3.8 AVIATION TECHNOLOGY (450)

The 2012 KCSE examination for Aviation Technology consisted of two papers namely Paper 1 (Theory) and Paper 2 (Practical). The theory paper was worth 60% while practical paper was worth 40% of the final mark .The revised syllabus was tested for the first time with the format and weighting changed for paper 1. The format and weighting for paper 2 was the same as for the previous years.

Candidates General Performance

The table below shows candidates' overall performance for the last five years.

Table 15: Candidates' Overall Performance in Aviation Technology for the years 2008, 2009, 2010, 2011 and 2012

Year	Paper	Candidature	Maximum Score	Mean Score	Standard Deviation
2008	1		60	34.78	5.84
	2		40	26.56	2.94
	Overall	**63**	**100**	**61.33**	**7.79**
2009	1		60	34.84	6.17
	2		40	26.24	3.97
	Overall	**68**	**100**	**61.07**	**9.09**
2010	1		60	37.76	6.62
	2		40	27.21	2.94
	Overall	**52**	**100**	**63.52**	**11.1**
2011	1		60	35.49	6.51
	2		40	26.16	3.04
	Overall	**70**	**100**	**61.26**	**9.05**
2012	1		60	**34.82**	**6.63**
	2		40	**25.08**	**4.13**
	Overall	**393**	**100**	**59.90**	**9.87**

From the table above, the following observations can be made:

(i) The candidature increased from **70** in 2011 to **393** in 2012.
(ii) The candidature has been increasing consistently since 2008 except in 2010 when there was a slight drop from 68 to 52. This shows that the subject is gaining popularity amongst students and schools.
(iii) The mean score for both papers **1** and **2** dropped slightly but this may have been because of increase in candidature.

3.8.1 Aviation Technology Paper 1 (450/1)

The questions which were reported to have been poorly performed have been analyzed with a view to pointing out candidates' weaknesses and propose suggestions on some remedial measures that would be

taken in order to improve performance in future. The questions for discussions include 2, 3, 5, 6, 8, 10 and 14.

Question 2

With the aid of a labeled sketch, show the cross section of an aircraft propeller blade in flight.
Candidates were tested in the skill of sketching and labeling a cross section of an aircraft propeller blade.

Weakness

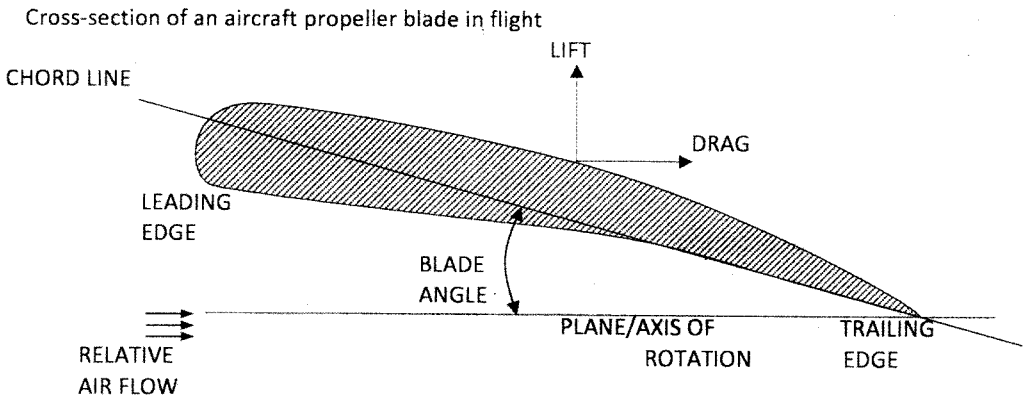
Most candidates were unable to sketch and label a cross section of an aircraft propeller blade.

Advices to teachers

They should cover the topic of propellers extensively as outlined in the syllabus.

Expected response

Cross-section of an aircraft propeller blade in flight.



Question 3 (b)

Describe **one** basic non-destructive testing method of composite structures on an aircraft

Candidates were tested on the topic; composite structures of an aircraft.

Weakness

Most candidates assumed that composite has the same meaning as any other method.

Advice to Teachers

They should teach various non-destructive methods and give examples of where each method is applied.

Expected response

Visual and coin tapping method. This is used as an elementary method to locate delamination by tapping with a coin the part being inspected and listening for debonding sound.

Question 5 (a)

List **four** ramp maintenance tasks carried out on an aircraft.

Candidates were tested on maintenance tasks on an aircraft.

Weakness

Most candidates could not answer the question.

Advice to **Teachers**

They should teach all the topics in the syllabus without assuming any.

Expected response

Four ramp maintenance tasks;

i. Servicing
ii. Engine starting
iii. Refueling or defueling
iv. Marshalling
v. Releasing the aircraft.

Question 5 (b)

State three characteristics of cirrus clouds.

Candidates were expected to state the characteristics of cirrus clouds.

Weakness

Most candidates could not answer the question which means that they did not have an idea of the answer.

Advice to Teachers

Teachers are advised to teach all the topics in the syllabus without assuming any.

Expected response

Characteristics of cirrus clouds

i. Wispy appearance
ii. Very high altitude
iii. Ice crystals
iv. Less bumpy

Question 6

Outline the working environment requirements for each of the following in the aviation industry:

i. Lighting

ii. Noise
iii. Temperature

Candidates were tested on the working environment requirements in the aviation industry.

Weakness

Most candidates confused lighting for lightening.

Advice to Teachers

They should cover more on environmental aspects in aviation industry conclusively.

Expected response

Working environment requirements
i. Lighting should be adequate.
ii. Noise should be below destruction level.
iii. Temperature must be adequate to work without discomfort.

Question 8

Draw symbol for a double pole single throw switch

Candidates were tested in drawing skills for a double pole single throw switch.

Weakness

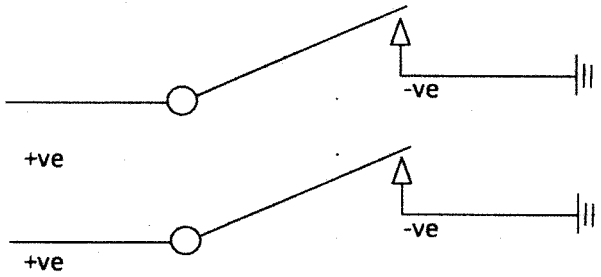
Most candidates had no idea about the question

Advice to Teachers

They are advised to cover more on electrical system requirements and the function of each system component.

Expected response

Double pole, single throw switch.



Question 8 (b)

A series Direct Current (DC) circuit has a voltage of 12 volts, resistance of 100 Ω and 12 Ω respectively.

Calculate the current flowing in the circuit.

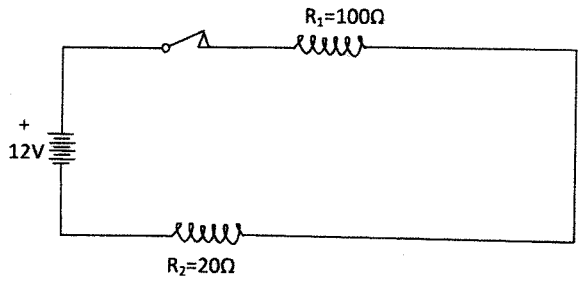
Weakness

Most candidates had no idea on how to calculate the current flowing through the circuit.

Advice to Teachers

Teachers are advised to cover the topic Electrical Systems.

Expected response



E=I(R)

$I = \frac{E}{R}$

E=12

TOTAL R=(100+20)Ω

=120Ω

$\therefore I = \frac{12}{120} = 0.1Amp$

SKETCH - 1 mark

LABELLING -1½ mark

CALCULATION- 1½ mark

(4 marks)

Question 10

State one reason for each of the following heat treatment processes:

a) Annealing
b) Case hardening
c) Normalizing
d) Tempering

Candidates were tested on heat treatment processes.

Weakness

Most candidates confused between the four processes.

Advice to Teachers

Teachers are advised to make adequate coverage of the topic Heat Treatment.

Expected response

Heat treatment processes:

a) Annealing- To produce maximum softness
b) Case hardening- To produce wear resistance surface
c) Normalizing- To produce tensile strength or remove internal stresses
d) Tempering- To reduce brittleness.

Question 14 (a)

Explain the function of each of the following elements of Instrument Landing System.

i. Localizer
ii. Glide slope
iii. Marker

Candidates were tested on the elements of Instruments Landing System

Weakness

Very few candidates got the right answer.

Advice to Teachers

They are advised to cover the topic of Navigation adequately.

Expected response

i. Localizer- The localizer provides tracking guidelines along the extend centerline of the runway. (guideline in azimuth left or right of the extended centerline)
ii. The guide slope- It provides vertical guidance towards the runway touchdown point, usually a slope of approximately 3^{o} to the horizontal.
iii. The marker- The marker beacons provide accurate range fixes along the approach (usually inner, middle and outer markers)

Question 14 (b)

Outline three sources of information received by the Radio Magnetic Indicator.

Candidates were expected to outline sources of information received by Radio Magnetic Indicator.

Weakness

Very few candidates got the right answer.

Advice to Teachers

They should cover the topic of systems adequately.

Expected response

Sources of information presented on the RM Indicator dial

i. Magnetic Heading- Heading from a remote indicating compass to a particular station.
ii. V.O.R- The bearing from a Very High Frequency Omni direction Range (VOR) ground station.
iii. A.D.F- The bearing from an Automatic Direction Funding (ADF) station.

Question 14 (c) i

State reasons for fuel cross-feeding on an aircraft.

Candidates were expected to state reasons for fuel cross-feeding on an aircraft.

Weakness

Very few candidates got the right answer.

Advice to Teachers

Teachers are advised to arrange for visits to airports or workshops for student to see the fuel systems.

Expected response

Fuel cross-feeding:

i. In case of engine failure
ii. In case of one or more tank failure
iii. Distribution of fuel for weight and balance purposes.

3.8.1 Aviation Technolofy Paper 2 (450/2)

This practical paper comprised 10 equally weighted exercises which were compulsory. The practical skills tested in this paper included the following:

(i) Sketching in good proportion an exploded view of a shimmy damping
(ii) Fabrication of a bracket shown in the figure
(iii) Identifying materials mechanical properties, type and stating their applications.
(iv) Operation of balance and Anti-balance control tabs
(v) Replacing piston rings of an engine procedurally
(vi) Interpretation of operation principle of a jet engine using Bernoulli's principle.
(vii) Exercises on navigation
(viii) Tests on Aerodrome facilities and operations
(ix) Connecting electrical circuits with different types of loads
(x) Taking measurements on a given component

Weaknesses

Although the overall performance in this paper was good, some weaknesses were noted in most of the questions as discussed below:-

In **station 1** some candidates had no idea on how the component achieves its damping function to prevent shimming.

In **station2** most candidates were not able to do the basic cutting, filing, drilling and bending in order to make the bracket as shown.

In **Station 3** candidates lacked to follow instructions while some were counting each stroke as a cycle.

In **station 4** the candidates assumed the results instead of carrying out the experiment as per the instructions.

In **station 5,** candidates in some centers used a ring squeezer to replace the piston rings.

In **station 6**, some candidates had weaknesses in interpretation of the results.

In **station 7** some candidates were not able to plot and determine bearing and type of wind.

In **station 8,** candidates in a few centers had no idea how aerodrome looks like.

In **station 9,** some candidates could not understand why the leads were of different materials and thus assume the results.

ADVICE TO TEACHERS

Teachers should ensure that all the practical aspects in the syllabus are adequately covered without assuming the support topics. The list of tools and equipment at the back of the syllabus should be used as a check list to ascertain that students are familiar with what they are expected to handle during the examination.

Students are expected to know aviation tools, parts, materials etc by the correct names. The correct handling of tools, parts, materials etc. should also be emphasized during training.

Students should be proactive in carrying out various experiments, inspecting and evaluating various aircraft components and also in setting and adjusting various parts of an aircraft.