Candidate's Name:.....

Signature:.....

Random No.						Personal No.		

(Do not write your School/Centre Name or Number anywhere on this booklet.)

535/1
PHYSICS
Paper 1
Oct./Nov. 2022
2¼ hours

UGANDA NATIONAL EXAMINATIONS BOARD

Uganda Certificate of Education

PHYSICS

Paper 1

2 hours 15 minutes

INSTRUCTIONS TO CANDIDATES:

Section **A** *contains* **40** *objective type questions. You are required to write the correct answer* **A, B, C** *or* **D** *in* **blue** *or* **black** *ink against each question in the box on the right hand side.*

Section **B** *contains* **10** *structured questions. Answers are to be written in the spaces provided on the question paper.*

Do **not** *use pencil* **except** *for drawings. Any work done in pencil will* **not** *be marked.*

Mathematical tables and silent non-programmable scientific calculators may be used.

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

Specific heat capacity of water $= 4200\ Jkg^{-1}K^{-1}$.

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** *the questions in this section.*

1. The instrument which applies the hydraulic principle is

A. lift pump.
B. manometer.
C. siphon.
D. rubber sucker.

2. Which one of the following is the S.I unit for volume?

A. ml.
B. cm^3.
C. mm^3.
D. m^3.

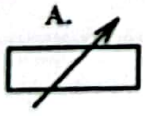
3. A stream of fast moving electrons is referred to as

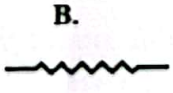
A. X - rays.
B. Gamma - rays.
C. Light rays.
D. Cathode rays.

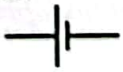
4. Which one of the following is an industrial use of X- rays?

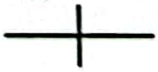
A. Treatment of cancer.
B. Microwave cooking.
C. Satellite communication.
D. Inspection of welds in steel pipes.

5. Which one of the following diagrams represents a symbol for a fixed resistor?

A. 

B. 

C. 

D. 

6. A piece of wire of length 12 cm is stretched by 2.5 cm when a mass of 5 kg is hanged on it. Find the stretch in the length of the wire when a mass of 8 kg is hanged on it.

A. $\frac{12\times2.5}{5\times8}$ cm.

B. $\frac{12\times2.5}{8}$ cm.

C. $\frac{2.5\times8}{5}$ cm.

D. $\frac{8\times5}{2.5}$ cm.

7. Which one of the following materials becomes permanently magnetised by induction when subjected to the same magnetising force?

A. Steel.
B. Iron.
C. Copper.
D. Brass.

8. The base of a Bunsen burner is made broad in order to

A. make its vertical line through the centre of gravity fall out of its base.
B. raise its centre of gravity.
C. lower its centre of gravity.
D. reduce its stability.

9. A radioactive nucleus of an element Y is represented by the symbol $^{288}_{92}Y$ Which one of the following represents atomic number of an element formed after an α decay by Y?

A. 288.
B. 92.
C. 196.
D. 90.

10. Which one of the following characteristics are for the image of an object placed at twice the focal length of a concave mirror?

A. real, inverted, magnified.
B. virtual, erect, diminished.
C. virtual, inverted, diminished.
D. real, inverted, same size as object.

11. Which of the following action(s) should be carried out to reduce the power loss in cables during power transmission?

(i) Use thicker wires.
(ii) Transmit power at high voltages.
(iii) Transmit power at high current.

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

12. Which one of the following shows elastic collision?

A. A rubber ball bouncing off the table and continues moving.
B. A piece of plasticine falling on a table and sticking on it.
C. A moving body colliding with a stationary body and sticking together after collision.
D. A moving body colliding with another moving body and sticking together after collision.

13. A cylinder of base area 4 cm^2 and height 2 cm has a mass of 20 g. Find its density in gcm^{-3}.

A. $\frac{20}{4 \times 2}$.
B. $\frac{4 \times 2}{20}$.
C. $\frac{2 \times 20}{4}$.
D. $\frac{4}{2 \times 20}$.

14. Figure 1 shows a coil *PQRT* of a galvanometer between its magnetic pole pieces *S* and *N*.

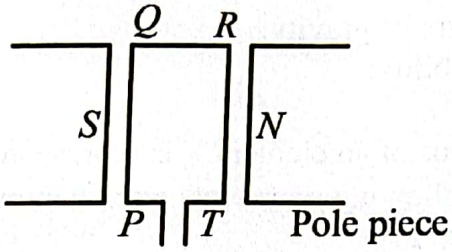


Fig. 1

When current flows through the coil, which part(s) experience(s) a force that causes it to rotate?

A. *Q* only.
B. *QR* only.
C. *RT* only.
D. *PQ* and *RT*.

15. How much work is done when a man lifts a mass of 4 kg vertically through a height of 8 m for 3 s?

A. 32 J.
B. 40 J.
C. 320 J.
D. 120 J.

16. Figure 2 shows a displacement-distance curve for waves travelling on a sea.

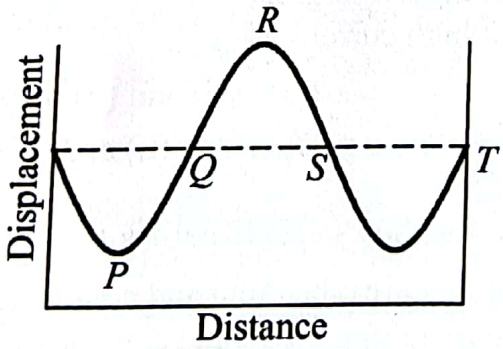


Fig. 2

Which one of the following pairs of points are one wavelength apart?

A. *P* and *R*.
B. *Q* and *S*.
C. *Q* and *T*.
D. *S* and *T*.

17. A stone is projected upwards with a velocity of 10 ms^{-1}. Find the time taken to reach maximum height. [*Acceleration due to gravity = 10 ms^{-2}.*]

A. 0.5 s.
B. 1.0 s.
C. 5.0 s.
D. 10.0 s.

18. Polarisation in a simple cell can be minimised by

(i) occasionally brushing the anode plate.
(ii) adding depolarizers which oxidise hydrogen to water.
(iii) dipping the plate in concentrated sulphuric acid and then mercury.

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

19. Water waves are produced in a ripple tank using a vibrator of frequency 4 kHz. Find the wavelength of the wave if the speed of the waves is 60 ms^{-1}.

A. 1.5×10^{-2} m.
B. 15.0×10^{1} m.
C. 2.4×10^{2} m.
D. 2.4×10^{5} m.

20. Nails with sharp ends pierce better than those with blunt ones because sharp nails

A. allow a force to act on a small area and produce large pressure.
B. allow force to act on a small area and produce small pressure.
C. have small area that reduces the force exerted and hence high pressure.
D. have large area that increases force exerted and hence high pressure.

21. A cuboid of dimensions 10.0 cm by 6.0 cm by 5.0 cm is made of material of density 15.0 gcm^{-3}. What is the tension in a string that freely supports this cuboid?

A. 4.5 N.
B. 45N.
C. 4500 N.
D. 45000 N.

22. The linear momentum of a body was uniformly increased from 3 $kgms^{-1}$ to 11 $kgms^{-1}$. If the time taken was 2 s, find the applied force.

A. 4.0 N.
B. 7.0 N.
C. 8.0 N.
D. 14.0 N.

23. An ammeter is connected in series with the load to

A. measure current through the load.
B. measure the p.d across the load.
C. increase the p.d across the load.
D. increase the current through the load.

24. A pin hole camera of length 20 cm forms an image of height 5 cm. If the object is 25 m from the camera, find the height of the object.

A. $\frac{25\times 5}{20}$.
B. $\frac{20\times 5}{25}$.
C. $\frac{20\times 25}{5}$.
D. $\frac{25}{20\times 5}$.

25. The coils of a solar heater are black because they

A. reflect all the heat energy better.
B. radiate heat quickly and better.
C. absorb radiant energy faster and better.
D. retain heat.

26. A pupil of mass 20 kg takes 40 s to climb a tree which is 25 m high. Find the average power developed.

A. $\frac{20 \times 25}{10 \times 40}$.
B. $\frac{25 \times 40}{20 \times 10}$.
C. $\frac{20 \times 10 \times 40}{25}$.
D. $\frac{20 \times 10 \times 25}{40}$.

27. When forces acting on a moving body are in equilibrium, the body

A. slows down at a steady slow speed.
B. moves in a straight line at a steady speed.
C. speeds up to a steady faster speed.
D. comes to a state of rest.

28. Figure 3 shows refraction of light through one face of a glass block at angle of refraction 26°.

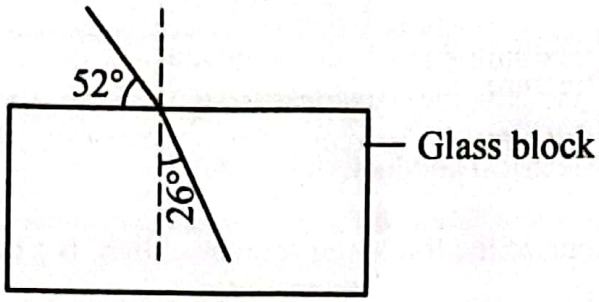


Fig. 3

Find the refractive index of the block.

A. $\frac{\sin 90^\circ}{\sin (26^\circ+52^\circ)}$.

B. $\frac{\sin(90^\circ - 26^\circ)}{\sin 52^\circ}$.

C. $\frac{\sin(90^\circ - 52^\circ)}{\sin 26^\circ}$.

D. $\frac{\sin 90^\circ}{\sin (52^\circ - 26^\circ)}$.

29. Which of the following properties of cathode rays shows that they possess energy? They

(i) affect photographic plates.
(ii) cause a small paddle - wheel in their path to rotate.
(iii) cast a sharp shadow on the screen when an object is placed in their path.

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

30. Figure 4 shows three resistors each of resistance 2 Ω connected across a battery of e.m.f 3.0 V.

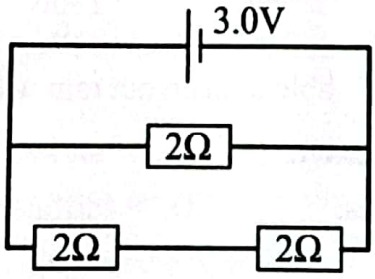


Fig. 4

Find the current supplied by the battery.

A. 0.50 A.
B. 0.75 A.
C. 1.50 A.
D. 2.25 A.

31. Which one of the following physical properties is applied in a mercury-in-glass thermometer?

A. Length.
B. Pressure.
C. Density.
D. Electrical conductivity.

32. Which one of the following sources of light is a natural luminous object?

A. Sun.
B. Moon.
C. Candles.
D. Electric lamp.

33. Which one of the following sources of energy are renewable energy?

A. Solar, Biogas and Tidal.
B. Fossil, Nuclear and Tidal.
C. Solar, Nuclear and Biogas.
D. Solar, Tidal and Fossil.

34. Which one of the following devices changes mechanical energy to electrical energy?

A. Motor.
B. Generator.
C. Microphone.
D. Loud speaker.

35. An electric iron rated 1500 W is used to iron for 45 minutes. If each unit of electricity costs UGX500, calculate the total cost of using the electric iron.

A. $\frac{1500}{1000} \times \frac{45}{60} \times 500.$
B. $\frac{1500}{1000} \times \frac{60}{45} \times 500.$
C. $\frac{1000}{1500} \times \frac{60}{45} \times 500.$
D. $\frac{1000}{1500} \times \frac{45}{60} \times 500.$

36. The canvas of a tent is able to keep out rain water because of

A. capillary attraction.
B. surface tension.
C. cohesion forces.
D. diffusion.

37. Nuclear fission may be used in

(i) X-ray production.
(ii) nuclear reactors.
(iii) nuclear bombs.

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

38. Figure **5** shows a bar magnet which is broken at ***P***.

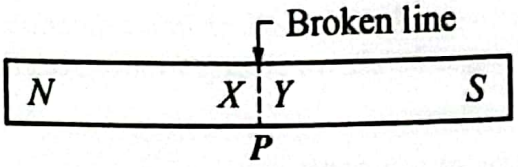


Fig. 5

Which one of the following pairs shows the correct polarity at X and Y?

	Polarity at X	Polarity at Y
A.	N - Pole	S - Pole.
B.	S - Pole	N - Pole.
C.	N - Pole	N - Pole.
D.	S - Pole	S - Pole.

39. Which one of the following is/are application(s) of capillarity?

(i) Wick in paraffin stove.
(ii) Absorption of moisture by a towel.
(iii) Movement of molecules of paraffin from high concentration to low concentration.

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

40. Figure **6** shows a toothed wheel rotating and producing sound by a holding cord.

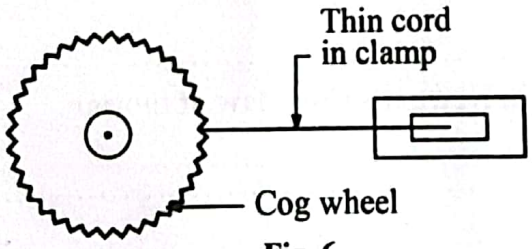


Fig. 6

What is the effect of increasing the speed of the wheel?

A. A decrease in the pitch of the sound.
B. An increase in the pitch of the sound.
C. A decrease in the speed of the sound.
D. An increase in the speed of the sound.

SECTION B

Answer **all** *the questions in this section.*
All working must be shown clearly in the spaces provided.

41. (a) State the **Law of moments.** (*01 mark*)

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(b) List **two** factors which affect the stability of a body. (*02 marks*)

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(c) Why does a body thrown upwards eventually come back to the ground? (*02 marks*)

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42. (a) (i) What is meant by **inertia** of a body? (*01 mark*)

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(ii) Explain Newton's **third law of motion.** (*01 mark*)

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(b) A truck of one tonne travelling at 25 ms^{-1} accelerates uniformly to 40 ms^{-1} in 5 s. Calculate the accelerating force. (*02 marks*)

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43. (a) (i) Define the **principal focus** of a convex mirror. *(01 mark)*

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(ii) State **one** reason why convex mirrors are used as driving mirrors. *(01 mark)*

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(b) An object *O* is placed in front of a convex mirror of principal focus, *F* and centre of curvature *C* as shown in figure 7.

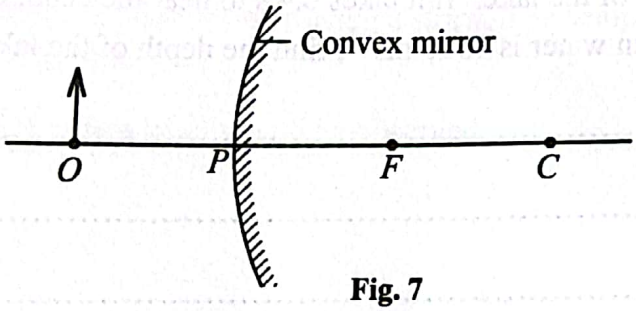

Fig. 7

Draw rays to determine the position and nature of the image formed. *(02 marks)*

44. (a) Define **radiation** as applied to heat. *(01 mark)*

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(b) Explain why water in a sauce pan boils starting from the top. *(02 marks)*

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(c) State **two** reasons why water is **not** used in thermometers. (*01 mark*)

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

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(b) A boat on the surface of water in a lake sends sound vertically to the bottom of the lake. If it takes 0.4 s to hear the echo, and the speed of sound in water is 1500 ms^{-1}, find the depth of the lake. (*03 marks*)

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

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(b) State **one** difference between a live wire and a neutral wire in domestic wiring. (*01 mark*)

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(c) A 60 W bulb is connected to a 240 V mains supply. How much energy is dissipated by the bulb in 10 minutes. (*02 marks*)

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47. (a) List any **two** states of matter. (*01 mark*)

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(b) A small crystal of blue copper sulphate is introduced at the bottom of a beaker containing water using a straw. The setup is left undisturbed for some time.

(i) Explain what would be observed. (*02 marks*)

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(ii) How would an increase in temperature of the setup affect your observation in (b)(i)? (*01 mark*)

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48. (a) State **Lenz's law**. (*01 mark*)

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(b) Name **one** non-metal which is a conductor of electricity. (*01 mark*)

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(c) List **two** ways the e.m.f obtained from a simple dynamo can be increased. (*02 marks*)

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49. (a) A bar magnet is placed with its South pole facing the earth's Geographical North. Draw the resultant magnetic field pattern. (*02 marks*)

(b) Why does the south pole of a freely suspended magnet point to the North? (*01 mark*)

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50. (a) What is meant by **half-life** of a radioactive material? *(01 mark)*

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(b) (i) The half-life of a certain radioactive element is 57 days. Find the fraction of the atoms disintegrated in 171 days. *(02 marks)*

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(ii) Sketch a graph to show the variation of the number of nuclei against time for a radioactive material. *(01 mark)*

END