NAME _____ **INDEX NO.** _____

CANDIDATE'S SIGNATURE _____

DATE _____

232/1
PHYSICS
PAPER 1
(THEORY)
JULY/AUGUST 2011
2 HOURS

KANGUNDO DISTRICT FORM 4 MULTILATERAL EXAM
Kenya Certificate of Secondary Education
PHYSICS
PAPER 1
THEORY
2 HOURS

INSTRUCTIONS TO CANDIDATES

1. Write your name and index numbers in the spaces provided.
2. This paper consists of TWO sections, A and B.
3. Answer all the questions in sections A and B in the spaces provided.
4. All working MUST be clearly shown in the spaces provided.
5. Non-programmable silent electronic calculators and KNEC mathematical table may be used.

For examiner's use only

SECTION	QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1 – 12	25	
B	13	10	
	14	13	
	15	12	
C	16	13	
	17	7	
TOTAL SCORE		80	

This paper consists of 13 printed pages

Turn Over

SECTION A (25 MARKS)

1. Figure 1 shows water in a measuring cylinder calibrated in cm^3

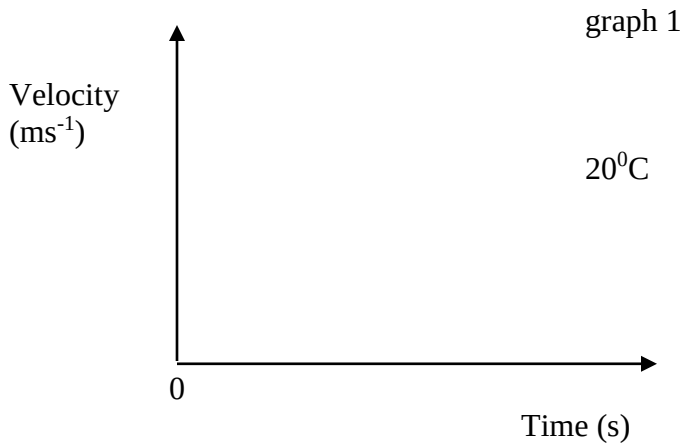
An object of volume $0.00002m^3$ is lowered gently until it is completely immersed in water and settles at the bottom of the cylinder. Indicate on the diagram in figure 1 the new level of water. (1mk)

2. Figure 2 (a) and 2 (b) show two narrow glass tubes P and Q dipped in water and mercury respectively.
P water Fig 2 a Q Mercury Fig 2b

(i) Indicate on the glass tubes P and Q the levels of the liquids. (2mks)

(ii) Explain why the levels of the liquids appear as indicated in (i) above (1mk)

3. The graph 1. below shows the motion of a ball bearing falling through a glycerine column.



(a) On the same axis sketch a graph to show the motion of the same ball bearing when the temperature of the glycerine was increased from 20^{0}C to 60^{0}C. (1mk)

(b) Explain the difference in the motion of the ball bearing in regard to temperature change. (1mk)

4. State two reasons why gases diffuse faster than liquids. (2mks)

5. The set-up in figure 3 shows a spring balance supporting a metallic cube.
Fig. 3

(a) If the pointer reading was 4.6N, what adjustment should be done to the set-up to make the pointer reading less than 4.6N, provided the mass and the spring constant remain unchanged? (1mk)

(b) Explain how the adjustment in (a) above makes the spring balance to read less than 4.6N (1mk)

6. One property of a liquid that is considered while constructing a liquid – in – glass thermometer is that the liquid should expand more than the glass for the same temperature change. State two other properties of the liquid that are considered. (2mks)

7. Figure 4 shows a light wheel fixed on an axle such that it can rotate. The wheel is just in contact with the water surface.
Light wheel Axel Water Tank Heat Fig 4

(a) State the direction of the motion of the wheel. (1mk)

(b) Explain why the wheel rotates in such direction stated in (a) above. (1mk)

8. Figure 5 below shows a uniform metallic rod of length 4m and weight 10N. The rod is balanced at a distance d from one end by a mass of 3kg.
3kg d Fig.5

Determine the value of d. (3mks)

9. Figure 6 below represents a displacement time graph for a motion of an object.

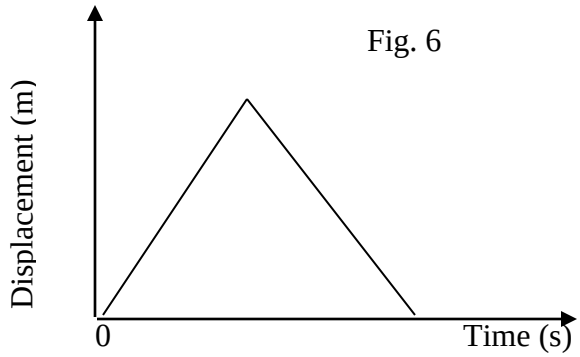


Fig. 6

Sketch the velocity – time graph for the motion of the object. (1mk)

10. Figure 7 below shows an oil drum of mass 180kg being pushed up an inclined plane 3m long to a truck of 1.5m high. A constant force, F, of 1200N is applied.

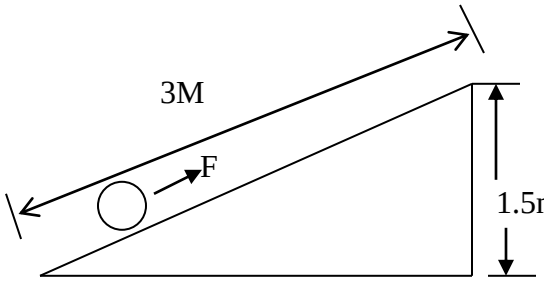


Fig. 7

Determine the efficiency of the machine. (3mks)

11. Figure 8 below is a manometer containing water. Air is blown across the mouth of one tube and the levels of water changes as shown below.

Air blown Water Fig. 8

Explain why the level of water in the left limp of the manometer is higher. (2mks)

12. Figure 9 below shows energy transformation chain of a lighting system of a bicycle.

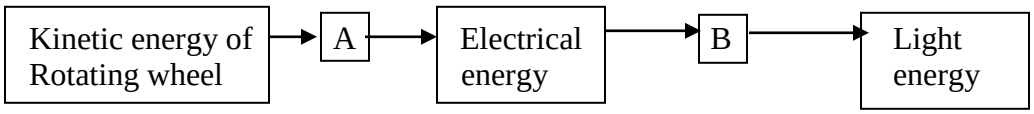


Fig. 9

Name the transducers A and B (2mks)

A _____

B _____

SECTION B (55 MARKS)

13. Figure 10 below was set up to investigate how length Lof enclosed gas column varied when masses of different sizes where placed on piston A.
Liquid

Varying masses, m, were placed on piston A and corresponding lengths L, of the enclosed gas column recorded. The results obtained are as shown in table 1 below. The temperature was kept constant through out the experiment.

Mass,m, (kg)	1.0	2.0	3.0	4.0	5.0	6.0
Length L, (cm	5.0	3.3	2.5	2.0	1.7	1.4
$^{I}/_{L}$ (cm^{-1})						

Table 1

(i) Complete the table 1 by filling the missing values of $^{I}/_{L}$. (2mks)

(ii) On the grid provided plot a graph of $^{I}/_{L}$ (y – axis) against mass M. (5mks)

(iii) From your graph, determine the volume of the enclosed air when no mass, m, placed on the piston A. (3mks)

14. (a) Define the term specific latent heat of vaporizations of a substance (1mk)

(b) Fig. II below shows a set –up used to determine the specific latent heat of vaporization of water.
Fig. 11

Describe how you would use the apparatus above to determine the specific latent heat of vaporization of water, stating any assumption made and the measurement one would take. (6mks)

(c) 60g of steam at 100^0C was passed into cold water at 22^0C. The temperature of the water rose to 62^0C. determine the mass of cold water used. Specific heat capacity of water = $4200JKg^{-1}k^{-1}$ and Lv = $2.26 \times 10^6 JKg^{-1}$ (4mks)

(d) State two factors that would raise the boiling point of water. (2mks)

15. (a) Two girls, Jane and Mary were playing a game with a rope tied to a fixed post. Mary was at a position nearer the post than Jane as shown in the figure 12

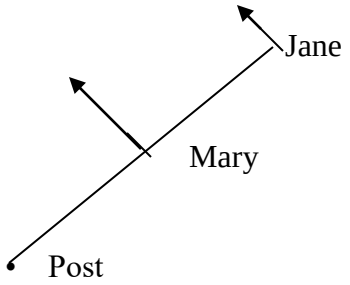


Fig. 12

The rope was held tightly and they both started to run in anticlockwise direction at the same time.

(i) Explain why Jane had to run fast than Mary for the rope to remain taut. (2mks)

(ii) State two factors that a motorist moving round a bend track depends on to avoid skidding. (2mks)

(b) The tension developed in a rope is 25N when an object of mass 500g is tied to one end of the rope and whirled in a horizontal circle with a constant speed of $10ms^{-1}$. Determine the radius of the circle. (3mks)

(c)A ball of mass 30g is attached to the end of a string while the other end of the string is held in the hand. The length of the string is 50cm. Determine

(i) The minimum speed at which the ball will describe a vertical circle. (2mks)

(ii) The tension on the string at the lowest point of the motion at the speed in (i) above. (3mks)

16. (a) State the law of flotation. (1mk)

(b) Figure 13 below show un graduated hydrometer.
A B Thin/Narrow glass stem Bulb Lead shots Fig. 13

(i) Calibrate the hydrometer between points A and B for values of relative densities 0.7 to 1.2 (2mks)

(ii) State the reason why the glass stem is made narrow as possible. (1mk)

(iii) Give two reasons why the bulb is weighted with lead shots. (2mks)

(c) In an experiment to determine the density of a liquid, a uniform metal cylinder of cross-sectional area $3.4cm^2$ and length 4.5cm was hung from a spring balance and lowered gradually into the liquid as shown in figure 14.

Fig.14

The upthrust was calculated from the spring balance and found to be 0.5N when the metal cylinder was completely sub-merged in the liquid. Determine;

(i) Volume of the liquid displaced. (2mks)

(ii) Mass of the liquid displaced. (2mks)

(iii) Density of the liquid. (3mks)

17. Figure 15 below shows a spinning ball as it moves through air in the direction shown.

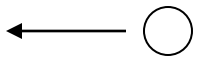


Fig. 15

(a) Draw the streamlines of air around the ball and show the direction in which it spins such that an upward force is created. (2mks)

(b) When spraying a field with water using a hose pipe it is common to reduce the pipes opening in order for the water to reach the furthest point. Explain how this is achieved. (2mks)

(c) Figure 16 below shows water moving from one end of a pipe to the other end. The cross-section area A_1 is $6cm^2$ and A_2 is $2cm^3$. If the flow rate past each section is 4.0×10^2 cm^3s^{-1}.
Determine velocities V_1 and V_2. (3mks)
A_1 A_2 Fig. 16

232/1
PHYSICS
PAPER 1
(THEORY)
JULY/AUGUST 2011
2 HOURS

KANGUNDO DISTRICT FORM 4 MULTILATERAL EXAM
Kenya Certificate of Secondary Education
PHYSICS
PAPER 1
THEORY
MARKING SCHEME

SECTION A (25 MARKS)

1. $0.00002m^3 = 20cm^3$

√1 for correct indication of the new level.

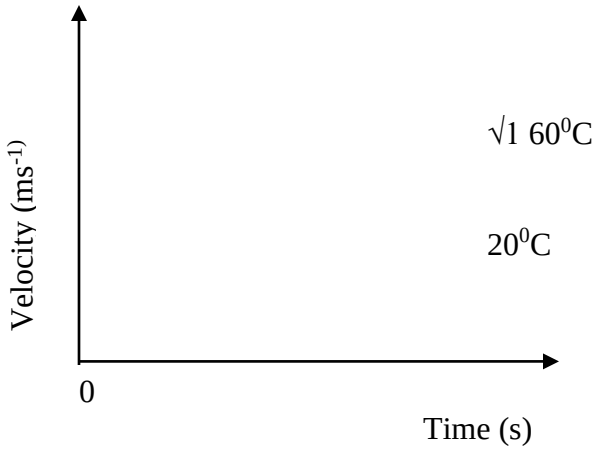
New level = Initial value (reading) + volume of object
= (15 + 20) cm^3
= $35cm^3$

2. (a) (i)

(ii) Water rises in the narrow glass tube because the adhesive forces between water and glass molecules are greater than the cohesive forces between water molecules.
Mercury falls in the narrow glass tube because the cohesive forces in mercury molecules are greater than the adhesive forces between mercury and glass molecules.
NB: √1mk for one correct explanation

This paper consists of 6 printed pages

3. (a)



(b) Temperature increase, decreases the viscosity of glycerine. This makes the ball to move with greater initial velocity√1 thus attaining a higher terminal velocity.

4. - Have low density.√1
- High kinetic energy.√1 any two correct award each √1
- Weak cohesive forces.

5. (a) Immerse the metal cube partially or wholly in water or any other liquid.√1

(b) When the cube is immersed in a liquid it experiences an upthrust√1 making the resultant downward force less than 4.8N

6. - Should be visible.√1
- Should not wet the glass.√1 any correct two award each√ 1
-Good thermal conductor.

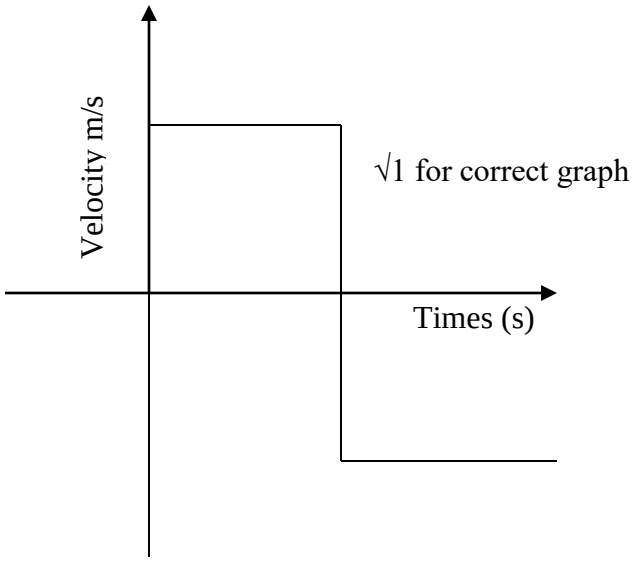
7. (a) The Wheel rotates in the anticlockwise √1direction.

(b) When water is heated at the left lower part of the tank, it expands and becomes less dense. This sets up convectional √1currents in clockwise direction thus making the wheel to rotate in the opposite direction.

8.

Anticlockwise moments = clockwise moments
30d = W (2 – d)√1
30d = 10 (2-d)
30d = 20-10d√1
40d = 20
D = 0.5m.√

9.



√1 for correct graph

10. % Efficiency $= \frac{\text{M.A}}{\text{V.R}} \times 100\%$

M.A $= \frac{\text{Load}}{\text{Effort}}$

$= \frac{1800}{1200}$

$= 1.5$√1

V.R $= \frac{\text{Effort distance}}{\text{Load distance}}$

$= \frac{3}{1.5}$

$= 2$√1

% E $= \frac{1.5}{2} \times 100\%$

% E $= 75\%$√1

11. The fast flowing air lowers√1 the pressure above the water on the left limp. The excess √1atmospheric pressure acting on the right limp pushes the water up.

12. A – Dynamo√1
B – Bulb√1

SECTION B (55 MARKS)

13. (i)

$^{I}/_{L}$ (cm^{-1})	0.20	0.30	0.40	0.50	0.59	0.71

Award 2mks for all correct values

(ii) Refer to the graph

(iii) $M = 0$

$^{I}/_{L} = 0.1cm^{-1}$

$L = \frac{1}{0.1cm^{-1}}$

$L = 10cm\surd1$

But the cross – section area of piston B = $10cm^2$

Volume of enclosed gas = A_BL

$= 10cm^2 \times 10cm\surd1$

$= 100cm^3\surd1$

14. (a) Is the quantity of heat required to change a unit mass of the substance from liquid to vapour without change of temperature.√1

(b) – Switch on the heater and allow heating to continue until condensed water issues down the tube T at a constant rate.√1

- Weigh the beaker and place it under the tube to collect the condensed water and simultaneously start timing√1
- When a measurable quantity of water has collected in the beaker, remove the beaker as you stop the watch and at the same time record both the ammeter and voltmeter √1reading. Record the time and the weight of the beaker and condensed water.√1

Results

Ammeter reading = 1, voltmeter reading = V

Mass of empty beaker = m,

Mass of condensed water + beaker = m_2

Time taken to collect condensed water = t.

Assume.

- All heat given by the heater coil is used in vaporizing the water.√1 for the assumption
- All the steam is condensed.

Heat supplied by the heater = heater used to vaporize the water.

$VIt = (m_2 - m_1) LV$

$LV = \frac{VIt}{(M_2-m_1)}\surd1$ for the equation used to calculate Lv

LV = Specific latent heat of vaporization.

(c) Heat gained by water = heat lost by√1 steam + heat lost by condensed steam

$M_W C_W D\theta$ = M x LV + M x $C_W D\theta$

Steam steam

M_W x 4200 x (62 – 22) = $\frac{60}{1000}$ x 2.26 x 10^6 + $\frac{60}{1000}$ x 4200 x (100 – 62)

√1

$168000M_W$ = 135600 + 9576√1

M_W = 864g√1 (0.864kg)

(d) – presence of impurities.√1

- Change in pressure.√1

15. (a) (i) Since both girls have equal angular velocities√1. Jane has to run faster (greater linear velocity) to compensate for her larger radius/distance√1 from the post.

W = $\frac{\text{V greater}}{\text{r larger}}$

Constant

(ii) – Friction between the motor tyres and road surface.√1

- The banking angle of the bend track.√1

(b) Tension = centripetal force

$T = \frac{MV^2}{r}$√

$r = \frac{MV^2}{T} = \frac{0.5\ (10)^2}{2.5}$ √1= $\frac{50}{25}$

r = 2m√

(c) (i) V = $\sqrt{rg}$√1

$= \sqrt{0.5 \times 10}$

V = 2.24m/s√1

(ii) $T = \frac{MV^2}{r}$ + Mg √1

$= M\left(\frac{V^2}{r} + g\right)$

$= \frac{30}{1000}\left(\frac{(2.24)^2}{0.5} + 10\right)$√1

= 0.6011N√

16. (a) A floating body displaces its own weight of the fluid in which it floats

(b) (i) A√1 B√1 0.7 0.8 0.9 1.0 1.1 1.2

NB: The scale is non – uniform

- 0.7 to coincide with A and 1.2 with B

(ii) To increase the sensitivity of the hydrometer.√1

(iii) – To lower the position of C.O.G making it stable.√1
- Make it float upright in a liquid.√1

(c) (i) Volume of liquid = volume of the metal cylinder.√1
= Ah
= $3.4cm^2$ x 4.5cm
= $15.3cm^3$√1
Or $1.53 \times 10^{-5}m^3$

(ii) Weight of the liquid displaced = upthrust
W = 0.5N
But W = mg
Mg = 0.5√1
$M = {}^{0.5}/_{g} = \frac{0.5}{10}$
M = 0.05kg
= 50g.√1

(iii) Density of the liquid $= \frac{\text{Mass of liquid}}{\text{Volume of the liquid}}$√1
$= \frac{50g}{15.3cm^3}$√1
$= 3.268gcm^{-3}$√1
$= 3.268 \times 10^3\ Kgm^{-3}$

17. (a) Stream line close to one another Stream line spaced √1 for the direction of spinning √1 for streamlines

(b) Velocity is increased,√1 hence the water covers along distance.√1

(c) $A_1V_1 = A_2V_2 = \sqrt{}4.0 \times 10^2\ cm^3/s$
$V_1 = \frac{4.0 \times 10^2\ cm^3/s}{6\ cm^2}$
V_1 = 66. 67 cm/s√1
(0.67m/s)
$V_2 = \frac{4.0 \times 10^2\ cm^3/s}{4cm^2}$
= 100cm/s√1
(1.0m/s)

NAME _____ INDEX NO. _____

CANDIDATE'S SIGNATURE _____

DATE _____

232/2
PHYSICS
PAPER 2
(THEORY)
JULY/AUGUST 2011
2 HOURS

KANGUNDO DISTRICT FORM 4 MULTILATERAL EXAM
Kenya Certificate of Secondary Education
PHYSICS
PAPER 2
THEORY
2 HOURS

INSTRUCTIONS TO CANDIDATES

1. Write your name and index numbers in the spaces provided above.
2. This paper consists of TWO sections, A and B.
3. Answer all the questions in sections A and B in the spaces provided.
4. All working MUST be clearly shown.
5. Non-programmable silent electronic calculators may be used.

* Where needed take $C = 3.0 \times 10^{8}$ m/s
$e = 1.6 \times 10^{-19}$ C
$Me = 9.1 \times 10^{-31}$ kg

For examiner's use only

SECTION	QUESTIONS	MAXIMUM SCORE	CANDIDATE'S SCORE
A	1-14	25	
B	15	13	
	16	12	
C	17	11	
	18	9	
	19	10	
TOTAL SCORE		80	

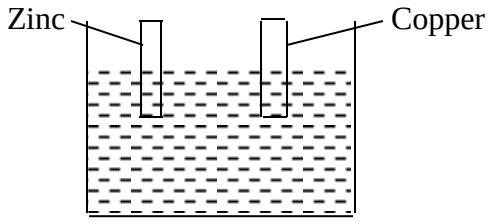
This paper consists of 12 printed pages

Turn Over

SECTION A (25MARKS)

1. Figure 1 shows a simple cell made of copper and zinc electrodes dipped in dilute sulphuric acid.

Figure 1



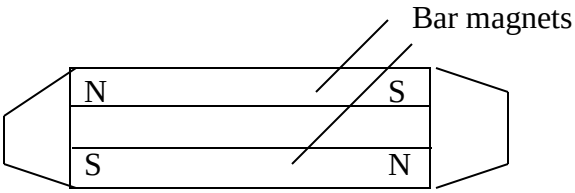
Identify the Cathode and Anode (2mks)

Anode _____

Cathode _____

2. Figure 2 shows how bar magnets are stored. Identify the poles induced in the keepers. (1mk)

Figure 2.



3. A wire made from some alloy has a resistance of 2 ohms per metre. What length of this wire would be required to make a heating coil of rating '240v, 1kw? (2mks)

4. Use a ray diagram to show how a converging mirror forms a virtual image. (2mks)

5. Distinguish between thermionic and photoelectric emission (1mk)

6. Figure 3 below shows a permanent magnet suspended by a spring. State with a reason the behaviour of the magnet when the switch is closed. (2mks)

7. A man standing between two parallel cliffs claps his hands. He hears the first echo 0.3sec later and the next echo after a further 0.2sec. If the velocity of sound in air is 300m/s. Calculate the distance between the walls. (3mks)

8. Use the diagram below to answer questions that follow.
Figure 4

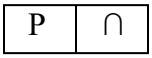
Figure 4 above shows coil carrying current in a magnetic field.
Using symbols show the direction of the field lines and force acting on the coil. (2mks)

9. The figure below shows a 6v battery connected to an arrangement of resistors. Determine the current flowing through the 2Ω resistor. (3mks)
6Ω 6Ω 2Ω 6v Figure 5.

10. An uranium 236 isotope has a symbol $^{236}_{92}U$. When bombarded by a neutron, it splits to give Substance K and L and 2 neutrons. Calculate the values of a and b in the equation below. (2mks)

$$^{236}_{92}U + {}^{1}_{0}n \longrightarrow {}^{95}_{56}K + {}^{a}_{b}L + 2\,{}^{1}_{0}n$$

11. The diagram below shows a junction diode

Figure 6. 

Complete the diagram to show how the diode can be connected in a reverse bias mode. (1mk)

12. Arrange the following radiations in order of increasing wavelengths: (1mk)
Microwaves, Gamma rays, purple light, ultra violet, and infra red.

13. What is polarization as used in simple cells? (1mk)

14. You are provided with a circular soft iron ring, long length of wire, galvanometer, three cells, rheostat and a switch. In the space provided sketch how you could assemble a step up transformer. (2mks)

SECTION B: (55MARKS)

Answer ALL the questions in this section in the spaces provided

15. (a) Fig 7 below represents part of the main circuit.

Figure 7

(i) It is not advisable to fix a fuse on the neutral line. Explain (2mks)

(ii) Explain why there are fuses of different ratings in the distribution box. (2mks)

(b) A heater is rated 500W is used to heat water for 6 hours. Calculate the cost of electricity at 90cts per unit. (3mks)

(c)Give a reason why transmission of electric power is done at very high voltage. (1mk)

(d) Figure 8 below shows connection of a three pin plug.
Green Red Black Fuse 10A Figure 8

(i) Identify any two mistakes in these wires. (2mks)

(ii) Suggest what would happen if this plug was connected to the mains of the socket. (1mk)

(iii) Give two reasons why the earth pin is normally longer than other two pins. (2mks)

16. (a) Define capacitance. (1mk)

(b) Describe how the type of charge on a charged metal rod can be determined. (3mks)

(c) The figure 9 below shows a hollow positively charged sphere with a metal disc attached to an insulator placed inside

Insulator Metal disc Figure 9

State what would happen to the leaf of an uncharged electroscope if the metal disc were brought near the cap of electroscope. Give reason for your answer. (2mks)

(d) The figure 10 below shows capacitors connected to a DC supply.

Figure 10 12v 2uF 2uF 3uF

Determine

(i) The charge stored in the 3uF capacitor. (3mks)

(ii) The resultant capacitance of the arrangement. (3mks)

17. (a) State differences between longitudinal and transverse waves. (2mks)

(b) The figure below shows a transverse wave traveling along the horizontal axis

A X(cm)

Determine

(i) Wavelength of the wave in metres. (2mks)

(ii) Amplitude of the wave. (1mk)

(iii) If the time taken by the wave to move from O to A is 0.02 seconds. Determine

(i) Frequency of the wave (3mks)

(ii) Speed of the wave (2mks)

(c) If the frequency of the wave is doubled. State what happens to the energy of the wave if the amplitude remains constant. (1mk)

18. The fig 11 below shows apparatus used to produce x – rays
Figure 11

Name the parts marked A and B (2mks)
A _____

B _____

(b) Briefly explain how x-ray are produced in the x-ray tube. (2mks)

(c) An x-ray tube is operating with an anode potential of 15KV and a current of 10mA.
(i) Explain how the intensity of x-rays from such a tube may be increased (1mk)

(ii) Explain how penetrating power of –rays from such a tube may be increased (1mk)

(iii) Calculate the number of electrons hitting the anode per second. (3mks)

19. The figure below represents a graph of stopping potential, Vs (v) against frequency (Hz)
Frequency (Hz) $x10^{14}$ 0 1 2 3 4 5 6 7 8 9 10 11 12 0.5 1.0 1.5 2.0 2.5 3.0
-0.5 -1.0 -1.5 -2.0 -2.5 -3.0

(a) From the graph determine:
(b) (i) Plank's constant, h (3mks)

(ii) Work function of the metal in electron volts (3mks)

Figure 12 shows a cell. Use it to answer questions that follow:
Figure 12 Anode

(i) Name the type of cell (1mk)

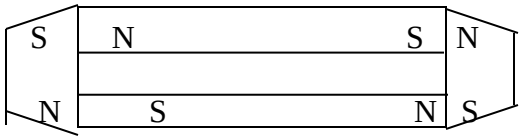
(ii) Label the cathode (1mk)

Sketch the circuit symbol for a photoconductive cell (2mks)

232/2
PHYSICS
PAPER 2
(THEORY)
JULY/AUGUST 2011
2 HOURS

KANGUNDO DISTRICT FORM 4 MULTILATERAL EXAM
Kenya Certificate of Secondary Education
PHYSICS
PAPER 2
THEORY
MARKING SCHEME

1. Cathode – Zinc√1
   Anode - Copper√1 max 2 mks

2. 

√1 (All correctly labeled)

3. $\Rightarrow P = \frac{V^2}{R}$
   $= \frac{240^2}{1000}$
   $= 57.6\Omega$√1
   Length $= \frac{57.6\Omega}{2\ \Omega/m} = 28.8M$√1
   max 2 mks

4.

5.

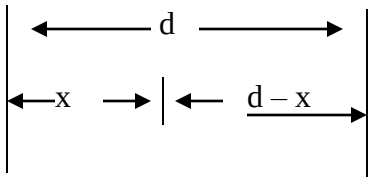
Thermionic emission	Photo-electric effect (emission)
- Energy is supplied as Heat	- Heat is inform of radiation of the electromagnetic spectrum.√1

(Any correctly stated)

6. - Magnet moves away from the solenoid√1
   - End Y acquires a S – pole which repels the S-pole of the permanent magnet. √
   Max 2mks

This paper consists of 4 printed pages

Turn over

7. 

$300 = \frac{2x}{0.3}$√1

$300 = \frac{2(d-45)}{0.5}$√1

x = 45m

d = 120m√1 max 3mks

8. N S √1 correct magnetic field lines √1 correct direction of motion field

9. $R_T = \frac{6 \times 2}{6 + 2} + 6$

= 7.5Ω√1

Total current = $\frac{V}{R_T}$

= $\frac{6V}{7.5\Omega}$

= 0.8A √1

V1 = 0.8A x 1.5Ω

= 1.2V

I across 2Ω

= $\frac{1.2}{2\Omega}$

= 0.6A√1 max 3 mks

10. a = 140√1

b = 36√1 max 2mks

11. P ∩ √1 correct drawing only

12. Gamma rays, ultraviolet, purple light, infrared, microwaves. √1 correct arrangement

13. Covering of copper plate by hydrogen bubbles thus cutting the current flow.√1

14. √1 correct drawing √1 correct number of turns.

SECTION B (55 MARKS)

15. (a) (i) – It is not at a higher potential,√1 so incase of fault, an electrical device would still be live hence dangerous.√1 max 2mks

(ii) There are different circuits√ and each carries a different amount of current.√ max 2mks

(b) Cost of electricity

$= \frac{500}{1000} \times 6 \times \frac{90}{100}$√1

= sh. 2.70√1

Accept sh 2.7√

Max 3mks

(c) To minimize power loss 1mk

(i) The fuse is usually placed on live wire, which is usually red or brown not black as this case. 1mk

The earth wire is usually coloured green or green with yellow stripes not red as this case.√ 1mk

(ii) The appliance may blow up/burns (don't accept spoils or damages)√ 1mk

(iii) It helps in opening the holes for the live and neutral pins. 1mk

- It earths the appliance in order to protect the user from the shock√ 1mk

16. (a) Ratio of charge to its potential or charge per unit potential difference.√ 1mk

(b) – Bring the metal rod close to the cap√1 of charged electroscope whose charge is known

- If the leaf collapses, then the charges on the metal is opposite that of the electroscope.√ 1mk

(c) – No change on the leaf√ 1mk

- Charge is always distributed on the outside of a surface and hence the disc carries no charge√ 1mk

(d) (i) Q = CV √ 1mk

= 3 x 12√ 1mk

= 36uF √ 1mk

(ii) $\frac{1}{C_S} = \frac{1+1}{2 \quad 2}$

C_S = 1Uf √

C_T = 1 + 3√

= 4uf √

17. (a) – Longitudinal – particles of transmitting medium vibrate in the direction of the wave.√ 1mk

- Transverse wave – particles of the transmitting medium vibrate at right angles to the direction of the wave.√ 1mk

max 2mks

(b) (i) 0.04m √1mk correct reading

√ correct units

(ii) 2cm √ 1mk accept also in metres

(iii) (i)$F = \frac{I}{T}$ √ 1mk

$= \frac{1}{0.01}$√

= 100Hz√ 1mk

(ii) $V = \lambda F \surd 1$ 1mk

$= 0.04 \times 100$

$= 4m/s \surd$ 1mk

Max 2 mks

(c) If frequency is doubled the energy is also doubled.$\surd$ 1mk

18. (a) A - Cathode$\surd 1$

B - Anode$\surd 1$

(b) - Cathode is heated by a low voltage to produce electrons.$\surd 1$

- Electrons produced are accelerated by high voltage and on hitting the target x-rays are produced.$\surd 1$

(c) (i) By increasing the amount of heating current.$\surd 1$

(ii) Increasing the p.d between the Cathode and Anode.$\surd$

(iii) $I = n \times e \surd 1$

$n = \frac{1}{e} = 0.01$

$1.6 \times 10^{-19} \surd 1$

$= 6.25 \times 10^{16}$ electrons.$\surd 1$

Max 3mks

19. (a) (i) $\frac{h}{e}$ = gradient$\surd 1$

$\frac{\Delta Y}{\Delta X} = \frac{(25 - 0)}{(12.6) \times 10^{-14}} \surd 1$

$= \frac{25}{6} \times 10^{-14}$

$H = \frac{25}{6} \times 10^{-14} \times 1.6 \times 10^{-19} \surd 1$

$= 6.667 \times 10^{-34} JS \surd 1$

(ii) $Wo = hfo \surd 1$

$= 6.67 \times 10^{-34} \times 6.0 \times 10^{14} \surd 1$

$= 4.0 \times 10^{19} J \surd 1$

(iii) (i) – Photoemissive cell$\surd 1$

Cathode

NAME _____ INDEX NO. _____

CANDIDATE'S SIGNATURE _____

DATE _____

232/3
PHYSICS
PAPER 3
(PRACTICAL)
JULY/AUGUST 2011
2 ½ HOURS

KANGUNDO DISTRICT FORM 4 MULTILATERAL EXAM
Kenya Certificate of Secondary Education
PHYSICS
PAPER 3
PRACTICAL
2 ½ HOURS

INSTRUCTIONS TO CANDIDATES

Answer ALL the questions in the spaces provided in this question paper
You are supposed to spend the first 15 minutes of the 2 ½ hours allowed for this paper reading the whole paper carefully before commencing your work.
Marks are given for clear record of the observations actually made their suitability and accuracy and the use made of them.
Candidates are advised to record their observations as soon as they are made.
Mathematical tables and electronic calculators may be used.

FOR EXAMINER'S USE ONLY

Question 1

Maximum score	**20**
Candidate's score	

Question 2

Maximum score	**20**
Candidate's score	

This paper consists of 8 printed pages

Turn Over

Question 1

PART 1

(a) You are provided with

- A boiling tube
- Some sand or gravel
- Some liquid L
- A balance (for sharing)
- A half metre rule

You are required to determine the density of the liquid as follows

(i) Measure the total length of Y of the tube

Fig 1

(ii) Put some little sand in the boiling tube and place it in liquid L. Add some sand a time until the tube floats freely upright in the liquid.

(iii) Measure the length x of the tube above liquid level

X = …… (cm) (1mk)

X = …… (m) (1mk)

(iv) Determine the length of the tube immersed in the liquid

Y – X = …….. (1mk)

(v) Wipe off the liquid from the outside of the tube and measure the mass of the tube with its contents

M = ……. Kg (1mk)

(vi) Using a vernier calipers measure the outer diameter of the tube at about the middle.

d = …….. m (1mk)

(vii) Use your measurements to determine the density of the liquid L. Give your answer in SI. (3mks)

PART II

You are provided with the following

- A nicrome wire 1m long mounted on a mm scale
- One dry cell
- One ammeter (0 – IA)
- A switch
- A bulb in a bulb holder
- One voltmeter
- One cell holder
- 6 connecting wires
- A micrometer screwgauge

(i) Set up the circuit as shown in the figure 2 below

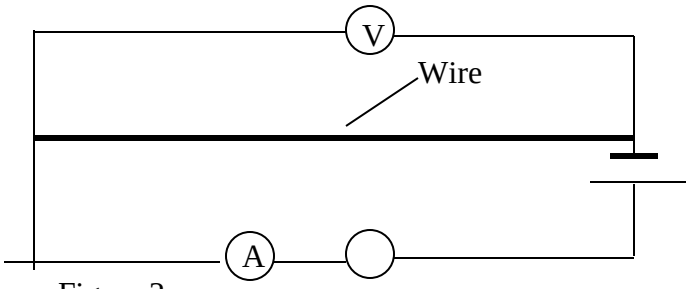


Figure 2.

Record the ammeter reading I = …….. (1mk)

Add voltmeter reading V = …… (1mk)

(ii) Using the micrometer screwgauge provided measure the diameter of the nichrome wire

d = ……. Metres (1mk)

(iii) Calculate the quantity Q where

$Q = \frac{8}{10}\left[\frac{V}{I}\right]\left[\frac{d^2}{L}\right]$ give its units take L = 1m (2mks)

Re – arrange figure 2 as follows

(a) Place the jockey 20cm from A and record the reading in the voltmeter.

(b) Repeat a for the following length 40cm, 60cm and 80cm.

(c) Record your readings on the table below

Length of the wire (cm)	Voltmeter reading in volts
20	
40	
60	
80	

Table 1 (2mks)

(d) Plot a graph of voltage (v) against (L) in cm. (5mks)

(e) Determine the slope (1mk)

Question 2

APPARATUS

- Rectangular block
- Half metre rule
- Soft board
- Four optical pins
- Plain sheet of paper

PROCEDURE

(a) Trace the outline of the glass block on the sheet of paper provided.

(b) Mark the point B on one of the longer edge of the traced outline of the block and using a setsquare, Construct a normal to the line representing the face at point B.

(c) Construct an incident ray AB with angle of incidence
(i) = 15^0.

(d) Replace the glass block and fix pins P_1 and P_2 along the line AB.

(e) Remove the block and trace the path of the ray A B C D.

(g) Measure the length L of BC in centimeters.

P_1 Fig 4 A

(b) Length of BC = L …… cm (1mk)

(i) Repeat the procedure for angles of incidence (i) = 27, 34, 40, 43, 50, 55 and 67 and Write your results in the table 1

Table 1

1	27	34	40	43	50	55	67
Sin i							
Sin^2i							
Length BC (L) (cm)							
L^2 (cm^2)							
$^I/_{L^2}$ (cm^{-2})							

(j) Complete the table (6mks)

(k) Plot a graph of $^I/_{L^2}$ against Sin^2i (5mks)

(l) Find the slope of the graph (3mks)

(m) Find y – intercept, c (2mks)

(n) Given that $C = {}^{1}\!/_{b^2}$, find the refractive index n of the glass block using the formula

$$n = \sqrt{\frac{1}{b^2 S}}$$ (3mks)

232/3
PHYSICS
PAPER 3
(PRACTICAL)
JULY/AUGUST 2011
2 ½ HOURS

KANGUNDO DISTRICT FORM 4 MULTILATERAL EXAM
Kenya Certificate of Secondary Education
PHYSICS
PAPER 3
PRACTICAL
MARKING SCHEME

1. **Q 1**

PART 1
(i) Y = 0.152m √1 ± 0.0005m
(ii) X = 0.045m √1 ± 0.0005m
(iii) Y – X = 0.107m √1
(iv) M = 0.0446kg √1 ± 0.005kg
(v) d = 0.023m√1 ± 0.0005m
(vi) Density = $\frac{\text{Mass displaced}}{\text{Volume displaced}}$

A floating body displaces its own mass of fluid = 0.0446kg
Volume of liquid displaced = Volume of test tube immersed.

$= \pi r^2 h$
$= 3.142 \times (0.0115)^2 \times 0.107\sqrt{1}$
$= 4.45 \times 10^{-5}\ m^2$

$d = \frac{0.0446}{4.45 \times 10^{-5}\sqrt{1}}$
$= 1002.2 kg/cm^3\sqrt{}$

PART II (a)
(i) I = 0.2A√1 ± 0.05A
V = 2.8V√1 ±0.1

(ii) d = 0.01mm√1 +0.005mm

(iii) Q = $1.12 \times 10^{-9}\sqrt{1}$
Working

$Q = \frac{8}{10} \left(\frac{2.8}{0.2}\right) \left(\frac{(1.0 \times 10^{-5})^2}{1m}\right) \sqrt{1}$

This paper consists of 4 printed pages

Turn Over

PART II (b)

Q 1 (d)

Voltage (v) Length (cm) 0 20 40 60 80 100 120 1.0 2.0 3.0

A – 1

S – 1

P – 2

L – 1

5mks

Slope = $\frac{\Delta Y}{\Delta X}$ = 0.01V/cm√√ 1

Q2

Y-axis $^{I}/_{L^2}$ cm $^{-2}$ X- axis Sin^2 i 0 4 8 12 16 20 24 28 $10x^{-3}$ 1.5 3.0 4.5 6.0 7.5 9.0 10.5 x10

Slope = $\frac{\Delta Y}{\Delta X}$ √√√ 3

= -0.165 + 0.02

- correct intervals√1
- correct evaluation√1
- accuracy

(-0.145 - - 0.185√1)

Ignore units

Axes both labeled (units)√1

Scale

Simple & uniform√1

Plotting each

½ mk

Max 4 pts√1

Line passing through at last 4 points√1

5mks

Length of the wire (cm)	Voltmeter reading in volts $\pm$ 0.1
20	1.8
40	2.2
60	2.4
80	2.6

@ ½

1	27	34	40	43	50	55	67
Sin i	0.454	0.559	0.643	0.682	0.766	0.819	0.921
Sin^2i	0.206	0.312	0.413	0.465	0.586	0.671	0.848
Length BC (L) (cm) $\pm$ 0.1 cm	6.5	6.7	6.8	6.9	7.2	7.3	8.0
L^2 (cm^2) $\pm$	42.25	44.89	46.24	47.61	51.84	53.29	64.00
$^I/_{L^2}$ cm^{-2}	0.024	0.022	0.022	0.021	0.019	0.018	0.015

@ ½ max 6 max

Y – Intercept C = 2.8×10^{-3} /cm^2

$$N = \sqrt{\frac{1}{b^2 \times \text{slope}}}$$

232/3
PHYSICS
PAPER 3
(PRACTICAL)
JULY/AUGUST 2011

KANGUNDO DISTRICT FORM 4 MULTILATERAL EXAM
Kenya Certificate of Secondary Education
PHYSICS
PAPER 3
PRACTICAL
CONFIDENTIAL INSTRUCTIONS

INSTRUCTIONS TO SCHOOLS

1. The information contained in this paper is to enable the head of school and the teacher in charge of physics to make adequate preparation for this year's physics practical examination.
   NO ONE ELSE should have access to this paper or acquire knowledge of it's contents. Great care MUST be taken to ensure that the information here in does not reach candidate either directly or indirectly.

2. The apparatus required by each candidate for the physics practical examination are set out on the next page. It is expected that the ordinary apparatus of physics laboratory will be available.

APPARATUS

QUESTION ONE.

PART 1

- A boiling tube
- Some sand or gravel
- Some liquid L (water)
- A balance (for sharing)
- A half metre rule
-

PART II

- A nichrome wire 1m long mounted on a mm scale (G32)
- Two dry cells
- One ammeter (0-1A)
- A switch
- A bulb in a bulb holder
- One voltmeter (0-5V)
- One cell holder
- 6 connecting wires
- A micrometer screwgauge
- Jockey

QUESTION TWO

APPARATUS

- Rectangular block
- Half metre rule
- Soft board
- Four optical pins
- Plain sheet of paper

This paper consists of 1 printed page