3.8 AVIATION TECHNOLOGY (450)

The 2019 KCSE examination for Aviation Technology consisted of two papers namely Paper 1 (Theory) and Paper 2 (Practical). The theory paper constituted 60% while the Practical Project constituted 40% of the final mark. The format and weighting of the papers was the same as that of the previous years.

Candidates General Performance

Table 15: Candidates overall performance for the last six years

Year	Paper	Candidature	Maximum scores	Mean Score	Standard deviation
2014	1		60	31.98	9.03
	2		40	20.59	4.92
	Overall	**160**	***100***	***52.58***	***13.32***
2015	1		60	37.66	10.81
	2		40	24.13	3.33
	Overall	**155**	***100***	***61.79***	***11.98***
2016	1		60	31.07	7.85
	2		40	26.90	3.5
	Overall	**143**	***100***	***57.97***	***10.12***
2017	1		60	36.65	6.75
	2		40	26.81	3.43
	Overall	**101**	***100***	***63.47***	***8.89***
2018	1		60	36.17	6.28
	2		40	23.91	3.00
	Overall	**117**	***100***	***60.09***	***8.44***
2019	1		60	38.81	7.22
	2		40	23.15	3.21
	Overall	**176**	***100***	***57.96***	***9.22***

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

(i) There was an increase in the candidature from 117 in the year 2018 to 176 in 2019.

(ii) The mean score dropped from 60.09 in the year 2018 to 57.96 in 2019.

(iii) The standard deviation increased from 8.44 in the year 2018 to 9.22 in 2019.

3.8.1 Aviation Technology Paper 1 (450/1)

The questions which were reported to have been poorly responded to have been analyzed with a view to pointing out candidates' weaknesses and propose suggestions on some remedial measures that should be taken in order to improve in future. The questions for discussions include: 4, 6, 7, 11, 13 and 14.

Question 4 (a)

Sketch and label the following aircraft hardware:

(i) Countersunk rivet
(ii) Raised head screw

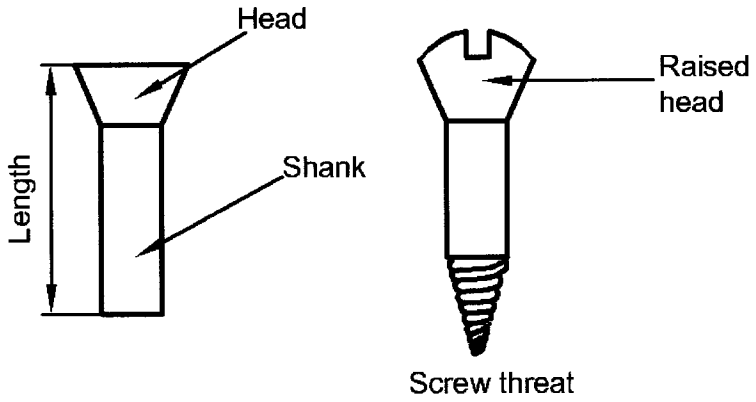
Weakness

Some candidates were unable to sketch the stated hardware

Advice to teachers

Teachers are advised to effectively cover the syllabus adequately and especially the bit of sketching.

Expected responses



Question 6

(a) Differentiate between propeller driven and pure jet engine methods of thrust generation

(b) Explain why propeller blades are twisted

Weakness

Most of the candidates were not able to differentiate between the methods stated and could also not explain the reason for twisting the blades.

Advice to teachers

Teachers are advised to do more coverage of propulsion as a topic in the syllabus.

Expected responses

(a)

(i) Pure jet engines give a big acceleration to a small mass of air.
(ii) Propeller driven engines give a small acceleration to a big mass.
(iii) Fire wall (fire bulkhead) separate heat areas.

(b) Propeller blades are twisted to ensure equal work is done along the whole blade length.

Question 7

(a) Explain the function of each of the main structural member of the semi-monoloque

(b) Name four methods of non destructive testing used in aircraft inspection

Weakness

Most of the candidates were unable to explain the function of the structural member and name the methods of non destructive testing used.

Advice to teachers

Teachers are advised to exhaustively teach the topic on aircraft technology

Expected response

(a) Functions of the structural members of the semi-monologue.

- Longerons take up bending loads.
- Frames give the aircraft its circular shape and provide attachment for longerons and stringers.
- They give the aircraft its rigidity.
- Stringers give support, strength and provide attachment to the aircraft skin.
- Bulkheads provide rigidity and partitioning.
- The skin provides the aircraft structural cover and takes up aerodynamic loads.

(Any 5 x 1=

(b)

- Visual
- Ultra sonic
- Radiographic (x-ray)
- Magnetic particle
- Dye penetrant
- Eddy current

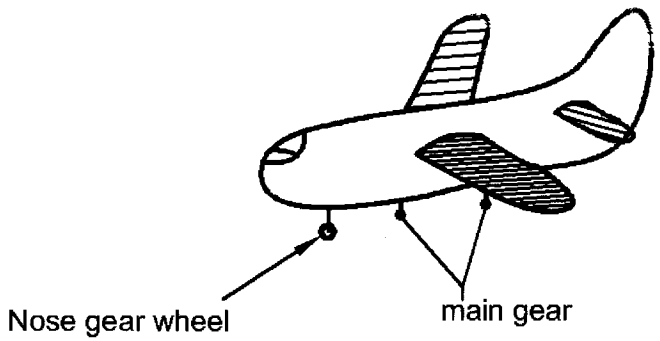
(Any 4 x ½)=

Question 11 (c)

Explain how steering is achieved in each of the following gear configuration:

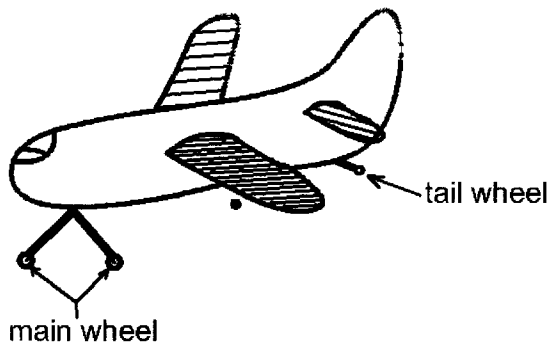
(i) Tri-cycle
(ii) Conventional

(i) Tri-cycle



- This is an arrangement where a nose landing gear is fitted in front of two main landing gear.

(ii) Conventional



- Steering to the right.
- The pilot steps on the right hand brake pedal.
- The right hand main wheel stops moving (stationary).
- The nose wheel turns to the right, as the aircraft steers to the right (and vice versa)

Question 13 (a) (i)

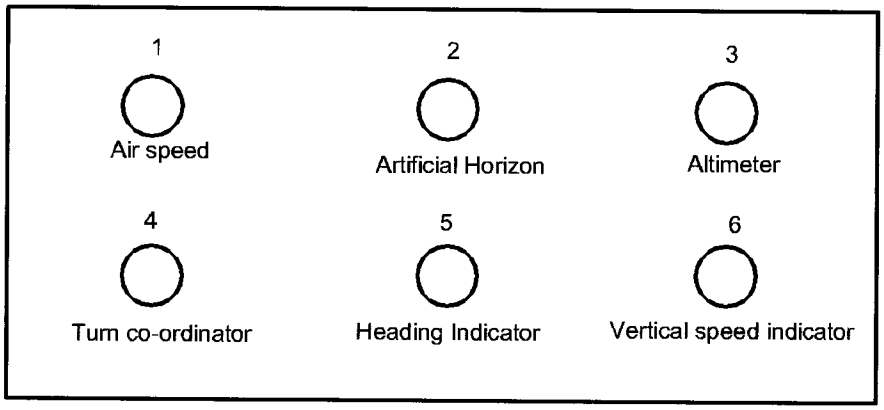
Show the typical layout of six basic flight instruments

Weakness

Most of the candidates were unable to show the layout of basic flight instruments

Advice to teachers
Teachers are advised to more coverage on aircraft instrument.

Expected response



Question 14 (b)

With the aid of a sketch, describe the formation of induced drag.

Weakness
Most of the candidates were unable to describe the formation of induced drag

Advice to teachers
Teachers are advised to do more coverage on the theory of flight.

Expected response

(i) anhedral

(ii) mid wing

(iii) Gull wing

3 x 1 = 3 marks

3.8.2 Aviation Technology Paper 2 (450/2)

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

- Sketching in good proportion atypical pictorial view of a hydraulic system hand pump.
- Using the tools, equipment and materials provided to fabricate a aircraft VHF radio compartment tray.

- Using a multimeter and an assembly provided to perform given tasks and recording the measurements taken.
- Identifying tools provided then stating their use and maintenance.
- Studying the mechanisms and operations of the given instruments.
- Identifying a breaking unit provided then making observations about condition and defects.
- Identifying parts of a composite material provide and sketching.
- Demonstrating and explaining the procedure of taxing from the airport to the point indicated on a model runaway.
- Assessment on the principle of Archimedean principle of floatation as applied in aviation.
- Using tools, equipment and materials provided to construct a circuit with two cells and two bulbs in series on the bread board provided

Weaknesses

Although the overall performance was good, some weaknesses were noted in most of the questions as discussed below.

Station 1: Some students could not sketch in good proportion the assembled hand pump.

Station 2: Some candidates could not complete the task within the given time.

Station 3: The question could not be attempted because the component was not provided.

Station 4: Most students had problems in taking measurements using the precision tools

Station 5: Majority of the students had no problems in carrying out the task.

Station 6: Some students had problems in giving the operations of some instruments.

Station 7: Most students did not encounter any problem in the question.

Station 8: Most candidates could not interpret the question as expected and thus could not sketch as expected.

Station 9: Most students had no problem with this question

Station 10: Majority of the student had problems determining the weight and volume of the item provided.

Advice to Teachers

Schools offering the subject are advised to source for aircraft instruments from grounded aircrafts in some airstrips and airports within their locality for learning purposes. They should also materials for practice and consider attachment for the teachers teaching this subject in the field of aviation.

Teachers should ensure they cover the syllabus fully with more emphasis in the following:

- More practice to be given to the students to improve their skills in drawing.
- More practice in the use of tools and equipment in the workshop.
- Expose students to aircraft instruments and cover more on the principles and operating mechanisms
- More coverage on the hydraulic system and landing gear for better performance.
- Organize for visits to airports or airstrips for them to understand the markings on runaways and *the procedures involved.*
- More coverage on the theory of flights and practical approach to lift and drag.