

3.6 ELECTRICITY (448)



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In the year 2012, Electricity was tested in two papers; paper 1(448/1) and paper 2 (448/2). Paper 1 was a theory paper which constituted 60% of the final mark while Paper 2 was a practical paper which constituted 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.

General Candidates Performance

The candidate's performance statistics in the KCSE electricity examination since the year 2008 when the syllabus was revised are as shown in the table below.

Table 13: Candidates overall performance in the years 2008 to 2012

Year	Paper	Candidature	Maximum score	Mean score	Standard deviation
2008	1		60	26.67	10.78
	2		40	21.83	6.64
	overall	48	100	48.58	15.29
2009	1	2	60	35.47	9.65
	2		40	24.08	5.66
	overall	19	100	59.55	13.75
2010	1		60	32.96	9.53
	2		40	28.56	4.33
	overall	161	100	61.52	12.56
2011	1		60	35.21	10.57
	2		40	30.17	3.99
	overall	183	100	65.37	12.63
2012	1		60	35.13	9.09
	2		40	25.47	4.29
	overall	214	100	60.60	11.83

From the table it can be observed that:

- (i) The candidature increased from 183 in the year 2011 to 214 in the year 2012.
- (ii) There was a slight drop in the mean for paper 1 from 35.21 in 2011 to 35.13 in 2012.
- (iii) Paper 2 also experienced a slight drop in the mean from 30.17 in 2011 to 25.47 in 2012.
- (iv) There overall performance dropped from a mean of 65.38 in 2011 to 60.60 in 2012.

3.6.1 Electricity Paper 1 (448/1)

The questions which were reported to have been poorly performed have been analyzed with a view to pointing out candidates' weaknesses and proposed suggestions on some remedial measures that would be taken in order to improve performance in future. The questions for discussions include 1(a), 2, 3, 5(a), 10 (b),14.

Question 1 (a)

State four categories of institutions that train electrical technicians in Kenya

Candidates were expected to state the institutions that train electricians in Kenya.

Weaknesses

Most candidates could not state the institutions that train electricians in Kenya.

Advice to Teachers

They should teach the whole syllabus including places one can proceed to for upward mobility.

Expected Responses

Institutions that train electricians in Kenya:

- i. Universities
- ii. Institutes of technology
- iii. Technical training institutes
- iv. Vocational training centers
- v. National polytechnics

Question 2 (a)

State how each of the following electrical waste materials should be disposed

- i. Lead acid battery
- ii. Fluorescent tube

Candidates were expected to state how electrical waste materials should be deposited.

Weaknesses

Most candidates mixed up the disposal methods.

Advice to Teachers

They should teach the syllabus holistically.

Expected Responses

- a) Disposal of electrical waste materials
 - i. Lead acid battery-return to the manufacturer

- ii. Fluorescent tube- break and burry

Question 2 (b)

State where each of the following type of fire extinguisher is suitably applied:

- i. Foam
- ii. Water
- iii. Dry powder

Candidates were tested on fire extinguishers

Weakness

Most candidates could not answer the question as expected.

Advice to Teachers

They should teach the syllabus holistically.

Expected response

- b) Use of fire extinguishers
 - i. Water- to put out fires on burning solid materials
 - ii. Foam- to put out fires on burning oils and chemicals
 - iii. Dry powder- used to deal with fires on burning flammable liquids and some solids

Question 3

A one-watt resistor has the colour code ; blue, grey and brown. Determine:

- a) The value of the resistor
- b) The maximum value of current that can flow through it without exceeding its power.

Candidates were expected to determine the value of resistor and maximum value of current that can flow through it without exceeding its power.

Weaknesses

Most candidates were not able to put the tolerance values for the stated resistors.

Advice to Teachers

They should teach colour code interpretations exhaustively and let learners understand the tolerance values.

Expected Responses

(a) Value of resistor = 680Ω (1 mark) $\pm 20\%$ (1 mark)

(b) Maximum current $I = \sqrt{\frac{P}{R}}$

$$P = 1 \text{ W}$$

$$\begin{aligned}
 I &= \sqrt{\frac{1}{680.68}} \\
 &= \sqrt{\frac{1}{544}} \\
 &= 42.87 \text{ Amps}
 \end{aligned}$$

Question 5 (a)

Explain the meaning of “sensitivity” as used in meter movement.

Candidates were tested on sensitivity in meters

Weaknesses

Most candidates did not seem to know what they were doing.

Advice to Teachers

They should teach the syllabus in totality without ignoring certain topics.

Expected Responses

Sensitivity is the amount of current required to provide full scale deflection of the pointer.

Question 10 (b)

Figure 2 shows the orthographic views of a bracket drawn in first angle projection.

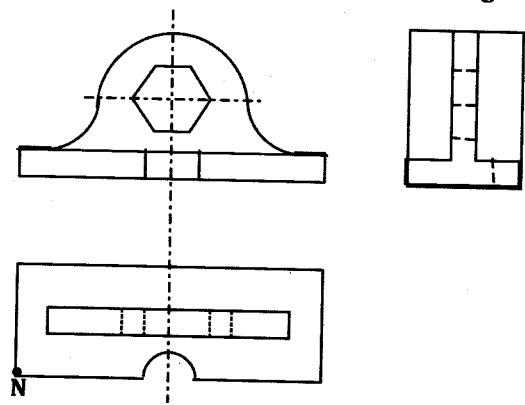


Figure 2

Taking N as the lowest point, make a free hand isometric sketch of the bracket.

Candidates were tested in sketching skills.

Weaknesses

Most candidates drew the bracket in oblique instead of isometric.

Advice to Teachers

They should teach the topic of related drawing to enhance the mental ability of the learners.

Expected Responses

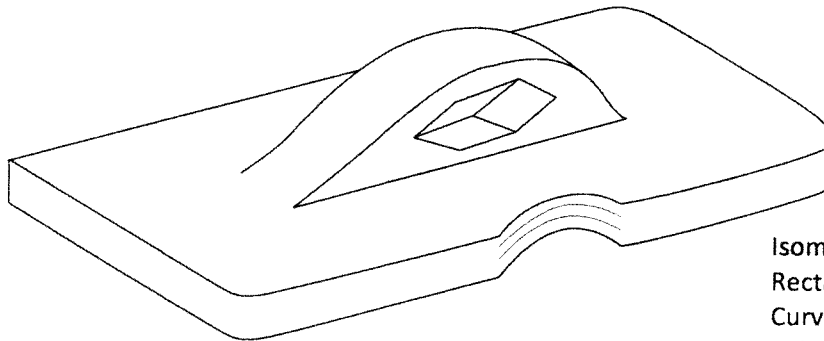


Figure 3

Isometric view with N lowest = 1mark
Rectangular base = 1mark
Curved upper part = 1mark
Other features = 1mark
4marks

Question14 (a)

State :

- i. Two IEEE requirements regarding bell transformers
- ii. Two advantages of MCB over cartridge fuses.

Candidates were tested on the IEEE regulations

Weaknesses

Most candidates could not answer this question correctly.

Advice to Teachers

They should teach the syllabus holistically and inclusively.

Expected Responses

(i) IEEE requirements regarding bell transformers

They :

- Must be double-wound
- Should be earthed at one point of secondary winding iron-core of transformer and metal casing
- Should have a separate control switch and connected on its own final circuit
- Should have a high grade insulation of supply cable to transformer.

(ii) Advantages of MCB over cartridge fuses.

- Easy to reset therefore replacement not necessary
- Give better overall protection against fire shock
- Cannot be replaced by an inexperienced person
- Highly discriminative
- Sustain overload and rejects harmless transient over current.

3.6.2 Electricity Paper 2 (448/2)

The 2011 Electricity Paper 2 tested candidates in the following skills:

- Connecting an electric circuit from the diagram in the question and setting meter ranges to measure and record the values.
- Drawing a graph from values found in the practical
- Drawing orthographic views of a bracket given in isometric
- Trouble shooting and repair.
- Drawing schematic diagram of a given circuit and connecting the circuit
- Circuit study by taking measurements of current and voltage then using them to plot a graph then interpreting the graph.
- Domestic installation of a fluorescent lamp lighting circuit to be controlled from two positions.

Weaknesses

- The candidates had challenges completing the tasks in time.
- Readings posed challenges to some candidates while some confused the reverse voltage plotting.
- The use of unfamiliar tools and equipment during examinations should be avoided.
- Some candidates could not interpret the maximum power transfer correctly
- Teachers should teach holistically by ensuring that they cover all the details as they are in the syllabus.