3.6 ELECTRICITY (448)

Electricity examination comprises of two papers; paper 1 (448/1) and paper 2 (448/2). Paper 1 tests theory while paper 2 tests practical skills. These papers constitute 60 % and 40 % of the final mark respectively. In 2021 examination, both papers followed the usual setting format as those of the previous years.

3.6.1 General Candidates Performance

The table 12 shows candidates' overall performance in the KCSE electricity examination since the year 2016.

Table 12: candidates overall performance in the year 2016 to 2021

Year	Paper	Candidature	Maximum Score	Mean Score	Standard Deviation
2016	1 2 **Overall**	215	60 40 **100**	38.55 26.6 **65.14**	69.62 5.04 **12.87**
2017	1 2 **Overall**	227	60 40 **100**	32.02 31.52 **63.53**	9.89 3.99 **12.31**
2018	1 2 **Overall**	244	60 40 **100**	37.14 27.32 **64.46**	10.91 4.64 **13.93**
2019	1 2 **Overall**	274	60 40 **100**	36.42 30.77 **67.19**	9.98 3.47 **11.85**
2020	1 2 **Overall**	276	60 40 **100**	43.04 28.34 **72.04**	8.78 4.66 **10.54**
2021	1 2 **Overall**	438	60 40 **100**	40.71 32.42 **73.04**	10.01 3.23 **12.13**

From the table it is worth noting that:

(i) The candidature increased from 276 in the year 2020 to 438 in the year 2021.

(ii) The mean score increased from 72.04 % in the year 2020 to 73.04 % in the year 2021.

(iii) The standard deviation increased from 10.51 in 2020 to 12.13 in 2021.

3.6.2 Electricity Paper 1 (448/1)

The questions which were reported to have been poorly responded to are analyzed with a view to pointing out candidates' weaknesses and propose suggestions on some remedial measures that can be taken in order to improve performance in future. The questions for discussion include 4, 6, 9 and 13.

Question 4

(a) In a domestic house, the lights in the bedroom go off while there is still power in the main switch. Outline **two** possible causes of this anomaly. (2 marks)

Weaknesses
Most candidates were not able to outline possible causes of electrical fault.

Expected response
- Blown fuse
- Short circuit
- Open circuit
- Overload

Any 2 x 1

Advice to Teachers
Teachers to take the learners through trouble shooting using the actual wiring system.

Question 6

(a) **Figure 2** shows a toroid-type transformer.

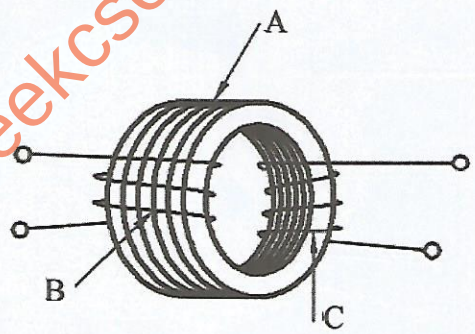


Figure 2

Name the parts labelled A, B and C. (3 marks)

A .....
B .....
C .....

Weaknesses

Most learners were unable to identify parts of the transformer.

Expected response

A - laminated core
B - primary winding
C - secondary winding (3 x 1)

Advice to Teachers

Teachers to expose the learners to the actual transformer and its working.

Question 9

Figure 4 shows a transistor in a common-base configuration. The voltage drop across the 2KΩ resistor is 3V and $\alpha = 0.95$.

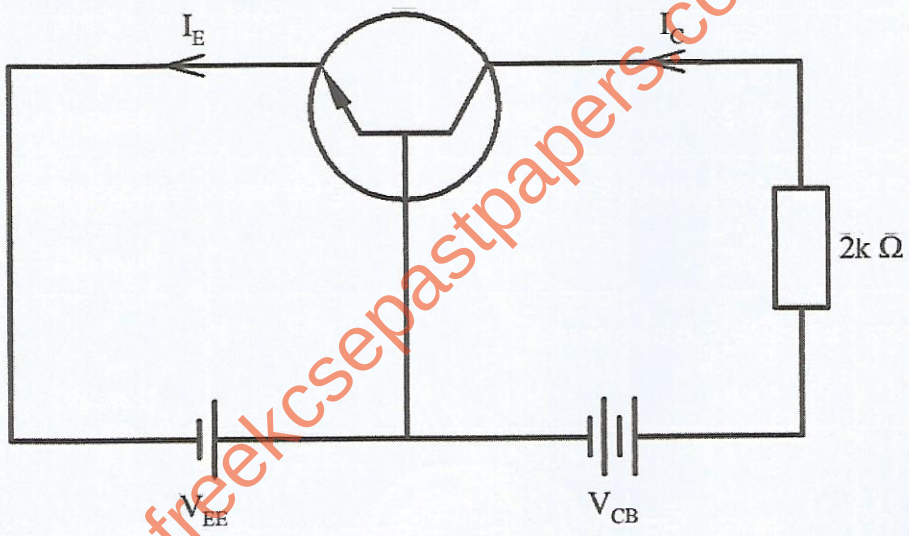


Figure 4

Find the:

(a) emitter current (2 marks)

(b) base current (2 marks)

Weaknesses

Most candidates were not able to apply the relevant formula in the calculations.

Expected response

(a) $Ic = \frac{3\ V}{2\ k\Omega} = 1.5\ mA$ 1 mark

$\propto = \frac{IC}{IE}$ $IE = \frac{IC}{\propto} = 1.579\ mA$ 1 mark

(b) $1_B = 1_E - 1_C$ 1 mark

$= (1.579\text{-}1.5)\ mA$

$= 79\ \mu A$ 1 mark

Advice to Teachers

Teachers should expose the learners to a lot of transistor network calculations.

Question 13

(c) **Figure 7** shows a diagram of a d.c. machine.

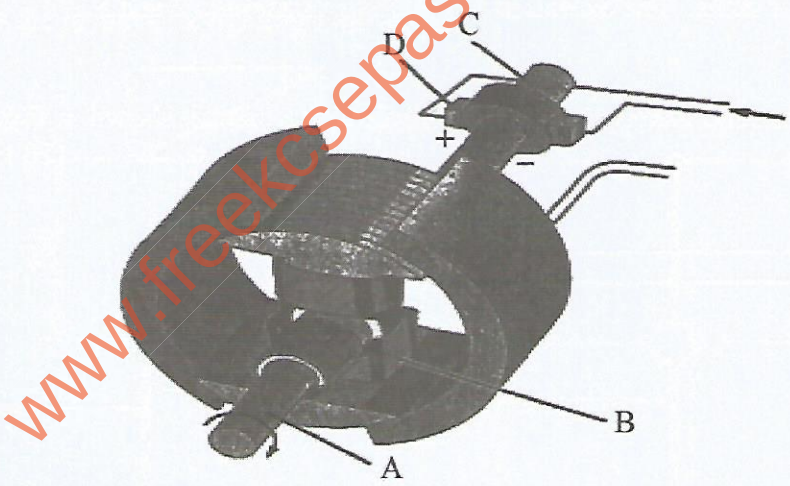


Figure 7

(i) Name the parts labelled A to D. (4 marks)

(ii) Explain the function of part C. (2 marks)

Weaknesses

Most candidates were not able to name parts of the d.c machine and their functions.

Expected response

(i) A - Shaft

B - Armature

C - Commutator

D - Brush **(Any 4 x 1)**

(ii) Commutator

- To produce direct current from an a.c. generator, a commutator is used. It converts generated alternating current into direct current for external use.

Advice to Teachers

Teachers are advised to expose learners to d.c machines and function of their parts

3.6.4 Electricity Paper (448/2)

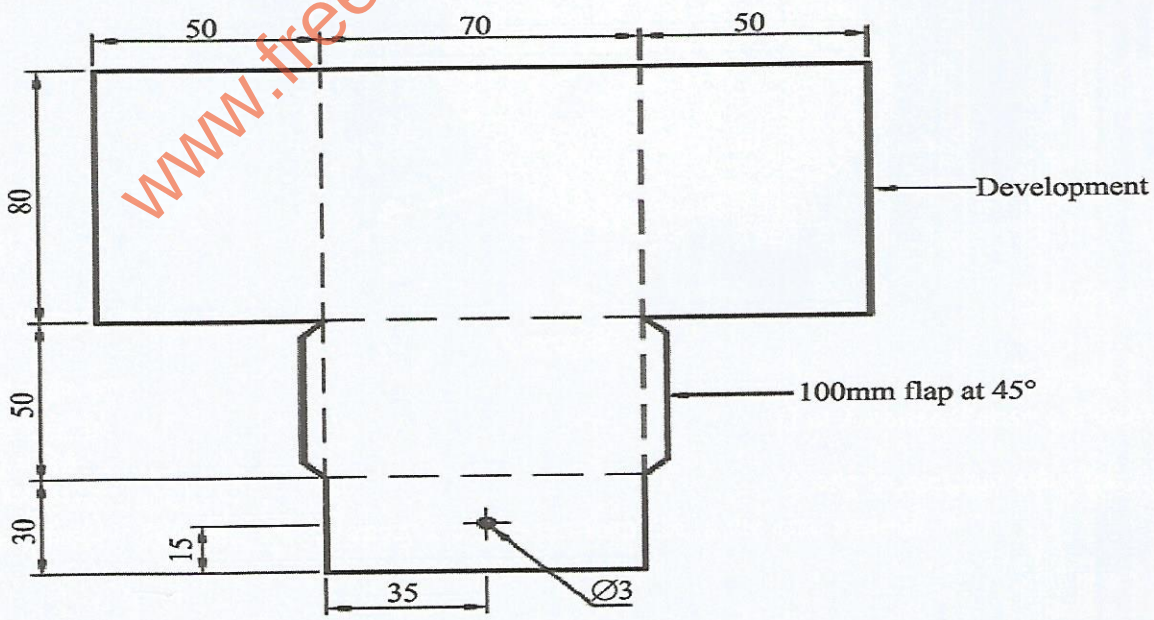
The questions were all set from the syllabus. The paper was balanced in terms of skills being tested, difficult versus easy questions, syllabus coverage, length of questions and adequacy of time allocated for the paper.

The exercises which were reported to have been poorly responded to are analyzed to help learners to improve on their practical skills. The exercises for discussions include 2 and 5.

EXERCISE 2

Using the tools, equipment and materials provided, fabricate the bracket shown in **Figure 2.**

(20 marks)



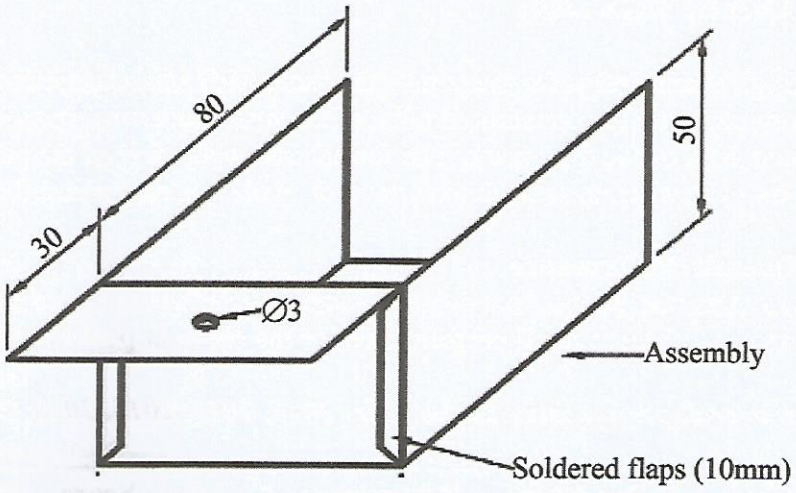


Figure 2

Weakness
Not all the candidates completed the task in 30 minutes.

Advice to teachers
Teachers to train the learners to perform tasks within stipulated times during class lessons.

EXERCISE 5
Figure 4 shows the layout of a lighting final circuit.

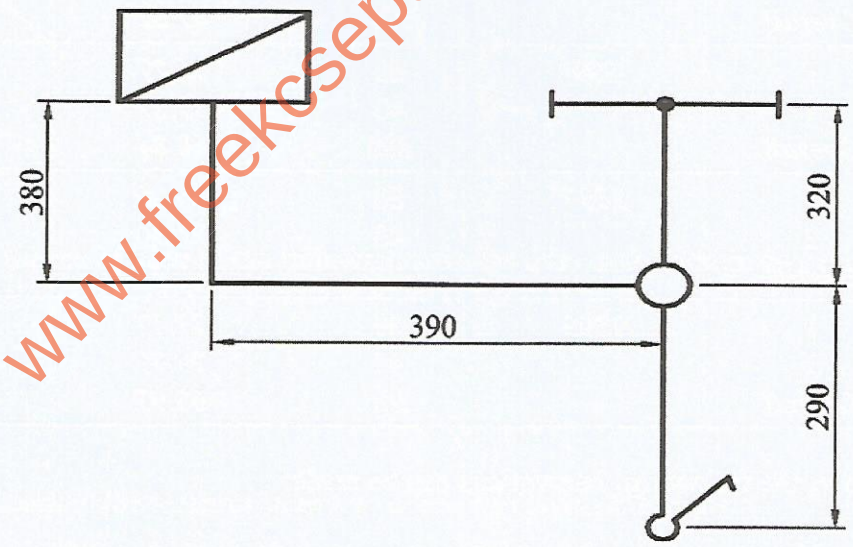


Figure 4

Using PVC sheathed cable, install the circuit such that the lamp is controlled from one point.
(20 marks)

Weaknesses
Not all the candidates completed the task.

Advice to teachers
Teachers to train the learners to perform installation tasks within stipulated times (not as they wish).