

## 23.15 AVIATION TECHNOLOGY (450)

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

450/1

AVIATION TECHNOLOGY

Paper 1

Oct./Nov. 2007

2½ hours



MANYAM FRANCHISE  
Discover! Learn! Apply

THE KENYA NATIONAL EXAMINATIONS COUNCIL

Kenya Certificate of Secondary Education

AVIATION TECHNOLOGY

Paper 1

2½ hours

#### INSTRUCTIONS TO CANDIDATES

*Candidates should have the following for this examination.*

*Answer booklet*

*Drawing instruments*

*Drawing paper size A3*

**SECTION A:** Answer *all* the questions.

**SECTION B:** Answer *question 11* and any other *three* questions.

*All dimensions are in millimetres unless otherwise stated.*

**This paper consists of 4 printed pages**

**Candidates should check the question paper to ascertain that all the pages are printed as indicated and no questions are missing.**

©2007 The Kenya National Examinations Council

7072

**Turn over**

### SECTION A (60 marks)

Answer **ALL** the questions in this section.

1. (a) List **four** precautions to be observed when towing a wide-body aeroplane from the apron. (2 marks)  
(b) State **four** entries made by the flight engineer in an aircraft technical log book after landing. (2 marks)
2. (a) Differentiate between the terms anti-icing and de-icing as applied to an aircraft in flight. (2 marks)  
(b) List **four** parts of an aircraft that require anti-icing. (2 marks)
3. (a) Explain the effects of headwind and tailwind on an aircraft during gliding. (2 marks)  
(b) Outline the functional differences between wing flaps and slats. (2 marks)  
(c) Illustrate the difference between symmetrical and cambered aerofoil. (2 marks)
4. Explain why the following properties are considered when selecting aircraft construction materials:  
(a) malleability  
(b) conductivity  
(c) hardness (3 marks)
5. (a) Explain how each of the following factors affects the thrust of a turbo-jet engine:  
(i) revolutions per minute  
(ii) aircraft forward speed. (3 marks)  
(b) Differentiate between firing order and timing as applied to a four stroke aeropiston engine. (2 marks)
6. (a) Differentiate between a bolt and a screw as applied in aviation industry. (1 mark)  
(b) State **four** factors that determine the selection of bolts and screws for use in an aircraft. (2 marks)
7. (a) Explain the term flashback as applied in oxy-acetylene gas welding. (1 mark)  
(b) State **four** causes of flashback. (2 marks)
8. Explain **three** prevailing weather conditions which would make a pilot change from visual to instrumental flying. (3 marks)
9. With the aid of a sketch, describe **three** methods of station numbering on an aeroplane. (5 marks)
10. Sketch in good proportion a hacksaw and label **two** parts. (4 marks)

**SECTION B (60 marks)**

*Answer question 11 and any other three questions from this section.  
Candidates are advised to spend not more than 25 minutes on question 11.*

11. Figure 1 shows three views of an aircraft bracket drawn in first angle projection. Draw in good proportion an isometric projection of the part taking Z as the lowest point. (15 marks)

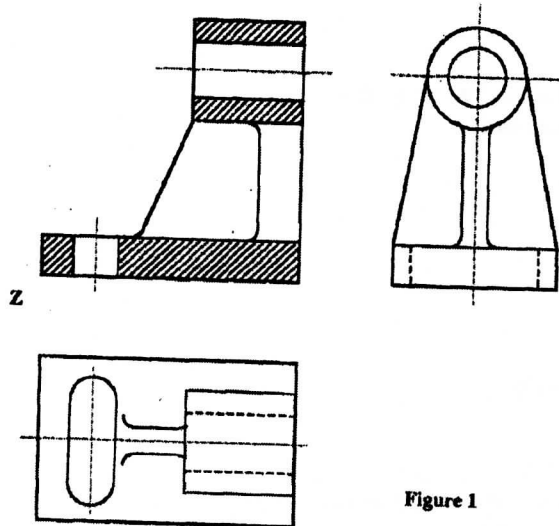


Figure 1

12. Explain three:
- (a) classes of fuel (3 marks)
  - (b) types of aircraft fuel tanks (6 marks)
  - (c) methods of measuring fuel quantities in fuel tanks. (6 marks)
13. (a) Sketch and label a basic aircraft electrical generating system to power a dc wiper motor. (9 marks)
- (b) Explain the operation of the circuit. (6 marks)
14. (a) Explain two purposes of using aero engine thrust reversal. (3 marks)
- (b) With the aid of sketches, describe each of the following means of thrust reversal on aero engines:
- (i) cold stream
  - (ii) hot stream
  - (iii) negative pitch. (12 marks)
- 7072
15. (a) Outline five maintenance checks normally carried out on aircraft pitot static systems. (5 marks)
- (b) With the aid of a labelled sketch, explain the construction and operation of an aircraft machmeter. (10 marks)

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

450/2  
AVIATION TECHNOLOGY  
Paper 2  
PRACTICAL  
Oct./Nov. 2007  
2½ hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL  
Kenya Certificate of Secondary Education  
AVIATION TECHNOLOGY  
Paper 2  
PRACTICAL  
2½ hours

### INSTRUCTIONS TO CANDIDATES

*There are ten stations in this examination.  
Candidates are allowed 15 MINUTES at each station.  
Candidates are NOT allowed to either review the previous station's work or read instructions for other stations.  
Write your NAME and INDEX NUMBER on all projects.  
Attempt ALL exercises in each station.  
All dimensions are in millimetres unless otherwise stated.*

### For Examiner's Use Only

Questions	1	2	3	4	5	6	7	8	9	10	TOTAL
Marks											

**This paper consists of 11 printed pages**

**Candidates should check the question paper to ascertain that all the pages are printed as indicated and no questions are missing.**

7073

© 2007 The Kenya National Examinations Council

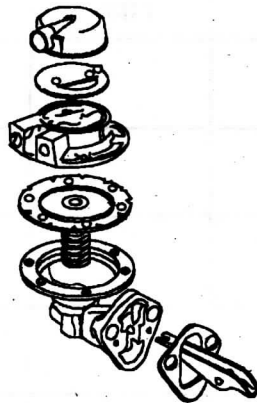
**Turn over**

## STATION 1

### INSTRUCTIONS

The figure below shows an exploded view of an aeropiston engine driven pump. On the drawing paper provided:

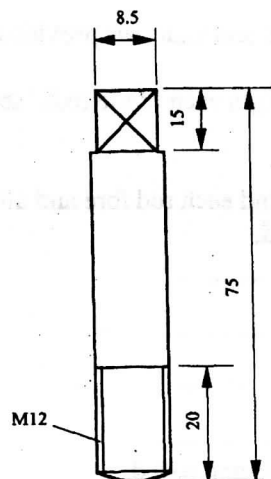
- (a) Sketch in good proportion a section view of an assembled unit along the vertical plane.
- (b) Name four parts which are not visible when the pump is assembled. (10 marks)



## STATION 2

### INSTRUCTIONS

Using the tools, materials and equipment provided, make the square head bolt as shown in the drawing below. (10 marks)



### **STATION 3**

#### **INSTRUCTIONS**

The beakers labelled 1 to 5 contain samples of oil obtained from various aeropiston engine lubrication systems.

Determine the possible causes of contamination in each sample by visual inspection, viscosity test and magnetic chip test. Record your observations in the table below. (10 marks)

SAMPLE	VISUAL INSPECTION	VISCOSITY	MAGNETIC CHIP	POSSIBLE CAUSE
1				
2				
3				
4				
5				

### **STATION 4**

#### **INSTRUCTIONS**

Carry out the following tasks using the tools and materials provided.

- (a) (i) Hold vertically and at midlength each of the rods labelled K, L, M and N in a bench vice.
- (ii) Using the tube labelled P, bend each rod fore and aft until it breaks. Record the number of bends for each rod.
- K .....
- L .....
- M .....
- N .....
- (iii) State the mechanical property being tested.
- (iv) Comment on the relationship between the number of bends each rod takes to break to the mechanical property tested.

- (b) Cut each of the rod labelled K, L, M and N to determine the hardest material.

Hardest material ..... (1 mark)

- (c) State one application and one reason of selecting each of the materials labelled K, L and M in an aircraft.

Material	Application	Reason
K	.....	.....
L	.....	.....
M	.....	.....

(3 marks)

### **STATION 5**

#### **INSTRUCTIONS**

- (a) (i) Fill the bottle labelled J with water and turn it upside down into the bowl provided. Record your observations.  
 (ii) Repeat (a)(i) above with the hole marked Q covered. Record your observations.  
 (iii) Relate the observations in (a)(i) and (a)(ii) above to the operation of an aircraft system.

(a) (i) .....

(a) (ii) .....

(4 marks)

- (b) (i) Repeat experiment (a)(i) above using the bottle marked K. Record your observations.  
 (ii) Lift the bottle slightly above the water level. Record your observations.  
 (iii) Relate the observations in (b)(i) and (b)(ii) above to the operation of an aircraft hydraulic system.

(b)(i) .....

(b)(ii) .....

(4 marks)

- (c) Give one limitation and one remedy of operations of an aircraft in flight in relationship to the experiments in (a) and (b) above. (2 marks)

Limitation	Remedy:
(a) .....	.....
(b) .....	.....

### STATION 6

#### INSTRUCTIONS

Study the components marked A, B, C, D, E and F and carry out the following tasks:

- (a) Identify items A to F and for each item draw the symbol and state its use. (9 marks)

ITEM	NAME	SYMBOL	USE
A			
B			
C			
D			
E			
F			

- (b) Record the value of items A and D.

A .....

D .....

(1 mark)

### STATION 7

#### INSTRUCTIONS

The pilot for the aircraft marked A has been cleared to taxi and encounters each of the scenario 1, 2, 3, 4 and 5 as shown on the aerodrome plan provided.

Study each scenario and in the table below state the expected immediate action and the reason for the action. (10 marks)

SCENARIO	IMMEDIATE ACTION	REASON FOR THE ACTION
1		
2		
3		
4		
5		



### **STATION 8**

#### **INSTRUCTION**

Study the dial test indicator provided and carry out the following tasks:

- (a) Push the plunger gently and describe what happens.
- (b)(i) Set the dial indicator plunger on the bar provided at the point marked X and take the reading. Move the bar under the indicator plunger and take the readings at points Y and Z respectively.
- (ii) From the results in (b)(i) above determine the state of the surface of the bar.

.....  
(4 marks)

- (c) (i) With the dial indicator plunger still at point Z, insert the plate labelled N between the plunger and the bar. Record the dial indicator reading .....
- (ii) Determine the thickness of the plate labelled N from the readings obtained.
- (iii) Using the micrometer screw gauge provided measure and record the thickness of the plate labelled N.
- (iv) Comment on the results obtained in (c)(ii) and (c)(iii)

.....  
(4 marks)

### **STATION 9**

#### **INSTRUCTIONS**

Using the tools equipment and materials provided, perform the following patch repair activities:

- (a) On the perspex piece labelled R;
  - (i) trim all the edges
  - (ii) chamfer one of the longer edges
  - (iii) round all the corners.(5 marks)
- (b) Use the piece labelled R to patch the area painted red on the perspex piece labelled S using the two capscrews provided. (5 marks)

Write your index number on a piece of masking tape and fix it to your workpiece.

### **STATION 10**

#### **INSTRUCTIONS**

Using the materials, apparatus and equipment provided:

- (a) By tabulation, determine:
  - (i) upthrust of the materials labelled A and B
  - (ii) density of the materials A and B
  - (iii) volume of the materials A and B(6 marks)

**UPTHRUST**

**A**

**B**

**DENSITY**

**A**

**B**

**VOLUME**

**A**

**B**

- (b) State the principle behind your observations in (a). (1 mark)
- (c) State the relevance of this experiment to an aircraft in flight. (1 mark)
- (d) Relate the results of the experiment in (a)(i) and (a)(ii) above to an aircraft during take-off and landing. (2 marks)