535/2
PHYSICS
PAPER 2
July/August 2018
$2^{1}/_{4}$ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

PHYSICS

Paper 2

2hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

- Answer any **five** questions.
- Any additional question(s) answered will **not** be marked.
- Mathematical tables and silent non- programmable calculators may be used.

These values of Physical quantities may be useful to you,

Acceleration due to gravity, g	=	$10ms^{-2}$
Specific heat capacity of water	=	$4200Jkg^{-1}K^{-1}$
Specific heat capacity of copper	=	$400Jkg^{-1}K^{-1}$
Specific latent heat of fusion of ice	=	$3.36 X 10^{5}Jkg^{-1}$
Density of water	=	$1000Kgm^{-3}$
Density of Mercury	=	$13,600Kgm^{-3}$
Speed of sound in air	=	$340ms^{-1}$

1. (a) (i) Define the term **density** and state its SI units. *(02 marks)*

(ii) Describe a simple experiment to measure the density of a piece of metal. *(03 marks)*

(b) State **Archimedes principle.** *(01 mark)*

(c) A piece of metal weighed 3.50N in air and when fully submerged in oil of density $800kgm^{-3}$ it weighed 3.10N.
Calculate the density of the metal. *(04 marks)*

(d) (i) Distinguish between **kinetic energy** and **potential energy.** *(02 marks)*

(ii) State the law of **conservation of energy.** *(01 mark)*

(iii) Describe the energy changes in a swinging simple pendulum. *(03 marks)*

2. (a) (i) Define the term **acceleration.** *(01 mark)*

(ii) Write down the equations of motion. *(03 marks)*

(b) A bullet is fired into a fixed block of wood resting on a smooth surface at a speed of $150ms^{-1}$. If it penetrated 0.08m before coming to rest;
Calculate its speed when it was 0.04m into the block. *(04 marks)*

(c) (i) Distinguish between **strong** and **brittle materials** and give **one** example of each. *(03 marks)*

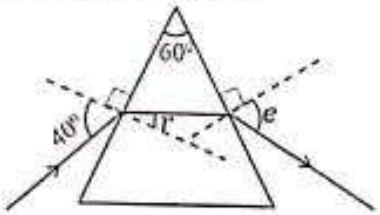
(ii) State the factors that determine the strength of a material. *(01 mark)*

(d) Describe a simple experiment to determine the thickness of an oil molecule. *(04 marks)*

3. (a) State the **laws of refraction.** *(02 marks)*

(b) White light is incident on the first refracting surface of an equilateral glass prism at an angle of 40^0 as shown in **figure 1** below.

Fig. 1



Given that the refractive index of the prism is 1.54, calculate,

(i) the angle of refraction **r** *(03 marks)*

(ii) the angle of emergence, ***e***. *(02 marks)*

(c) (i) Define the term **dispersion of light.** *(01 mark)*

(ii) Draw a clear diagram to show the formation of a white spectrum. *(02 marks)*

(iii) Explain why most hind car registration number plates are printed in black on a yellow back ground. *(03 marks)*

(d) (i) What is **power of a lens?** *(01 mark)*

(ii) Calculate the power of a concave lens of focal length 20cm. *(02 marks)*

4. (a) (i) Define **upper fixed point.** *(01 mark)*

(ii) Draw a labeled diagram showing how the upper fixed point can be determined. *(02 marks)*

(b) Explain why water is used in a car radiator? *(02 marks)*

(c) A piece of copper of mass 40g at 200°C is placed in a copper calorimeter of mass 60g and containing 50g of water at 10°C.
Determine the final temperature after stirring
(Ignore any heat losses to the surrounding) *(04 marks)*

(d) Describe the electrical method for determining the specific heat capacity of a metal block. *(06 marks)*

(e) State the function of the silvered walls of a thermos flask. *(01 mark)*

5. (a) (i) What are **x-rays?** *(01 mark)*

(ii) Draw a labeled diagram of a machine used for production of x-rays. *(03 marks)*

(b) (i) Define the term **"half-life"** of a radioactive nuclide. *(01 mark)*

(ii) The half-life of a nuclide is 24 days and has a mass of 0.64g.
Calculate the mass of the nuclide that will have decayed after 120days. *(04 marks)*

(c) Explain the changes that take place in the structure of element $^{226}_{88}X$ when two alpha particles are emitted. *(03 marks)*

(d) Briefly describe the mode of operation of a cathode ray oscilloscope (CRO). *(04 marks)*

6. (a) (i) What is an **echo?** *(01 mark)*

(ii) Explain why echoes are not heard in small rooms. *(02 marks)*

(b) Explain why reverberation in a concert hall can be desirable. *(02 marks)*

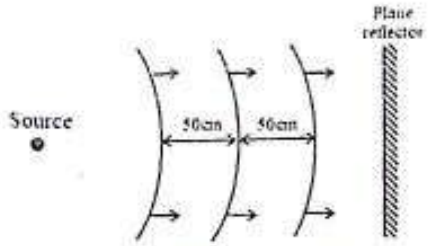
(c) Describe an experiment to show that sound waves require a material medium for their transmission. *(04 marks)*

(d) Define the following terms as applied to waves:
(i) **Wavelength.** *(01 mark)*

(ii) **Frequency.** *(01 mark)*

(e) The diagram in figure 2 shows circular waves propagating towards a plane reflector.

Fig. 2



(i) Copy the diagram and show how the waves are reflected. *(02 marks)*

(ii) If the wave is travelling with a velocity of $20ms^{-1}$, calculate its frequency. *(03 marks)*

7. (a) (i) What is a **magnetic line of force?** *(01 mark)*

(ii) List **two** properties of a magnet. *(02 marks)*

(b) (i) What is a **neutral point?** *(01 mark)*

(ii) Sketch a magnetic field pattern between the south poles of two bar magnets placed near each other. *(02 marks)*

(iii) State **two** ways of demagnetising a magnet. *(02 marks)*

(c) With the aid of a labeled diagram explain how a moving coil loudspeaker works. *(05 marks)*

(d) A milliameter has a resistance of 5Ω and gives a full scale deflection when a current of 0.015A flows through it. Calculate the value of the resistor to convert it into a voltmeter reading up to 15V. *(03 marks)*

8. (a) (i) State the **law of electrostatics.** *(01 marks)*

(ii) State **two** uses of a gold leaf electroscope. *(01 marks)*

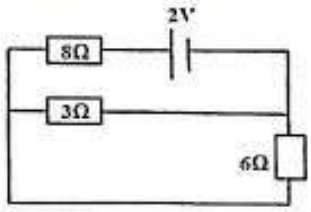
(iii) Describe how a gold leaf electroscope can be charged negatively by induction. *(03 marks)*

(b) Define the following terms:
(i) **electric cell.**
(ii) **internal resistance.** *(02 marks)*

(c) Explain why internal resistance of a primary cell is higher than that of a secondary cell. *(03 marks)*

(d) (i) Resistors of 8Ω, 6Ω and 3Ω are connected across a battery of e.m.f 2.0V and negligible internal resistance as shown in **figure 3** below;

Fig. 3



Calculate the current flowing through the 8Ω resistor. *(04 marks)*

(ii) Why is alternating current preferred to direct current in power transmission? *(02 marks)*

-END-

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WAKISSHA JOINT MOCK EXAMINATIONS

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INSTRUCTIONS TO CANDIDATES:

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Assume where necessary:

Acceleration due to gravity, g	=	$10ms^{-2}$
Specific heat capacity of water	=	$4200Jkg^{-1}k^{-1}$
Specific heat capacity of copper	=	$400Jkg^{-1}k^{-1}$
Specific latent heat of fusion of ice	=	$3.36 X 10^{5}Jkg^{-1}$
Density of water	=	$1000Kgm^{-3}$
Density of Mercury	=	$13,600Kgm^{-3}$
Speed of sound in air	=	$340ms^{-1}$

Turn Over

1. (a) (i) State the **principle of conservation of linear momentum.** (01 mark)

(ii) A bullet of mass 100g is fired with a velocity of $700ms^{-1}$ using a gun of mass 5.0kg. Calculate the recoil velocity of the gun. (03 marks)

(b) Explain why a loaded truck stops over a longer distance than an empty truck when the brakes are applied. (03 marks)

(c) (i) State the conditions necessary for a body to rest in mechanical equilibrium. (02 marks)

(ii) A uniform meter rule is pivoted at the 40cm mark and carries a weight of 20.0N at the 10.0cm mark.
If it is balanced horizontally by a weight of 10.0N placed at the 80.0cm mark, calculate the weight of the meter rule. (04 marks)

(d) (i) Define the terms **couple** and **torque** as applied to forces. (02 marks)

(ii) State **two** applications of couples of force. (01 mark)

2. (a) (i) Define the term **atmospheric pressure.** (01 mark)

(ii) Describe an experiment to measure the pressure of a liquid using a manometer. (05 marks)

(b) (i) State the factors that affect pressure in liquids. (02 marks)

(ii) A cow can easily walk on soft mud but a goat cannot. Explain. (03 marks)

(c) A glass tube is held vertically in a trough of water of density $1000kgm^{-3}$, the water rises to a height of 15cm above the water surface. Calculate the pressure exerted on the water by the water column. (02 marks)

(d) Explain why it is easier to lift a jerrican full of water with in the liquid than in air. (03 marks)

3. (a) (i) What is meant by total **internal reflection?** (01 mark)

(ii) State the conditions for total internal reflection to occur. (02 marks)

(b)

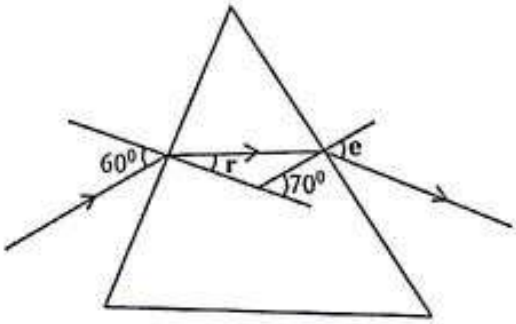

Figure 1

The diagram in fig.1 above shows a ray of blue light incident at an angle of 60° on one side of a triangular prism of refractive index of 1.52. Calculate the angles marked **r** and **e**. (04 marks)

(c) Describe the mode of operation of a projector (04 marks)

(d) (i) What are primary colours? (01 mark)

(ii) State the colours that pass through a yellow filter when light is incident on it. (02 marks)

(iii) Explain why a solar panel is tilted at an angle to the horizontal. (02 marks)

4. (a) (i) Distinguish between **interference** and **diffraction** of waves. (02 marks)

(ii) Figure 2 below shows plane water waves incident onto a straight barrier with two narrow slits A and B.
Complete the path of the waves after the barrier. (02marks)

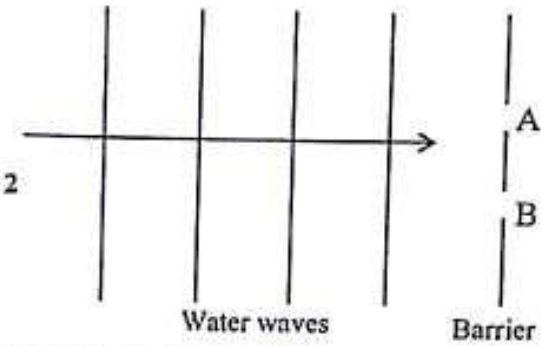

Figure 2

(b) (i) Draw a complete electromagnetic spectrum in the order of increasing wave length. (03 marks)

(ii) State **two** differences between sound and light waves. (02 marks)

(c) A wave covers 20.0cm in 2.5 seconds. If this distance corresponds to the length between 6 consecutive crests, calculate the:

(i) wavelength of the waves. (02 marks)

(ii) frequency of the waves. (02 marks)

(d) Explain why sound travels faster in solids than in air. (03 marks)

5. (a) (i) Distinguish between **Primary** and **Secondary** cells. (02 marks)

(ii) Give one example of each type of cell mentioned in a (i) above. (01 mark)

(iii) State the **law of electrostatics.** (01 mark)

(b) (i) Draw a labeled diagram of a gold leaf electroscope. (02 marks)

(ii) State **two** uses of a gold leaf electroscope. (02 marks)

(c) An accumulator of e.m.f 24.0V and internal resistance 2.0Ω is connected to 3Ω, 4Ω, 2Ω and 6Ω resistors as shown in figure 3.

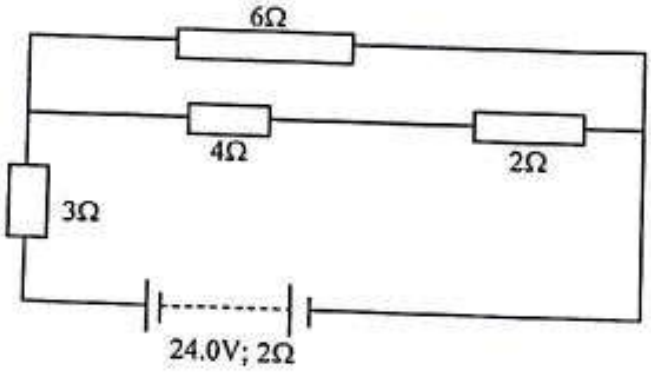

Figure 3

Calculate the;

(i) current through the 3.0Ω resistor (04 marks)

(ii) total power expended. (02 marks)

(d) State any **two** precautions under taken in domestic house wiring. (02 marks)

6. (a) (i) What is meant by **magnetic field?** (01 mark)

(ii) Sketch the magnetic field pattern between two bar magnets placed on a horizontal surface with their North poles facing each other. (02 marks)

(b) (i) What is an **electromagnet?** (01 mark)

(ii) With the aid of a labeled diagram, describe the structure and mode of operation of a step – down transformer. (05 marks)

(c) A transformer is designed to produce an output of 240V when connected to a 40V supply. If the transformer has a efficiency of 75%, calculate the input current when the output is connected on a 240V, 100W lamp. (04 marks)

(d) A galvanometer of resistance 40Ω and full scale deflection 25mA is to be provided with a multiplier such that it can read up to 10.0V. Calculate the resistance of the multiplier. (03 marks)

7. (a) Distinguish between a **conductor** and an **insulator** of heat and give one example of each. (03 marks)

(b) With aid of a labeled diagram, state the functions of the main parts of a vacuum flask. (06 marks)

(c) 200cm^3 of water at 25°C is poured into a copper calorimeter of mass 250g. A piece of copper of mass **m**kg at 70°C is dropped into the calorimeter and then stirred, giving a final temperature as 45°C. Calculate the mass (**m**) of the piece of copper. (05 marks)

(d) State any **two** reasons why water is not used as a thermometric liquid. (02 marks)

8. (a) Differentiate between **thermionic emission** and **photo electric emission.** (02 marks)

(b) Define the terms;

(i) **Activity.** (01 mark)

(ii) **Radioisotope.** (01 mark)

(c) A radioactive nuclei $^{214}_{82}X$ decays to $^{214}_{83}M$ by emission of two types of radiations.

(i) Name the possible radiations emitted during the decay. (01 mark)

(ii) Write a balanced equation to represent this nuclear reaction. (02 marks)

(iii) Determine the half-life of the element X if its mass is 800g and it decays to12.5g after 48days. (03 marks)

(d) (i) With aid of a labeled diagram, describe the working of a cathode Ray Oscilloscope (C.R.O). (05 marks)

(ii) State **two** uses of the C.R.O (01 mark)

-END-

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Density of water	=	$1000Kgm^{-3}$
Density of Mercury	=	$13,600Kgm^{-3}$
Speed of sound in air	=	$340ms^{-1}$

1. (a) Define the following
   (i) **Uniform acceleration.** (01 mark)
   (ii) **Linear momentum.** (01 mark)

   (b) A trolley P of mass 150g moving with a velocity of $20ms^{-1}$ collides with another stationary trolley Q of mass 100g. If P and Q move together after collision. Calculate;
   (i) Velocity with which P and Q move after collision. (03 marks)
   (ii) Loss in kinetic energy of the trolley. (03 marks)

   (c) Describe a simple experiment to determine an acceleration due to gravity using a simple pendulum. (05 marks)

   (d) The graph in the figure 1 below, shows the variation of velocity with time of a car.

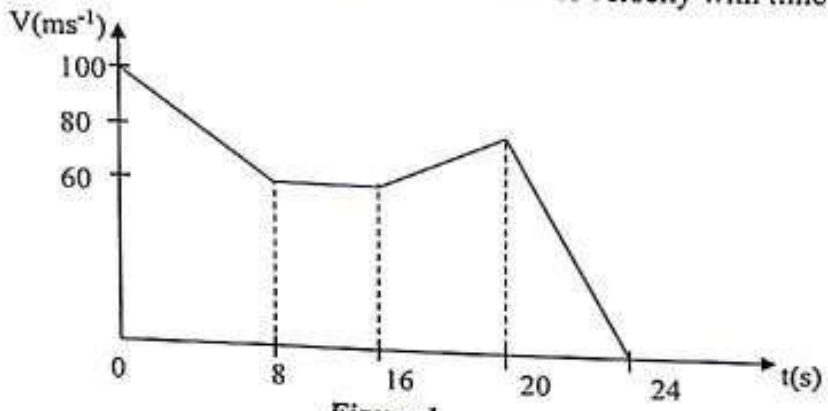

Figure 1

Describe the motion of the car. (03 marks)

2. (a) (i) Define **pressure.** (01 mark)
   (ii) Describe a simple experiment to show that pressure in a liquid increases with depth. (04 marks)

   (b) Figure 2 shows a hydraulic press. A and B are cylindrical pistons of radii 2cm and 0.4m respectively.

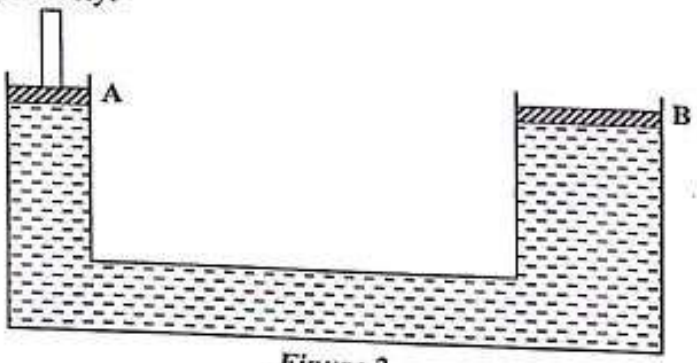

Figure 2

Calculate the maximum load at B that can be overcome by a force of 78N applied at A. (03 marks)

   (c) (i) Draw a diagram of a pulley system having a velocity of 5. (02marks)

   (d) In the gear system in figure 3 below, N_1 and N_2 are the number of teeth on the wheels. The efficiency of the gear system is 60%.

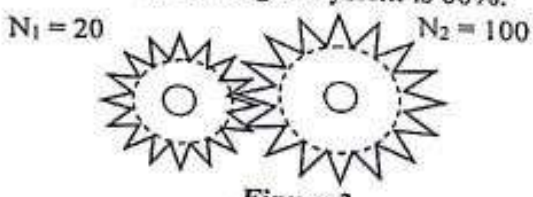

Figure 3

Find; (i) the **velocity ratio.** (01 mark)
(ii) the load that can be raised by an effort of 200N. (02 marks)

(e) Explain why its preferred to use a longer ladder to a shorter ladder when climbing a tree. (03 marks)

3. (a) Define the following;
(i) **Absolute Zero.** (01 mark)
(ii) **Boiling point.** (01 mark)

(b) (i) State **Charles' law.** (01 mark)
(ii)

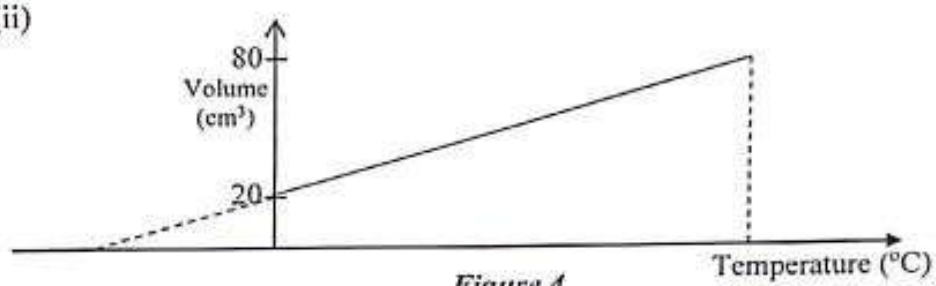

Figure 4

The graph in figure 4 shows variation of volume and temperature for a fixed mass of a gas.
Use the graph to determine the temperature when the volume equals to $80cm^3$. (03 marks)

(c) Explain each of the following observations
(i) Ether put on the body makes the body cool as it evaporates. (02 marks)
(ii) during melting of ice, heat is supplied but temperature does not change. (02 marks)

(d) (i) State **two** qualities of a good thermometric liquid. (02 marks)
(ii) State **two** ways you would use to improve the sensitivity of a liquid-in-glass thermometer. (02 marks)

(e) Describe what happens during a sea breeze. (02 marks)

4. (a) State the **law Electrostatics.** (01 mark)
(b) (i) Draw the electric field pattern due to two positively charged particles placed a small distance apart. (02 marks)
(ii) Describe how a gold leaf electroscope can be charged positively by induction. (05marks)

(c) A battery of e.m.f 6.0V and internal resistance 1.0Ω is connected to resistors as shown in the figure 5 below.

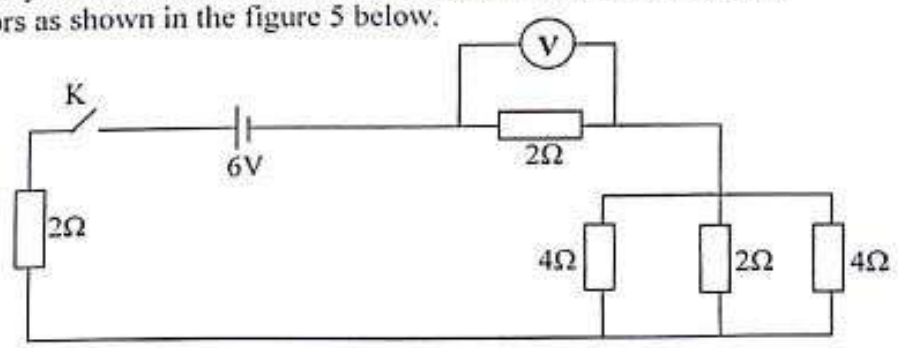

Figure 5

Find the voltmeter reading when switch K is closed. (05 mark)

(d) (i) State the function of a fuse in electric installation. (01 mark)
(ii) State **two** precautions undertaken when wiring a house. (02 marks)

Turn Over

5. (a) What is meant by the following terms as applied to waves.
   (i) **Amplitude** (01 mark)
   (ii) **Period** (01 mark)
   (b) State the factors that affect the frequency of a vibrating string. (03 marks)
   (c) Describe an experiment to show reflection of sound waves. (05 marks)
   (d) (i) Describe how echo sound is used to determine the depth of the sea. (03 marks)
   (ii) A long open tube is partially immersed in water and a turning fork of frequency 425Hz is sounded and held above it. If the tube is gradually raised.
   Find the length of the air colum when the resonance first occurs. (03 marks)

6. (a) (i) State **one** property of a magnet. (01 mark)
   (ii) Distinguish between **hard** and **soft** magnetic substances. (02 marks)
   (b) Briefly describe the electrical method for demagnetising a magnet. (03 marks)
   (c) (i) State **Faraday's law** of electromagnetic induction. (01 mark)
   (ii) With aid of a labelled diagram, describe how a transformer steps up voltage. (05 marks)
   (iii) State one cause of energy loss in a transformer. (01 mark)
   (d) A galvanometer of resistance 40Ω gives a full scale deflection of 10mA. Calculate; the value of the resistance which must be used so that the meter reads up to 2A. (03 marks)

7. (a) State the laws of reflection of light. (02 marks)
   (b) (i) With the aid of a ray diagram, explain how a plane mirror forms an image of a real object placed infront of it. (03 marks)
   (ii) State the characteristics of the image formed by a plane mirror. (02 marks)
   (c) (i) State the condition for total internal reflection to occur. (02 marks)
   (ii) Determine the critical angle for a ray of light travelling from glass of refractive index 1.49 to air. (03 marks)
   (d) (i) What are complementary colours. (01 mark)
   (ii) Give **two** sets of complementary colours. (02 marks)
   (iii) White light is viewed through a piece of yellow filter and then through a red filter. What colour is seen? (01 marks)

8. (a) (i) Define photoelectric emission. (01 mark)
   (ii) A clean zinc plate in placed on the cap of a gold leaf electroscope and illuminated with ultra violet radiation. Explain what is observed. (03marks)
   (b) (i) Draw a well labelled diagram of a Cathode Ray Oscilloscope. (C.R.O) (02marks)
   (ii) State **two** uses of a C.R.O (01 mark)
   (c) Briefly describe how X-rays are produced. (04 marks)
   (d) (i) Define halflife of a nuclide. (01 mark)
   (ii) A certain nuclide decays to $^1/_{16}$th of its mass in 120 years. Calculate the half-life of the nuclide. (03 mark)
   (e) A nuclide $^{228}_{86}X$ undergoes a decay by emission of an alpha particle to form nuclide Y. Write the balanced equation for the decay process. (01 mark)

END

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Density of water	=	$1000Kgm^{-3}$
Density of Mercury	=	$13,600Kgm^{-3}$

1. a) i) State the principle of conservation of **linear momentum.** *(01 mark)*

ii) A bullet of mass 100g is fired with a velocity of $700ms^{-1}$ from a gun of mass 5kg. Calculate the recoil velocity of the gun. *(03 marks)*

b) Explain why a loaded truck stops over a longer distance than an empty truck when the brakes are applied. *(03 marks)*

c) A trolley is set to move on an inclined smooth run way. Different masses are added to the trolley and its acceleration measured each time when force applied remains the same.

(i) Sketch a graph of acceleration against mass for a trolley. *(01 mark)*

(ii) Explain the shape of the graph. *(02marks)*

d) i) Describe an experiment to verify the **principle of moments.** *(05 marks)*

ii) State one application a couple. *(01 mark)*

2. a) i) Define **atmospheric pressure** *(01 mark)*

ii) Describe an experiment for measuring pressure of a liquid using a manometer. *(05 marks)*

b) A man swims 4m below the surface of water in a place where atmospheric pressure is 65cmHg. Calculate the total pressure on the man. *(03 marks)*

c) Explain why it's easier to lift a jerrican full of water in a liquid than in air. *(03 marks)*

d) i) A dam at a height of 700m above the sea level supplies water to a hydroelectric generating station at a height of 100m above sea level. 1000kg of water pass through the turbines in one second. Calculate the power of the station. *(03 marks)*

ii) State the condition for a body to sink in a liquid. *(01 mark)*

3. a) Define

(i) **Thermal conduction** *(01 mark)*

(ii) **Insulator** *(01 mark)*

b) Describe an experiment to show that water is a bad conductor of heat. *(05 marks)*

c) The pressure of a given mass of a gas at constant volume at a temperature of 117^0C is 310mmHg. Calculate the pressure if the temperature drops to 17^0C. *(03 marks)*

d) i) State **Kinetic theory** *(01 mark)*

ii) Using kinetic theory explain how evaporation causes cooling. *(03 marks)*

e) Give two differences between boiling and evaporation. *(02 marks)*

4. a) i) Define radius of curvature of a concave mirror. *(01 mark)*

ii) An object 5cm tall is placed 20cm in front of a concave mirror of focal length 15cm. By graphical method, determine the nature and the position of the image formed. (Use scale 1cm to represent 5cm) *(05 marks)*

b) i) Distinguish between **impure spectrum** and **pure spectrum**. *(02 marks)*

ii) Draw a well labeled diagram to show the formation of a pure spectrum. *(04 marks)*

c) With aid of a diagram distinguish between **regular** and **diffuse** reflection. *(04 marks)*

5. a) i) Distinguish between **diffraction** and **interference** of waves. *(02 marks)*

ii) Draw a diagram to show how plane waves are diffracted by a narrow gap. *(02 marks)*

b) i) Draw a complete electromagnetic spectrum in the order of increasing wave length. *(03 marks)*

ii) Give two differences between sound and light waves. *(02 marks)*

c) A wave covers 20m in 2.5 seconds. If the distance between two successive crests is 20cm,
Calculate

(i) Velocity of the wave *(02 marks)*

(ii) Frequency of the waves *(02 marks)*

d) Explain why sound is faster in solids than in air. *(03 marks)*

6. a) i) State the **law of electrostatics**. *(01 marks)*

ii) Describe how a lightening conductor works. *(07 marks)*

b) Lead acid accumulator of e.m.f 24V and internal resistance of 2Ω is connected to 3Ω, 4Ω, 2Ω and 6Ω resistors as shown in the figure 1.

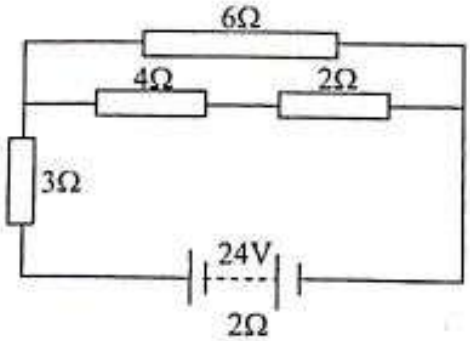


Fig. 1

Calculate,

(i) The current through the 3Ω resistor. *(04 marks)*

(ii) The total power expended. *(02 marks)*

c) State two defects of a simple cell. *(02 marks)*

7. a) i) What is a **transformer?** *(01 mark)*

ii) Describe the operation of a step up transformer. *(05marks)*

b) A transformer is designed to produce an output of 240V when connected to 40V supply. If the transformer is 75% efficient, calculate input current when the output is connected on 240V, 100W lamp. *(04 marks)*

c) State any two precautions taken when wiring a house. *(02 marks)*

d) A galvanometer of resistance 20Ω is to be provided with a shunt such that only one – tenth of the whole current in a circuit shall pass through the galvanometer. What is the resistance of the shunt? *(04 marks)*

8. a) Distinguish between **thermionic emission** and **photo electric emission.** *(02 marks)*

b) Draw a well labeled diagram of a modern X – ray tube and discuss the production of X – rays. *(06 marks)*

c) i) Define nuclear fission. *(01 marks)*

ii) State two applications of **nuclear fission.** *(01 mark)*

iii) A radioactive nuclide $^{226}_{88}Ra$ decays by emission of two alpha and five beta particles to form a nuclide Y. Find the atomic number and mass number of Y. *(02 marks)*

d) With aid of a diagram show the rectification of a.c using a single diode. *(04 marks)*

END

535/2
PHYSICS
PAPER 2
July/August 2013
$2^{1}/_{4}$hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

PHYSICS

Paper 2

2hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

- Answer any **five** questions.
- Any additional questions answered will **not** be marked.
- Mathematical tables and silent non- programmable calculators may be used.

These values of Physical quantities may be useful to you,

Acceleration due to gravity, g = 10ms^{-2}

Specific heat capacity of water = 4200Jkg^{-1}k^{-1}

Specific heat capacity of copper = 400Jkg^{-1}k^{-1}

Specific latent heat of fusion of ice = 3.36 X 10^{5}Jkg^{-1}

1. a) Distinguish between distance and displacement. (2 marks)

b) Figure 1 below shows the velocity-time graph for the motion of a body.

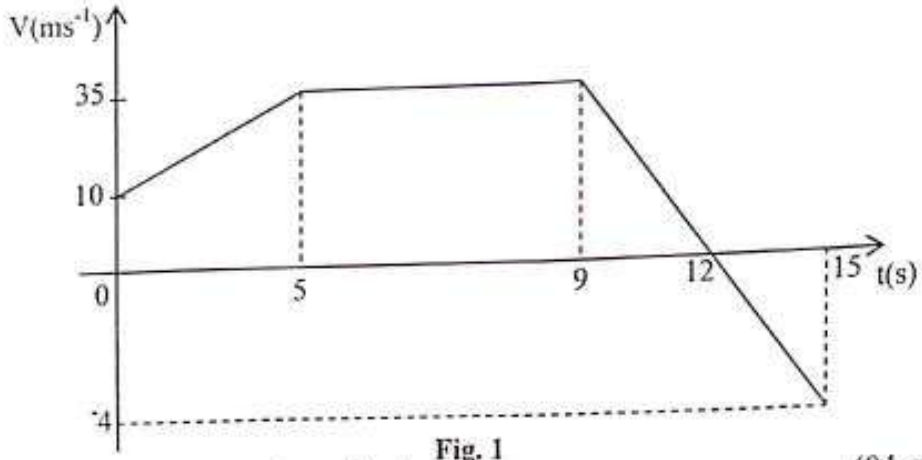


Fig. 1

i) Describe the motion of the body. (04 marks)

ii) Calculate the total distance covered by the body. (04 marks)

c) i) Define linear momentum. (01 marks)

ii) A bullet of mass 10g moving at $600ms^{-1}$ is fired horizontally into a large filled sand can which forms a bob of pendulum. If the can and its contents have a mass of 5kg and the bullet remains embedded in it, calculate the velocity at which the can moves. (03 marks)

d) Explain why a ship floats on water yet it is made out of metal. (03 marks)

2. a) Define a moment of a force. (01 mark)

b) Briefly describe an experiment to verify the principle of moments. (05 marks)

c) i) Define the term mechanical advantage. (01 mark)

ii) A wheel and axle system is used to raise a log of mass 90kg using an effort of 300N. If the wheel and axle radii are 40cm and 10cm respectively, calculate the efficiency of the system. (4 marks)

d) i) Why are aeroplanes streamlined? (01 mark)

ii) A metallic ball is dropped centrally on the surface of oil in a tall can. Describe the motion of the metallic ball. (04 marks)

3. (a) i) Define strain as applied to materials. (01 mark)

ii) State **two** factors that affect the strength of a material. (02 marks)

(b) Explain why a needle floats on clean water but sinks when some detergent is added to the water. (02 marks)

(c) i) Define conduction as applied to heat. (01 marks)

ii) With the aid of a well labeled diagram, explain how a thermos flasks keep cold liquids cold. (05 marks)

(d) i) State Charle's law. (01 mark)

ii) A volume of $2500cm^3$ of a gas is collected at 67^oC at a pressure of 730mmHg. Calculate the volume of the gas at s.t.p. (04 marks)

4. (a) i) What is meant by the term "shadow". (01 mark)

ii) Draw a diagram to show the formation of a shadow when an extended source of light is used. (03 marks)

(b) Describe an experiment to determine the focal length of a concave mirror given; a screen with a hole, light source, mirror holder and a mirror. (05 marks)

(c) A small object is placed at the bottom of a beaker containing a liquid which is filled to 10cm from the bottom, when the object is viewed from above it appears to be raised at 6cm from the surface of the liquid, calculate the refractive index of the liquid. (02 marks)

(d) What is the difference between pure spectrum and impure spectrum? (02marks)

(e) White light is incident on yellow filter.
i) State the colours observed after the filter. (02marks)
ii) Explain the observation in (e) (i) above. (01 mark)

5. (a) Define the following terms;
i) Period (01 mark)
ii) Frequency (01 mark)

(b) Figure 2 below shows a section of a progressive wave after 0.4 seconds from the start.

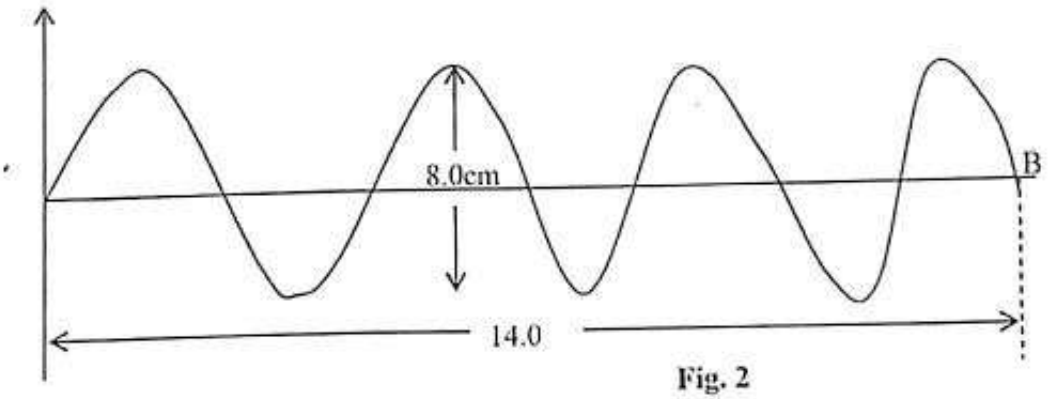


Fig. 2

Calculate;
i) The wave length of the wave. (02 marks)
ii) The period of the wave. (03 marks)

(c) Describe an experiment to determine the speed of sound in air by an echo method. (05 marks)

(d) i) Explain why sound is clearer at night than day. (02 marks)
ii) Give two applications of ultrasonic sound. (02 marks)

6. (a) State the law of electrostatics. (01 mark)

(b) Describe how two identical metal balls may be charged positively simultaneously by induction. (05 marks)

(c) Figure 3 below shows a network of resistors connected to a source of e.m.f.

Turn Over

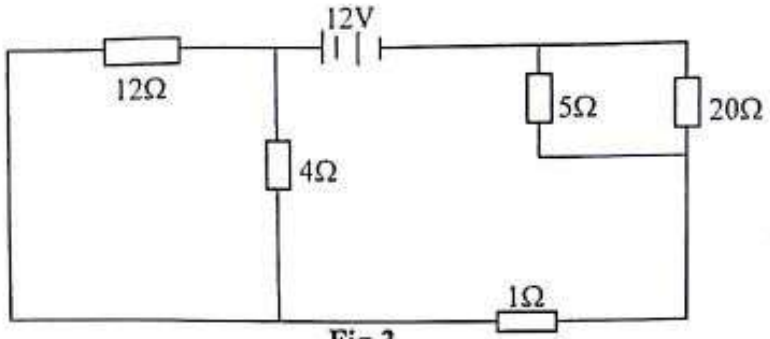


Fig 3

Calculate:

i) The effective resistance of the circuit. (03 marks)

ii) The current supplied by the source (cell). (02 marks)

(d) i) What is meant by the electromotive force of a cell? (01 mark)

ii) State two defects of a simple cell. (02 marks)

(e) Give two advantages of a secondary cell over a primary cell. (02 marks)

7. (a) State two behaviors of magnets. (02 marks)

(b) Describe briefly how to demagnetize a magnet by electrical method. (03 marks)

(c) i) State two factors that determine the size of a force on a current carrying conductor in a magnetic field. (02 marks)

ii) State one application of the principle in c (i) above. (01 mark)

(d) A transformer is designed to operate on 240V mains supply and delivers 24V. The current drawn from the mains supply is 5A. If the efficiency of the transformer is 80%.

Calculate;

i) The maximum out put current. (03 marks)

ii) The power loss. (02 marks)

(e) State three advantages of a.c over d.c in power transmission. (03 marks)

8. (a) i) What are X- rays? (01 mark)

ii) How are X- rays produced? (01 mark)

(b) Explain the use of the following in an X- ray tube.

i) Low power supply. (02 marks)

ii) Vacuum. (01 mark)

(c) A radioactive nuclide $^{226}_{88}Ra$ decays to Q by emission of two alpha particles and then to N by emission of a beta particle. If this nuclide has a half – life of $2.8X10^6$ years.

i) What does the statement half-life of $2.8X10^6$ years mean? (01 mark)

ii) Write down the nuclear equation for the decay process. (03marks)

(d) Y grams of a radioactive element of half-life 6 weeks decay to 5.12g in 30 weeks. Calculate the value of y. (04marks)

(e) A zinc plate is placed on a cap of negatively charged gold – leaf electroscope. The plate is irradiated with ultra – violent light.

i) State the observation. (01mark)

ii) Explain the observation in e (i) above. (02marks)

END

535/2
PHYSICS
PAPER 2
July/August 2012
$2^{1}/_{4}$ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

PHYSICS

Paper 2

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

- Answer any **five** questions.
- Mathematical tables, and silent non- programmable calculators may be used.

These values of Physical quantities may be useful to you,

Acceleration due to gravity, $g = 10ms^{-2}$

Specific heat capacity of water $= 4200Jkg^{-1}k^{-1}$

Specific heat capacity of copper $= 400Jkg^{-1}k^{-1}$

Specific latent heat of fusion of ice $= 3.36 \times 10^{5}Jkg^{-1}$

1. a) i) Define pressure *(1mk)*

ii) State the Principle of transmission of pressure in liquids. *(1mk)*

iii) Explain why a heavy truck takes long to brake to a stop compared to a light car at the same speed. *(4mk)*

iv) Give two practical applications of the above principle. *(1mk)*

b) i) State the principle of conservation of linear momentum. *(1mk)*

ii) Two bodies of mass 200kg and 100kg travel towards each other with velocities of 20m/s and 25m/s respectively. Find their common velocity after collision. *(3mks)*

c) A body of mass 5kg is at rest when a horizontal force is applied to it. The force varies with time as shown in figure 1.

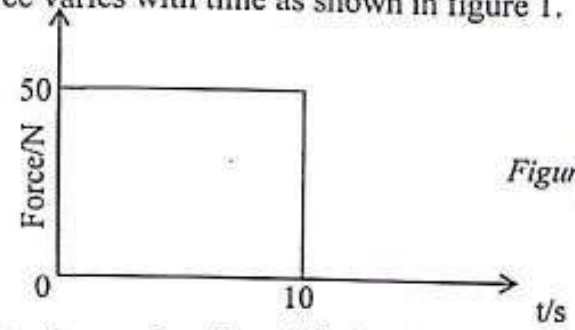


Figure 1

Find i) the acceleration of the body. *(2mks)*

ii) the velocity after 10 seconds. *(3mks)*

2. a) Define the term efficiency of a machine. *(1mk)*

b) Explain why it is easier to lift a load up a building under construction using a fixed pulley other than pulling it using the rope and hands. *(3mks)*

c) i) Draw a sketch graph to show how the mechanical advantage of pulley system varies with the load. *(2mks)*

ii) Explain the features of the graph. *(3mks)*

d) Define a shear force. *(1mk)*

e) A uniform metal tube of length 9m and mass 9kg is suspended horizontally by two vertical wires attached at 50cm and 150cm respectively from the ends of the tube.

i) Draw a diagram to show all forces acting on the system. *(2mk)*

ii) Find the tensions in each wire. *(4mks)*

3. a) i) What is a thermometric property of a thermometer? *(1mk)*

ii) Give two examples of thermometric properties. *(1mk)*

iii) Briefly describe how you would determine the lower fixed point of a thermometer. *(4mk)*

b) i) State Boyle's law *(1mk)*

ii) Sketch a graph to represent Boyle's law. *(2mks)*

c) A copper calorimeter weighs 100g when empty and 300g when half full of water at 30^0C. 5g of steam at 100^0C is passed into the calorimeter until the final steady temperature is reached.
Neglecting heat losses to the surrounding.
Calculate the final temperature of the calorimeter and its content. *(5mks)*

d) State the factors affecting the boiling point of a liquid. *(2mks)*

4. a) i) State the laws of reflection. *(2mks)*
ii) With the aid of diagrams, distinguish between regular and diffuse reflection. *(4mks)*

b) Sketch a ray diagram to show how a concave mirror is used by dentists. *(2mks)*

c) With the aid of a labeled diagram, describe how a slide projector works. *(4mks)*

d) An object of height 15cm placed in front of a concave mirror forms an image of height 5cm. if the object is placed 12cm from the mirror, use a scale ray diagram to determine the focal length of the mirror. *(4mks)*

5. a) State three differences between sound and radio waves. *(3mks)*

b) i) Draw a labeled diagram to show the main bands of the electromagnetic spectrum in order of their increasing wavelength. *(3mks)*

ii) State one application for any four of the bands named above. *(2mks)*

c) A progress wave travels a distance of 31.5m in 20 seconds.
If the distance travelled is equivalent to the distance between 10 crests.
Calculate; i) the wavelength of the wave *(2mks)*
ii) the period of the wave *(2mks)*

d) Briefly describe how you would determine the speed of sound using resonance method. *(4mks)*

6. a) Define the following
i) a volt *(1mk)*
ii) internal resistance *(1mk)*

b) Figure 2 represents four resistors and a 6.0V battery of negligible internal resistance.

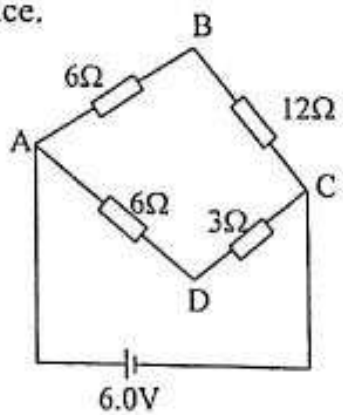


Figure 2

Calculate;

i) the current through ABC *(2mks)*

ii) the p.d between A and D *(2mks)*

iii) the energy converted into heat energy between A and D per second. *(2mks)*

c) State the importance of having an earth wire and fuse in the domestic wiring system. *(2mks)*

d) State any four precautions undertaken when wiring a domestic house. *(2mks)*

e) i) Differentiate between polarization and local action as applied to cells. *(2mks)*

ii) Give ways of controlling each of them. *(2mks)*

7. a) Define a magnetic field *(1mk)*

b) Figure 3 shows an iron ring placed between the poles of strong magnet as shown below.

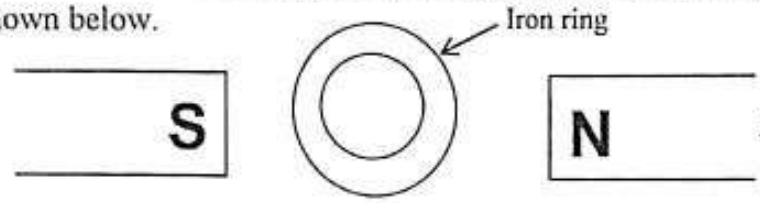


Figure 3

i) Draw the resultant magnetic field pattern. *(2mks)*

ii) State one application of the principle in figure 3 above. *(1mk)*

c) i) State the conditions necessary for electromagnetic induction. *(2mks)*

ii) With aid of a diagram describe the mode of action of a transformer. *(5mks)*

d) A transformer is designed to produce an output of 240V, when connected to a 40V supply.
If the transformer is 75% efficient, calculate the input current when the output is connected on a 240V, 100W lamp. *(4mks)*

e) Why is power transmission carried out at very high voltage? *(1mk)*

8. a) Define the following terms

i) Activity *(1mk)*

ii) Thermionic emission *(1mk)*

b) A radioactive substance $^{14}_{6}C$ has a half-life of 5600years and decays by emission of βeta particles.

i) Write down a balanced equation for the decay process. *(1mk)*

ii) If the source initially contains 8×10^6 atoms.
Calculate the time taken for 7.75×10^6 atoms to decay. *(3mks)*

c) With aid of a diagram, describe the mode of operation of the cathode ray oscilloscope. *(6mks)*

d) i) Distinguish between nuclear fusion and nuclear fission. *(2mks)*

ii) Give one application of each. *(2mks)*

END

535/2
PHYSICS
PAPER 2
July/August/2010
$2^1/_4$ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

PHYSICS

Paper 2

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

- Answer any five questions.
- Mathematical tables, slide rule and silent non- programmable calculators may be used.

These values of Physical quantities may be useful to you,

Acceleration due to gravity, $g = 10ms^{-2}$

Speed of sound in air = $340ms^{-1}$

Specific heat capacity of water = $4200Jkg^{-1}k^{-1}$

Specific latent heat of fusion of ice = $3.36 X 10^5 Jkg^{-1}$

Turn Over

1. a) Distinguish between a ductile and an elastic material.
Give one example of each. (03)

b) Give reasons why bicycle frames are made of hollow pipes other than solid bars. (03)

c) i) State Hooke's law of elasticity. (01)

ii) Describe briefly an experiment to verify Hooke's law (04)

iii) A helical spring has a force constant of $100Nm^{-1}$.
Calculate the compression produced in the spring when a mass of 10kg is dropped through a height of 45m on the spring. (03)

d) Two rocks of mass 24kg and 40kg are in contact and at rest in a stone quarry. When explosives are applied, the rocks explode and move in opposite directions with the 24kg rock moving with a speed of $20ms^{-1}$.
Calculate the velocity of the 40kg rock. (03)

2. a) State Pascal's Principle (01)

b) (i)

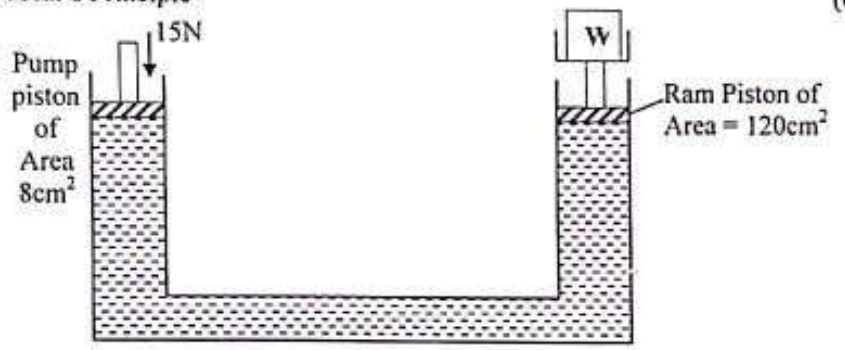


Fig 1

Figure 1 above shows a hydraulic press. If an effort of 15N is applied on the pump piston of area $8cm^2$ in order to raise the load W.
Calculate the weight of the load W. (04)

(ii) Explain why two holes are often made in a sealed tin full of kerosene to pour out the liquid easily. (02)

c) i) Define surface tension. (01)
ii) Give one way of weakening surface tension. (01)
ii) Explain why mercury is depressed in a capillary tube. (02)

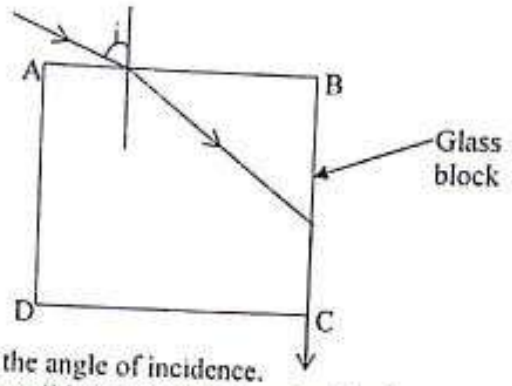
d) Describe an experiment to verify the law of floatation. (05)

3. a) i) Distinguish between primary and secondary colours giving one example of each. (03)

ii) Explain why the leaves of a tropical plant appear green while the flowers appear yellow? (02)

b) State Snell's law of refraction. (02)

c) A ray of light incident on a rectangular glass block ABCD of refractive index 1.40 just emerges from the side as shown in the diagram. (01)



i) Calculate the angle of incidence. (04)
ii) State the conditions for total internal reflection to occur. (02)

d) An object of height 2cm is placed vertically on the axis of a convex lens of focal length 20cm at a distance of 25cm from the lens. Use the graphical method to find the position and nature of the image formed. (04)

4. a) What do you understand by the following,
i) Specific heat capacity
ii) Latent heat of vaporization (02)

b) What is the minimum amount of ice at O^0C one would need to add to 0.2kg of water at 24^0C to drop its temperature to O^0C. (04)

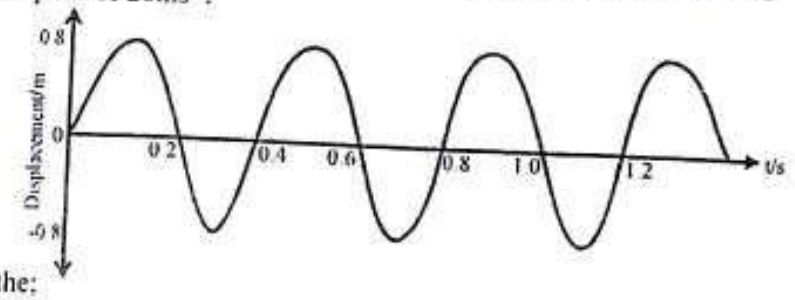
c) i) State Charles' law (01)
ii) Describe an experiment to show the relationship between the volume and the temperature of a fixed mass of gas at constant atmospheric pressure. (05)

d) i) State four ways in which heat losses can be minimized in a calorimetry experiment. (2mk)
ii) List the ways you would use to modify a liquid-in glass thermometer so that it can register temperature more quickly. (2mk)

5. a) Define the following as applied to wave motion.
i) wave front (2mks)
ii) interference

Turn Over

b) The graph below shows a displacement- time graph of a wave traveling through water at a speed of $20ms^{-1}$.



Find the:
i) amplitude (1mk)
ii) frequency (3mks)

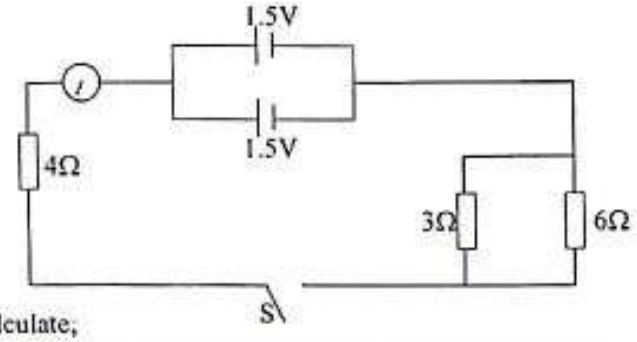
c) A pipe closed at one end has a length of 10cm. If the velocity of sound in air is $340ms^{-1}$. Calculate the frequency of the first overtone. (3mks)

d) (i) Describe an experiment to show that sound does not travel through a vacuum. (4mks)

(ii) Distinguish between mechanical and electro magnetic waves and give one example of each. (3mks)

6. a) State the major defects of a simple cell and suggest the ways of minimizing them in practice (4mks)

b) The figure below shows a network of resistors connected to two cells of emf 1.50V and internal resistance 1.0Ω each.



Calculate;

i) The reading of the ammeter when the switch S is first closed? (3mks)

iii) The power developed in the 4Ω resistor. (2mks)

c) Calculate the cost of running an appliance labelled 1200W, 240V for a week if it is used 30 minutes each day, given that the cost of a unit of electricity is 200/= (3mks)

d) Briefly describe how a lightening conductor works. (4mks)

7. a) i) Define magnetic field. (1mk)

ii) Describe how a piece of iron can be magnetized by electrical method. (4mks)

b) With the aid of a labelled diagram explain the effect of an iron ring placed in a magnetic field. (4mks)

c) A galvanometer of resistance 100Ω gives a full scale deflection of 10mA. Calculate the value of the resistor necessary to convert it to an ammeter reading to a maximum 10A. (3mks)

d) State any two factors that determine the magnitude of the force on a current carrying conductor. (2mks)

e) State two applications of electro magnets. (2mks)

8. a) Give two methods of producing electrons from a metal. (2mks)

b) With the aid of a labelled circuit diagram, describe how a diode is used to produce half wave rectification. (4mks)

c) The following results were obtained from the readings of a rate meter for the emission from a radioactive sample of iodine.

Count rate/s^{-1}	132	86	56	38	24	15
Time/days	0	1	2	3	4	5

Plot a suitable graph and determine;

i) half-life of iodine. (4mks)

ii) count rate after 6 days (1mk)

d) With the aid of a diagram describe the mode of operation of a cathode ray oscilloscope. (06mks)

END

535/2
PHYSICS
Paper 2
July/August 2009
2 Hours 15 Minutes

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education
PHYSICS
Paper 2
2 Hours 15 Minutes

INSTRUCTIONS

- *Attempt any **five** questions.*
- *Mathematics tables, slide rules and silent non – programmable calculators may be used.*
- *These values of physical qualities many be useful to you.*

Acceleration due to gravity, g	$= 10\ ms^{-2}$
Specific heat capacity of water	$= 4200\ Jkg^{-1}k^{-1}$
Specific heat capacity of copper	$= 400\ Jkg^{-1}k^{-1}$
Speed of light in a vacuum, C	$= 3.0 \times 10^{8}\ ms^{-1}$
Atmospheric pressure	= 760 mm Hg.

1 . (a) Define the following terms.

(i) Inertia (1 mark)

(ii) Momentum. (1 mark)

(b) Two trucks, one fully loaded and the other empty are moving at constant speed. On seeing the traffic light turn red, the drivers apply brakes at the same time. Explain why the heavier truck is brought to a stop over a longer distance than the lighter one. (4 marks)

(c) A car of mass 1200 kg traveling at $20ms^{-1}$ is brought to rest in 4.0s.

(d) Calculate:

(i) the average deceleration (3 marks)

(ii) The average braking force. (2 marks)

(iii) The distance moved during the deceleration. (3 marks)

(iv) The work done on the car by the braking force. (2 marks).

2. (a) (i) Define pressure and state its s.1. Unit. (2 marks)

(ii) Describe a simple experiment to show that the pressure in a liquid increases with depth. (3 marks)

(iii) Why is the bottom of a dam made thicker that the top?

(b) A heavy can full of air at atmospheric pressure sinks in water of density $1000kgm^{-3}$. If the can has a valve which opens under a pressure of 80,000pa, calculate the depth at which the valve opens. (3 marks)

(c) (i) What is atmospheric pressure? (1 mark)

(ii)

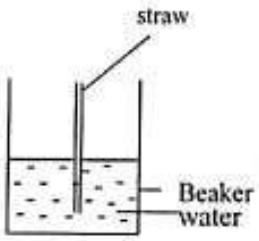


Fig 1(a)

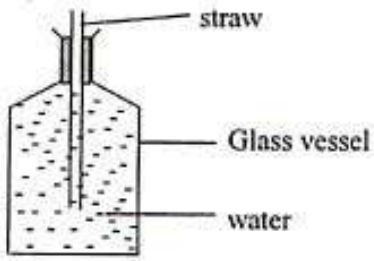


Fig 1(b)

The figures above shows drinking straws dipped into water in a beaker and closed vessel respectively.

Explain briefly why it is easier to suck water in fig 1 (a) than in 1 (b). (5 marks)

3. (a) (i) State Boyles' law. (1 mark)

(ii) In a chemistry experiment, 240cm^3 of oxygen gas was collected at a room temperature of 20°C and pressure of 770 mm Hg. Calculate the volume of gas at standard temperature and pressure. (3 marks)

(b) Define the following:

(i) Lower fixed point. (1 mark)

(ii) Upper fixed point. (1 mark)

(c) (i)Describe how you would determine the lower fixed point of mercury in glass thermometer. (4 marks)

(ii) Give any two reasons as to why water is not used as a thermometric liquid. (2 marks)

(d) A metal block of mass 20g heated to a temperature of 80°C was dropped carefully in 20 cm^3 of water contained in a copper calorimeter of mass 15g at a temperature of 30°C. After stirring, the final temperature of the mixture was 34.08°C, given that the density of water is 1 gcm^{-3}, calculate the specific heat capacity of the metal block. (4 marks)

4. (a) Define the following terms as applied to a convex lens.

(i) focal length. (1 mark)

(ii) principal focus. (1 mark)

(b) An object 15 cm high is placed at a distance of 22.5 cm from a convex lens. A real image is formed 45cm from the lens. By graphical method, determine.

(i) The power of the lens. (4marks)

(ii) The magnification of the image. (2 marks)

(c) (i) What property of a concave mirror makes it useful as a shaving mirror? (2 marks)

(d) (i) State the conditions for total internal reflection to occur.

(ii) Calculate the critical angle for a glass- air boundary if the refractive index of the glass is 1.60 (2 marks)

5. (a) Define the following terms. (2 marks)
   (i) period
   (ii) frequency

   (b) State the factors that affect the frequency of a vibrating string. (3 marks)

   (c) Describe an experiment to show that sound requires a material medium for its transmission. (5marks)

   (d) When a vibrating tuning fork is placed at the mouth of an open tube, the shortest length of the tube for resonance to take place in the tube is 0.12m. The next resonant length is 0.37m. if the speed of sound in air is 340 ms^{-1}, calculate the frequency of sound produced by the tuning fork. (3 marks)

   (e) Explain why sound is clear at night than during day. (3 marks)

6. (a) State the basic law of electromagnetism. (1 mark)

   (b) Describe how an iron rod can be magnetized by single stroke method.(4 marks)

   (c) What is meant by a neutral point as applied to a magnetic field? (1 mark)

   (ii) Draw magnetic field pattern for a wire carrying current. (2 marks)

   (d) Distinguish between a.d.c motor and d.c generator. (2 mark)

   (ii) Name the factors that affect the efficiency of a generator. (3 marks)

   (iii) State the advantages of a.c over d.c in power production and transmission. (3 marks)

7. (a) Draw a well labeled diagram of a gold leaf electroscope. (2 marks)

   (ii) Describe how two identical metal balls may be charged positively and simultaneously by induction. (4 marks)

   (b)(i) What is meant by resistance in electricity? (1 mark)

   (ii) State the factors that affect the resistance of a conductor. (2 marks)

   Calculate the current in a wire if a charge of 360C passes through a given point in 4 minutes. (2marks)

   (d) A battery of emf 24V made of two cells each of internal resistance 0.4 Ω is connected to a network of resistors as shown in figure(2).

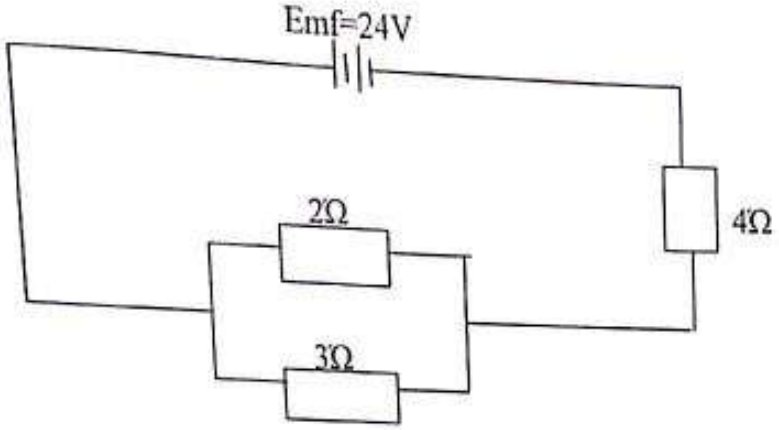


Figure 2

Calculate:

(i) Current through the 4Ω resistor. (2marks)

(ii) Power dissipated in the 3Ω resistor. (3 marks)

8 (a) Define.

(i) mass number (1 mark)
(ii) half life (1 mark)
(iii) isotopes (1 mark)

(b) A radio active nuclide 226. decays by emission of two alpha particles and five beta particles to form a nuclide Y.

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(i) What is meant by a radioactive nuclide? (1 mark)
(ii) Find the atomic number and mass number of Y. (2 marks)

(c) Draw a well labeled diagram of a modern X- ray tube and discuss the production of X-rays. (6 marks)

(d) State,

(i) Two health hazards of X –rays (1 mark)
(ii) two uses of X- rays. (1 mark)

(e) State four uses of a cathode ray oscilloscope. (2 marks)

END