

**450/1**  
**AVIATION TECHNOLOGY**  
**PAPER 1(THEORY)**  
**FORM 4**  
**JULY 2022**  
*TIME: 2½ hours*



**BUNAMFAN CLUSTER EXAMINATION - 2022**  
*Kenya Certificate of Secondary Education*

**NAME:** ..... **ADM No:** .....

**CANDIDATE’S SIGN:** ..... **CLASS:** ..... **DATE:** .....

**INSTRUCTIONS TO CANDIDATES.**

- i. Write your name, class, date and sign in the spaces provided.
- ii. Candidate should have the following for this examination.
  - (b) Drawing instruments
  - (c) Drawing paper size A3
- iii. The paper consists of two **Sections A and B.**
- iv. Answer all questions in **section A** and **any Four** in **Section B** in the spaces provided.
- v. **Question 15** should be answered on the drawing paper provided. All dimensions are in millimeters unless otherwise stated.
- vi. Candidates should check the question paper to ensure that all the pages are printed as indicated and no question is missing.
- vii. Candidates should answer the questions in **English.**

**For examiner’s use only**

<b>Section</b>	<b>Question</b>	<b>Maximum Score</b>	<b>Candidate’s Score</b>
<b>A</b>	1-10	44	
<b>B</b>	11	14	
	12	14	
	13	14	
	14	14	
	15	14	
<b>TOTAL</b>		100	

*This paper consists of 15 printed pages candidates should check the question paper to ensure that all the pages are printed as indicated and no questions are missing.*

**SECTION A(44 marks)**

*Answer all questions in this section in the spaces provided*

1. (a) State **four** safety precautions to observe while using oxygen cylinders for welding. (2 marks)

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- (b) Explain the following terms as used in aircraft fire protection. (2 marks)
- i. Firewall.

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- ii. Extinguishing.

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2. (a). State **four** requirements for one to be a commercial pilot. (2 marks)

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- (b). List any **four** roles of an airhost/hostess as part of the flight crew. (2marks)

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3. Sketch each of the following aircraft hardware and label any two parts. (2 marks)  
(i) Countersunk rivet.

(ii) Turn buckle. (2 marks)

(iii) Stud. (2 marks)

4.(a) State **four** advantages of flying an aircraft in the stratosphere layer. (2marks)

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(b) State **four** effects of lightning on an aircraft in flight. (2marks)

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5. Outline **three** reasons why an aircraft maintenance engineer in a busy working environment would experience abnormal moods and poor decision. (3marks)

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6. (a) Differentiate between the following terms as applied to aircraft materials;  
(i) Mechanical properties (1mark)

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(ii) Chemical properties (1mark)

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(b) Explain **four** advantages which make aluminium alloys best suited for aircraft fabrication. (4marks)

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7. An aircraft with a rectangular wing is flying at a speed of **849.6 kilometres per hour** at sea level conditions experiences a resistance of **128 KN**. If the wing span of the aircraft is 25m and chord of 20m; find the value of drag coefficient in 4 decimal places. (4marks)

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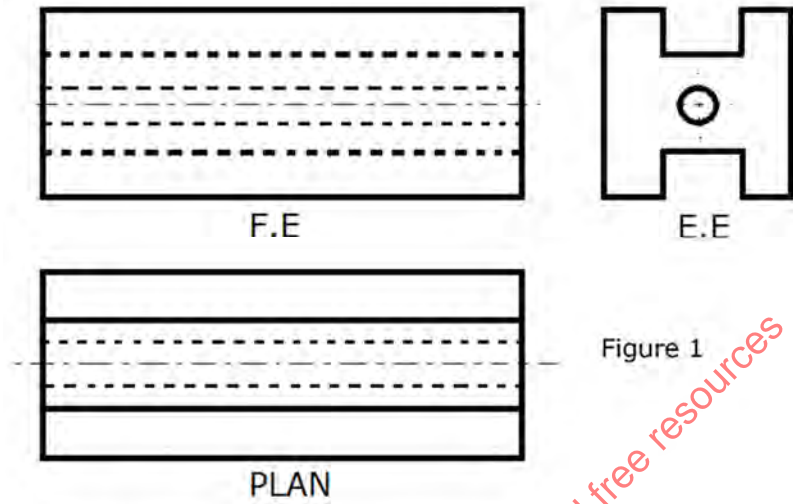
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8. (a) If you to cut a female and male thread, explain with reason which one will you cut first. (2 marks)  
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(b) Outline procedure for cutting a male thread on a mild steel metal. (4 marks)  
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9. An aircraft left airport **A** (**120°E, 20°N**) at **0900 hours** on Mondays. Calculate the time it is expected to arrive at airport **B** (**150°W, 20°N**). (3marks)  
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10. (a) Outline **two** essential information contained in a title block on a drawing. (1 marks)  
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- (b) **Figure1** shows three views of a longitudinal beam of an aircraft fuselage drawn in first projection. Sketch in good proportion an isometric drawing of the beam.  
(3 marks)



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**SECTION B (56 MARKS)**

Answer any **FOUR** questions from this section in the spaces provided.

11. (a) Differentiate between the following terms as used in aircraft structure.

(i) Strain

(ii) Stress

(1 mark)

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(b) State **two** functions of each of the following structural members of an aircraft. (3 marks)

(i) Longerons

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(ii) Spars

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(iii) Bulkhead

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(c) Using well labelled sketches, explain any **four** structural stresses acting on an aircraft parts. (6 marks)

(d) Describe the construction of Pratt truss fuselage. (4 marks)

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12. (a) (i) Explain induced drag. (2mark)

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(ii) Using drag/velocity graph illustrate the effect of speed on drag. (3marks)

(b) Explain how the following factors affect lateral stability:

(i) Low wing (1 ½ marks)

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(ii) Dihedral wing (1 ½ marks)

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(c) Explain the **three** degrees of dynamic stability using sketches. (6marks)

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13. (a). Give any **SIX** ground operations done on an aircraft on the ramp area. (3marks)

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(b). Outline the function of **FIVE** safety equipment carried on an aircraft. (5marks)

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(c). Wanjala has just stepped into the JKIA terminal building and intends to travel to Hong Kong. Outline the stages he will go through before finally boarding the flight to his destination. (6marks)

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14. (a) (i) Draw a cross-section of a cylinder piston assembly and show the following;

- ✓ Cylinder
- ✓ Piston
- ✓ Connecting Rod
- ✓ Stroke

(3 marks)

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(ii). With the aid of sketches, explain the basic principle of thrust generation by each of the following

- a) Propeller
- b) Jet engine

(4 marks)

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(b) With the aid of a sketch, explain construction of a typical dry sump lubrication system of reciprocating engine. (7 marks)

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15. **Figure 2** shows an aircraft door bracket drawn in isometric projection. In first angle projection, draw **fullsize** the following views.

(a) Front elevation in the direction of arrow **F**

(b) The plan and end elevation

(c) Indicate **four** major dimensions.

(14 marks)

Use the **A3** paper provided

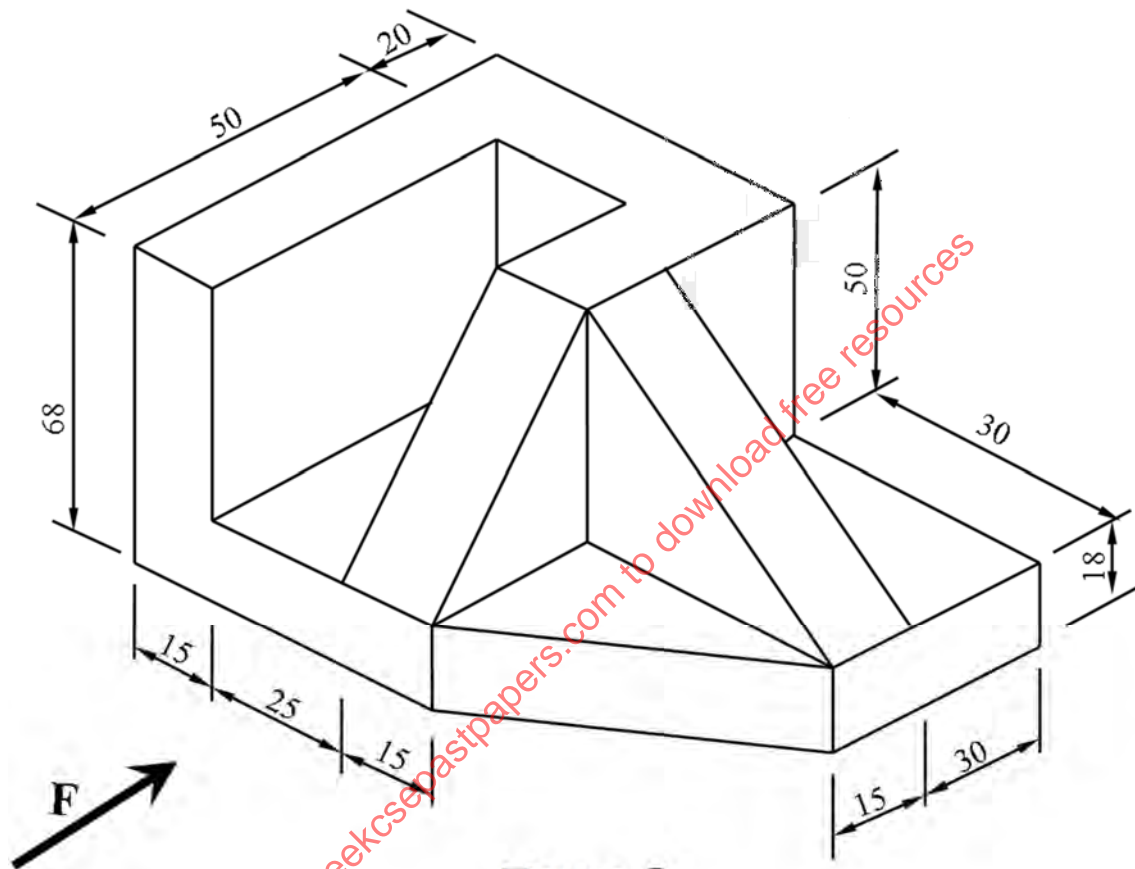


Figure 2