

Airmen's Academic Examination

E40

Qualification	Instrument Rating (Airplane) (Rotorcraft)	No. of questions; time allowed	20 questions; 2 hours
Subject	Instrument Flight - General (subject code: 14)	Code	H1CC142050

- ⊙ Explanatory Notes: (1) In the designated spaces on the Airmen's Academic Examination Answer Sheet (Multiple-Choice Answers) (mark sheet), write your examinee number, examinee number mark, subject, subject code, subject code mark, qualification, qualification category, name, and date of birth.
If you write your examinee number, examinee number mark, subject code, and/or subject code mark incorrectly, computer grading will not be possible and you will fail the subject.
- (2) Write your answers on the Airmen's Academic Examination Answer Sheet (Multiple-Choice Answers) (mark sheet).
- (3) There is no need to submit a navigation log.
- ⊙ Point Allocation: All questions are worth five points each.
- ⊙ Pass Mark: The pass mark is 70%.

Flight plan exercise

Complete the navigation log and answer Questions 1 to 6 with regard to the following flight plan for a flight to be conducted under instrument flight rules:

Date of departure: Month ____ Day ____, Year ____ Estimated time of departure: 09:00 (JST)

Departure airport: ZZ Airport Destination airport: YY Airport Alternate airport: WW Airport

Cruising altitude: 9,000 ft

Route: ZZ airport → A VOR → B VOR → C VOR → D VOR → YY airport

Route to alternate airport: YY airport → E VOR → WW airport

Cruising altitude to alternate airport: 6,000 ft (not taking climb and descent into consideration)

Performance particulars

Speed (TAS)	: Climb 80 kt	Cruising 110 kt	Descent 100 kt
Fuel consumption rate	: Climb 16 gal/hr	Cruising 8 gal/hr	Descent 4.5 gal/hr
Rate of climb/descent	: Climb 600 ft/min		Descent 450 ft/min

Flight details

- 1) After departure, arrival, approach and landing, the aircraft flies the “ZZ Airport – A VOR – B VOR – C VOR – D VOR – YY Airport” route according to the entry in the navigation log.

The elevations of the departure and destination airports are both 0 (zero) ft. No crossing altitudes are designated from take-off to cruising altitude. Descent is commenced from cruising altitude so as to bring the altitude at the destination airport to 0 (zero) ft. No midcourse altitudes are designated.

- 2) Wind direction/velocity values to be used for calculations are $350^{\circ}/26$ kt for climb and $240^{\circ}/14$ kt for descent, and the values in the appropriate box in the navigation log for winds at the cruising altitude of each leg. All wind directions are stated relative to magnetic north.

Q1 Which of the following estimated times of arrival (JST) at YY Airport is the closest to the planned time?

- (1) 10:35
- (2) 10:40
- (3) 10:45
- (4) 10:50

Q2 How many of the following statements (a) to (d) on the first leg are correct? Choose from (1) to (5) below.

- (a) The WCA value during ascent to cruising altitude is negative, while the WCA value after the aircraft reaches cruising altitude is positive.
- (b) The point at which the aircraft reaches cruising altitude is closer to A VOR than the midpoint of the first leg.
- (c) The crosswind component from reaching cruising altitude to A VOR is 10 kt or more.

(d) In ascent, at least four times the fuel used from reaching cruising altitude to A VOR is consumed.

- (1) 1 (2) 2 (3) 3 (4) 4 (5) NONE

Q3 If this flight is not for air transport service and the alternate airport or the like is indicated in the flight plan, which of the following is the minimum necessary quantity of on-board fuel set forth by law prior to departure from ZZ Airport? (Calculate to the first decimal place for each log.)

For rotorcraft, consider the fuel consumption rate during holding to be the same as that during cruising.

- (1) 24.8 gal
(2) 25.2 gal
(3) 25.6 gal
(4) 26.0 gal

Q4 Which of the following statements is correct in cases where the aircraft takes off from airport ZZ with total fuel calculated from the navigation log?

- (1) The leg with the lowest fuel consumption at cruising altitude is between D VOR and the point at which descent is started.
(2) The amount of fuel remaining at the point where one hour has elapsed from takeoff is 15 gal or more.
(3) The amount of fuel remaining when the aircraft lands at airport YY after flying as planned is 10.0 gal.
(4) The amount of fuel remaining when the aircraft has been on hold for 30 minutes at cruising altitude and cruising speed in airspace above D VOR after flying as planned is below 8 gal.

Q5 GS in a cruise from C VOR to D VOR was measured, and it was found that the aircraft advanced 7.0 nm in 3 minutes and 14 seconds.

How many of the following statements (a) to (d) on navigation particulars in cases where CH is 011 degrees and the course was retained are correct? Choose from (1) to (5) below.

If the value is within the tolerance indicated in parentheses, it shall be regarded as correct.

- (a) The actually measured GS is the same as the planned GS (tolerance: within ± 1 kt).
(b) WCA is +7 degrees (tolerance: within ± 1 degree).
(c) The actually measured wind direction is 145 degrees (tolerance: within ± 5 degrees).
(d) The actually measured wind speed is 20 kt (tolerance: within ± 1 kt).

- (1) 1 (2) 2 (3) 3 (4) 4 (5) NONE

Q6 How many of the following statements (a) to (d) on navigation particulars in cases where the aircraft flies based on the completed navigation log are correct? Choose from (1) to (5) below.

If the value is within the tolerance indicated in parentheses, it shall be regarded as correct.

- (a) CAS measured in cases where the atmospheric pressure is 29.92 inHg and the external air temperature is -5 degrees Celsius above C VOR is 96 kt (tolerance: within ± 1 kt).
- (b) The time required for a flight from YY airport to the airspace above WW airport is 30 minutes (tolerance: within ± 1 minute).
- (c) The point at which descent to YY airport is started is 12 minutes after the aircraft passes D VOR (tolerance: within ± 1 minute).
- (d) The leg with the largest GS at cruising altitude on a flight to airport YY is that from C VOR to D VOR.

(1) 1 (2) 2 (3) 3 (4) 4 (5) NONE

Q7 If the lowest usable flight level is 155, which of the following is correct as the atmospheric pressure (QNH) of that flight?

- (1) 29.45 inHg
- (2) 28.97 inHg
- (3) 28.82 inHg
- (4) 28.39 inHg

Q8 How many of the following statements (a) to (d) on ATS routes are correct? Choose from (1) to (5) below.

- (a) Domestic airways are designated under the Regulation for Enforcement of the Civil Aeronautics Act.
- (b) The protective airspace of any domestic (inland) airway that is other than a RNAV route and consists of VOR has a primary area with a width of at least four nautical miles and a secondary area with a width of at least four nautical miles on both sides of the centerline.
- (c) For airways, an MEA is set in each section, and is always at an altitude equal to the MRA on any route involving radio navigation aids.
- (d) An en-route holding pattern is set outside the approach control area in order to have the aircraft on hold en-route in cases where the handling capacity of the airport has declined due to unforeseen circumstances or bad weather.

(1) 1 (2) 2 (3) 3 (4) 4 (5) NONE

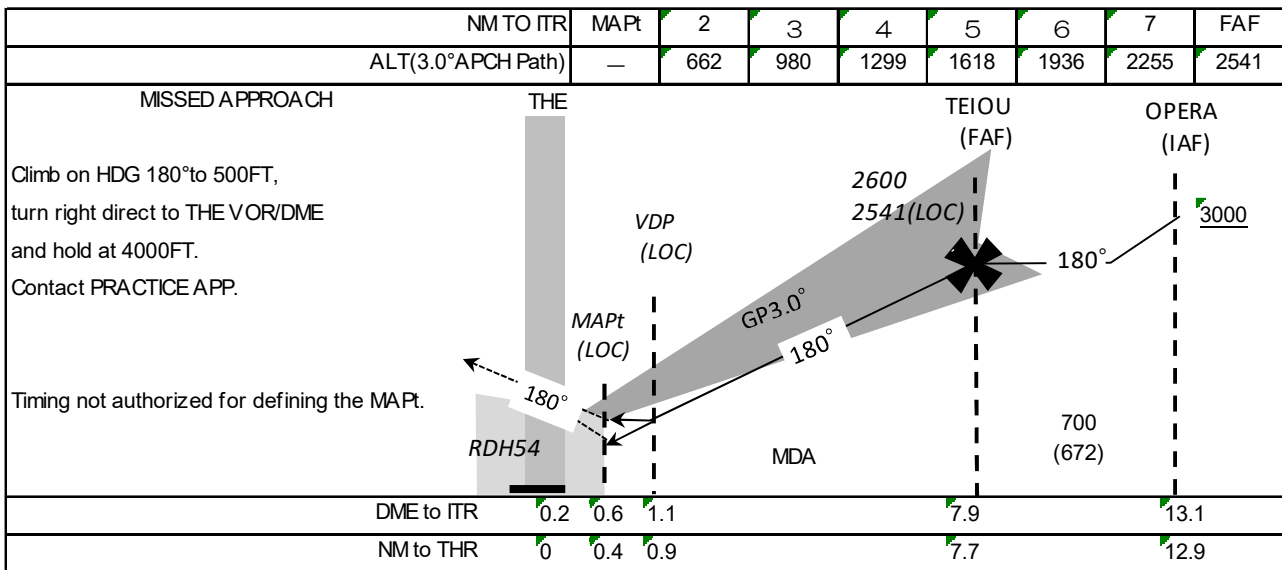
Q9 Which of the following is an incorrect full version of abbreviations used in the aeronautical information service?

- (1) MHA : Minimum holding altitude
- (2) MCA : Minimum crossing altitude
- (3) MSL : Minimum sector altitude
- (4) MOC : Minimum obstacle clearance

Q10 In the filing of a flight plan which specifies instrument flight rules at the point of departure and a flight under visual flight rules at a true airspeed of 160 kt for the portion from Kagawa VOR (KTE), which one of the entries below is correct for that portion in Item 15 "ROUTE" of the flight plan?

- (1) KTE/N0160VFR VFR
- (2) KTE/N0160 IFR VFR
- (3) KTE/IFR N0160VFR
- (4) KTE/IFR N0160VFR VFR

Q11 How many of (a) to (e) below apply to the condition described by the cross-sectional drawing in the approach chart below (approach procedure using ILS)? Choose from (1) to (5) below.



- (a) The glide path angle is set at 3.0°.
- (b) For localized approach, the FAF crossing altitude is specified as 2541 ft.
- (c) The allowable altitude loss at the start of the missed approach is 54 ft.
- (d) The missed approach is set up to also be performed based on the passage of time from the FAF.

- (1) 1
- (2) 2
- (3) 3
- (4) 4
- (5) NONE

Q12 Which of the following statements regarding the ILS is incorrect?

- (1) The ground equipment consists of a DME and two sets of non-directional radio wave transmitting equipment (a localizer and a glide slope) in principle.
- (2) Approach lights, touchdown zone lights, runway edge lights, centerline lights and other facilities are installed to provide visual information for ILS approach operation.
- (3) The ILS identification signal is composed of three letters, always beginning with "I" (two dots) and transmitted on a localized frequency.
- (4) The horizontal distribution of localized signals is adjusted so as to cover 210 m (700 ft) of width at the landing threshold, and the lateral beam angle varies depending on the runway length.

Q13 How many of the following statements (a) to (d) on speed adjustment under radar control are correct? Choose from (1) to (5) below.

- (a) An error of ± 10 kt is permitted for the designated speed.
- (b) If the aircraft is instructed to be on hold, speed adjustment will be automatically completed.
- (c) If a request for deceleration and an instruction for descent are issued simultaneously, an instruction on which of the operations must be performed first will be given.
- (d) Speed adjustment specified by a transferring facility remains in effect when transferred to another facility.

(1) 1 (2) 2 (3) 3 (4) 4 (5) NONE

Q14 Which of the following definitions of the final approach route is incorrect?

- (1) The segment from the end point of the base turn or procedure turn to the missed approach point (MAPt)
- (2) The segment from the FAF to the missed approach point (MAPt)
- (3) On VOR approach, the segment from the FAP to the missed approach point (MAPt)
- (4) Any instrument approach procedure has its own final approach segment.

Q15 The following statements (a) to (d) describe holding. How many are correct? Choose from (1) to (5) below.

- (a) The outbound-leg flight duration at an altitude above 14,000 ft is two minutes.
- (b) The outbound-leg flight duration at an altitude of 14,000 ft or less is one minute.
- (c) The turning direction in the standard pattern is clockwise.
- (d) For the minimum holding altitude (MHA), a vertical separation of at least 984 ft from an obstacle on the ground in the holding area is secured, and separation from an obstacle in a buffer area of 5 nm around the holding area is also considered.

(1) 1 (2) 2 (3) 3 (4) 4 (5) NONE

Q16 Which one of the following abbreviations and definitions of aerodrome lighting aids is incorrect?

- (1) ALS : Arrays of lights marking the final approach for aircraft intending to land
- (2) PAPI : Arrays of lights showing approach-angle appropriateness for aircraft intending to land
- (3) RTHL : Arrays of lights showing distance from the distal end of the runway for aircraft on the runway
- (4) RCLL : Arrays of lights marking the center line of the runway for aircraft about to take off or land

Q17 The following statements (a) to (d) describe vectoring. How many are correct? Choose from (1) to (5) below.

- (a) Vectoring is initiated by assigning a specific heading. Magnetic headings are applied at all times.
- (b) If the turning direction is not instructed by ATC, the pilot is expected to turn in the shorter direction toward the assigned heading.
- (c) If the ATC is unsure of the current heading of the aircraft in question and there is no time to confirm it, the ATC will instruct on the turning angle and the turning direction.
- (d) Vectoring is principally conducted at or below MEA.

- (1) 1 (2) 2 (3) 3 (4) 4 (5) NONE

Q18 Which of the following options represents the meteorological minimum condition to which conversion to CMV (converted meteorological visibility) is applicable?

- (1) Take-off of a multi-engine aircraft with an alternate take-off airport flight-planned
- (2) Circling approach (limited to aircraft classified B or below)
- (3) CAT-I precision instrument approach by a single-engine aircraft
- (4) Alternate destination airport

Q19 The following statements describe the procedure to be followed when a communication failure occurs during navigation under IFR. Which one is incorrect?

- (1) An aircraft in visual meteorological conditions shall continue to fly in visual meteorological conditions and land at the nearest airport etc. where a safe landing is possible.
- (2) An aircraft in instrument meteorological conditions shall proceed according to the last assigned route to the point over the destination (the airspace directly above the destination aerodrome or the appropriate designated navigation aid/fix specified as a point at which any instrument approach procedure will be commenced).
- (3) An aircraft in instrument meteorological conditions where the approach clearance had been issued before communication failure shall commence descent after holding over the point until the time when the total estimated elapsed time in the flight plan has passed since takeoff.
- (4) An aircraft in instrument meteorological conditions where the holding instruction and EAT had been issued before communication failure shall commence descent after holding until EAT.

Q20 Which of the following statements regarding illusions during flight is incorrect?

- (1) The inclined ridgelines of clouds, obscured horizons, darkness containing a mixture of ground lights and starlight, and some types of geometric configurations of ground lights, for example, have a tendency to cause illusions whereby the attitude of the aircraft does not appear accurately aligned to the actual horizon.
- (2) In areas without ground objects, such as water surfaces, dark areas, or snow covered terrain, pilots have a tendency to fall under the illusion that they are flying lower than the actual altitude.
- (3) After staring at a static light in the darkness for several tens of seconds, pilots may fall under the illusion that the light is moving, be tricked by the apparent movement and lose control of the aircraft.
- (4) Various complex motions encountered during flight and the appearance of external forces and scenery, etc., can cause illusions regarding motion and position. Vertigo caused by these illusions can be prevented by reliably and visually recognizing solid objects on the ground that can be trusted, and by monitoring flight instruments.

ETD : JST				NAVIGATION LOG														
TIME							DEPARTURE AP			ZZ	FUEL							
TO DESTINATION							DESTINATION AP			YY	BURN OFF	gal	RESERVE	gal				
FR DESTINATION TO ALTERNATE							ALTERNATE AP			WW	ALTERNATE	gal	TOTAL	gal				
TO	ALT	TAS	WIND	MC	WCA	MH	DEV	CH	Z DIST	C DIST	G/S	Z TIME	C TIME	ETO	F/F	Z FUEL	C FUEL	REMARKS
ZZ																		
- A			270/24	151			2E		44									A VOR
- B			310/32	037			1W		26									B VOR
- C			300/36	050			1E		41									C VOR
- D			190/20	004			2W		39									D VOR
- YY			200/24	067			2E		63									
YY																		
- E			220/30	212			2W		4									E VOR
- WW			200/28	288			3W		42									