

LUI

School code

School name

Given name/s

Family name

Attach your
barcode ID label here

Book

of

books used

External assessment 2022

Question and response book

Aerospace Systems

Time allowed

- Perusal time — 10 minutes
- Working time — 120 minutes

General instructions

- Answer all questions in this question and response book.
- QCAA-approved calculator permitted.
- QCAA-approved flight calculator permitted.
- Protractor and ruler or plotter required.
- QCAA formula and data book provided.
- Planning paper will not be marked.

Section 1 (10 marks)

- 10 multiple choice questions

Section 2 (70 marks)

- 13 short response questions



DO NOT WRITE ON THIS PAGE
THIS PAGE WILL NOT BE MARKED

Section 1

Instructions

- Choose the best answer for Questions 1–10.
- This section has 10 questions and is worth 10 marks.
- Use a 2B pencil to fill in the A, B, C or D answer bubble completely.
- If you change your mind or make a mistake, use an eraser to remove your response and fill in the new answer bubble completely.

	A	B	C	D
Example:	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	A	B	C	D
1.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do not write outside this box.

Section 2

Instructions

- Write using black or blue pen.
 - If you need more space for a response, use the additional pages at the back of this book.
 - On the additional pages, write the question number you are responding to.
 - Cancel any incorrect response by ruling a single diagonal line through your work.
 - Write the page number of your alternative/additional response, i.e. See page ...
 - If you do not do this, your original response will be marked.
 - This section has 13 questions and is worth 70 marks.
-

QUESTION 11 (4 marks)

A VFR aircraft is leaving an airport with an airfield elevation of 21 ft. Use the terminal area forecast (TAF) to identify the outside air temperature and QNH at 03UTC. Determine the pressure altitude and density altitude.

TAF YHOT 022230Z 0300/0312

28015KT 9999 SCT050CB

T 21 24 28 28 Q 1009 1007 1009 1010

Do not write outside this box.

QUESTION 12 (6 marks)

Identify six vision issues that affect human performance in aerospace contexts.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

QUESTION 13 (3 marks)

Identify the preferred engine type for medium- and long-range passenger airliners. Provide two reasons why this engine is preferred.

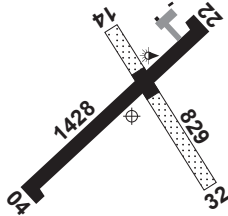
Do not write outside this box.

QUESTION 14 (5 marks)

A pilot is chartered to fly a Saab 340 twin-engine turboprop aircraft from Adelaide to Coober Pedy, departing at 9:30 am. The Saab 340 has a tyre pressure of 120 PSI and a wingspan of 21.44 m.

COOBER PEDY AVFAX CODE 5201

ELEV 745



SA
290224S 1344315E UTC +9:30 YCBP
AD OPR District Council of Coober Pedy, PO Box 425, Coober Pedy, SA,
5723 ARO 0400 108 230: 0418 844 593. OPS MGR 0418 848 279. CERT
Council PH 08 8672 4600.

REMARKS

- AD Charges - All ACFT \$14/1,000KG MNM \$14. Helicopter \$14/landing.
- This AD is a Security Controlled Airport.

HANDLING SERVICES AND FACILITIES

VIVA Energy Aviation - Underground Books: MON-FRI 0800-1700 local. Weekends, AH and PH by 48HR prior arrangement - call-out fee \$165. PH 0428 829 795.

AVGAS H24 swipe bowser - accepts Viva Fuel2Sky card, V, MC and debit card (pin number RQ for all credit cards).

JET A1 bowser (operator call-out RQ at all times).

PASSENGER FACILITIES

WC/HC (PH 0417 805 891)/LG (Limited times)

METEOROLOGICAL INFORMATION PROVIDED

- TAF CAT D, METAR/SPECI.
- AWIS PH 08 8150 3803 - Report faults to BoM.
- AWIS FREQ 122.125 - Report faults to AD OPR (requires one-second pulse to activate).

PHYSICAL CHARACTERISTICS

04/22	043	47a	PCN 8 /F /A /870 (126PSI) /U	WID 30	RWS 150
14/32	145	27c	5700/520 (75PSI) Gravel. Unrated	WID 30	RWS 90

AERODROME AND APPROACH LIGHTING

RWY 04/22 LIRL PAL 119.6

RWY 04/22 PTBL(1)

RWY 14/32 PTBL(1)

(1) EMERG only

RWY edge light spacing: 04/22: 90M.

OTHER LIGHTING

TWY LGT: Blue edge.

ATS COMMUNICATIONS FACILITIES

FIA MELBOURNE CENTRE 120.7 7000FT

RADIO NAVIGATION AND LANDING AIDS

NDB CBP 341 290154.5S 1344325.6E Range 50 (HN 50) (1)

(1) Pilot monitored.

LOCAL TRAFFIC REGULATIONS

- All ACFT ABV 3,000KG to turn at turning nodes only, using MAX RAD turns.
- PRKG restrictions for non RPT aircraft on sealed apron area. Permit obtainable FM AD Manager on at least 48 HR PN.

CTAF - AFRU 126.7

ADDITIONAL INFORMATION

- Gliding and recreational ACFT OPS.
- Winch launching and aero-tow for glider OPS.
- Warning: Kangaroo and bird hazards exist.
- Ultralight OPS and training.

Do not write outside this box.

Use the ERSA extract on the previous page to:

- a) identify runway lengths and a potential hazard

[3 marks]

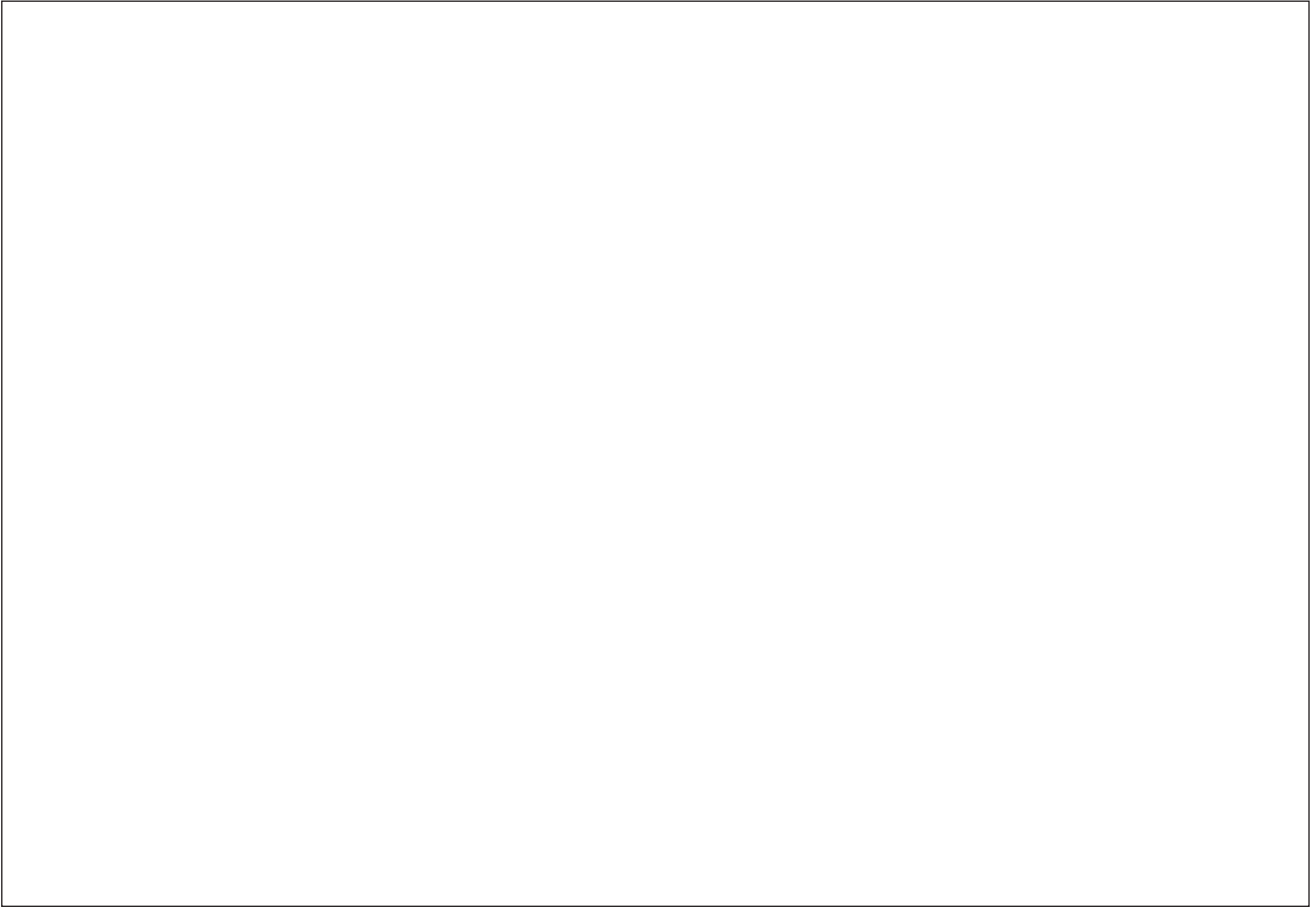
- b) determine the most appropriate runway for landing and take-off for the aircraft and explain your reasoning.

[2 marks]

Do not write outside this box.

QUESTION 16 (5 marks)

Explain the purpose of an instrument landing system (ILS) and how it operates. Use sketches to support your explanation in the space provided.



Note: If you make a mistake in the sketch, cancel it by ruling a single diagonal line through your work and use the additional response space at the back of this question and response book.

Do not write outside this box.

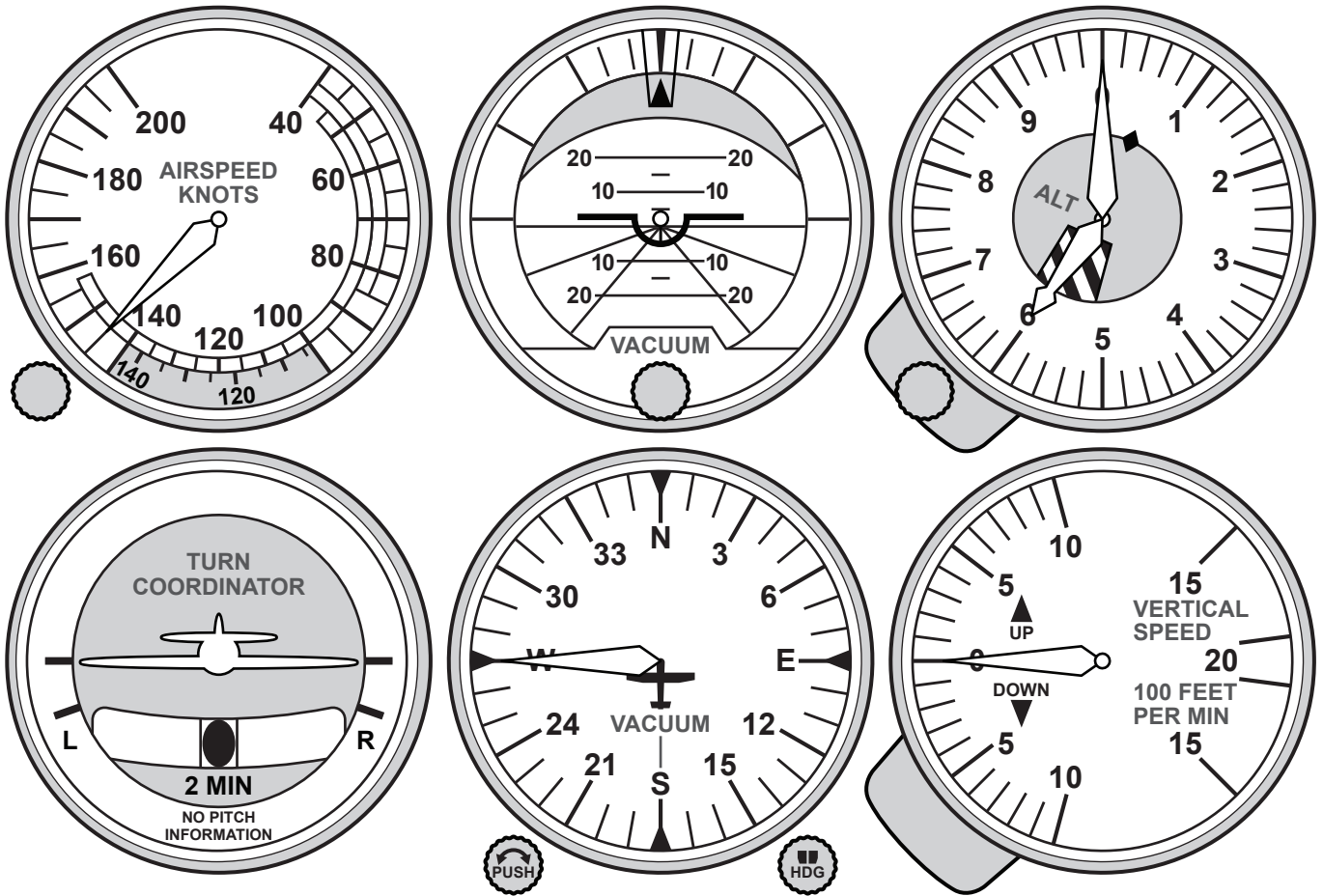
b) Explain a limitation of traffic collision avoidance systems (TCAS) in this scenario. *[1 mark]*

c) Determine the level of risk of a mid-air collision during the scenic flight and provide an example to support your decision. *[2 marks]*

Do not write outside this box.

QUESTION 18 (5 marks)

During a flight heading west through dusty conditions, the pilot notices a problem with the ASI instrument. The pilot completes a controlled descent and climb manoeuvre, where both the altimeter and vertical speed indicator were observed and behaved as intended. However, during the manoeuvre there was an indication of airspeed decreasing to 135 kts during the descent and an indication of airspeed increasing to 155 kts during a controlled climb.



Analyse the six flight instruments to determine the cause of the problem.

Do not write outside this box.



Do not write outside this box.



QUESTION 19 (8 marks)

During a hot summer, a solo pilot planned a flight from Walgett (YWLG) to Bourke (YBKE) departing at 2330 UTC. The pilot completed a 6-hour flight beforehand with a short coffee break between the flights.

After flying 42 NM, they found they were 13 NM off track to the right. En route, they noticed their ground speed was slower than planned and calculated that 0100 UTC was their new ETA. After looking at their flight plan and fuel log, the pilot believed it was safe to continue the flight.

- Wind = 330°/20
- TAS = 125 kts
- Usable fuel = 120 L
- Fuel rate = 40 L per hour
- Magnetic variation = 10° E
- Taxi fuel = 7 L at YWLG and YBKE
- Cruise altitude will be reached while on track
- Climb fuel and time are assumed as part of cruise fuel and time
- Regulatory requirements for fixed fuel reserve is 45 mins of flight time

a) Use the data provided to complete the fuel log forms. Include track error, track made good, closing angle and a new heading to fly to YBKE in the space provided.

[5 marks]

NAV/COMM LOG											
	LSALT	ALT	TAS	TR (m)	WIND	HDG	G/S	DIST	ETI	EET	PLN EST
YWLG											
YBKE	1536		125	261				113			

Fuel	Min	Litres
Climb		
Cruise		
Alternate		
Sub-total		
VRB RES (15%)		
Fixed RES (45 min)	45	

Fuel	Min	Litres
Holding	Inter 30 min	
	Tempo 60 min	
Taxi		14
Fuel required		
Fuel margin		
Endurance		

Note: If you make a mistake in the fuel log forms, cancel it by ruling a single diagonal line through your work and use the additional response space on page 25 of this question and response book.

Do not write outside this box.

QUESTION 20 (5 marks)

Refer to the visual terminal chart (VTC) in the stimulus book.

A pilot is planning a skydiving flight with four passengers from Hobart to the drop zone at Buxton Point, overflying Triabunna airfield in a GA aircraft (TAS 150 knots). The magnetic variation in the region is 15°E and the area forecast indicates that the winds are 230/14 at all levels up to FL140. The skydivers will jump from 10 000 ft.

- a) Use the VTC to complete the flight plan.

[4 marks]

NAV/COMM LOG									
	LSALT	ALT	TAS	TR (m)	WIND	HDG	G/S	DIST	ETI
Hobart (HBA)									
Triabunna (TNA)			150 kt					26	
Buxton Point (BP)			150 kt					16	

Note: If you make a mistake in the flight plan, cancel it by ruling a single diagonal line through your work and use the additional response space on page 25 of this question and response book.

- b) State where the aircraft departs controlled airspace.

[1 mark]

Do not write outside this box.

QUESTION 22 (5 marks)

Pilot performance is reduced by blood alcohol concentrations as low as 0.025%, with serious errors committed by pilots with a BAC above 0.04%.

- a) Determine two variables that will increase a pilot's blood alcohol concentration level. *[2 marks]*

- b) Identify three organs crucial to flying and explain the impact each organ has on pilot performance when alcohol concentrations exceed 0.04%. *[3 marks]*

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ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

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Write the question number you are responding to.

Do not write outside this box.

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

ADDITIONAL RESPONSE SPACE FOR QUESTION 19a)

If you want these fuel log forms to be marked, rule a single diagonal line through the fuel log forms on page 12.

NAV/COMM LOG											
	LSALT	ALT	TAS	TR (m)	WIND	HDG	G/S	DIST	ETI	EET	PLN EST
YWLG											
YBKE	1536		125	261				113			

Fuel	Min	Litres
Climb		
Cruise		
Alternate		
Sub-total		
*VRB RES (15%)		
*Fixed RES (45 min)	45	

Fuel		Min	Litres
Holding	Inter 30 min		
	Tempo 60 min		
Taxi			14
Fuel required			
Fuel margin			
Endurance			

ADDITIONAL RESPONSE SPACE FOR QUESTION 20a)

If you want this flight plan to be marked, rule a single diagonal line through the flight plan on page 15.

NAV/COMM LOG									
	LSALT	ALT	TAS	TR (m)	WIND	HDG	G/S	DIST	ETI
Hobart (HBA)									
Triabunna (TNA)			150 kt					26	
Buxton Point (BP)			150 kt					16	

Do not write outside this box.

References

Question 14

Airservices Australia, 'Aeronautical information package — En Route Supplement Australia (ERSA)' Coober Pedy, www.airservicesaustralia.com/aip/current/ersa/FAC_YCBP_27FEB2020.pdf.

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Question 18

Adapted from 2019, 'Complete set for any aircraft', *RealityXP*, <https://reality-xp.com/flightsim/flight/features/index.html>

Question 19

Adapted from CASA 2023, 'Flight planning notepad', *Australian Government Civil Aviation Safety Authority*, <https://shop.casa.gov.au/products/flight-planning-notepad-flight-planning-notepad>

Question 20

Adapted from CASA 2023, 'Flight planning notepad', *Australian Government Civil Aviation Safety Authority*, <https://shop.casa.gov.au/products/flight-planning-notepad-flight-planning-notepad>



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