

Name: Class

Kenya Certificate of Secondary Education

MINI MOCK EXAMINATION 2014

PHYSICS

PAPER 2 (Theory)

TIME: 2 HOURS

Instructions to Candidates

1. Write your name and index number in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above.
3. This paper consists of **two** sections; **A** and **B**.
4. Answer **all** the questions in sections **A** and **B** in the spaces provided.
5. All working **must** be clearly shown.
6. Non-programmable silent electronic calculators and KNEC mathematical tables may be used.
7. This paper consists of **11** printed pages.
8. Candidates should check the questions paper to ascertain that all the pages are printed as indicated and that no questions are missing.

FOR EXAMINERS USE ONLY

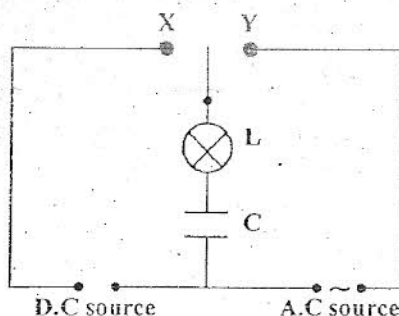
Section	Questions	Maximum Score	Candidate's Score
A	1-11	25	
B	12	13	
	13	15	
	14	11	
	15	5	
	16	11	
	TOTAL	80	

This paper consists of **11** printed pages students should check the question paper to ensure that all the pages are printed as indicated and no questions are missing.

SECTION A (25 marks)

Answer ALL the questions in this section in the spaces provided.

1. The figure below shows a circuit with a capacitor C and a lamp L.



Use the information to answer the questions that follow

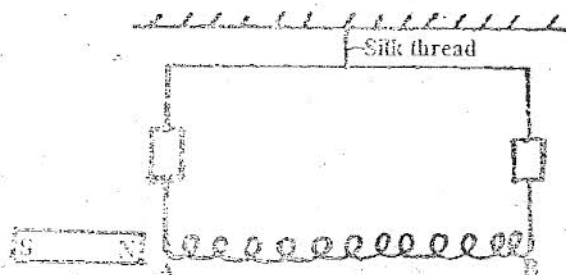
- i) To which of the terminals X and Y should the switch be connected so that the lamp

I). Lights (1 mark)

II). Does not light (1 mark)

Explain your answers in the question above. (2 marks)

2. The figure below shows a rigid circuit ABCD suspended by a silk thread from a support. The coil AB is made of copper.



The magnet near A is suddenly pulled to the left. State and explain the observation on the circuit.

3. Why is it possible to start a car with a lead acid battery but not with eight dry cells each of e.m.f 1.5V aligned in series.

(1 mark)

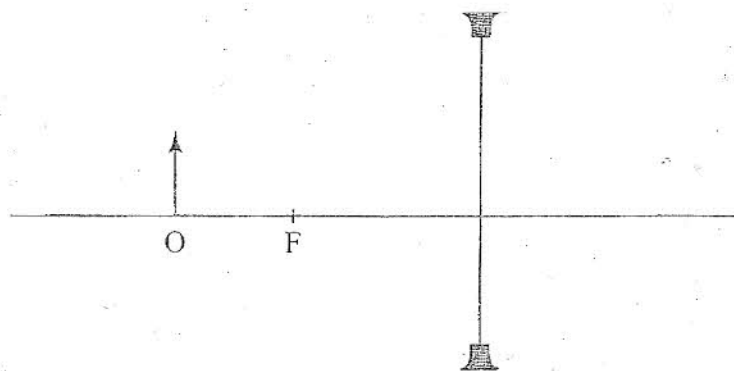
4. Explain how a fuse wire inserted in an electrical circuit protects the rest of the circuit against excess current.

(2 marks)

5. What is the difference between Flemings right hand rule and Flemings left hand rule.

(1 mark)

6. The figure below shows an object O placed in front of a diverging lens whose principal focus is F.



On the figure draw a ray diagram to locate the image formed.

(3 marks)

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7. Rods P, Q and R affect a charged leaf electroscope as follows. Rods P and R cause the leaf of the electroscope to collapse while rod Q cause it to rise higher. State the charges on the rods.

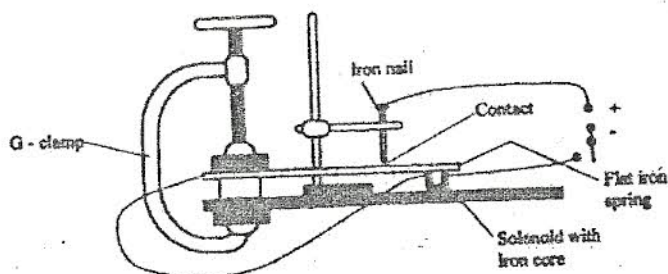
(
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marks)

8. A vertical object placed on a bench is observed to have three shadows of different sharpness, in different directions. Explain this observation.

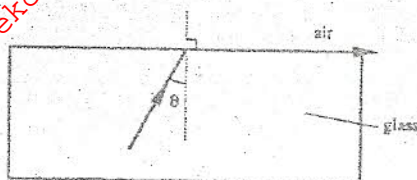
(2 marks)

9. The figure below shows a flat spring made of iron clamped horizontally on the bench over a solenoid. When the switch is closed, the spring vibrates. Explain the observation.

(3 marks)



10. The figure below shows a ray of light incident on the boundary between two media 1 and 2 at an angle θ .



Show that the refractive index for a ray of light travelling from medium 1 to medium 2 is given by

$$n_2 = \frac{1}{\sin \theta}$$

(2 marks)

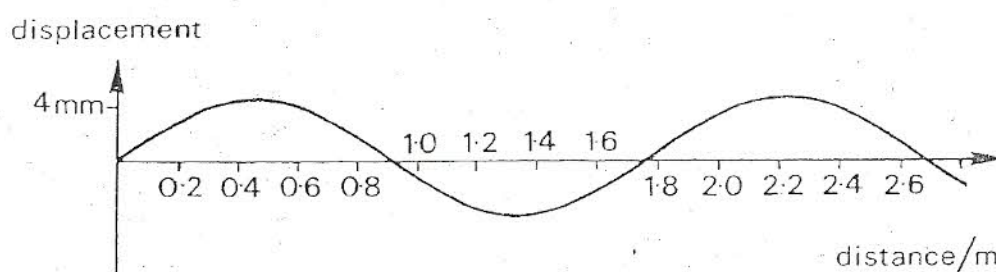
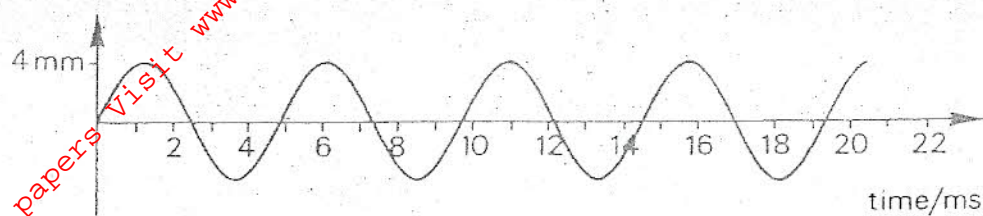
11. State the property of X-rays, which makes it possible to detect cracks in bones.
(1 mark)

SECTION B (55 marks)

Answer ALL the questions in this section in the spaces provided

- 12(a) i) Distinguish between longitudinal and transverse waves.
{2 marks}
- ii) What phenomenon associated with transverse waves is not observed with longitudinal waves.
{1 mark}

- b) The figure below shows two graphs which refer to the same wave.

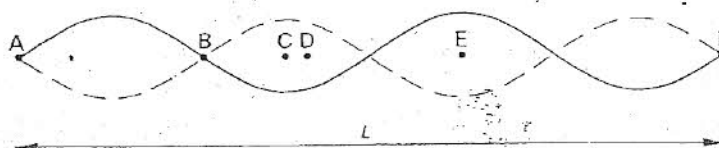


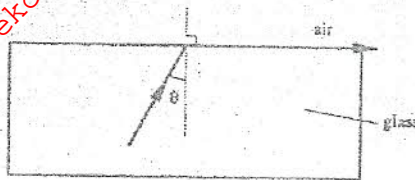
Calculate the speed of the wave.
marks}

{4

- c) i) Distinguish between progressive and stationary waves.
{2 marks}

- ii) Figure below shows a stationary wave on a string stretched between two points A and F which are a distance L apart.





Show that the refractive index for a ray of light travelling from medium 1 to medium 2 is given by

$$n_2 = \frac{1}{\sin \theta}$$

(2 marks)

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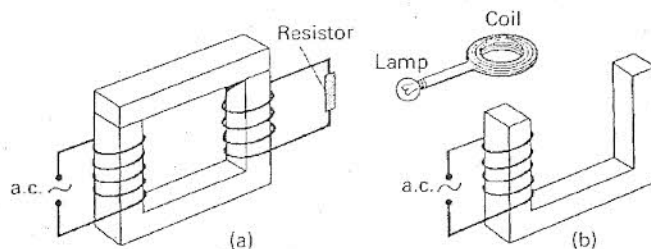
Describe the oscillations of the points B, C, D and E. Compare these oscillations in terms of their relative phases and amplitudes.

{ 3 marks }

iii) What is the wavelength in terms of L .

{ 1 mark }

- 13(a) The figure below represents a transformer with a primary coil of 400 turns and a secondary coil of 200 turns



- i) If the primary coil is connected to a 240 V a.c mains supply what will be the secondary voltage.
(2 marks)
- ii) Calculate the efficiency of the transformer if the secondary current is 5A.
(3 marks)
- b) The secondary coil is removed and a small coil connected to a low voltage lamp as shown in figure b. Explain the following observation.

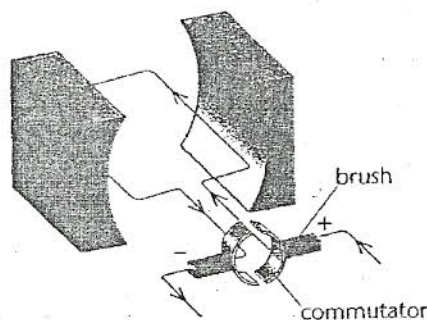
i) The lamp lights.
(2 marks)

iii) If the coil is moved upwards, the lamp gets dimmer.
(1 mark)

iii) When a soft iron rod is placed through the coil, the lamp brightens.
(2 marks)

iv) The lamp will not light if a d.c supply is used instead of a.c.
(1 mark)

c) Study the diagram below and answer the questions.



i) Draw an arrow to show the direction of the magnetic field between the poles of the magnet.

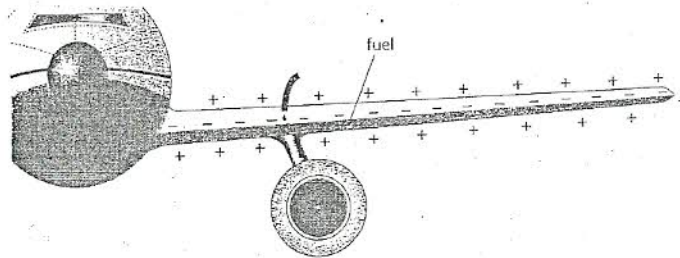
{1 mark}

ii) Explain why the forces acting on the sides of the coil are in opposite directions and describe the directions of the forces.

{2 marks}

- iii) What is the purpose of the commutator?
{1 mark}

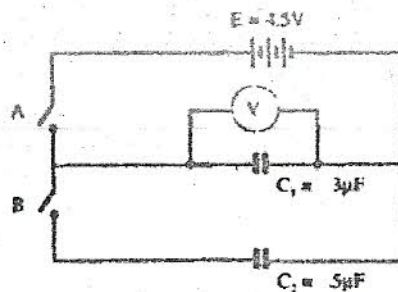
- 14(a) When an aircraft is being refuelled, the fuel can become negatively charged as it flows along the metal pipe to the fuel tanks.



- i) Explain how the fuel becomes negatively charged.
{2 marks}
- ii) What type of charge does the metal pipe gain?
{1 mark}
- iii) Explain why a build-up charge on the wings of the aircraft could be dangerous.
{2 marks}
- iv) During refuelling, the metal airframe is connected to the ground. Explain how this makes the process safer.
{2 marks}

b) The figure below shows a circuit where a battery of e.m.f 4.5V, switches A and B, two capacitors

$C_1 = 3 \mu\text{F}$ and $C_2 = 5 \mu\text{F}$ and a voltmeter are connected.



State what is observed on the voltmeter when

i) Switch A is closed and switch B is open.

{1 mark}

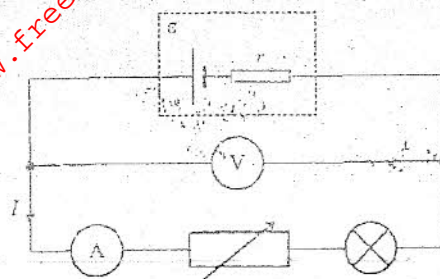
ii) Switch A is closed and opened and then B is closed.

{1 mark}

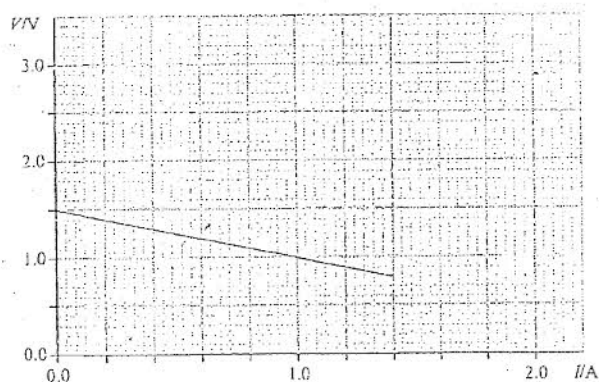
iii) Explain the observation made in (ii) above.

{2 marks}

15(a) A student wants to determine the e.m.f of a cell and its internal resistance r . He uses the circuit shown and measures the terminal voltage V across the cell and the current I in the circuit for each setting of the variable resistor.



He plots the following graph of terminal voltage V against current I .



- i) Show how the relationship $V = E - Ir$ can be used with his graph to determine the e.m.f. E of the cell. State its value.

{2 marks}

- ii) Calculate the internal resistance r of the cell.

{2 mark}

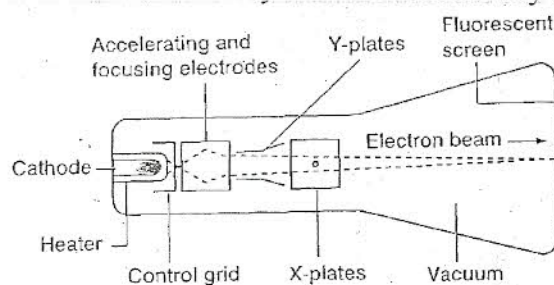
- iii) The student repeats the experiment using two of these cells in series. On the graph, draw the line that he obtains.

{1 mark}

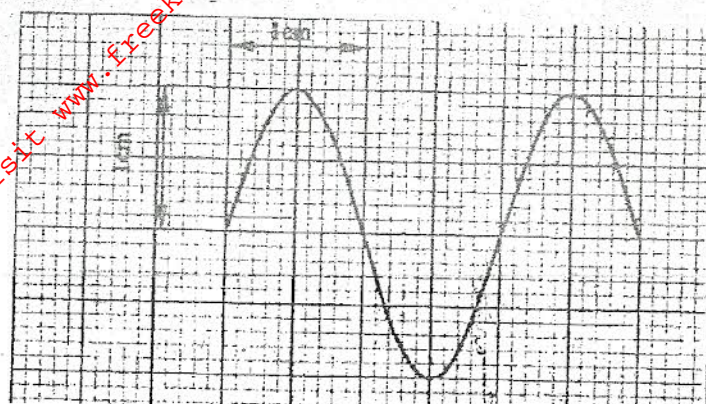
- 16(a) i) State two differences between cathode rays and electromagnetic radiations

(2 marks)

- b) The diagram below shows a cathode ray tube of a cathode ray oscilloscope.



- i) Explain how electrons are produced in the tube.
(2 mark)
- ii) Explain how the control grid controls the brightness of the spot on the screen
(2 marks)
- iii) When using the CRO to display wave forms of voltages, state where the following should be connected
- I) The voltage to be displayed on the screen
(1 mark)
- II) The time base voltage
(1 mark)
- c) The figure below shows the waveform of a voltage displayed on the screen of a CRO.
The Y-gain calibrations was 3V per cm



- i) Determine the peak to peak voltage of the Y-input (1 mark)
- ii) Sketch on the same figure the appearance of the waveform after the voltage of the input signal has been halved and its frequency is doubled.
(2marks)