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# KENYA NATIONAL EXAMINATION COUNCIL

## KCSE 2007

### PHYSICS PAPER 2

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23.5.2 Physics Paper 2(232/2)

Name..... Index Number...../.....

232/2  
PHYSICS  
Paper 2  
Oct./Nov. 2007  
2 hours

Candidate's Signature.....  
Date.....

**THE KENYA NATIONAL EXAMINATIONS COUNCIL**  
**Kenya Certificate of Secondary Education**  
**PHYSICS**  
**Paper 2**  
**2 hours**

*Write your name and index number in the spaces provided above.*  
*Sign and write the date of examination in the spaces provided.*  
*This paper consists of TWO sections: A and B.*  
*Answer ALL the questions in sections A and B in the spaces provided.*  
*All working MUST be clearly shown in the spaces provided in this booklet.*  
*None programmable silent electronic calculator and KNEC mathematical tables may be used except where stated otherwise.*

**For Examiner's Use Only**

Section	Question	Maximum Score	Candidate's Score
A	1 – 14	25	
B	15	14	
	16	15	
	17	11	
	18	15	
<b>Total Score</b>		<b>80</b>	

**This paper consists of 15 printed pages**

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

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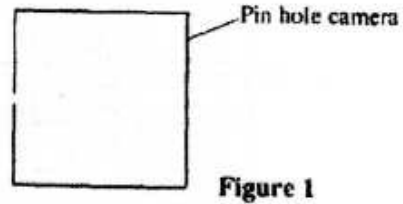
**Turn over**

7033

**SECTION A (25 marks)**

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

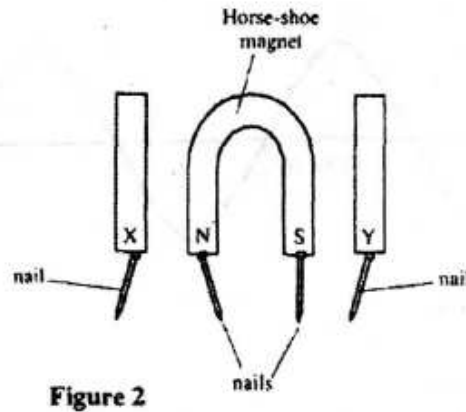
- 1 Figure 1 represents a pinhole camera.



Sketch rays to show the formation of an enlarged image in the camera. Label both the object and the image. (2 marks)

- 2 State **one** advantage of an alkaline cell over a lead-acid cell. (1 mark)

- 3 Figure 2 shows a horse-shoe magnet whose poles are labelled and two other magnets near it. Iron nails are attracted to the lower ends of the magnets as shown.



Identify the poles marked X and Y.

(1 mark)

X.....

Y.....

- 4 Figure 3 shows an object, O, in front of a concave mirror and its image, I, formed after reflection.

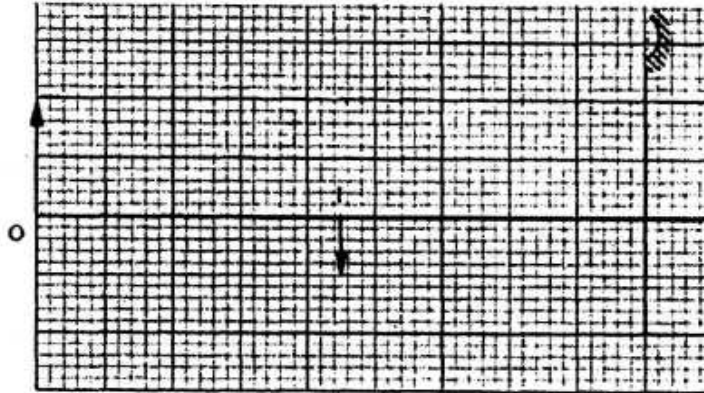


Figure 3

- (a) On the same diagram draw appropriate ray(s) to locate the principal focus, F, of the mirror. (2 marks)  
 (b) Determine the focal length of the mirror (scale 1:5). (1 mark)
- 5 Figure 4 shows the displacement-time graph for a certain wave.

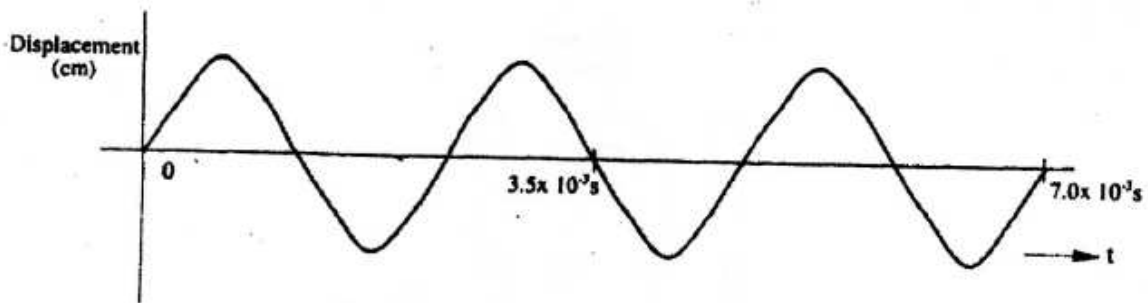


Figure 4

Determine the frequency of the wave. (3 marks)

- 6 Figures 5 (a) and (b), show wavefronts incident on barriers blocking part of the path.

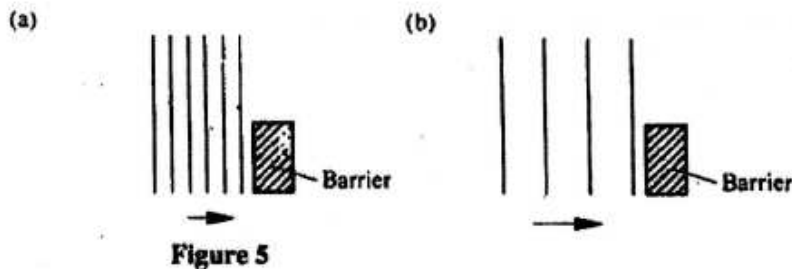


Figure 5

On the same figures sketch the wavefronts to show the behaviour of the waves as they pass each barrier and after passing the barrier. (1 mark)

- 7 Figure 6 shows a ray of light incident on the face of a water prism.

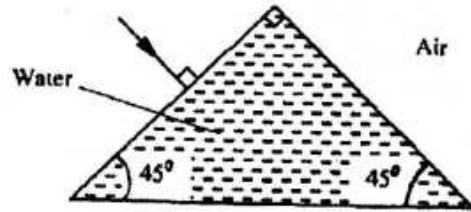


Figure 6

Sketch the path of the ray as it passes through the prism.  
Critical angle for water is  $49^\circ$ .

(1 mark)

- 8 In the circuit diagram shown in Figure 7, the ammeter has negligible resistance. When the switch, S, is closed, the ammeter reads 0.13A.

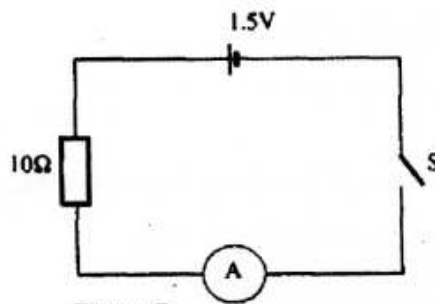


Figure 7

Determine the internal resistance of the cell.

(3 marks)

- 9 A heater of resistance  $R_1$  is rated P watts, V volts while another of resistance  $R_2$  is rated 2P watts,  $\frac{V}{2}$  volts. Determine  $R_1/R_2$ . (3 marks)
- 10 State what is meant by the term *accommodation* as applied to the human eye. (1 mark)

The graph in Figure 8 shows the variation of photoelectric current with applied voltage when a surface was illuminated with light of a certain frequency. Use the information in the figure to answer questions 11 and 12.

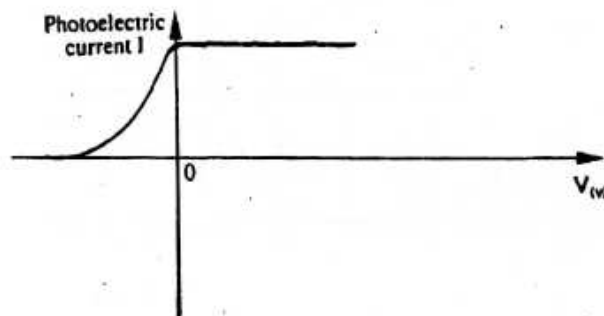
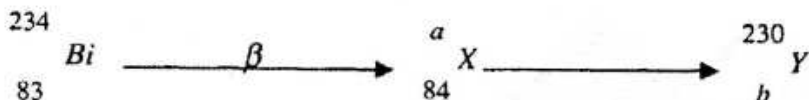


Figure 8

- 11 On the same axes, sketch the graph when light of higher intensity but same frequency is used to illuminate the surface. (1 mark)
- 12 Explain your answer in 11 above. (1 mark)

13 The following is part of a radioactive decay series.



Determine the values of a and b. (2 marks)

a = ..... b = .....

14 You are provided with a diode, a resistor R, an a.c source of low voltage and connecting wires.

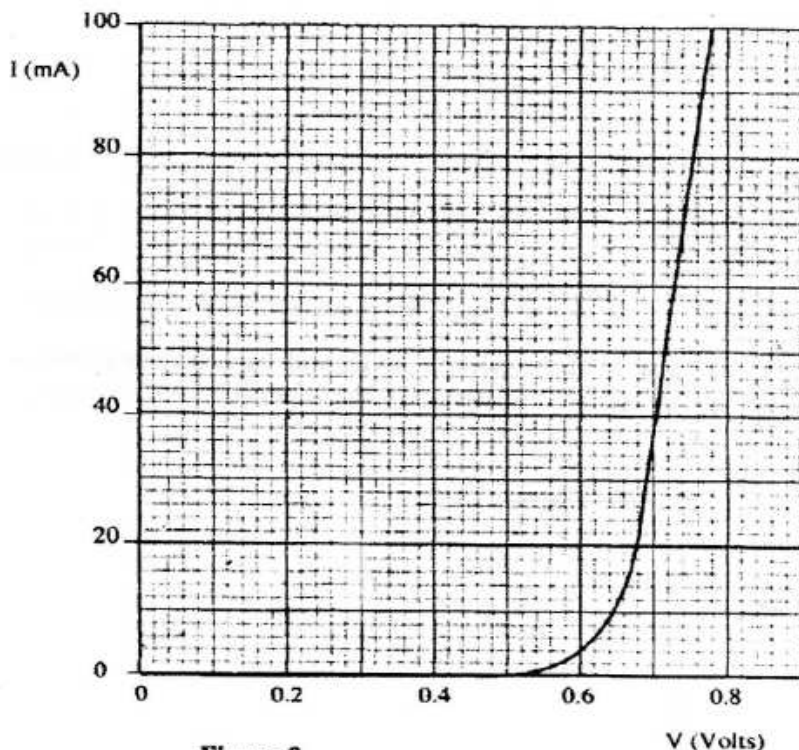
In the space provided, sketch the circuit diagram for a half-wave rectifier and indicate the terminals where the output voltage  $V_o$  may be connected. (2 marks)

**SECTION B (55 marks)**

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

15 (a) State Ohm's Law. (1 marks)

(b) The graph in Figure 9 shows the current-voltage characteristic of a certain device, X.

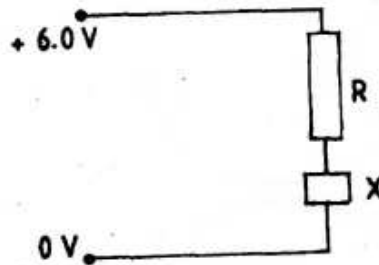


**Figure 9**

(i) State with a reason whether the device obeys Ohm's law. (2 marks)

(ii) Determine the resistance of the device, X, when the current through it is 60 mA. (3 marks)

- (iii) When the device, X, is connected in the circuit below, the voltage across it is 0.70V.



Calculate the value of the resistance R. (3 marks)

- (c) The cell in Figure 10 has an emf of 2.1V and negligible internal resistance.

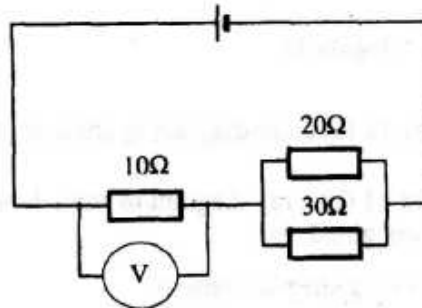


Figure 10

Determine the

- (i) total resistance in the circuit (2 marks)
- (ii) current in the circuit (1 mark)
- (iii) reading on the voltmeter. (2 marks)

16 (a) Figures 11 (a) and (b) show diagrams of the human eye.

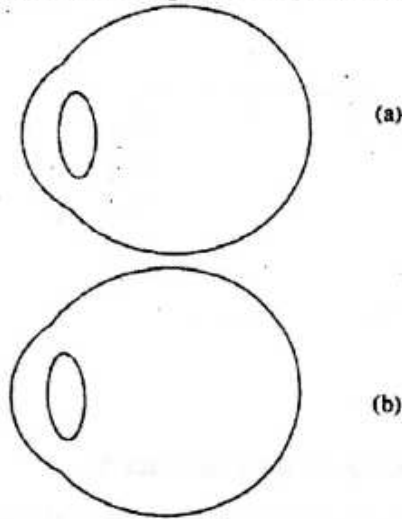


Figure 11

- (i) Sketch in Figure 11 (a) a ray diagram to show shortsightedness. (1 mark)
- (ii) Sketch in Figure 11 (b) a ray diagram to show how a lens can be used to correct the shortsightedness. (2 marks)

(b) Figure 12 shows the features of a simple camera.

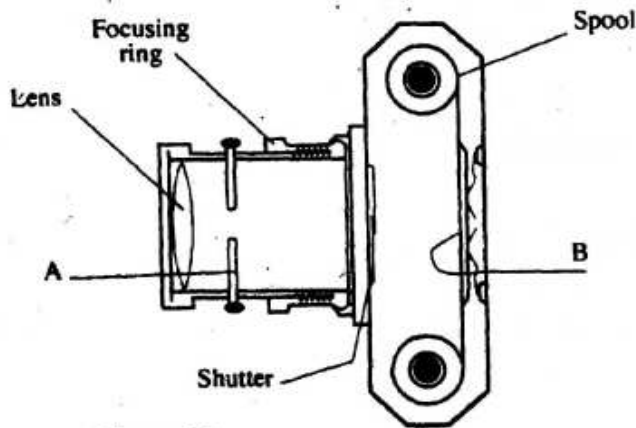


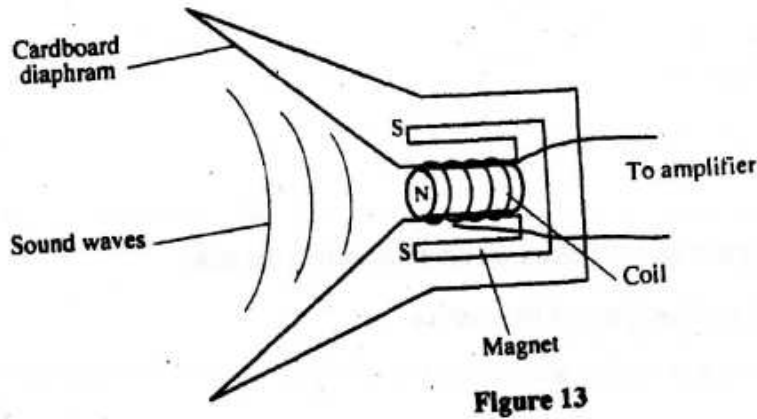
Figure 12

- (i) Name the parts labelled A and B. (2 marks)
- (ii) A still object is placed at a certain distance from the camera. Explain the adjustments necessary for a clear image of the object to be formed. (2 marks)
- (iii) State the functions of the shutter and the parts labelled A and B. (3 marks)

Shutter.....

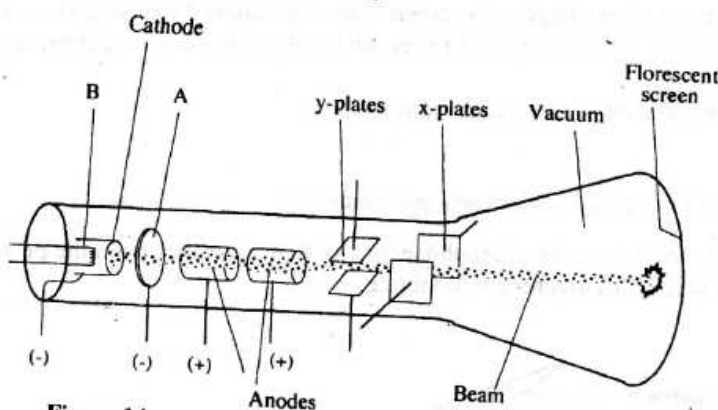
- (c) A lens forms a clear image on a screen when the distance between the screen and the object is 80cm. If the image is 3 times the height of the object, determine:
- (i) the distance of the image from the lens (3 marks)

- 17 (a) State Lenz's Law of electromagnetic induction. (1 mark)
- (b) Figure 13 shows a simple microphone in which sound waves from the person talking cause the cardboard diaphragm to vibrate. (3 marks)



- (i) Explain how a varying current is induced in the coil when the diaphragm vibrates. (3 marks)
- (ii) State two ways in which the induced current in (i) above can be increased. (2 marks)
- (c) A transformer with 1200 turns in the primary circuit and 120 turns in the secondary circuit has its primary circuit connected to a 400V a.c source. It is found that when a heater is connected to the secondary circuit, it produces heat at the rate of 600w. Assuming 100% efficiency, determine the:
- (i) voltage in the secondary circuit; (2 marks)
- (ii) current in the primary circuit; (2 marks)
- (iii) the current in the secondary circuit; (1 mark)

- 18 (a) Figure 14 shows the features of a cathode ray tube.



**Figure 14**

- (i) Name the parts labelled A and B. (2 marks)

A..... B.....

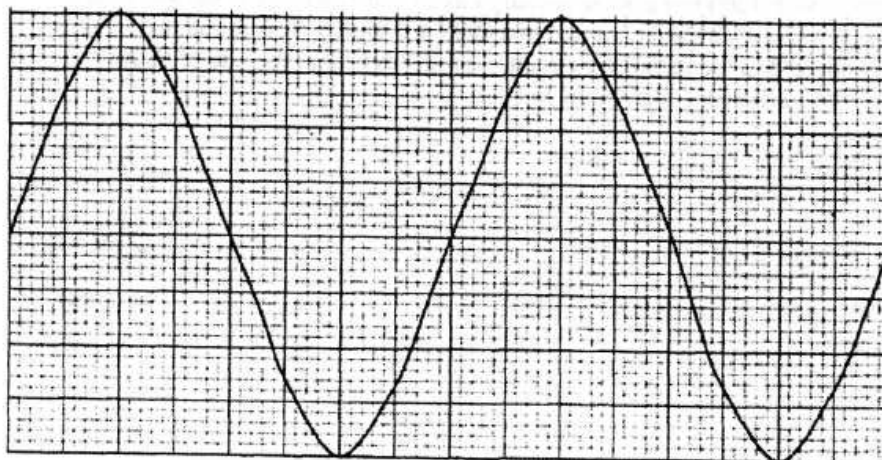
- (ii) Explain how the electrons are produced in the tube. (2 marks)

- (iii) State **two** functions of the anodes. (2 marks)

- (iv) At what part of the cathode ray tube would the time base be connected? (1 mark)

- (v) Why is a vacuum created in the tube? (1 mark)

- (b) The graph in Figure 15 was obtained on a cathode ray oscilloscope (CRO) screen when the output of an a.c generator was connected to the input of the CRO. The time-base calibration of the CRO was set at 20 milliseconds per centimetre and the y-gain at 5 volts per centimetre.



- (i) Determine the peak voltage of the generator. (2 marks)
- (ii) Determine the frequency of the voltage. (3 marks)
- (iii) On the same grid, redraw the graph for the same voltage when the time base calibration is set at 40 milliseconds per centimetre and the y-gain at 10 volts per centimetre. (Show at least one complete cycle). (2 marks)

- (b) Figure 12 shows masses A, B and C placed at different points on a rotating table. The angular velocity,  $\omega$ , of the table can be varied.

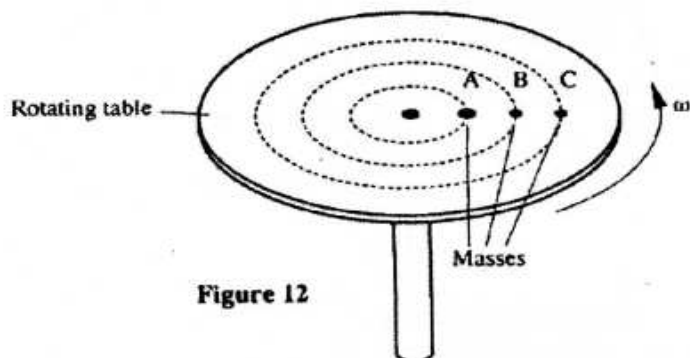


Figure 12

- (i) State two factors that determine whether a particular mass slides off the table or not. (2 marks)
- (ii) It is found that the masses slide off at angular velocities  $\omega_A$ ,  $\omega_B$ , and  $\omega_C$  respectively. Arrange the values of  $\omega_A$ ,  $\omega_B$ ,  $\omega_C$  in decreasing order. (1 mark)
- (c) A block of mass 200 g is placed on a frictionless rotating table while fixed to the centre of the table by a thin thread. The distance from the centre of the table to the block is 15 cm. If the maximum tension the thread can withstand is 5.6 N, determine the maximum angular velocity the table can attain before the thread cuts. (4 marks)
- 19 (a) State the law of floatation. (1 mark)
- (b) Figure 13 shows a simple hydrometer.

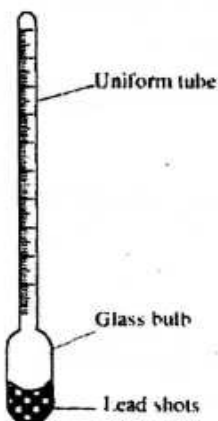


Figure 13

- (i) State the purpose of the lead shots in the glass bulb. (1 mark)
- (ii) How would the hydrometer be made more sensitive? (1 mark)

(iii) Describe how the hydrometer is calibrated to measure relative density. (2 marks)

(c) Figure 14 shows a cork floating on water and held to the bottom of the beaker by a thin thread.

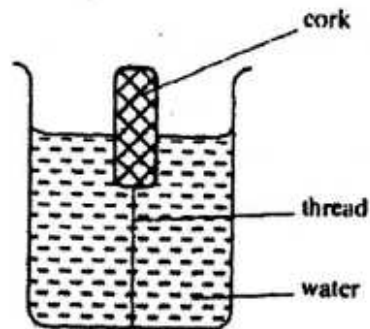


Figure 14

(i) Name the forces acting on the cork. (3 marks)

(ii) Describe how each of the forces mentioned in (i) above changes when water is added into the beaker until it fills up. (3 marks)