

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	H1CC142110

- © Explanatory (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: 08:30 (JST)

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

Cruising altitude: 6,000 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: 5,000 ft (does not take climb and descent into consideration)

Performance particulars

Speed (TAS)	: Climb 74 kt	Cruising 100 kt	Descent 96 kt
Fuel consumption rate	: Climb 15 gal / hr	Cruising 8 gal / hr	Descent 4 gal / hr
Rate of climb/descent	: Climb 600 ft/min		Descent 500 ft/min

Flight details

- 1) After departure, arrival, and 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 the cruising altitude. And a descent is commenced from the 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 260°/8 kt for the climb, 310°/26 kt for the descent, and the values in an appropriate box in the navigation log for winds at the cruising altitude of each leg. All wind directions are stated relative to magnetic north.

Q 1 Which of the following estimated times of arrival (JST) to YY Airport is the closest to the planned time?

- (1) 10:19
- (2) 10:22
- (3) 10:25
- (4) 10:28

Q 2 How many of the following statements (a) to (d) on the first leg are correct? Choose from (1) to (5) below.

- (a) There is a change in CH during ascent to the cruising altitude and after the aircraft reaches the cruising altitude.
- (b) The point at which the aircraft reaches the cruising altitude is in a position closer to ZZ Airport than the midpoint of the first leg.
- (c) The time required for ascent and the time required for cruising are the same.
- (d) In ascent, fuel at least two times the fuel consumption from reaching the cruising altitude to A VOR is consumed.

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

Q 3 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 quantities is the minimum value that satisfies the fuel on board set forth by law prior to departure from ZZ Airport?

(Calculate to the first decimal place for each log.)

In the case of a rotorcraft, consider the fuel consumption rate during holding to be the same as that during cruising.

- (1) 23.6 gal
- (2) 23.9 gal
- (3) 24.2 gal
- (4) 24.5 gal

Q 4 Which of the following statements is correct in cases where the aircraft takes off from airport ZZ with a total fuel calculated with the navigation log?

- (1) A leg with the most fuel consumption at the cruising altitude is between ZZ Airport and A VOR.
- (2) The amount of fuel remaining at the point where one hour has elapsed from takeoff is 14.1 gal.
- (3) The amount of fuel remaining when the aircraft lands at airport YY after flying as planned is 6.4 gal.
- (4) The amount of fuel remaining when the aircraft has been on hold for 30 minutes at the cruising altitude and the cruising speed in airspace above D VOR after flying as planned is below 10 gal.

Q 5 GS in a cruise from C VOR to D VOR was measured, and it was found that the aircraft advanced 5.5 nm in 3 minutes.

How many of the following statements (a) to (d) on navigation particulars in cases where CH is 289 degrees and the course was retained are correct? Choose from (1) to (5) below.

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

- (a) There is no change in the D VOR estimated arrival time calculated from the arrival time of C VOR.
- (b) WCA is +8 degrees (tolerance: within ± 1 degree).
- (c) The actually measured wind direction is 050 degrees in magnetic bearing (tolerance: within ± 5 degrees).
- (d) The actually measured wind speed is 18 kt (tolerance: within ± 1 kt).

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

- Q 11 Which of the following instructions describing the flight rules of item 8 "Flight Rules and Type of Flight" in the flight plan is incorrect?
- (1) Y: If the flight is initially operated under IFR, but changed to VFR in flight
 - (2) X: If the flight is initially operated under IFR, but changed to VFR and back to IFR in flight
 - (3) Z: If the flight is initially operated under VFR, but changed to IFR in flight
 - (4) Z: If the flight is initially operated under VFR, but changed to IFR and back to VFR in flight
- Q 12 Which of the following statements regarding the ILS is incorrect?
- (1) The ground equipment consists of a DME and two non-directional radio wave transmitting equipment; a localizer and a glide slope.
 - (2) Approach lights, touchdown zone lights, runway edge lights, centerline lights and other facilities are installed as visual information for the ILS approach operation.
 - (3) The ILS identification signal is composed of three letters, always beginning with "I" (two dots) and transmitted on a localizer frequency.
 - (4) The horizontal distribution of the localizer 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.
- Q 13 How many of the following statements (a) to (d) regarding the takeoff minima are correct? Choose from (1) to (5) below.
- (a) On a multi-engined airplane without takeoff alternate airport flight-planned or single-engined airplane, if the available approach procedure is CAT-I precision approach, the ceiling (rounded up to the nearest 100 ft) equal to MDH for non-precision approach and VIS equal to the minima for non-precision approach are applied.
 - (b) On a multi-engined airplane without takeoff alternate airport flight-planned or single-engined airplane, if the available approach procedure is the non-precision approach, MDH for non-precision approach plus 200 ft is applied as the ceiling (rounded up to the nearest 100 ft) and VIS equal to the minima for non-precision approach plus 1,000 m is applied.
 - (c) On a multi-engined airplane without takeoff alternate airport flight-planned or single-engined airplane, if the available approach procedure is the circling approach, the ceiling equal to MDH for circling approach (rounded up to the nearest 100 ft) and VIS equal to the minima for circling approach are applied.
 - (d) When RVR is not available, use the reported visibility by converting it to CMV.
- (1) 1 (2) 2 (3) 3 (4) 4 (5) None

Q 14 How many of the following statements (a) to (d) regarding airways and routes is correct? Choose from (1) to (5) below.

- (a) An aircraft flying under instrument flight rules must fly at the centerline of the airway except for when there are unavoidable circumstances.
- (b) A pilot must request and obtain authorization by ATC when deviating from airway to avoid bad weather during a flight under instrument flight rules.
- (c) Domestic airways predicated on VOR have primary areas on the inside and secondary areas on the outside of either sides of the centerline; both areas are a minimum of 4 nm in width.
- (d) A direct route means a route between the final fix and the airway of SID.

(1) 1 (2) 2 (3) 3 (4) 4 (5) None

Q 15 The following statements describe the procedure when a communication failure occurs while navigating under IFR. Which one is incorrect?

- (1) If an aircraft is in visual meteorological conditions, the aircraft shall continue to fly in visual meteorological conditions and land at the nearest airport etc. where a safe landing is considered possible.
- (2) If an aircraft is in instrument meteorological conditions, the aircraft shall proceed according to the last assigned route to the point over the destination (the airspace right above the destination aerodrome or the appropriate designated navigation aid/fix specified as a point which that an instrument approach procedure will be commenced if any).
- (3) If an aircraft is in instrument meteorological conditions, has arrived overhead the destination prior to failure of the communication equipment, has been instructed to wait overhead the applicable point, and has received the scheduled time for the commencement of approach, the aircraft shall wait overhead the applicable point until that time, and then commence descent.
- (4) Since direction signaling lights are used at an aerodrome where an instrument approach procedure is set, landing shall be performed according to light-based signals.

Q 16 Which of the following combinations of aerodrome lights and an explanation of them is incorrect?

- (1) REDL : Lights that are installed at both ends of a runway in order to show the ends of the runway to an aircraft that is about to take off or land, and are other than emergency runway edge lights.
- (2) RCLL : Arrays of lights that are installed on the center line of a runway in order to show the centerline of the runway to an aircraft that is about to take-off or land
- (3) CGL : Lights that are installed outside a runway in order to show the position of the runway to an aircraft that is performing a circular flight, and project a lamp light beam upward from the runway outside location.
- (4) AGL : Lights that are installed in order to notify an aircraft that has taken off of its route after takeoff, or notify an aircraft that is about to land of the approach route until the its final approach route.

Q 17 A pilot may continue the approach below the approach height threshold provided that at least one visual reference is established at DA/H or MDA/H and is maintained so that the landing might be completed. How many of the following items (a) to (d) can be used as the above visual reference for non-precision approach, ILS approach (CAT I) and PAR approach? Choose from (1) to (5) below.

- (a) Touchdown zone lights
- (b) Runway threshold identification lights
- (c) Precision approach path indicator
- (d) Runway edge lights

(1) 1 (2) 2 (3) 3 (4) 4 (5) None

Q 18 Which of the following statements regarding the visual descent point (VDP) is correct?

- (1) Visual descent point is the marginal position in radar navigational guidance for landing.
- (2) Visual descent point is the position to commence descent below decision height when an appropriate visual reference is in sight during PAR approach.
- (3) Visual descent point is the position to commence descent below decision height when an appropriate visual reference is in sight during ILS approach (CAT I).
- (4) Visual descent point is the descent point on the final approach course of nonprecision approach procedure from which normal descent from the MDA may be commenced provided visual reference is established with which the approach light or the runway threshold (runway approach end) is identified.

Q 19 The following statements describe countermeasures when turbulence is encountered. How many of these statements (a) to (d) are correct? Choose from (1) to (5) below.

- (a) The most important thing is the "Fly Attitude", and power adjustments and pitch corrections should be made well within the minimum range.
- (b) Watch the navigation and engine instruments carefully.
- (c) Plan to evacuate from a turbulent area as necessary when the area is considered to be expanding by an analysis of cloud conditions, weather radar, outside temperature and information from other aircraft.
- (d) Inform ATC as soon as practicable regardless of the intensity when it is considered to be dangerous for aircraft operations.

(1) 1 (2) 2 (3) 3 (4) 4 (5) None

Q 20 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, whereby the pilot can be tricked by the apparent movement of the light 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 flight instruments.

NAVIGATION LOG

ETD : JST		NAVIGATION LOG																	
TO DESTINATION		TIME						DEPARTURE AP				FUEL							
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	
FR	DESTINATION TO ALTERNATE	:	:	:	:	:	ALTERNATE AP	YY	WW	BURN OFF	RESERVE	gal	TOTAL	gal	gal	gal	gal	gal	
ZZ																			
- A			330/24	181			2E		30										A VOR
- B			350/18	222			1E		22										B VOR
- C			060/24	257			1E		43										C VOR
- D			040/28	282			1E		33										D VOR
- YY			180/32	350			2E		87										
- E			220/42	025			2W		7										E VOR
- WWW			280/38	116			3W		34										