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

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

535/1
PHYSICS
PAPER 1
August 2023
$2^{1}/_{4}$ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

PHYSICS

Paper 1

2 hours 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* = $10\ ms^{-2}$
  - *density of water* = $1000\ kgm^{-3}$
  - *density of mercury* = $13600\ kgm^{-3}$
  - *density of hydrogen* = $0.089\ kgm^{-3}$
  - *density of air* = $1.29\ kgm^{-3}$
  - *speed of sound in air* = $330\ ms^{-1}$
  - *Speed of light in Vacuum* = $3.0 \times 10^{8}\ ms^{-1}$

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

Turn Over

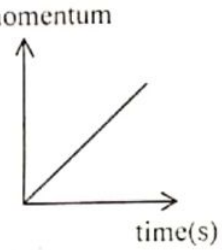
SECTION A (40 Marks)

Answer **all** questions in this section

1. Which one of the following substances undergoes plastic deformation?
   A. Copper
   B. Wood
   C. Glass
   D. Concrete

2. A body of mass 120 g and density 2.5 gcm^{-3} is placed in a measuring cylinder containing water and the level of water rises to 80 cm^3. Find the initial level of the water.
   A. 48 cm^3
   B. 40 cm^3
   C. 32 cm^3
   D. 30 cm^3

3. A body of a given mass is moving with uniform momentum. Which of the following graphs describes its motion?

   A.
   

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   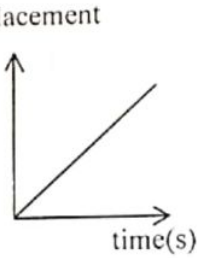

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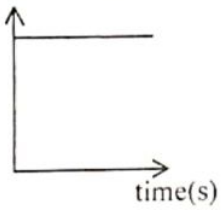
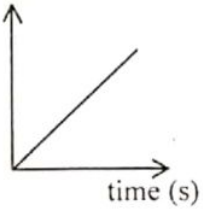
   

   D.
   

4. Which of the following statements are true about light colour filters.
   (i) Magenta filter absorbs red and transmits blue and green.
   (ii) Magenta filter absorbs green and transmits red and blue.
   (iii) Cyan filter absorbs blue and transmits red and green.
   (iv) Yellow filter absorbs blue and transmits red and green.

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

5. The process of using a material of low thermal conductivity to prevent heat loss is called
   A. lagging.
   B. cooling.
   C. absorption.
   D. contraction.

6. In an experiment to find how the force of repulsion between two magnets varies with their distance apart, the following results in a table below were obtained.

Force (N)	Distance (m)
30	1
120	4
480	16

From the results it can be deduced that:

A. $F \alpha d^2$
B. $F \alpha d$
C. $F \alpha \frac{1}{d}$
D. $F \alpha \frac{1}{d^2}$

7. A ray of light AO is incident on a plane mirror and it is reflected along OB as shown in figure 1 below.

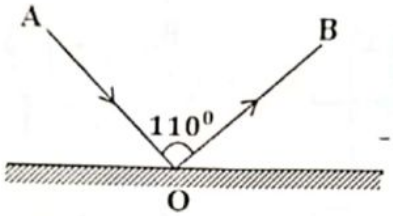


Fig. 1

The glancing angle is:

A. 35^o
B. 40^o
C. 55^o
D. 60^o

8. In order to charge a gold leaf electroscope positively by induction, the following is the correct order of the process involved:

(i) A negative rod is brought close to the cap.
(ii) The cap is earthed.
(iii) The negative rod is withdrawn.

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

9. Two girls are swinging in turns. One of them complained how it was hard to set her friend in motion. The property that accounts for this tendency is

A. friction.
B. inertia.
C. gravitational force.
D. momentum.

10. Two boys P and Q of masses 40 kg and 60 kg respectively climb a distance of 8 m each in 10 seconds and 15 seconds respectively. One of the following statements is correct about them.

A. The power of P equals to the power of Q.
B. The power of P is greater than that of Q.
C. The power of Q is greater than that of P.
D. The work done by P is greater than done by Q.

11. **Fig. 2**

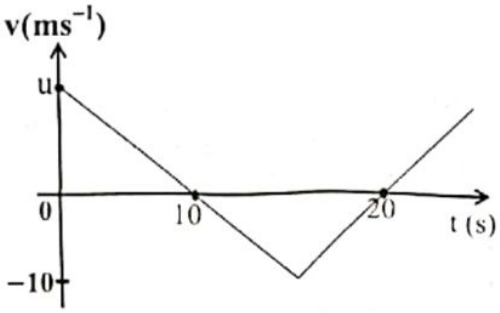
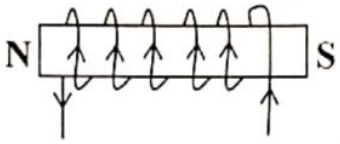
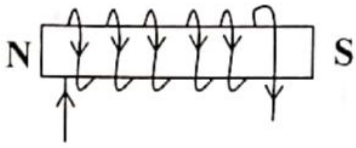


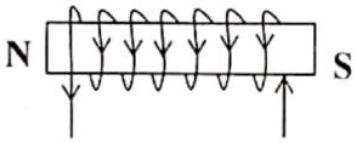
Figure 2 above shows motion of a body which covered a total displacement of 50 m. Find the value of its initial velocity u.

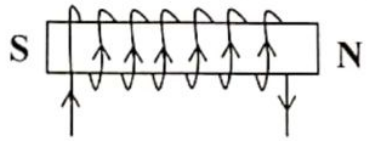
A. $4.5\ ms^{-1}$
B. $10\ ms^{-1}$
C. $16\ ms^{-1}$
D. $20\ ms^{-1}$

12. The diagrams below show electric field and polarity of an electromagnet. Which of them is correct?

A.


B.


C.


D.


13. Plane waves are diffracted as circular waves in a narrow gap. When the gap is made narrower the plane waves become

A. straight waves.
B. more circular.
C. standing waves.
D. reflected.

14. **Fig. 3**

Four identical cylindrical resistors each of cross sectional area A, resistivity **ρ**, and length ***l*** are combined in a bundle as shown in figure 3 above. Their effective resistance **R** is given by:

A. $\frac{\rho l}{4A}$
B. $\frac{4\rho l}{A}$
C. $\frac{4A}{\rho l}$
D. $4A\rho l$

15. Which of the following are true about a wave travelling from deep to shallow water?

(i) wavelength reduces.
(ii) velocity reduces.
(iii) wave length increases.
(iv) velocity increases.

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

16. A magnified virtual image can only be produced by a
A. plane mirror.
B. convex mirror.
C. concave mirror.
D. driving mirror.

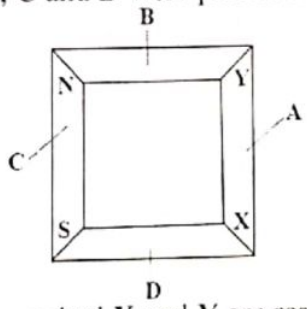
17. The density of a substance can be termed as the
A. quantity of matter per unit square metre.
B. space occupied by a substance.
C. quantity of matter per unit space occupied by a substance.
D. gravitational force working on a substance.

18. Full wave rectification can be achieved by using either of the following
(i) one diode
(ii) two diodes
(iii) three diodes
(iv) four diodes
A. (i) only
B. (ii) and (iv) only
C. (iii) and (iv) only
D. (iv) only

19. A fixed mass of an ideal gas has temperature, **T**, volume, v, and pressure **P**. When its pressure is halved and volume is trippled, its new temperature becomes.
A. $\frac{3}{2}T$
B. $\frac{2}{3}T$
C. $\frac{1}{6}T$
D. $6T$

20. Four bar magnets A, B, C and D were placed next to one another as shown in fig. 4 below.

Fig. 4



The poles of magnet **A** marked **X** and **Y** are respectively
A. south and north.
B. south and south.
C. north and north.
D. north and south.

21. A nuclide $^{10}_{6}\mathbf{X}$ decays to nuclide **Y** by emission of a Beta particle and Alpha particle. The nucleon number of **Y** is:
A. 16
B. 11
C. 6
D. 1

22. A high AC voltage can be obtained from a low DC voltage by use of a
A. rectifier.
B. inverter and transformer.
C. transformer.
D. diode and a transformer.

23. A uniform beam of mass 250 g is pivoted at point P as shown fig 5 below.

Fig. 5

Determine the mass B to be put at one end for the beam to balance.
A. 120 g
B. 122 g
C. 125 g
D. 250 g

24. Which of the following statements is/are correct about a body moving with uniform velocity.
(i) Resultant force is zero.
(ii) Acceleration is zero.
(iii) Momentum is zero.
A. (i) and (ii)
B. (i) and (iii)
C. (iii) only
D. (i) (ii) and (iii)

25. In gears a large velocity ratio is obtained when,
A. effort is applied on a small gear to drive a large gear.
B. effort is equal to the load.
C. effort is applied on a large gear to drive a small gear.
D. the gears move in opposite directions.

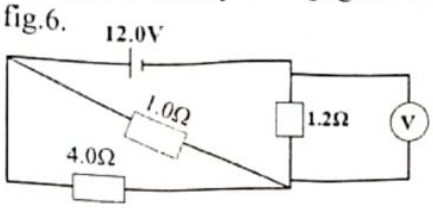
26. A fish in a pond looks at a man standing besides the pond. To the fish, the man appears to be
A. smaller and nearer than he actually is.
B. smaller and further than he actually is.
C. larger and nearer than he actually is.
D. larger and further than he actually is.

27. When Action and Reaction forces act on a body, the resultant is
A. greater than zero.
B. one.
C. less than zero.
D. zero.

28. A liquid of density $1.0 \times 10^3 kgm^{-3}$ fills a vessel of uniform cross-sectional area of 200 cm^2 to a depth of 500 mm. Calculate the force exerted by the liquid at the bottom of the vessel.
A. 50 N
B. 100 N
C. 150 N
D. 200 N

29. Three resistors are connected to a 12.0 V battery of negligible internal resistance as shown in the circuit below in fig.6.

Fig. 6



Find the voltmeter reading.

A. 6.0 V
B. 7.2 V
C. 8.0 V
D. 12.0 V

30. Clouds are 1650 m from the observer on the ground. Find the time that elapses between the lightening flash and thunder. (Speed of sound in air = 330 ms^{-1})

A. 0.005 s
B. 050 s
C. 5.0 s
D. 50 s

31. The advantage(s) of mercury over alcohol as a thermometric liquid is/are

(i) mercury is opaque.
(ii) mercury has a high temperature coefficient of expansion.
(iii) mercury is more sensitive.
(iv) mercury is a good conductor of heat.

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

32. One of the following statements is true about the working of simple cells.

A. Polarisation is caused by impure zinc.
B. The hydrogen produced at the zinc plate causes polarisation.
C. The formation of hydrogen bubbles at the copper plate causes local action.
D. Potassium dichromate is used to minimise polarization.

33. It is easier to charge insulators than conductors because

A. insulators do not allow the charge to flow away but conductors do.
B. conductors allow the charges to flow through them but insulators don't.
C. it is impossible to charge conductors under any condition.
D. insulators just receive charge from the atmosphere without being rubbed.

34. State what would happen to the size of a football inner tube when its pressure is increased, if it exactly obeys Boyle's law.

A. It would increase.
B. It would reduce.
C. It would not change.
D. It would lead to immediate bursting.

35. 93.75% of a radioactive material decays after 80 days. Find its half-life.

A. 20 days
B. 40 days
C. 80 days
D. 120 days

36.

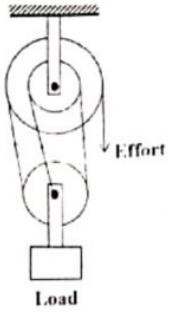


Fig. 7

The diagram in figure 7 above shows a pulley system. Which of the following statement(s) is true about it?

(i) The mechanical advantage of the system increases up to a limit as the load increases.

(ii) The mechanical advantage cannot exceed 3 depending on the load.

(iii) The efficiency of the system increases as the load increases.

A. (i) and (ii) only

B. (ii) and (iii) only

C. (i) and (iii) only

D. (iii) only

37.

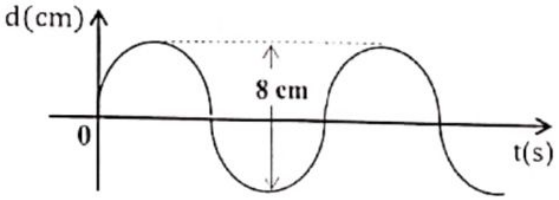


Fig. 8

Figure 8 above shows a wave in motion. If its wavelength is half the amplitude with a frequency 50 Hz, calculate its velocity.

A. 0.5 ms^{-1}

B. 1.0 ms^{-1}

C. 2.0 ms^{-1}

D. 4.0 ms^{-1}

38. A charge of 30 C flows through a coil for one sixth of a minute. If the resistance of the coil is 4.0 Ω find the pd across it.

A. 10.0 V

B. 12.0 V

C. 14.0 V

D. 16.0 V

39. In Optics, which of the following is true in both concave mirrors and convex lenses during image formation?

A. An incident ray parallel and close to the principal axis passes through the principal focus after reflection or refraction.

B. An incident ray through the principal focus is reflected/refracted through the centre of carvature.

C. A ray through the principal focus is reflected/refracted along the same path.

D. A ray through the optical centre is undeviated during reflection from the lens.

40. An electric heater is used to heat $2x10^{-4}m^3$ of water for 200 s. Find the p.d across the heater if the current through it is 0.5 A and the temperature of the water rises by 25°C.

A. 145 V
B. 175 V
C. 210 V
D. 240 V

SECTION B (40 Marks)

Answer all questions in this section.

41. (a) (i) What is meant by **gravitational pull?** *(01 mark)*

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.....

(ii) State any **two** factors affecting a freely falling body in a vacuum. *(01 mark)*

.....

.....

(b) A doctor of mass 80 kg is moving in a lift accelerating at 2 ms^{-2} from sixth to ground floor. Find the reaction of the lift on the doctor. *(02 marks)*

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42. (a) Define **Pressure.** *(01 mark)*

.....

.....

(b)

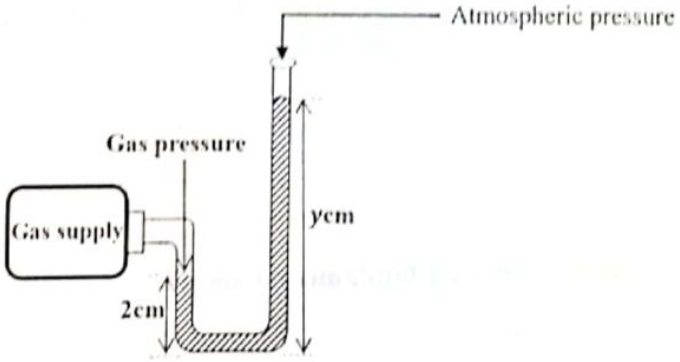

Fig. 9

The diagram in figure. 9 shows an instrument for measuring gas pressure in a laboratory. If the gas pressure is 123,760 Pa, find the value of y. *(03 marks)*

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43. (a) (i) Differentiate between a **virtual** and a **real** image. *(01 mark)*

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Turn Over

(ii) State the conditions for total internal reflection to occur. *(01 mark)*

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(b) Yellow light is incident on a glass prism as shown in figure 10.

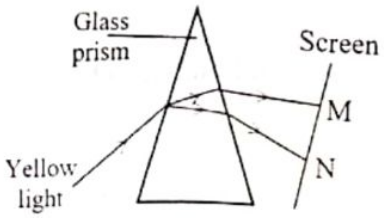

Fig. 10

(i) Name the colours M and N. *(01 mark)*

M .....

N .....

(ii) Colour M is mixed with Cyan. Name the resultant colour. *(01 mark)*

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44. (a) Define **Latent heat of fusion.** *(01 mark)*

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(b) An electrical heater rated 1000 W is immersed in a plastic bucket of ice of mass 500 g at $0^{o}C$. If it takes 10 minutes for the ice to raise its temperature to θ, determine the value of θ. *(03 marks)*

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45. (a) What is meant by a **fundamental note?** *(01 mark)*

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.....

(b) (i) A column of air 26.25 cm in a closed tube resonates to a sounding tuning fork and produces a note of lowest frequency. If the velocity of sound in air 330 ms^{-1}, determine the frequency of the fork. *(02 marks)*

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(ii) State **one** advantage of using open over closed pipes as musical instruments. *(01 mark)*

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46. (a) An energy bulb saver is rated 240 V , 15 W. What is meant by this rating? *(01 mark)*

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(b) (i) Give **one** difference between a shunt and a multiplier. *(01 mark)*

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(ii) A multiplier has internal resistance 5.0 Ω and full scale deflection of 20 mA. Calculate the value of the resistor which will enable it to be converted to a shunt so that a maximum current of 5 A can be measured. *(02 marks)*

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47. (a) (i) What is meant by **Corona discharge?** *(01 mark)*

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(ii) Write **two** applications of Corona discharge. *(01 mark)*

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

48. (a) (i) Define **nuclear fusion.** *(01 mark)*

.....

.....

(ii) Mention **two** conditions for nuclear fusion to occur. *(01 mark)*

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.....

(b) The nuclide $^{215}_{84}Po$, decays to nuclide X by emission of two alpha particles and one Beta particle. Write a balanced equation for the decay. *(02 marks)*

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49. (a) (i) Define **magnetic saturation.** *(01 mark)*

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(ii) Explain briefly why increase in temperature destroys the magnetism of a magnet. *(02 marks)*

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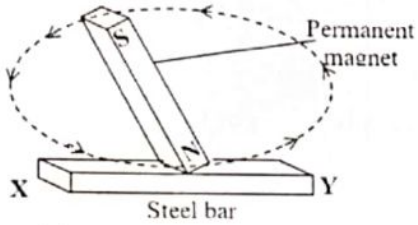
(b) Figure 11 below shows magnetisation of a steel bar by a permanent magnet.

Fig. 11



Name the polarity X and Y. *(01 mark)*

X .....

Y .....

50. (a) (i) Define **capillarity.** *(01 mark)*

.....

.....

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

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(b) A small spherical metal ball was dropped in oil contained in a vessel. Draw a diagram to show the forces acting on the metal ball. *(02 marks)*

END