

## 4.8 AVIATION TECHNOLOGY (450)

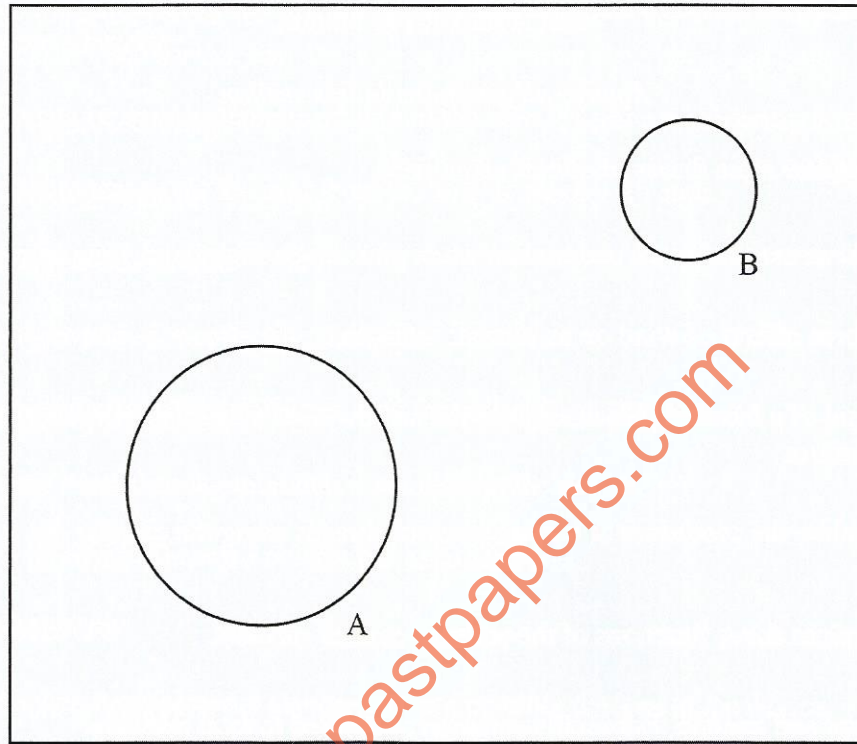
### 4.8.1 Aviation Technology Paper 1 (450/1)

#### SECTION A (44 Marks)

*Answer all questions in this section.*

1. Highlight **three** main duties of aircraft cabin crew. (3 marks)
2. Explain **three** external tasks undertaken when picketing a high fixed wing aircraft. (3 marks)
3. Outline **three** effects of wind on an aircraft in flight. (3 marks)
4. With the aid of a labelled sketch, explain the airflow over a flat plate perpendicular to the relative airflow. (3 marks)
5. (a) Outline the procedure of cutting external threads using the circular die. (5 marks)  
(b) Explain **three** functions of the primary control surfaces. (3 marks)
6. (a) State and explain, Bernoulli's equation as applied to total pressure. (2 marks)  
(b) With the aid of a labelled sketch, show how lift is produced on an aerofoil. (3 marks)
7. State **one** property and **one** application for each of the following metals used in the construction of aircrafts: (3 marks)
  - (a) Copper
  - (b) Magnesium alloy
  - (c) Stainless steel
8. Differentiate between each of the following: (4 marks)
  - (a) Otto cycle and Brayton cycle
  - (b) Wet sump and dry sump
9. (a) Give **three** reasons for selecting titanium alloys for use on aircraft engines. (3 marks)  
(b) Explain the function of each of the following aircraft structural members: (3 marks)
  - (i) Strut
  - (ii) Rib

10. **Figure 1** shows a plan of a metal plate with two circles of different diameters. Dimension the distance between the centres of the circles on the plate. (6 marks)



**Figure 1**

**SECTION B (56 marks)**

*Answer any **four** questions from this section in the spaces provided. Question 15 should be answered on the A3 paper provided. Candidates are advised to spend not more than 1 hour on question 15.*

11. (a) With the aid of labelled sketch, describe the construction of the primary circuit of the magneto system. (10 marks)
- (b) Using a labelled sketch, show an aero gas turbine engine subsonic intake. (4 marks)
12. (a) Explain **eight** tasks carried out on an aircraft between flights. (8 marks)
- (b) Explain **four** range marking for a typical airspeed indicator. (4 marks)
- (c) State **four** ways of avoiding detonation in aero piston engines during the various phases of ground and flight operations. (2 marks)
13. (a) Outline the importance of each of the following ramp operations: (3 marks)
- (i) Engine starting services

- (ii) Refueling
  - (iii) Marshalling
- (b) Outline the **four** aspects considered in human factors. (4 marks)
- (c) Sketch and label the cross-sectional views of each of the following types of check valves: (7 marks)
- (i) Flap
  - (ii) Ball
  - (iii) Poppet
14. (a) Give **three** instruments for each of the following radio beacon direction finding systems: (3 marks)
- (i) Instrument landing system.
  - (ii) Radio magnetic indication.
- (b) With the aid of labelled sketches, show the air traffic pattern at a controlled airport. (4 marks)
- (c) Sketch and label the cross sectional view of a turbo propeller centrifugal gas turbine engine. (7 marks)

15. Figure 2 shows a pictorial view of an aircraft part.

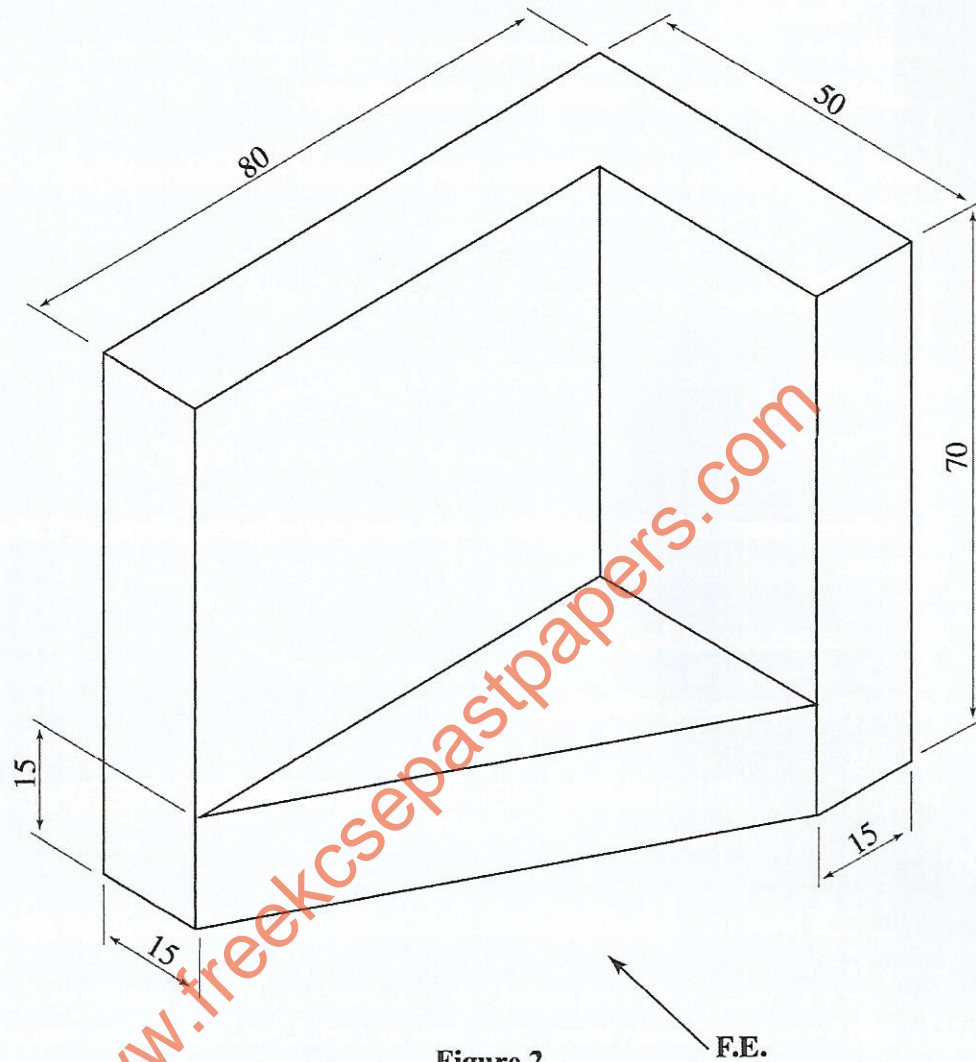


Figure 2

F.E.

On the A3 paper provided, draw to a scale of 2:1 each of the following views in first angle projection:

- (a) Front elevation in the direction of arrow F.E. (14 marks)
- (b) End elevation
- (c) Plan

### 4.8.2 Aviation Technology Paper 2 (450/2)

#### STATION 1

##### INSTRUCTIONS

Figure 1 shows an assembly drawing of a light aircraft system part.

- (a) Identify the system and name the parts labelled 1, 2 and 3. (2 marks)

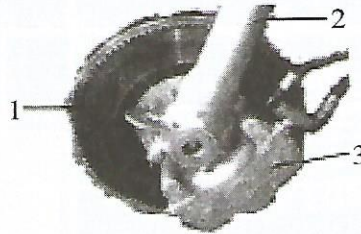


Figure 1

- (b) On the drawing paper provided, sketch in good proportion the exploded view of the unit labelled 3. (8 marks)

#### STATION 2

##### INSTRUCTIONS

Using the tools, equipment and materials provided, make the aircraft longeron as shown in Figure 2. (10 marks)

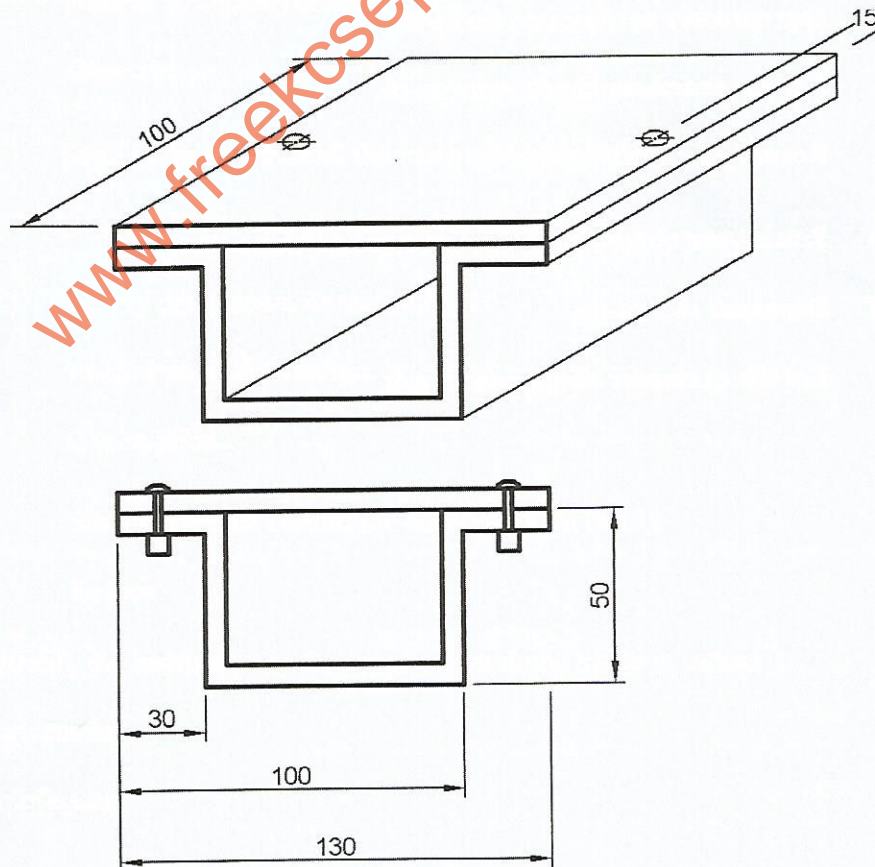


Figure 2

## STATION 3

## INSTRUCTIONS

- (a) Study the aircraft components marked A, B, C, D, E and F and then perform the tasks detailed in Table I. (6 marks)

PART	IDENTIFICATION	FUNCTION
A		
B		
C		
D		
E		

Table 1

- (b) Using the tools and equipment provided, perform each of the following tasks:
- (i) Set the outlet compressor pressure at 15 psi and release the pressure at right angle appropriately to blades on set up G. (1 mark)  
**Let the examiner check your work.**
  - (ii) Record your observations. (1 mark)
  - (iii) Relate your observations to an aero gas turbine engine. (1 mark)
  - (iv) Dismantle the set-up. (1 mark)

**Let the examiner check your work.**

## STATION 4

## INSTRUCTIONS

- (a) Using tools and materials provided, make a simple model of the weather instrument as shown in Figure 3. (4 marks)

Let the examiner check your work progressively.

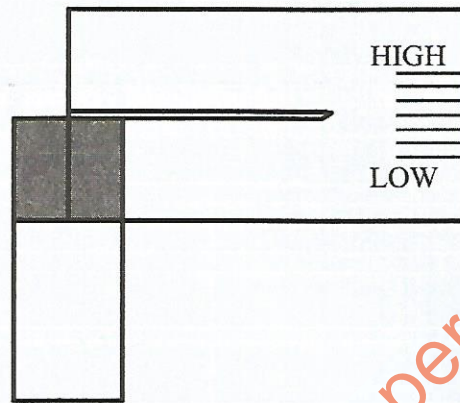


Figure 3

- (b) (i) Light the burner and place it under the can for about 40 seconds.  
Record your observation.  
Observation (1 mark)  
State the reason behind the observation in (b)(i). (1 mark)  
Reason
- (ii) Gently press down on the balloon.  
Record your observation.  
Observation (1 mark)  
State the reason behind the observation in (b)(ii). (1 mark)  
Reason
- (c) Identify the instrument and its application in the aviation industry.  
Instrument (½ mark)  
Application (½ mark)

- (d) From your observation in (b)(i) and (b)(ii) state the relationship to the atmospheric conditions and the effects of these changes.

- (i) Relationship (½ mark)
- (ii) Effects (½ mark)

### STATION 5

#### INSTRUCTIONS

- (a) Identify each of the aircraft parts, materials and systems labelled 1–8 and complete **Table II** and **Table III**.

LABEL	PART	MATERIAL
1		
2		
3		
4		

**Table II**

(4 marks)

LABEL	PART	SYSTEM
5		
6		
7		
8		

**Table III**

(4 marks)

- (b) Apply the given loads on each of the materials labelled 9–10 and complete **Table IV**.

MATERIAL	LOAD	OBSERVATION	PROPERTY
9	Tension		
10	Bending		

**Table IV**

(2 marks)



**STATION 6****INSTRUCTIONS**

- (a) Study and identify each of the signs marked G, H, I, J, K and L. (3 marks)

<b>SIGN</b>	<b>IDENTIFICATION</b>
G	
H	
I	
J	
K	
L	

- (b) Using the aeroplane model provided, demonstrate to the examiner each of the following manoeuvres: (4 marks)
- (i) Yawing
  - (ii) Overshoot
  - (iii) Rolling
  - (iv) Pitching
- (c) **Demonstrate to the examiner** each of the following helicopter marshalling signals: (3 marks)
- (i) Move horizontally right
  - (ii) Move downwards
  - (iii) Hover

## STATION 7

## INSTRUCTIONS

Using the parts marked O, P and Q, perform each of the following tasks:

- (a) (i) Connect Pipe X to port P on the instrument marked 'O'.  
**Let the examiner check your work.** (1 mark)
- (ii) Apply a pressure of 5 psi to port marked 'P' and record your observation. (1 mark)  
Observation
- (iii) Connect Pipe Y to port Q. (1 mark)  
**Let the examiner check your work.**
- (iv) Apply pressure of 5 psi and record your observation. (1 mark)  
Observation
- (v) Release pressure on P and record your observation. (1 mark)  
Observation
- (b) Explain the reasons behind the observation in (a)(ii) and (a)(iv) with reference to an aircraft in level flight. (2 marks)  
Reason a(ii)  
Reason (a)(iv)
- (c) Study the instrument marked XY and identify range markings coloured RED, YELLOW and GREEN. (3 marks)
- (i) RED  
(ii) YELLOW  
(iii) GREEN

## STATION 8

## INSTRUCTIONS

- (a) (i) Connect the components provided as shown in the circuit in **Figure 4**. (5 marks)

Let the examiner check your work

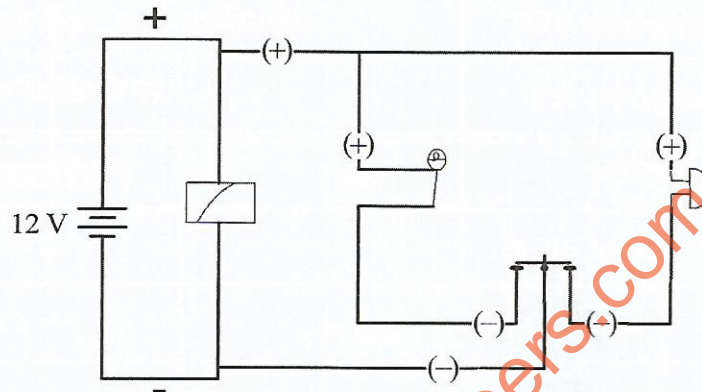


Figure 4

- (ii) Press the switch to 'ON' position and record your observation. (1 mark)
- (iii) State where the system is applicable on an aircraft. (1 mark)

Application

- (iv) Give **two** reasons for use of the system on an aircraft. (1 mark)

Reasons

- (b) State the function of each component in the circuit in **Figure 4**. (2 marks)

**STATION 9**

- (a) Using the most appropriate tools, take and record the measurements of the aircraft components painted red, white, green and blue and complete **Table (V)**.

AREA TO BE MEASURED	MEASUREMENT TAKEN	TOOL USED
Outside diameter for part painted RED		
The angle of the part painted WHITE		
The gap of part painted GREEN		
Internal diameter of part painted BLUE		

**Table (V)**

(6 marks)

- (b) Identify the aircraft hardware labelled T, U, V and W and state one probable defect for each and complete **Table (VI)**.

HARDWARE	DEFECT
T	
U	
V	
W	

**Table VI**

(4 marks)

## STATION 10

(a) Study the specimens labelled 11–14 and for each:

- (i) identify the specimen
- (ii) state the use.
- (iii) state the system applicable.

Complete **Table (VII)**.

(6 marks)

SPECIMEN	IDENTITY	USE	SYSTEM
11			
12			
13			
14			

**Table VII**

(b) (i) Dis-assemble the component marked 15. (½ mark)

**Let the examiner check your work.**

(ii) Identify the parts painted red, blue, white and green. (2 marks)

Red .....

Blue .....

White .....

Green .....

(iii) Carry out the servicing. (1 mark)

(iv) Assemble the component (½ mark)

**Let the examiner check your work.**