditions of issue of the Instrument Rating are stated in the Canadian Aviation Regulations (CARs). CAR Standard 421.13 specifies the examination prerequisites. CAR Standard 421.46, 421.48 and 421.49 specifies the requirements for an Instrument Rating.

EXAMINATION PREREQUISITES

CAR 401.13(1)

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

a) medical fitness;

b) identification;

c) a recommendation from the flight instructor who is responsible for the training of the applicant; and

d) experience.

To meet the above, a candidate for an Instrument Rating examination must produce proof of medical fitness, identification bearing the signature and photograph of the candidate, and proof of having completed 20 hours of instrument flight or ground time. No recommendation from a flight instructor is required.

KNOWLEDGE REQUIREMENTS

Applicants for the Instrument Rating shall demonstrate their knowledge by writing a Transport Canada multiple-choice examination on subjects contained in this guide. Applicants must also be able to read the examination questions in either English or French without assistance.

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.
MATERIALS REQUIRED
A pencil is required for rough work. Electronic calculators are useful and are permitted if their memory is cleared before and after the examination. Computers capable of storing text are not approved. A flight computer is required for the navigation questions. A list of approved electronic flight computers is available at:


VALIDITY PERIOD
Examinations 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.

REWITING 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 Feedback Statement:
Interpret instrument approach procedure charts.
EXAMINATIONS

INSTRUMENT TYPE RATING EXAMINATION (INRAT)
The examination consists of general IFR questions in addition to questions based on a simulated IFR flight. There are different versions of the examination for aeroplane and helicopter pilots. The category of aircraft used on the initial flight test must match the category of aircraft specified on the INRAT examination.

<table>
<thead>
<tr>
<th>Examination</th>
<th>Questions</th>
<th>Time Limit</th>
<th>Pass Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>INRAT</td>
<td>50 Multiple</td>
<td>3 hours</td>
<td>70%</td>
</tr>
</tbody>
</table>

CONVERSION EXAMINATION – FAA INSTRUMENT RATING – AEROPLANE (FAAIA)
Pilots converting a valid United States of America FAA Instrument Rating may demonstrate their knowledge by writing the following Transport Canada examination:

<table>
<thead>
<tr>
<th>Examination</th>
<th>Questions</th>
<th>Time Limit</th>
<th>Pass Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAAIA (aeroplanes)</td>
<td>20 Multiple</td>
<td>1 hour</td>
<td>70%</td>
</tr>
</tbody>
</table>

This examination is based on the differences between American and Canadian air law and procedures for IFR flight. Candidates should read the recommended references on page 13 as they apply to aircraft in IFR operations.
AIR LAW AND PROCEDURES

Canadian Aviation Regulations (CARs)

Some 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 (Definitions)

PART IV - PERSONNEL LICENSING AND TRAINING

401 - FLIGHT CREW PERMITS, LICENCES AND RATINGS
   401.03 Requirement to Hold a Flight Crew Permit, Licence or Rating
   401.05 Recency Requirements
   401.46 Instrument Rating, aircraft groups (in the standards)
   401.47 Instrument Rating Privileges
   401.48 Instrument Rating Period of Validity

PART VI - GENERAL OPERATING AND FLIGHT RULES

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
   601.05 IFR Flight in Class A, B, C, D or E Airspace or Class F Special Use Restricted or Class F Special Use Advisory Controlled Airspace

602 – OPERATING AND FLIGHT RULES
   602.08 Portable Electronic Devices
   602.31 Compliance with Air Traffic Control Instructions and Clearances
   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

OPERATIONAL AND EMERGENCY EQUIPMENT REQUIREMENTS
   602.60 Requirements for Power-driven Aircraft

FLIGHT PREPARATION, FLIGHT PLANS AND FLIGHT ITINERARIES
   602.71 Pre-flight Information
   602.72 Weather Information
   602.73 Requirement 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
602.88  Fuel Requirements

OPERATIONS AT OR IN THE VICINITY OF AN AERODROME
602.96  General
602.97  VFR and IFR Aircraft Operations at Uncontrolled Aerodromes within an MF Area
602.104 Reporting Procedures for IFR Aircraft When Approaching or Landing at an Uncontrolled Aerodrome

INSTRUMENT FLIGHT RULES
602.121 General Requirements
602.122 Alternate Aerodrome Requirements
602.123 Alternate Aerodrome Weather Minima
602.124 Minimum Altitudes to Ensure Obstacle Clearance
602.125 En route IFR Position Reports
602.126 Take-off Minima
602.127 Instrument Approaches
602.128 Landing Minima
602.129 Approach Ban – General

RADIOCOMMUNICATIONS
602.137 Two-way Radiocommunication Failure in IFR Flight

605 – AIRCRAFT REQUIREMENTS
605.18  Power-driven Aircraft – IFR
605.30  De-Icing or Anti-Icing Equipment
AIR TRAFFIC SERVICES
1 Air Traffic Control (ATC) and Advisory Services
2 Flight Service Stations (FSS) / Flight Information Centres (FIC)
3 Clearances and instructions
4 Communication procedures / departure / en route / arrival
5 Radar Services – departure / en route / arrival
6 Transponder operation
7 Wake turbulence separation
8 Reduced Visibility Operations

CANADIAN AIRSPACE
1 Low level controlled airspace / types / dimensions / flight rules
2 Classification of airspace
3 Special use airspace

ROUTE AND FLIGHT PLANNING
1 Publications/Charts – requirements and use
2 Preferred routing – factors affecting flight plan
3 Navigation Plan & Flight Log
4 Altitude selection
5 IFR flight in mountainous regions
6 Fuel requirements – aeroplanes, helicopters
7 Weather requirements – take-off, landing, alternate
8 NOTAM – classifications and interpretation
9 Use of flight computer
10 Canada Air Pilot – utilization and definitions

DEPARTURE PROCEDURES
1 ATIS
2 Radar departure
3 Non-radar departure
4 Standard Instrument Departure (SID)
5 Departure at uncontrolled aerodrome
6 Obstacle clearance
7 Visibility requirements / RVR

EN ROUTE PROCEDURES
1 Position reports
2 Clearance limits
3 Changes to flight plan
4 Altitude Limitations – MEA, MOCA, MRA, GASA
5 Adherance to TAS
6 Fixes/waypoints
7 1,000 Feet on Top – IFR flight
8 IFR flight from controlled airspace to uncontrolled airspace
9 IFR flight from uncontrolled airspace to controlled airspace

HOLDING PROCEDURES
1 Holding clearance
2 Entry
3 Standard holding pattern
4 Non-standard holding pattern
5 Timing
6 Speed limitations
7 DME
8 Shuttle
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<tr>
<th>APPROACH PROCEDURES</th>
<th>CANADA AIR PILOT (CAP)</th>
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<tr>
<td>1 ATIS</td>
<td>1 Chart Legend</td>
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<tr>
<td>2 STARs</td>
<td>– approach, aerodrome, lighting and symbols</td>
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<td>3 Radar vectors</td>
<td>2 Altitude corrections</td>
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<td>4 Speed adjustment</td>
<td>3 Operating minima</td>
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<tr>
<td>5 Transition to approach</td>
<td>4 Aircraft categories</td>
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<tr>
<td>6 Initial approach/procedure turn</td>
<td></td>
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<tr>
<td>7 Straight-in approach (No PT)</td>
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<tr>
<td>8 Straight-in minima</td>
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<tr>
<td>9 Final approach</td>
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<tr>
<td>10 Precision approach – ILS, PAR</td>
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</tr>
<tr>
<td>11 Non-Precision approach – NDB, VOR, DME, LOC, RNAV/GNSS</td>
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</tr>
<tr>
<td>12 Stabilized Constant Descent Angle approach</td>
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<tr>
<td>13 Visual/Contact approach</td>
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<tr>
<td>14 Circling approach</td>
<td></td>
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<tr>
<td>15 Missed approach</td>
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<tr>
<td>16 Uncontrolled aerodromes / VFR / IFR traffic mix</td>
<td></td>
</tr>
<tr>
<td>17 Obstacle clearance – Minimum Safe Altitude, Minimum Sector Altitude (MSA)</td>
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<tr>
<td>18 Temperature compensation</td>
<td></td>
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<tr>
<td>19 Approach Ban – visibility requirements</td>
<td></td>
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</tbody>
</table>
## METEOROLOGY

### FUNDAMENTALS OF WEATHER
1. Meteorological services available
2. Factors that determine the weather
3. Meteorological aspect of altimetry
4. Temperature
5. Moisture
6. Stability and instability
7. Clouds/surface based layers
8. Wind
9. Air masses
10. Fronts – types and associated weather

### ICING
1. Formation, meteorological factors
2. Types and intensities
3. Effects on aircraft performance
4. Flight precautions and avoidance

### TURBULENCE
1. Mechanical
2. Thermal
3. Frontal
4. Wind Shear
5. Flight precautions

### THUNDERSTORMS
1. Conditions for development
2. Structure
3. Classification
4. Hazards – macro-bursts, microbursts
5. Squall lines
6. Flight precautions

### AVIATION WEATHER REPORTS
1. Types and times (METAR, SPECI, METAR AUTO, SPECI AUTO)
2. Decoding
3. Pilot report (PIREP)

### AVIATION FORECASTS
1. Times issued and validity
2. Decoding
3. Graphical Area Forecasts (GFA)
4. Aerodrome Forecasts (TAF)
5. Upper level winds and temperature forecasts (FD)
6. Significant In-Flight Weather Warning Messages (SIGMET)

### WEATHER MAPS AND PROGNOSTIC CHARTS
1. Surface weather chart
2. Upper level charts – ANAL (to 700 MB)
3. Prognostic surface chart
4. Significant weather prognostic chart (700-400 MB)
5. Times issued and validity
6. Symbols and decoding

### WEATHER INTERPRETATION
1. Weather systems affecting preferred routes and altitudes
INSTRUMENTATION, NAVIGATION AND RADIO AIDS

PITOT STATIC SYSTEM
1. Pitot
2. Static
3. Anti-icing
4. Alternate static
5. Sources/errors
6. Blockage

PITOT STATIC INSTRUMENTS
1. Principles
2. Errors

GYROSCOPIC SYSTEMS AND INSTRUMENTS
1. Principles
2. Power sources
3. Errors

MAGNETIC COMPASS
1. Principles
2. Use of the magnetic compass
3. Errors

VOR
1. Serviceability checks
2. Interpretation and use
3. Limitations

ADF
1. Serviceability checks
2. Interpretation and use
3. Limitations

ILS
1. Basic components – air and ground
2. Principles of operation
3. Limitations
4. Localizer only

GNSS
1. GPS – basic principles – air and ground
2. Limitations
3. Equipment
4. Interpretation
5. RAIM, Fault Detection & Exclusion
6. WAAS

TRANSPONDER
1. Principles of operation
2. Phraseology and use

OTHER SYSTEMS – BASIC PRINCIPLES AND USE
1. DME
2. VORTAC
3. Area navigation (RNAV)
4. RMI
5. Horizontal Situation Indicator (HSI)
6. Radio/radar altimeter
7. Flight Director system
8. Surveillance Radar - Primary and Secondary
9. Airborne weather radar
10. Lightning detection equipment (e.g. stormscope)
HUMAN FACTORS AND AIRMANSHP

AVIATION PHYSIOLOGY
1. Hypoxia/hyperventilation
2. Orientation / disorientation / visual and vestibular illusions
3. Sleep/fatigue

AVIATION PSYCHOLOGY
1. Decision-making process
2. Factors that influence decision-making
3. Situational awareness

PILOT – EQUIPMENT/MATERIALS RELATIONSHIP
1. Controls and displays – errors in interpretation and control i.e. ADF / VOR RMI
2. Cockpit visibility – seat position
3. Correct use of charts, checklists, manuals
4. Automation advantages / threats

CONTROLLED FLIGHT INTO TERRAIN (CFIT)

THREAT AND ERROR MANAGEMENT
1. Threats and errors in IFR flight
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:
RECOMMENDED STUDY MATERIAL

- Canadian Aviation Regulations (CARs)
  http://www.tc.gc.ca/eng/civilaviation/regserv/cars/menu.htm
- Transport Canada Aeronautical Information Manual (TC AIM) (TP 14371)
- Canada Air Pilot (CAP) – CAP General section
- Canada Flight Supplement (CFS)
- Enroute Low/High/Terminal Charts
- Human Factors for Aviation – Basic Handbook (TP 12863)
- Air Command Weather Manual (TP 9352)
- When in Doubt ... Aircraft Critical Surface Contamination Training (TP 10643)

Knowledge of the following charts is recommended for pilots intending to fly IFR in the United States:

- FAA AeroNav Aeronautical Charts
- Jeppesen En Route and Approach Charts

Transport Canada Publications (TP) may be purchased from retailers, or at the following web site: http://shop.tc.gc.ca/TChtm/ibeCZzpHome.jsp?language=US

NavCanada publications and charts may be purchased from retailers, or at the following web site:
http://www.navcanada.ca/navcanada.asp?Language=en&Content=ContentDefinitionFiles%5CPublications%5CAeronauticalInfoProducts%5Cdefault.xml

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

RECOMMENDED STUDY MATERIAL FOR THE FAA CONVERSION EXAMINATION

Candidates attempting the examination for conversion from an FAA aeroplane instrument rating to a Canadian aeroplane instrument rating (FAAIA examination) are encouraged to review the following references as they apply to aeroplanes:

CARs Part I, Subpart 0 GENERAL PROVISIONS
  100.01 – Short Title
CARs Part I, Subpart 1 INTERPRETATION
  101.01 – Interpretation (definitions as needed)
CARs Part IV, Subpart 1 FLIGHT CREW PERMITS, LICENCES AND RATINGS
  401.05(3) – Recency Requirements (Instrument Rating)
  Division XIV – Instrument Rating
CARs Part VI, Subpart 2 OPERATING AND FLIGHT RULES
Division I – General
Division II – Operational and Emergency Equipment
Requirements
Division III – Flight Preparation, Flight Plans and Flight Itineraries
Division IV – Pre-flight and Fuel Requirements
Division V – Operations at or in the Vicinity of an Aerodrome
Division VII – Instrument Flight Rules
Division VIII – Radiocommunications
CARs Part VI, Subpart 5 AIRCRAFT REQUIREMENTS
Division II – Aircraft Equipment Requirements

TC AIM - GEN GENERAL
1.0 – General Information
3.0 – Transportation Safety Board of Canada

TC AIM - COM COMMUNICATIONS
5.15 – Phone use during Radio Communications Failure

TC AIM - RAC RULES OF THE AIR AND AIR TRAFFIC SERVICES
1.0 – General Information
2.0 – Airspace – Requirements and Procedures
3.13 – Fuel Requirements
3.14 – Requirements for Alternate Aerodrome – IFR Flight
3.15 – Completion of Canadian Flight Plan / Flight Itinerary and ICAO Flight Plan
6.0 – Instrument flight rules (IFR) -General
7.0 – Instrument flight rules (IFR) – Departure Procedures
8.0 – Instrument flight rules (IFR) - En Route Procedures
9.0 – Instrument flight rules (IFR) Arrival Procedures
10.0 – Instrument flight rules – Holding Procedures

TC AIM - MAP AERONAUTICAL CHARTS AND PUBLICATIONS
3.0 – Aeronautical Information – IFR

The above documents can be found on the Transport Canada web pages
http://www.tc.gc.ca/eng/civilaviation/regserv/cars/menu.htm
and