535/3
PHYSICS
PRACTICAL
PAPER 3
$2^{1}/_{4}$ hours

WAKISSHA

Uganda Certificate of Education

PHYSICS PRACTICAL

Paper 3

2hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

- Answer question **1** and one other question. You will not be allowed to start with the apparatus for the first 15 minutes.
- Marks are given mainly for a clear record of the observations actually made and use made of them. Whenever possible candidates should put their observations in a suitable table drawn in advance, as soon as they are made.
- An account of the method of carrying out the experiment is not required.
- Graph papers may be provided.
- Mathematical tables and silent non-programmable calculators may be used.

Turn Over

1. **In this experiment you are to determine the mass of a metre rule.**

(a) Adjust the metre rule on a knife – edge until it balances horizontally as shown in figure 1.

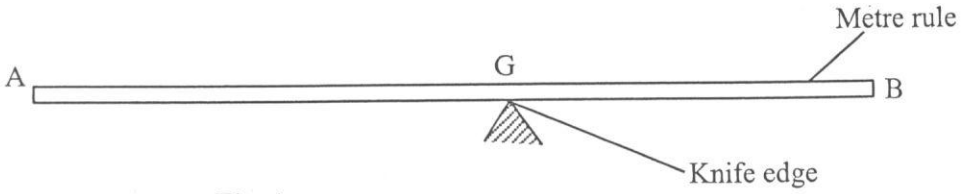

Fig. 1

(b) Read and record the position, **G**, of the knife edge on the metre rule.

(c) Hang the **100g** mass from end A at a distance x = **2.0cm** on the metre rule.

(d) Adjust the metre rule on the knife edge until the rule balances horizontally on the knife edge as shown in figure 2

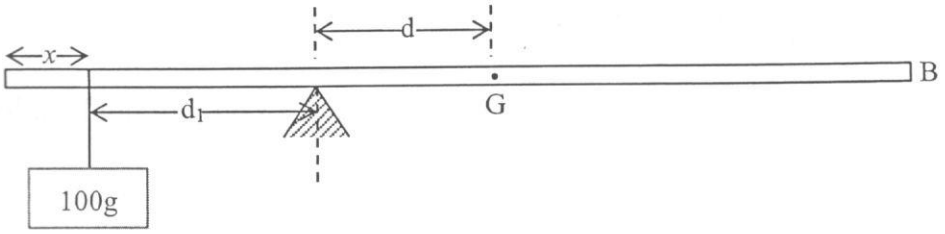

Fig. 2

(e) Read and record distances **d,** from **G** to the knife edge and $\mathbf{d_1}$, from the mass to the knife edge.

(f) Repeat procedures **(c)** to **(e)** for values of x = **4.0, 6.0, 8.0, 10.0** and **12.0cm.**

(g) Tabulate your results in a suitable table.

(h) Plot a graph of $\mathbf{d_1}$ against **d**

(i) Find the slope, **D** of the graph

(j) Calculate the mass, m, of the metre rule from **m = 100D**

2. **In this experiment you are to determine the refractive index of a block of glass using Snell's law.**

(a) Fix the white sheet of paper on the soft board using drawing pins.

(b) Make an outline ACDE of the glass block in the middle of the paper.

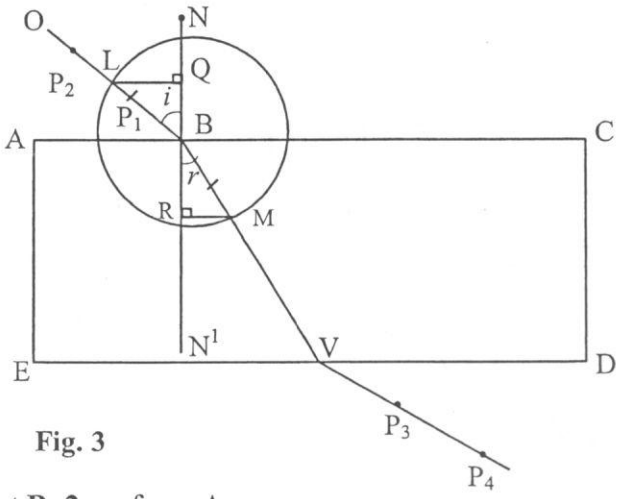

Fig. 3

(c) At point **B, 2cm** from **A**
- (i) Draw a normal **NN^1** to **AC**
- (ii) Draw a circle of radius **4.0cm** with **B** as its centre

(d) Measure from the normal **NN^1** angle **$i = 10^0$** and draw a ray **OB**

(e) Replace the glass block to its outline and place pins **P_1** and **P_2** along **OB.**

(f) Observe the images of **P_1** and **P_2** by looking through side **ED** and place pins **P_3** and **P_4** such that the images of **P_1** and **P_2** and pins **P_3** and **P_4** are in a straight line.

(h) Remove the glass block and pins **P_3** and **P_4.**

(i) Join the holes **P_3** and **P_4** with a straight line to touch **ED** at **V**

(j) Draw a line **VB**

(k) Draw perpendiculars **MR** and **LQ** on the normal as shown in figure 3.

(l) Measure **LQ** and **MR.**

(m) Repeat procedures **(d)** to **(*l*)** for
***i* = 20^0, 30^0, 40^0, 50^0** and **60^0**

(n) Record your results in a suitable table.

(o) Plot a graph of **LQ** against **MR.**

(p) Determine the slope, η of the graph.

3. **In this experiment you are to determine the relationship between the potential difference causing current to flow through a uniform wire and the length of wire through which it flow.**

(a) Connect up the circuit as shown in figure 4.

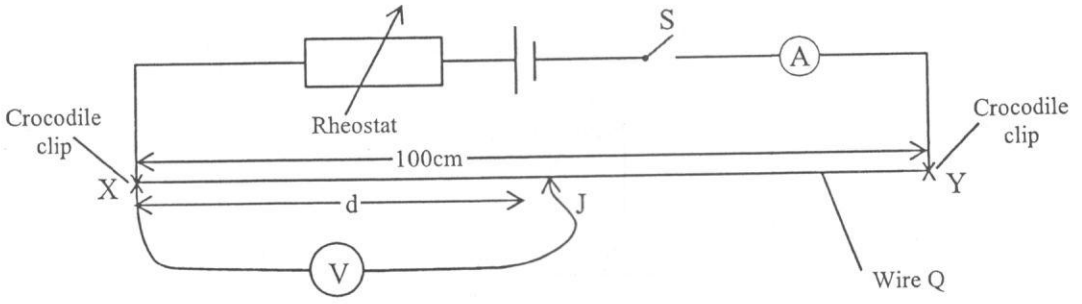

Fig. 4

(b) Close switch **S**

(c) Touch point **Y** with the sliding contact J then adjust the rheostat until the voltmeter shows maximum deflection, V_0.

(d) Record V_0.

(e) Read and record the ammeter reading, I_0.

(f) Move **J** along wire **Q** to a point **d = 80.0cm**

(g) Record the voltmeter reading, **V.**

(h) Repeat procedures **(f)** and **(g)** for **d = 60.0, 40.0** and **20.0cm**; keeping **I** constant throughout by adjusting the rheostat.

(j) Plot a graph of **V** against **d.**

(k) Determine the slope, **P,** of the graph.

END

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PHYSICS
PAPER 2
$2^1/_4$ hours

WAKISSHA

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) What is meant by **efficiency of a machine?** (01 mark)

(ii) State **two** factors that determine the amount of frictional force between solid surfaces. (02 marks)

(b) Using a block and tackle system, a man exerts an effort of 500N to pull 12m of the hauling rope through his hands in one minute.
During this time, the load of 800N raises 0.6m.
Calculate;

(i) the efficiency of the system. (03 marks)

(ii) the power at which the man works. (02 marks)

(c) Describe an experiment to locate the center of gravity of an irregular shaped lamina. (04 marks)

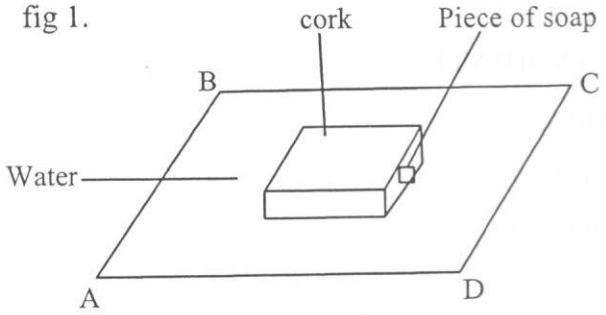
(d) Two capillary tubes of same radius are dipped into a beaker of water and the other in a beaker of Mercury.

(i) Draw the levels of the liquids in the two tubes. (02 marks)

(ii) Explain your observation in (d)(i) above. (02 marks)

2. (a) The diagram in figure 1 below shows the surface of water in a rectangular trough ABCD. A piece of cork to which a slice of soap is attached is lowered on the water surface as shown.

fig 1.



(i) State the forces acting on the cork (02 marks)

(ii) In what direction will the cork move (01 mark)

(iii) Explain what causes the motion (02 marks)

(b) Some water was put into an empty tin and boiled for several minutes. The tin was tightly curved and its heating stopped immediately.
Cold water was run over the tin.

(i) State what happened to the tin (01 mark)

(ii) Briefly explain the observation in b) i) above. (02 marks)

(c) Explain why the table-cloth on a table can easily be pulled out without disturbing the dish placed on it. (02 marks)

(d) A uniform rod AB of length 9m is pivoted at a point P, 4m from B,
A load W is attached at A to support the weight of a student of mass 50kg who is at B. the load is adjusted as the student starts walking towards P to keep the system in equilibrium.

A table below shows the load W when the student is at a distance P, from the pivot.

W(N)	380	280	180	80	30
x(m)	4.0	3.0	2.0	1.0	0.5

(i) Plot a graph of W against x. (03 marks)

(ii) Determine the weight of the rod. (03 marks)

3. (a) Cells are connected either in series or Parallel. Using usual symbols for cells, show such connections for two cells. (02 marks)

(b) (i) State **one** advantage of connecting cells in;

(i) series (01 mark)

(ii) parallel (01 mark)

(c) Explain why the voltage across the terminals of a cell fall when it is delivering current. (02 marks)

(d) An electric kettle is rated 2200W, 240V.

(i) State what is meant by the markings on the kettle? (01 mark)

(ii) What fuse should be fitted in the plug for the kettle to work normally? (02 marks)

(e) An electric heater is made of two elements of resistance 40Ω each which can be switched to parallel or series connection to a 240V supply.
Find out which connection gives maximum power. (03 marks)

(f) Describe how a lightning conductor safe guards a tall building from being struck by lightning. (04 marks)

4. (a) (i) Define **temperature.** (01 mark)

(ii) Explain why the bulb of a clinical thermometer is not quite full of mercury at room temperature. (02 marks)

(b) (i) Explain why a person feels colder after taking a bath of warm water. (02 marks)

(ii) State **two** practical instances that shows that evaporation causes cooling. (02 marks)

(c) When pieces of ice at O^0C were put in 0.5kg of water at 20^0C, the final temperature was 15^0C. (04 marks)
Find the mass of the ice that was added.
[Specific latent heat of fusion of ice = 336,000 $Jkg^{-1}K^{-1}$]

(d) (i) Describe the principle on which a pressure cooker works. (03 marks)

(ii) Explain why it is difficult to cook quickly with an open vessel at mountain tops. (02 marks)

5. (a) (i) State **one** property of light that a pin-hole camera illustrates. (01 mark)

(ii) State **two** ways in which the image in a pin hole camera is different from the object. (01 mark)

(b) Explain, with the aid of a ray diagram, how a converging lens is used in a simple camera. (03 marks)

(c) Describe short sightedness and how it is corrected. (03 marks)

Turn Over

(d) (i) What is meant by **total internal reflection?** (01 mark)

(ii) Explain how a mirage occurs during hot sunny days. (03 marks)

(iii) State **two** practical applications of **total internal reflection.** (02 marks)

(e) A flag has four stripes of colours; yellow, red, cyan and blue.
Describe appearance of the flag when viewed in a room where there is only yellow light. (02 marks)

6. (a) Define the terms

(i) **Wave length** (01 mark)

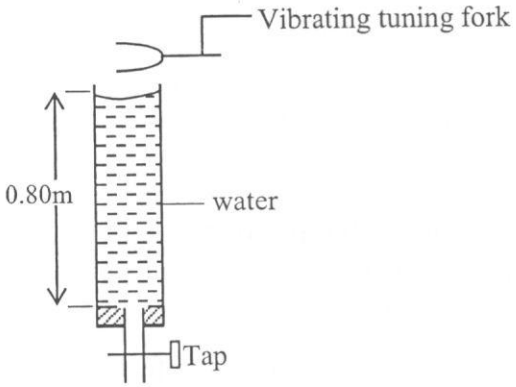
(ii) **Beats in sound** (01 mark)

(b) (i) Give **two** reasons why sound is louder at night than day time. (02 marks)

(ii) Briefly describe an experiment to demonstrate interference of water waves. (03 marks)

(c) A vibrating tuning fork producing a note of frequency 425H_Z is held above the mouth of the tube of length 0.80m, containing water as shown in figure 2 below.

fig. 2.



(i) The water is slowly run out of the tube. A loud sound is first heard when there is 0.60m of water left in the tube.
Explain why a loud sound is first heard for this length of the air column. (01 mark)

(ii) Sketch a diagram to show the mode of vibration of the air column. (01 mark)

(iii) State the name of this effect. (01 mark)

(iv) Calculate the value of speed of sound in air. (02 marks)

(d) How does wind affect the speed of sound in air? (02 marks)

(e) State **two** factors that affect the frequency of a vibrating string. (02 marks)

7. (a) State what is meant by the following as applied to magnetism.

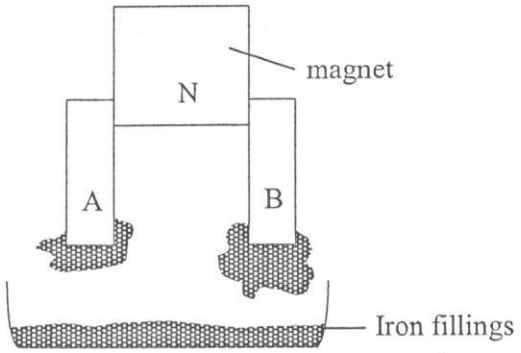
(i) **Magnetic field?** (01 mark)

(ii) **Neutral point?** (01 mark)

(b) What is **magnetic induction?** (01 mark)

(c) Figure 3 below shows two pieces of metal A and B attached on the pole of a magnet and placed near a dish containing iron fillings.

fig. 3.



(i) Describe what is observed in A and B when the magnet is detached. (02 marks)

(ii) Describe the magnetic properties of metal A. (01 mark)

(d) (i) Describe how you would care for magnets to maintain their strength. (03 marks)

(ii) Explain how you would demagnetize a bar magnet by hitting. (03 marks)

(e) A galvanometer with a resistance of 100Ω gives a full scale deflection of 10mA. What adjustment is needed to make the metre suitable to measure current of up 10A? (03 marks)

(f) Given one advantage of using a magnetic relay to switch electrical machinery on and off. (01 mark)

8. (a) Define the following terms

(i) **Isotopes** (01 mark)

(ii) **Atomic number** (01 mark)

(b) Naturally occurring chlorine is a mixture of two Isotopes. One isotope has 17 protons and 18 neutrons. Find the total mass of each atom if the other atom has 2 more neutrons. (02 marks)

(c) (i) What are **cathode rays?** (01marks)

(ii) Describe briefly how cathode rays are produced in the Cathode ray tube. (03 marks)

(d) (i) Explain why people are advised against exposing themselves to x-rays unless it is absolutely unavoidable. (03 marks)

(ii) State **two** differences between **Cathode rays** and **X-rays.** (02 marks)

(e) Explain why alpha particle produce much dense track than that of beta particles. (02 marks)

(f) State the energy changes that occur in an X- ray tube when in use. (01 mark)

END

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

School..... Signature .....

535/1
PHYSICS
PAPER 1
$2^1/_4$ hours

WAKISSHA

Uganda Certificate of Education

PHYSICS

Paper 1

2hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

- *This paper has* **two** *sections;* **A** *and* **B.**
- *Section* **A** *contains* **40** *objective type questions. You are required to write the correct answer* **A, B, C** *or* **D** *in the box on the right hand side of the question.*
- *Section* **B** *contains* **10** *structured questions. Answers to this section are to be written in the spaces provided on the question paper.*
- *Assume where necessary:*
  - *acceleration due to gravity, g* = $10ms^{-2}$
  - *specific heat capacity of water* = $4200J\ kg^{-1}K^{-1}$
  - *specific heat capacity of copper* = $400J\ kg^{-1}K^{-1}$
  - *density of water* = $1000kgm^{-3}$
  - *density of mercury* = $13600kgm^{-3}$
  - *density of hydrogen* = $0.089kgm^{-3}$
  - *density of air* = $1.29kgm^{-3}$
  - *speed of sound in air* = $340ms^{-1}$
  - *specific latent heat of vaporization of water* = $2.3 \times 10^6 J\ kg^{-1}$
  - *Speed of light in Vacuum* = $3.0 \times 10^8 ms^{-1}$
  - *Refractive index of air* = 1
  - *Specific latent heat of ice* = $336,000\ J\ kg^{-1}$

For examiners use only

Q.41	Q.42	Q.43	Q.44	Q.45	Q.46	Q.47	Q.48	Q.49	Q.50	MCQ	Total

SECTION A (40 Marks)

Answer **all** questions in this section.

1. Threads within tyres are used to
   A. make tyres attractive.
   B. make tyres stronger.
   C. reduce friction.
   D. help tyres grip the road surface.

2. A larger amplitude produces a sound wave which is
   A. louder.
   B. less loud.
   C. high and sharp.
   D. flat.

3. The device used in half-wave rectification is
   A. dynamo.
   B. semi-conductor diode.
   C. C.R.O.
   D. voltmeter.

4. The optical device used to form a real and inverted image on the screen placed on the same side as the object is
   A. concave mirror.
   B. convex mirror.
   C. concave lens.
   D. convex lens.

5. The correct order of the processes undergone by a volatile liquid in a domestic refrigerator is
   (i) evaporation
   (ii) cooling
   (iii) compression
   (iv) condensation
   A. (ii), (i), (iii) and (iv)
   B. (iii), (ii), (i) and (iv)
   C. (i), (ii), (iv) and (iii)
   D. (i), (ii), (iii) and (iv)

6. **Figure 1** below represents a horizontal solid frustrum of mass 1.54kg with respective cross sectional diameters of 14cm and 28cm. Calculate the maximum pressure that can be exerted by this body.

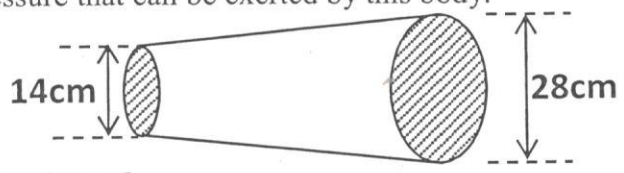


Fig.1

   A. $2.5 \times 10^3 Nm^{-2}$
   B. $1.1 \times 10^3 Nm^{-2}$
   C. $5.5 \times 10^3 Nm^{-2}$
   D. $1.0 \times 10^3 Nm^{-2}$

7. In a simple cell, the source of electrons which constitute the electric current is
   A. the zinc plate.
   B. the copper plate.
   C. dilute sulphuric acid.
   D. potassium dichromate.

8.

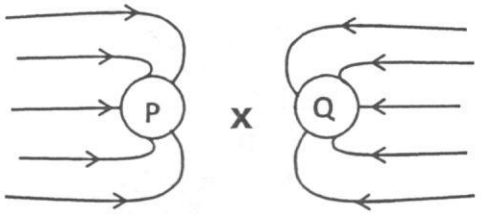


Fig. 2

Figure 2 above represents the electric field pattern of two charged bodies P and Q. When P is brought near the cap of a positively charged electroscope, the leaf will
   A. diverge.
   B. be unaffected.
   C. collapse.
   D. converge and later diverge.

9. Which of the following devices uses a soft magnet?
   A. Motor
   B. Electric bell
   C. AC generator
   D. Thermionic Diode

10. A man pushes a body with a force of 150N at an angle of 30^o to the horizontal. Find the horizontal force which acts on the body.
   A. 23.1N
   B. 75.0N
   C. 86.6N
   D. 129.9N

11.

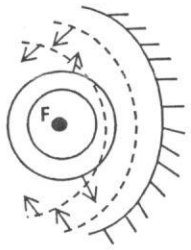
Element	Neutrons	Protons	Electrons
P	6	6	6
Q	2	2	2
R	8	6	6
S	2	3	3

The table above shows the structure of four atoms P, Q , R and S. Which ones of them are isotopes of the same element?
   A. P and R
   B. Q and R
   C. P and S
   D. P and Q

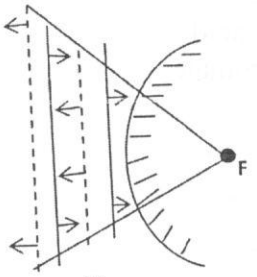
Turn Over

12. Which of the following diagrams shows correct reflection of an incident circular wave from point F?

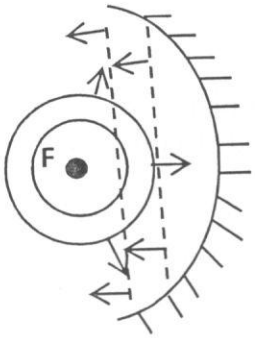
A.



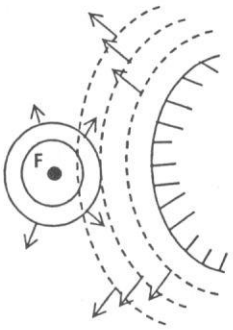
B.



C.



D.



13. A body at the equator experiences a smaller gravitational attraction than a body at one of the poles of the Earth. This is because

A. the earth is a perfect sphere
B. the equatorial radius of the earth is greater than the polar radius.
C. A body at the equator experiences a greater centripetal force.
D. the polar radius of the earth is greater than the equatorial radius.

14. An object is placed at 15cm in front of a concave lens of focal length 15cm. What is the nature of the image produced?

A. Inverted
B. Magnified
C. Same Size as object
D. Diminished

15. The respective lower and upper fixed points of a calibrated thermometer are 2cm and 52cm respectively. An unknown temperature of a suspected **Covid-19** patient is found at 30cm below the upper fixed point. What is the temperature of the suspect as per this thermometer reading.

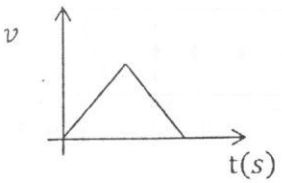
A. $\frac{20}{50} \times 100^0C$

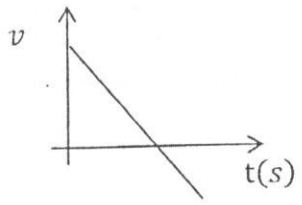
B. $\frac{30}{50} \times 100^0C$

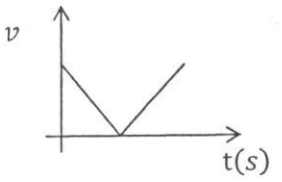
C. $\frac{28}{52} \times 100^0C$

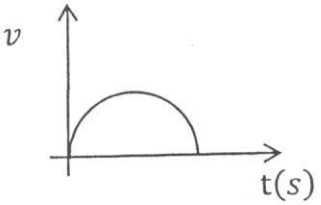
D. $\frac{32}{52} \times 100^0C$

16. Which of the following velocity-time graphs represents the motion of an Olympic high jumper?

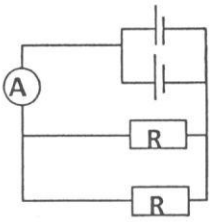
A. 

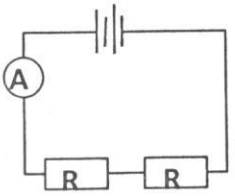
B. 

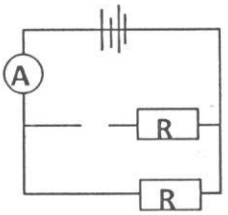
C. 

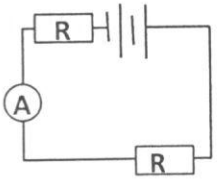
D. 

17. The following circuit arrangements represent batteries connected to resistors. In which arrangement does the ammeter show greatest deflection?

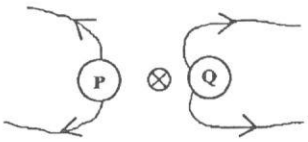
A. 

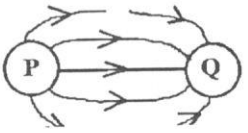
B. 

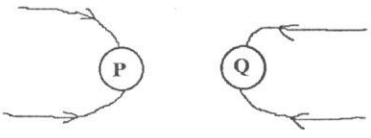
C. 

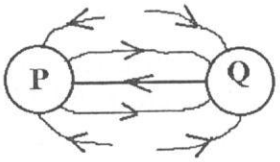
D. 

18. Two insulated metal spheres P and Q are placed in contact. A negatively charged rod is brought close to Q. While the negative rod is still in its position, an earth wire is connected to P and later broken. Finally the rod is removed and the spheres separated. Which of the following field patterns is correct for P and Q after the experiment?

A. 

B. 

C. 

D. 

19. Four bars of metal P, Q, R and S are tested for magnetism. Q attracts both P and R but not S. S is not attracted to P, Q or R. Which of the following statements is correct about P, Q, R and S?

A. P, Q and R are magnets while S is magnetic.
B. P and Q are magnets while R and S are magnetic.
C. P, R and S are magnets, while Q is magnetic.
D. Q is a magnet, P and R are magnetic while S is non-magnetic.

Turn Over

20.

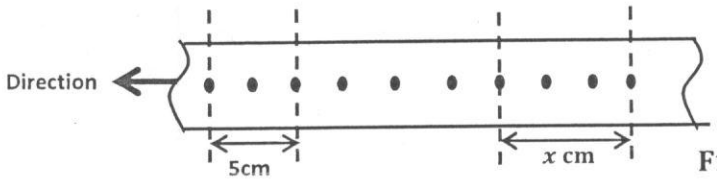


Fig. 3

Figure 3 above shows a belt attached to a trolley moving in a left ward direction as shown. If the frequency of the timer is 50Hz and the trolley accelerates at a rate of 5.8 ms^{-2}. Calculate the value of x.

A. 80.0cm
B. 90.0cm
C. 100.0cm
D. 120.0cm

21. A piece of cloth is viewed through a blue glass and it appears blue. Which one of the following mixtures produces the correct colour of the cloth?

A. Red + Green
B. Green + Blue
C. Red + Blue
D. Red + Green + Blue

22. The distance between **eight** crests of a water wave is 350cm. If the velocity of the wave is $20ms^{-1}$, calculate its frequency.

A. 20Hz
B. 40Hz
C. 50Hz
D. 100Hz

23. A Strontium-90 nucleus undergoes a certain decay to produce a daughter nuclei Yittium-90 and a radiation X, according to the equation: $^{90}_{38}Sr \rightarrow {}^{90}_{39}Y + {}^{A}_{Z}X$
The emitted radiation X is

A. Alpha
B. Beta
C. Gamma
D. Proton

24. An object is placed in front of a convex lens at a distance 1.5 times of its focal length. What is the nature of the image formed?

A. Real, inverted and magnified
B. Real, erect and diminished,
C. virtual, inverted and diminished
D. Real, inverted and magnified

25. Two thermometric liquids P and Q are heated up to their respective boiling points. P has a low boiling point. Which of the following properties is correct about P or Q?

A. P wets glass
B. P is opaque
C. Q wets glass
D. Q does not expand regularly

26. A 50kg mass body and a 20kg mass body are projected into space to cover the same vertical distance over the roof of a house with the same initial upward velocity. Ignoring air resistance, which of the following is correct about the two bodies?
A. The 20kg mass returns to the ground faster
B. The 50kg mass returns to the ground faster
C. They both return to the ground at the same time.
D. They both remain in space.

27. Two bulbs each of resistance 5.0Ω are connected in parallel across two batteries each of emf 1.5V and internal resistance of 0.5Ω also in parallel. What is the current generated by the setup?
A. 0.5A
B. 1.0A
C. 1.5A
D. 2.0A

28. A body of volume $0.0002m^3$ and density of $600kgm^{-3}$ floats in paraffin of density $800kgm^{-3}$. What fraction of the body remains exposed above the surface of paraffin?
A. $\frac{3}{20}$
B. $\frac{1}{4}$
C. $\frac{3}{4}$
D. $\frac{1}{3}$

29. A moving coil ammeter
(i) measures only direct current
(ii) has a permanent magnet
(iii) measures only alternating current
(iv) measures both alternating and direct current.
Which of the following statements are true?
A. (i) only
B. (ii) and (iii) only
C. (ii) and (iv) only
D. (i), (ii), (iii) and (iv)

30. The length of a constantan wire used in a school laboratory can accurately be measured by
A. a micrometer screw gauge
B. an engineer's calliper
C. a vernier calliper
D. a metre rule

31. The following are units of derived quantities only
A. kg, m, s
B. N, kgm^{-3}, m
C. s, N, ms^{-2}
D. m^3, m^2, ms^{-1}.

32.

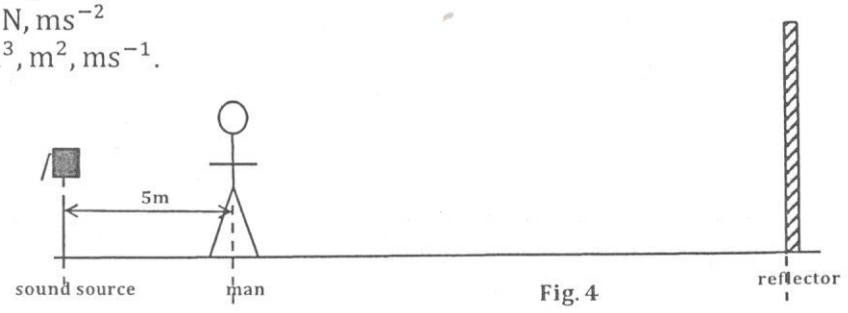


Fig. 4

A man stands 5m away from a sound source as shown in **figure 4** above. He hears sound from the original source and three seconds later he hears an echo from the reflector. Determine the distance between the reflector and the source.

A. 480m
B. 485m
C. 960m
D. 965m

33. A uniform meter rule of weight 1.05N is suspended by a spring of force constant 25Nm^{-1} at 30cm mark from one end. The meter rule is also pivoted at 70cm mark. If a 5.0g mass is suspended at the 90cm mark, calculate the extension of the spring to obtain equilibrium.

A. 2.0cm
B. 4.0cm
C. 6.0cm
D. 8.0cm

34. A spherical object is viewed through the hole of a pinhole camera at a distance of 40m. If the length between the hole and the screen is 50cm and the height of the image is 4cm. What is radius of the object?

A. 160cm
B. 200cm
C. 300cm
D. 320cm

35. A metallic body of mass 250g was heated to a temperature of 100°C and then dropped into water of mass 100g at 30°C in a copper calorimeter of heat capacity 100JK^{-1}. If the final temperature of the mixture is 50°C. Calculate the specific heat capacity of the body.

A. $1018\text{Jkg}^{-1}\text{K}^{-1}$
B. $11400\text{Jkg}^{-1}\text{K}^{-1}$
C. $832\text{Jkg}^{-1}\text{K}^{-1}$
D. $10400\text{Jkg}^{-1}\text{K}^{-1}$

36.

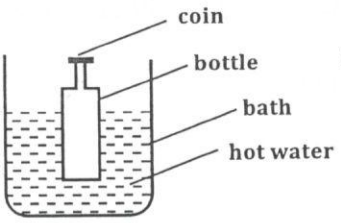


Fig. 5

An empty bottle was immersed in hot water and then closed with a coin as shown in **figure 5** above. When the bottle is immersed in cold water and turned upside down, the coin

A. does not fall off because the pressure inside the bottle is greater than that outside the bottle.
B. does not fall off because the pressure outside the bottle is greater than that inside the bottle.
C. falls off because the pressure inside the bottle will equal to that outside the bottle.
D. falls off because pressure inside the bottle is greater than that outside the bottle.

37. A flat iron of resistance 10Ω is connected to the mains supply of 220V and it is used for 5 hours daily for 5days. If the cost of a unit is sh.1000 determine the amount of money consumed in that period.

A. 100,000
B. 121,000
C. 110,000
D. 50,000

38. Which of the forces act on a stationary body in a viscous liquid?

(i) up thrust
(ii) viscosity
(iii) weight

A. (i) only
B. (i), (ii) and (iii)
C. (ii) and (iii) only
D. (i) and (iii) only.

39. A T.V remote operating on a 6.0V d.c supply can draw power from a 240.0V mains by connecting it in

A. series with a low resistance.
B. series with a high resistance.
C. parallel with a low resistance.
D. parallel with a high resistance..

40. An electric heater is immersed in 0.05kg of oil in a calorimeter at 20^0C. The temperature of the oil rose to 323K in $^1/_6$ of a minute. If the specific heat capacity of oil is $2000 Jkg^{-1}K^{-1}$, calculate the power supplied by the heater.

A. 100W
B. 200W
C. 300W.
D. 400W

SECTION B (40 Marks)

*Answer **all** questions in this section.*

41. (a) (i) What is meant by **plastic deformation** *(01 mark)*

.....

.....

(ii) State **two** factors which affect a body under plastic deformation. *(01 mark)*

.....

.....

(b) Sketch an extension against load graph of an elastic body and indicate on it elastic limit and yield point. *(02 marks)*

42. (a) (i) State the **law of conservation of linear momentum.** *(01 mark)*

.....

.....

(ii) Write any **two** applications of the law in (i) above. *(01 mark)*

.....

.....

(b) A body of mass 5.0g moving with a velocity of $10ms^{-1}$ collides with a stationary body of mass 10g. If the 5.0g body moves backwards with a velocity of $5ms^{-1}$ after collision, find the velocity of the 10g mass body after collision. *(02 marks)*

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43. (a) Define **Pressure** and state its SI unit. *(02 mark)*

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(b) A water tap of cross-sectional diameter of 3.5cm is located at the base of a tank of height 4.0m to allow water out of it. Calculate the force at which water flows out of the tank. *(02 marks)*

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44. (a) Define **absolute refractive index** *(01 mark)*

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(b)

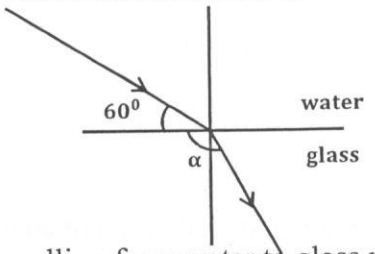

Fig 6

A ray of light travelling from water to glass makes an angle of 60^{o} with the boundary as shown in **figure 6** above. If the refractive indices of water and glass are 1.33 and 1.50 respectively, calculate angle α. *(03 marks)*

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45. (a) What is a **stationary wave?** *(01 mark)*

.....

(b)

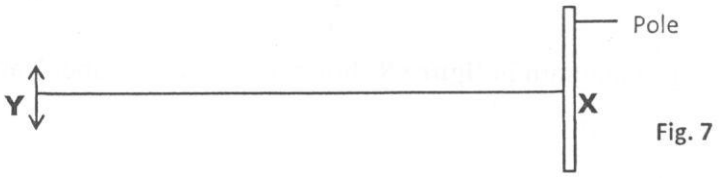

Fig. 7

The end X of a rope is tied to a pole while end Y is moved up and down as shown in **figure 7**.

(i) Sketch the resultant pattern between X and Y. *(01 mark)*

(ii) A horizontal distance between a node and antinode of a standing wave is 2.0cm. If the frequency of the wave is 50Hz, calculate its velocity. *(02 marks)*

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46. (a) (i) Define the term **Absolute zero**. *(01 mark)*

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(ii) The cooling system of a refrigerator extracts heat at a rate of 0.7kJs^{-1}. How long will it take to convert 500g of water at 20°C into ice? *(02 marks)*

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(b) State any **two** factors affecting melting point of copper. *(01 mark)*

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47. (a) (i) Define **Photoelectric emission** *(01 mark)*

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(ii) State any **two** applications of photoelectric emission. *(01 mark)*

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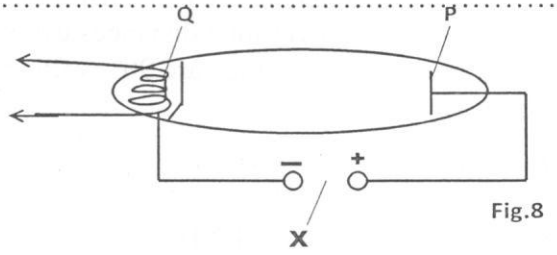

Fig.8

(b) The diagram in **figure 8** shows a thermionic tube. Name parts marked

(i) P..... *(0½ mark)*

(ii) Q..... *(0½ mark)*

(c) State the function of the part labeled X *(01 mark)*

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48. (a) (i) What is meant by **electrostatic induction?** *(01 mark)*

.....

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

.....

.....

(b) Draw an electric field pattern for two positively charged parallel plates at a short distance apart. *(02 marks)*

49. (a) (i) State **Ohm's law** *(01 mark)*

.....

.....

(ii) Write any **two** advantages of alternating current over direct current *(02 marks)*

.....

.....

(b) Sketch a current against voltage graph for a torch bulb. *(01 mark)*

50. (a) Distinguish between **mutual** and **self-induction** *(02 marks)*

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(b) Electric power is generated at 11kV. Transformers are used to raise voltage to 440kV for transmission over long distances using cables. The output of the transformers is 19.8mW and they are 90% efficient. Calculate the input current. *(02 marks)*

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END