Name ..... Index No. .....

232/2
PHYSICS
Paper 2
July/August 2013
Time : 2 Hours

Candidate's signature .....

Date .....

MERU COUNTY FORM 4 JOINT EVALUATION -2013

Kenya Certificate of Secondary Education

PHYSICS
Paper 2
July/August 2013
Time: 2 Hours

INSTRUCTION TO ALL CANDIDATES

1. Write your name and index number in the spaces provided above
2. Sign and write date of examination in the spaces provided above.
3. Answer ALL the questions in the spaces provided in the question paper.
4. All working MUST be clearly shown.
5. Non-programmable silent electronic calculators and KNEC mathematical tables may be used.
6. Candidates should check the question paper to ascertain that no questions are missing.

For Examiners Use Only

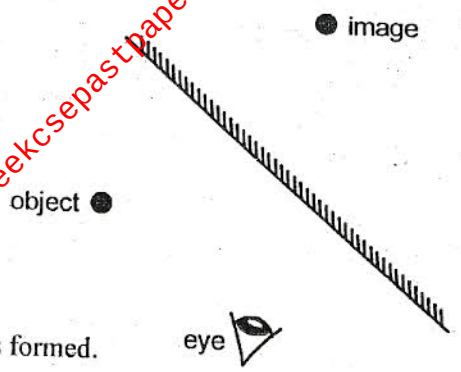
QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1-14	25	
15	12	
16	12	
17	12	
18	12	
19	7	
TOTAL	80	

This paper consist of 12 printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing

SECTION A (25 MARKS)

1. Figure 1 below represents a point image formed by a plane mirror.

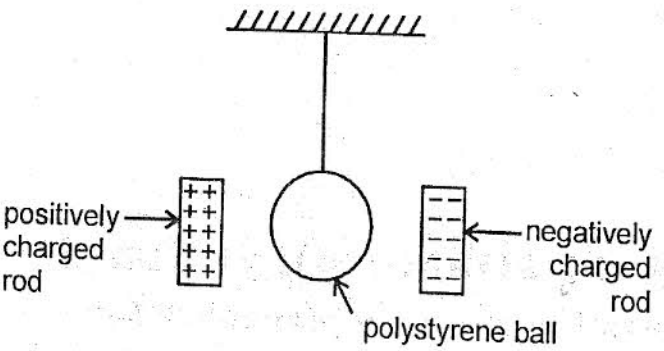
Fig 1



Sketch rays to show how the image is formed. **(2mks)**

2. A polystyrenes ball coated with aluminium is freely suspended between two highly charged rods as shown in figure 2 below.

Fig 2



The ball is found to swing between the two rods as it touches one of them at a time. Explain the cause of this behavior of the ball between the rods. **(1mk)**

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3. Distinguish between polarization and local action as defects of a simple cell. **(1mk)**

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4. State one property of images formed by plane mirrors. **(1mk)**

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5. A current carrying wire is placed between the poles of a magnet as shown in figure 3 below.

Fig 3

Sketch the magnetic field pattern between the poles. **(1mk)**

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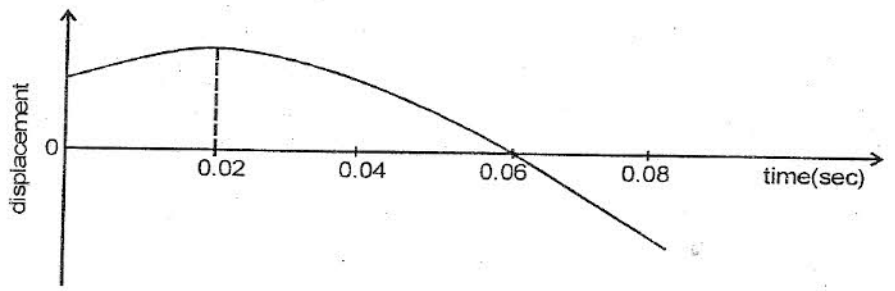
6. Figure 4 below shows a wave form. Determine the period of the wave. **(1mk)**

Fig 4



7. A student stands between a high wall and a thick forest. After clapping her hands, he receives an echo from the wall after 0.1 seconds and after another 0.5 seconds, he receives another echo from the thick forest. Given that the speed of sound in air is 330 ms^{-1}, determine the distance between the wall and the forest. **(3mks)**

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8. Explain why a radio aerial dish uses a parabolic metal reflector as opposed to a spherical one. **(1mk)**

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9. A torch bulb is labelled 2.5V, 0.3A. Calculate the power of the bulb. **(2mks)**

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10. Two dry cells in series provide an e.m.f. of 3.1V. When a load of 6.9 Ω is connected in series, the current drawn is 0.33A. Calculate the internal resistance of the cell. **(3mks)**

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11. An upright object was placed in front of a converging lens. An image magnified three times was formed on the screen. If the distance between the object and the screen was 80cm, determine, the object distance. **(3mks)**

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12. Figure 5 below shows the electromagnetic spectrum.

Fig 5

Gamma rays	A	Ultraviolet radiation	Visible light	Infrared radiation	Radio waves

a) Identify A. **(1mk)**

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b) State one use of A. **(1mk)**

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13. Explain why long distance power transmission is done at a very high voltages. **(1mk)**

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14. The accelerating potential in a x-ray tube is 50KV. Determine the kinetic energy of an electron (Electronic charge, e = 1.6×10^{-19} c) **(3mks)**

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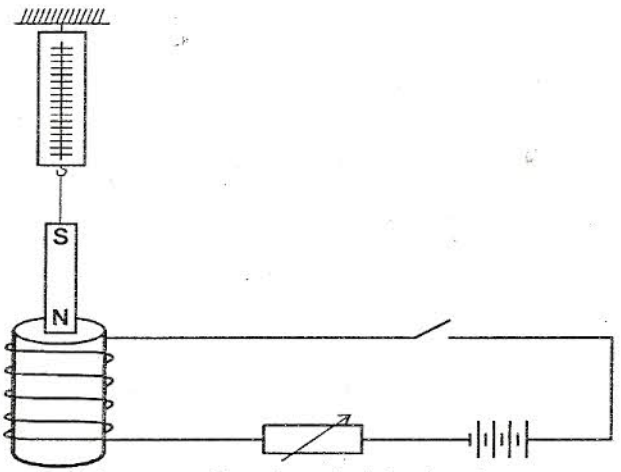
SECTION B (55 MARKS)

15a) A bar magnet is suspended from a spring balance attached to a fixed support as shown in figure 6 below and hangs over a coil.

Fig 6



i) Indicate on the coil the direction of current when the switch is closed. **(1mk)**

ii) State and explain what happens to the spring balance when the switch is closed. **(2mks)**

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iii) What would be observed on the spring balance if the current is increased? **(1mk)**

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iv) Other than increasing current, how else can the observation in (iii) above be achieved? **(1mk)**

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b)i) Define mutual induction. **(1mk)**

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ii) State two factors that determine the magnitude of e.m.f induced in a coil. **(2mks)**

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iii) Figure 7 below shows and induction coil used to produce sparks.

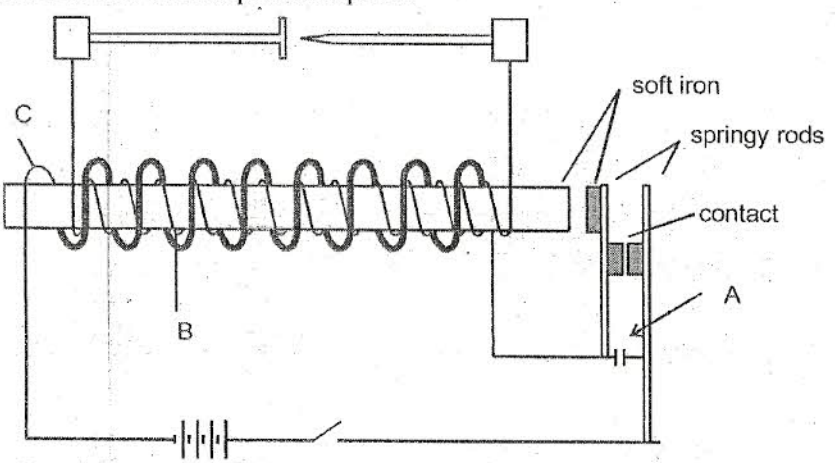

Fig 7

(I) Name the parts labelled A, B and C. **(3mks)**

A .....

B .....

C .....

(II) Explain the purpose of part A. **(1mk)**

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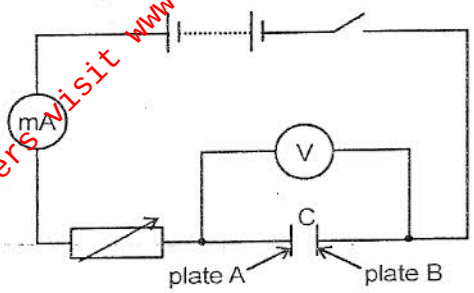
16a)i) Figure 8 below shows two negatively charged metal plates. Complete the diagram to show the electric field between the plates. **(1mk)**

Fig 8

ii) Fig 9 below shows a resistor - capacitor circuit that can be used to charge a capacitor C.

Fig 9



(I) When the switch is closed, the charging current is initially high but gradually falls to zero. Explain this observation. **(2mks)**

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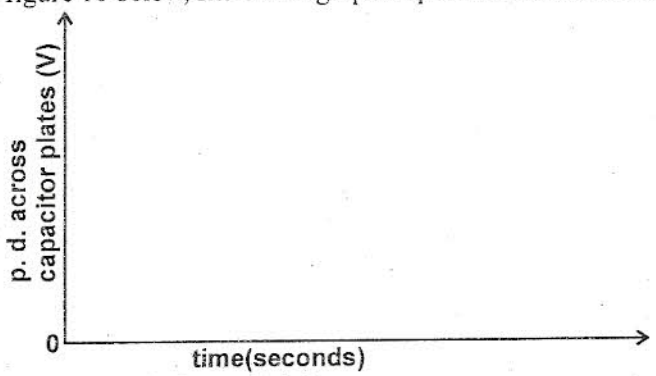
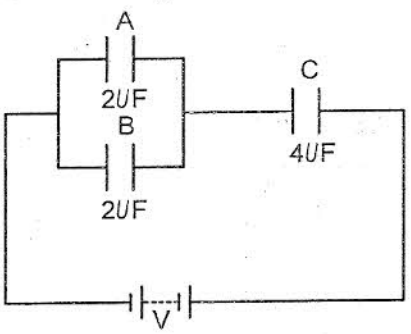
(II) On the axes provided in figure 10 below, sketch the graph of potential difference across the capacitor plates against time. **(1mk)**

Fig 10



iii) Three capacitors are arranged as shown in figure 11 below

Fig 11



Given that the charge on capacitor C in 20 MC, determine the potential difference V, shown in the diagram. **(3mks)**

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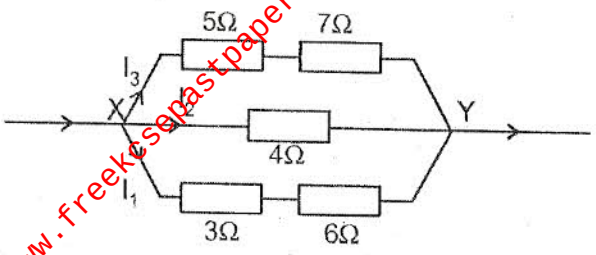
b) Figure 12 below represents resistors arranged in a circuit.

Fig 12



i) Calculate the effective resistance R, between points X and Y. **(2mks)**

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iii) Determine the voltage, B across points X and Y. **(2mks)**

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iv) Find the value of current I_2. **(1mk)**

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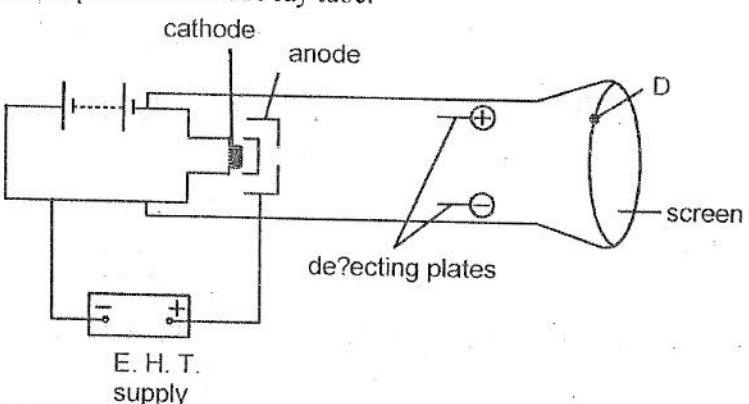
17a) The diagram in figure 13 below shows part of a cathode ray tube.

Fig 13



i) Explain how the cathode rays are produced. **(2mks)**

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ii) On the same diagram, draw the path of the cathode rays to the spot produced on the screen at D. **(1mk)**

iii) Explain the observation made on the spot when the connection to the high voltage supply are interchanged so that the anode is made negative. **(2mks)**

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iv) State one property of cathode rays. **(1mk)**

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b) A certain surface of a metal is illuminated with light of different frequences and the corresponding stopping potentials measured. The graph in figure 14 below shows how frequency f. varies with stopping potential, V_s for the metal.

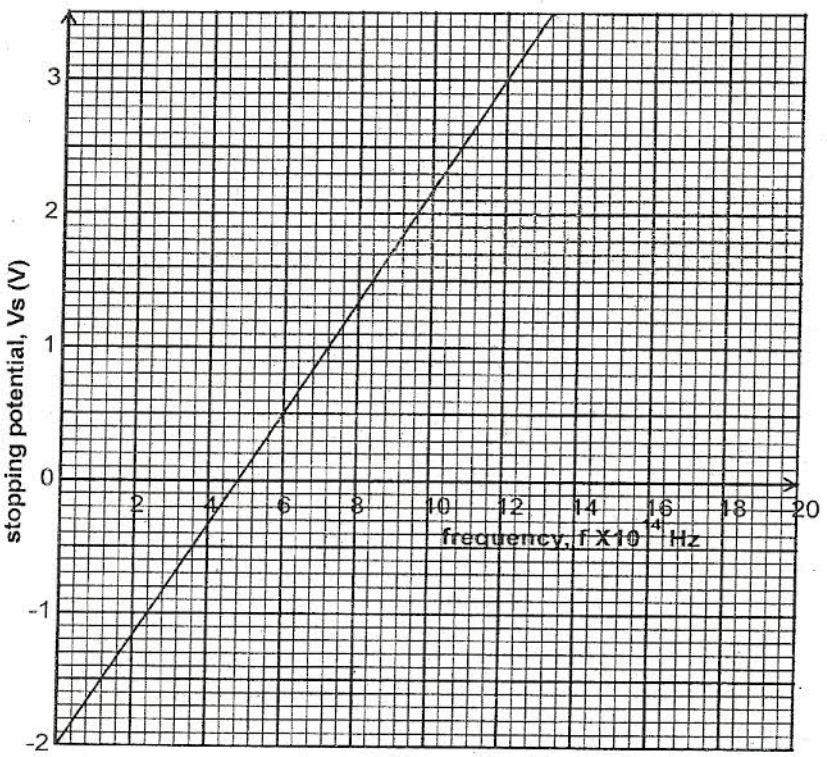

Fig 14

Given that $eVs = hf = hf_o$ and that $e = 1.6 \times 10^{-19}$ c, determine from the graph;

i) h **(3mks)**

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ii) f_o **(2mks)**

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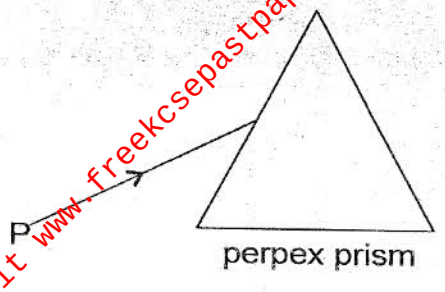
18ai) Figure 15 below shows a ray of monochromatic light P incident on a perplex prism.

Fig 15



Complete the figure by drawing a ray diagram showing the path of the light as it traverses through the prism and into the air. **(2mks)**

ii) Determine the refractive index of diamond given that its critical is 24°c. **(3mks)**

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iii) State two conditions necessary for total internal reflection of light to occur. **(2mks)**

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bi) (I) Define diffraction **(1mk)**

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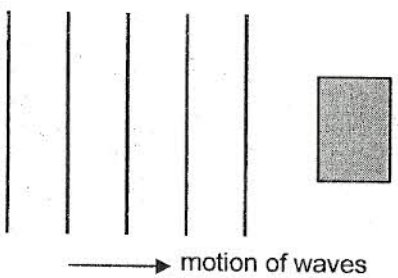
(II) Figure 16 below shows wave fronts approaching an object. On the same diagram, draw the wave form after it passes the object. **(1mk)**

Fig 16



ii) State two conditions necessary for the formation of a stationary wave. **(2mks)**

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19ai)Explain the effect of increasing temperature on the conductivity of a metal conductor. **(2mks)**

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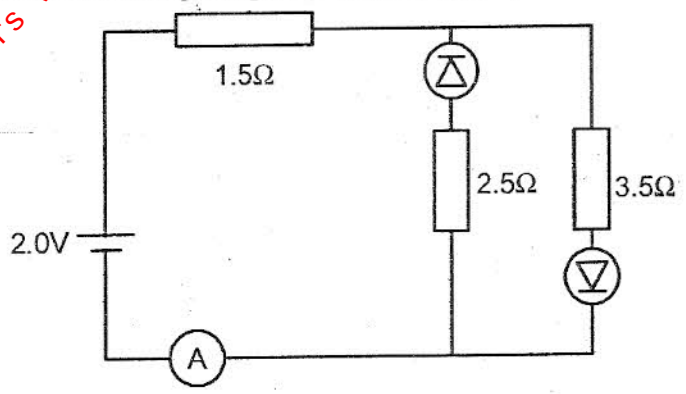
ii) Figure 17 below shows a circuit comprising a dry cell, two diodes, ammeter and three resistors.

Fig 17



Determine the ammeter reading given that the cell has an e.m.f of 2.0V. **(2mks)**

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bi) The following is a nuclear reaction which results in emission of some particles.

$$^{210}_{81}A \xrightarrow{X} {}^{210}_{84}B \xrightarrow{Y} {}^{214}_{82}C$$

(I) Identify the particles x and y. **(2mks)**

X .....

Y .....

(II)How many particles of x are involved in the reaction? **(1mk)**

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ii) (I) Define half- life of a radio-active material. **(1mk)**

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(II)The half-life of a radio active substance is 118 days. A sample of the substance has 4×10^{10} un-decayed nuclei at time t = O, How many un-decayed nuclei will be left after 472 days. **(3mks)**

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