

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	H1CC141810

- ☆ 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) You don't need to submit the 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.

Day of departure: yymmdd

Estimated time of departure: 08:30 (JST)

Departure airport: ZZ Airport

Destination airport: YY Airport

Alternate airport: WW Airport

Cruising altitude: 8,000ft

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: 7,000 ft (climbs and descents not taken into account)

Performance particulars

Speed (TAS): Climb 120 kt; cruise 150 kt; descent 120 kt

Fuel consumption rate: Climb 45 gal/h; cruise 26 gal/h; descent 21 gal/h

Climb rate: 800 ft/min

Descent rate: 400 ft/min

Flight details:

- 1) For 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 between takeoff and cruising altitude. Descent shall be commenced so that the altitude will reach 0 (zero) ft at the destination. No crossing altitudes are designated on the descent.
- 2) Wind direction/velocity values to be used for calculations are 360°/12 kt for the climb, 170°/16 kt for the descent, and the values in appropriate boxes in the navigation log for cruising altitude. These wind directions are stated relative to the magnetic north.

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

- (1) 10:42
- (2) 10:45
- (3) 10:48
- (4) 10:51

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

- (a) CH remains the same before reaching the cruising altitude during the climb and after reaching it.
- (b) The aircraft will reach cruising altitude at the point halfway in the first leg.
- (c) The difference between the GS until the aircraft reaches cruising altitude and the GS from thereon until it reaches A-VOR is less than 15 kt.
- (d) The amount of fuel consumption from the point where the aircraft reaches cruising altitude to A-VOR is less than half compared to the amount consumed during the climb.

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

Question 3: If this flight is not for air transport service and the alternate airport is indicated in the flight plan, which of the following quantities is the closest to the minimum quantity of fuel that must be carried by the aircraft prior to departure from ZZ Airport as designated by the Act? (Calculate to the first decimal place for each leg.) In the case of a rotorcraft, consider the fuel consumption rate during holding to be the same as that during cruising.

- (1) 81 gal
- (2) 84 gal
- (3) 87 gal
- (4) 90 gal

- Question 4: Which of the following is closest to the point where half of the fuel on board is consumed if the aircraft takes off ZZ Airport carrying the total fuel calculated using the navigation log?
- (1) About 15 nm from C-VOR in the direction towards D-VOR
 - (2) About 30 nm from C-VOR in the direction towards D-VOR
 - (3) About 30 nm from D-VOR in the direction towards C-VOR
 - (4) About 15 nm from D-VOR in the direction towards C-VOR
- Question 5: When the GS was measured during the cruise from B-VOR to C-VOR, the aircraft advanced 7 nm in 3 minutes 08 seconds. CH was kept at 271°. In this state, how many of the following statements (a) to (d) regarding the navigation particulars are correct? Choose from (1) to (5) below. If the values are within the acceptable tolerance in parentheses, it shall be considered correct.
- (a) The change in ETA of C-VOR calculated from ATA of B-VOR is within 1 minute.
 - (b) WCA is -3°. (acceptable tolerance is within ±1 degrees)
 - (c) The actual wind direction is 315°. (acceptable tolerance is within ±5 degrees)
 - (d) The actual wind velocity is 20 kt. (acceptable tolerance is within ±2 kt)
- (1) 1 (2) 2 (3) 3 (4) 4 (5) None
- Question 6: Regarding the navigation particulars obtained from the completed navigation log, how many of the following statements (a) to (d) are correct? Choose from (1) to (5) below. If the values are within the acceptable tolerance in parentheses, it shall be considered correct.
- (a) Above C-VOR, if the pressure is 29.92 inHg and the outside temperature is -2°C, CAS is approx. 169 kt. (acceptable tolerance is within ±1 kt)
 - (b) The time required from YY Airport to the airspace over WW Airport is 15 minutes. (acceptable tolerance is within ±1 minute)
 - (c) TOD to YY Airport is 20 minutes after passing over D-VOR. (acceptable tolerance is within ±1 minute)
 - (d) The descent angle to YY Airport is less than 3 degrees (shallower than 3 degrees).
- (1) 1 (2) 2 (3) 3 (4) 4 (5) None
- Question 7: Which of the following flight is not included in the flights which shall not be performed unless the pilot has obtained instrument flight certification?
- (1) Instrument flight
 - (2) Instrument navigation flight which exceeds the distance of 110 km or the duration of 30 minutes
 - (3) Night flight which exceeds the distance of 185 km or the duration of 30 minutes
 - (4) Flight under instrument flight rules
- Question 8: 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

- Question 9: Which of the following abbreviations and its meanings used in METAR is incorrect?
- (1) VCVA: Volcanic ash in the vicinity of the airport
 - (2) SHRA: Shower rain
 - (3) DRSA: Low drifting sand
 - (4) FZDZ: Heavy drizzle
- Question 10: With regards to recent flight experience of flight crew-members engaged in instrument flight, the following statements describe the time accepted as the recent flight experience among those recorded in the flight crew-members log book. Which one is incorrect?
- (1) "Other flight time" where the flight crew member was on board the aircraft and maintaining vigilance so as to avoid collisions during instrument flight training.
 - (2) Time operating a "synthetic flight trainer" according to the procedure specified by the minister of land, infrastructure and transportation (however, limited to the operation of synthetic flight trainers accredited by the minister of land, infrastructure and transportation.)
 - (3) "Hooded" time where instrument flight training was conducted using a view limiting device on board the aircraft.
 - (4) "Instrument flight" time among the flight time under IFR, where instrument flight was conducted.
- Question 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
- Question 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.
- Question 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

- Question 14: How many of the following statements (a) to (d) regarding airways and routes is correct? Choose from (1) to (5) below.
- (a) A pilot 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.
 - (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 pilot may avoid bad weather based on his/her decision without reporting to air traffic control authorities if the flight remains within the protected airspace of the airway.
- (1) 1 (2) 2 (3) 3 (4) 4 (5) None

- Question 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 and the approach clearance had been issued before the communication failure, commence descent after holding over the point until the time when the total estimated elapsed time in the flight plan has elapsed after takeoff.
 - (4) If an aircraft is in instrument meteorological conditions and the holding instruction and EAT had been received before the communication failure, commence descent after holding until EAT.

- Question 16: Which of the following statements regarding the contact approach is incorrect?
- (1) The contact approach is an approach by an IFR aircraft when either part or all of an instrument approach procedure is not completed and the approach is executed in visual reference to an airport.
 - (2) The clearance for the contact approach will be issued by ATC, upon the pilot's request, when the ground visibility is at least 1,500 meters and traffic permitting.
 - (3) The contact approach is usually approved with the phraseology "CLEARED FOR CONTACT APPROACH". When the approach has been approved without specifying the type of approach, the pilot only needs to notify his intention to make the contact approach to the landing airport's Advisory Service Unit.
 - (4) If the meteorological minima for contact approach is satisfied, contact approach can be applied for landing even when the meteorological minima promulgated at the airport for instrument approach is not satisfied.

Question 17: A pilot may continue the approach below the approach height threshold (DA/H or MDA/H) 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) Runway threshold (runway approach end)
- (b) Runway threshold identification lights
- (c) Precision approach path indicator
- (d) Runway threshold marking

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

Question 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-1).
- (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.

Question 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

Question 20: Which of the following statements regarding illusions in flight is incorrect?

- (1) Sloping cloud formations, an obscured horizon, a dark scene spread with ground lights and stars, and certain geometric patterns of ground lights can create the illusion of not being aligned correctly with the actual horizon.
- (2) An absence of ground features, such as when flying over water, darkened areas, and terrain made featureless by snow, can create the illusion that the aircraft is at a lower altitude than it actually is.
- (3) In the dark, a static light will appear to move about after staring at it for several dozen seconds. The disoriented pilot will lose control of the aircraft by attempting to align it with the light.
- (4) Various complex motions and forces and certain visual scenes encountered in flight can create illusions of motion and position. Spatial disorientation due to these illusions can be prevented only by visual reference to reliable, fixed points on the ground or to flight instruments.

ETD		JST		NAVIGATION LOG															
TIME				DEPARTURE AP				FUEL				FUEL							
TO DESTINATION		:		:		:		:		:		:		:		:		:	
FR DESTINATION TO ALTERNATE				:				:				:				:			
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			290/16	236			1E		42										A VOR
- B			230/20	182			1W		34										B VOR
- C			310/18	274			2E		81										C VOR
- D			200/36	350			2W		81										D VOR
- YY			160/30	296			2E		94										
YY																			
- E			350/20	053			1W		7										E VOR
- WW			210/14	139			2W		29										

