Candidate's Name:

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Signature:.....

Random No.						Personal No.		

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

535/1
PHYSICS THEORY
Paper 1
July. / Aug. 2023
2 1/4 hours

JINJA JOINT EXAMINATIONS BOARD

Uganda Certificate of Education

MOCK EXAMINATIONS 2023

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** 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.*
Mathematical tables and silent non-programmable calculators maybe used.

Acceleration due gravity, g	=	$10\ m\ s^{-2}$
Specific heat capacity of water	=	$4200\ J\ kg^{-1}\ K^{-1}$
Velocity of light in air, c	=	$3.0 \times 10^{8}\ m\ s^{-1}$
Density of water	=	$1000\ kg\ m^{-3}$

For Examiner's Use Only

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

9. The main reason (s) why the moon is called a silent planet is that:

(i) It has no atmosphere for transmission of sound waves.

(ii) Waves on the moon travel at a speed greater than $3.0 \times 10^{8} ms^{-1}$.

(iii) No person lives on the moon.

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

10. Screw jack, inclined planes and wheel and axle belong to which of the following groups?

A. Electrical appliances. B. First class levers.
C. Magnetic materials. D. Machines.

11. A charge of 72 C flows through an electrical kettle for 0.2 minutes when connected to a 240 *V* battery. Determine the resistance of the kettle.

A. 40.00 Ω. B. 0.67 Ω
C. 3.33 Ω. D. 20.00 Ω

12. Convert a temperature of 67 K to centigrade scale.

A. 206 *°C* B. 340 *°C*
C. 4.07 *°C* D. 2.06 *°C*

13. Figure 4 shows wheel A, driving wheel B. The diagram is drawn to scale. If a force of 300 N is used to drive a load of 280 N

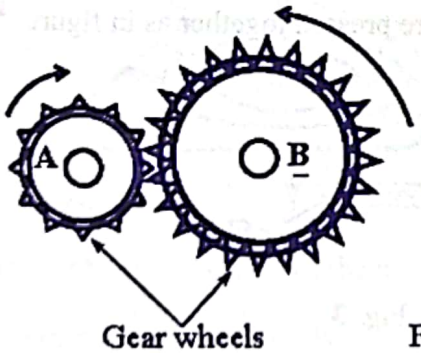

Fig. 4

Calculate the efficiency of the machine system.

A. 53.6% B. 50.0%
C. 46.7%. D. 60.0%

14. An object of mass m kg is acted on by a force of 24 N, making it to change its velocity from 10 m s^{-1} to 32 m s^{-1} in 11 seconds. Find the value of m.

A. 12 B. 1.09
C. 48 D. 2.40

15. Two cells each of e.m.f 3V and internal resistance 2Ω are arranged in series, and across which a resistor of resistance 11Ω is connected. Find the current through the 11Ω resistor.

A. 0.25 A B. 0.50 A
C. 0.40 A D. 0.20 A

16. A boy standing by a tall building a few metres away claps his hands once. After 2.5 seconds, he hears another clap. Determine the distance between the boy and the building. (Speed of sound in air is 330 ms^{-1})

A. 412.50 m B. 825.00 m
C. 132.00 m D. 206.25 m

17. The table below shows a neutral atom X with M as a product of an isotope of X after a radioactive decay.

Atom	Atomic mass	Neutron number	Electron number
X	p	55	f
M	89	V	43

If M results after the isotope of X losing two alpha particles, find the values of p, f and V.

	Value of p	Value of f	Value of V
A.	89	43	55
B.	102	47	46
C.	102	43	55
D.	89	47	46

18. A ball of mass 300g is dropped from the top of a tower, 50 m high. What is its kinetic energy half-way down the tower?

A. 75 J B. 75 kJ
C. 150 J D. 60 J

19. An object of mass 2kg at a temperature of $90^{o}C$ is placed in a liquid of mass 3.6 kg at a temperature of $25^{o}C$. If the temperature of both the liquid and object settles to a uniform value of $55^{o}C$ and the specific heat capacity of the liquid is 3600J $kg^{-1}K^{-1}$, calculate the heat capacity of the object.

A. 11108.57J $kg^{-1}K^{-1}$ B. 5554.29J $kg^{-1}K^{-1}$
C. 5554.29J K^{-1} D. 11108.57J K^{-1}

20. An A.C transformer has 80 turns in the primary coil connected to an A.C voltage equal to 20 *V*. The current through resistance ***R*** connected across the secondary coil is 10 A. Calculate the value of ***R*** if the number of turns in the secondary coil is 150.

A. 0.27 Ω B. 60.00 Ω
C. 30.00 Ω D. 3.57 Ω

21. Two plane mirrors are inclined at an acute angle to each other. When a chair is placed in between the mirrors, 8 images are seen in the mirrors. Determine the angle of inclination between the mirrors.

A. 40^{o} B. 45^{o}
C. 51^{o} D. 36^{o}

22. The strength of an electromagnet can be increased by:

(i) making it a U-shaped magnet.
(ii) decreasing the current flowing through the solenoid.
(iii) increasing the number of turns of the solenoid.

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

23. Which of the following is true about **kinetic theory** of matter?

(i) Molecules in gases possess the strongest intermolecular force of attraction.
(ii) Molecules in solids are constantly and randomly vibrating in all directions about their equilibrium positions.
(iii) Molecules in gases are at rest and only vibrate about their equilibrium positions when the liquid is subjected to heating.

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

24. Figure 5 shows a bar magnet moved towards and away from the solenoid in an experiment to verify one of the laws in electromagnetic induction.

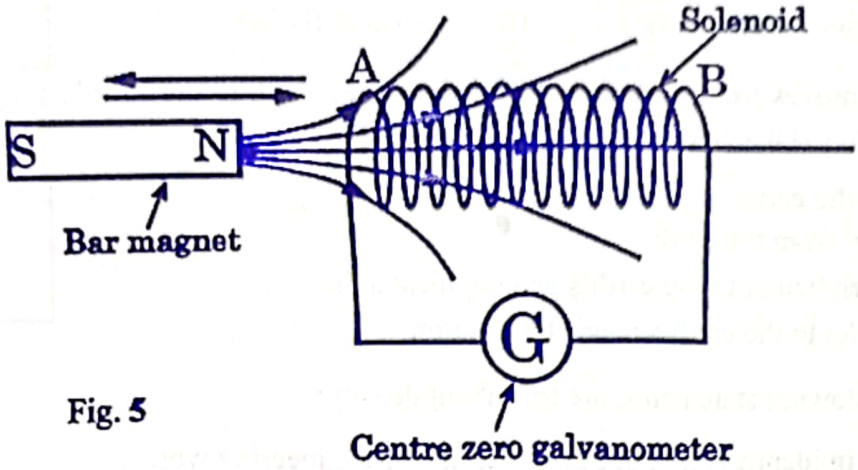

Fig. 5

What is the polarity of the solenoid when the bar magnet is moved towards and away from it respectively?

	Towards the solenoid	Away from the solenoid
A.	A is north, B is south	A is south, B is north
B.	A is south, B is north	A is south, B is north
C.	A is north, B is south	A is north, B is south
D.	A is south, B is north	A is north, B is south

25. A huge, electric spark discharge between two charged clouds or between a charged cloud and the ground best describes:

A. Work function. B. Corona discharge
C. Lightning D. Electrostatic induction.

26. Which of the following is (are) true about closed pipes as applied to stationary waves?

(i) The fundamental note occurs with one node and one antinode.
(ii) The pipes form transverse stationary waves.
(iii) The frequency of the second resonance in the pipes is three times the fundamental frequency.

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

27. In the sun, it is known that a hydrogen atom combines with a hydrogen atom or with a helium atom to form other atoms with a release Mega-watts of thermal energy. What is the best description of this process?

A. Nuclear fusion
B. Radioactivity.
C. Thermoelectric emission.
D. Nuclear fission.

28. When a person moves from the magnetic equator of the earth to the earth's geographical north with a compass needle, at the geographical north, the needle

A. dips into the earth.
B. dips away from the earth.
C. lies perpendicular to the earth's geographical axis
D. lies parallel to the earth's magnetic equator.

29. Which of the following statements, are true about density:

(i) It is used in identification of best materials for engineering works.
(ii) It is a scalar quantity.
(iii) It is a fundamental quantity of measurement in physics.
(iv) For an irregular shaped object, it can be determined using a graduated cylinder.

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

30. Mercury is preferred to alcohol as a thermometric liquid. Because:

(i) alcohol does not stick on the walls of the capillary tube.
(ii) mercury is a better conductor of heat than alcohol.
(iii) alcohol is transparent and makes it easier to take temperature readings.

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

31. A point beyond which a material is permanently stretched and there is a permanent change in length when the stretching force is removed, best describes

A. Yield point.
B. Proportional limit.
C. Elastic limit.
D. Breaking point.

32. The temperature of a substance in a laboratory is found to be $52^{o}C$ on a thermometer. The ice point and boiling point of the thermometer are found to be at a distance of 6.5 cm and 22.5 cm from the lower part of the bulb of the thermometer. What is the length of the mercury column for the measured temperature?

A. 14.82 cm B. 8.32 cm
C 8.58 cm D. 21.58 cm

33. Methylated spirit of density 1.12 g cm^{-3} and volume 35 ml is mixed with water of the same volume. Calculate the density of the mixture.

A. 2120 kg m^{-3} B. 560 kg m^{-3}
C. 1120 kg m^{-3} D. 1000 kg m^{-3}

34. A convex lens of focal length 12 cm forms an image 2.5 times its object. If the object is 14 cm away from the optical center of the lens, determine the image distance.

A. 30.0 cm B. 25.0 cm
C. 35.0 cm D. 67.2 cm

35. Figure 6 shows a car passing by pothole A at 90 km h^{-1} and observed to possess a kinetic energy of 1500 k J at pothole B.

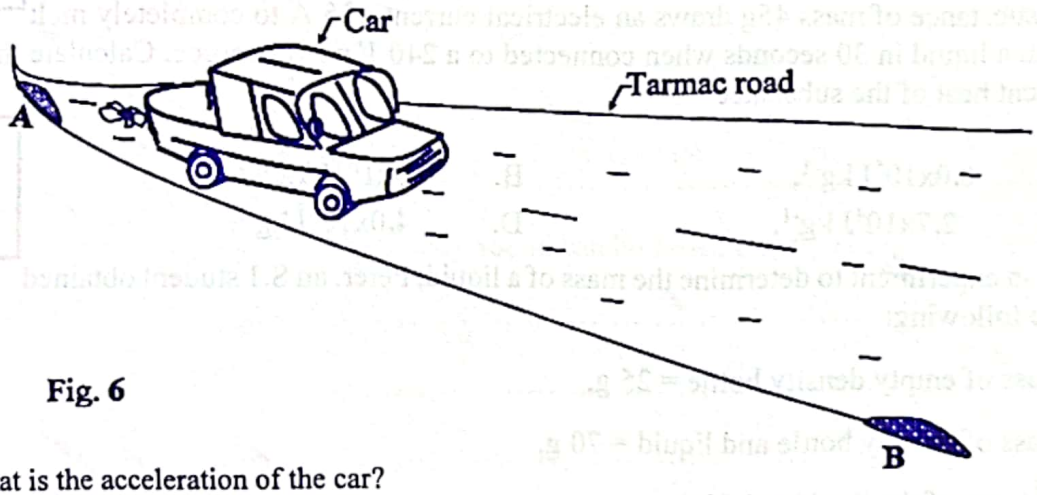

Fig. 6

What is the acceleration of the car?

A. 0 .47ms^{-2} B. 1.2 5ms^{-2} C. 2.5ms^{-2} D. 0 .75ms^{-2}

36. A plutonium bomb released a huge amount of thermal energy on Hiroshima in accordance to the equation below.:

$$^{239}_{92}Pu + in \rightarrow yxAm + 2in + y^{o}e$$

Find the values represented by x and y on Am.

A. $x = 238, y = 93$
B. $x = 240, y = 92$
C. $x = 239, y = 93$
D. $x = 242, y = 91$

37. The distance between the first and the third crest on a transverse wave is 17.5 m. Determine the frequency of vibration of the wave medium.

A. 19.4 Hz
B. 18.9 Hz
C. 37.7 Hz
D. 38.9 Hz

38. Which part of a human eye has the same function as the diaphragm of a lens camera?

A. Iris.
B. Retina.
C. Ciliary muscles.
D. Pupil.

39. A substance of mass 45g draws an electrical current of 5 A to completely melt into a liquid in 30 seconds when connected to a 240 V power source. Calculate the specific latent heat of the substance.

A. $8.0 \times 10^{5} J\ kg^{-1}$.
B. $8.0 \times 10^{4} J\ kg^{-1}$.
C. $2.7 \times 10^{4} J\ kg^{-1}$.
D. $4.0 \times 10^{6} J\ kg^{-1}$.

40. In an experiment to determine the mass of a liquid, Peter, an S.1 student obtained the following:

Mass of empty density bottle = 25 g,

Mass of density bottle and liquid = 70 g,

Volume of the liquid = 0.02 l.

Calculate the relative density of the liquid

A. 2.25
B. 1.25
C. 1.56
D. 1.08

SECTION B (40 MARKS)

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

41. (a) State **Newton's first law** of motion. (*01 mark*)

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(b) State **one** instance where Newton's first law is applied practically. (*01 mark*)

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(b) Body A of mass 2 kg moving at $20ms^{-1}$ collides head-on with a stationary body B and the bodies stick together after collision. If both move at $8ms^{-1}$ after collision, calculate the mass of body B. (*02 marks*)

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42. (a) (i) Define the term a **wave.** (*01 mark*)

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(ii) Briefly, explain why sound can be heard clearly at night? (*02 marks*)

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(b) State **two** properties of sound waves. (*01 mark*)

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43. (a) What is meant by a **volt?** *(01 mark)*

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(b) A cell produces 0.5 A when connected to two 2Ω resistors arranged in series. When the resistors are arranged in parallel in the same circuit, the current flowing becomes 2 A. Determine the **e.m.f** and internal resistance of the cell.

(03 marks)

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44. (a) (i) Briefly explain why a cathode ray tube is evacuated. *(01 mark)*

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(ii) What is the function of the cooling fins in an X-ray tube. *(01 mark)*

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(b) Figure 7 shows the screen of C.R.O. The time base is set to 0.005 s cm^{-1}.

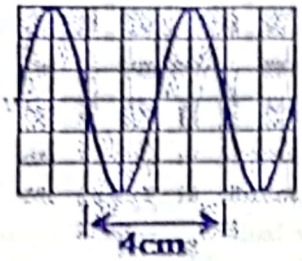

Fig. 7

Determine the frequency of the input A.C signal. *(02 marks)*

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(a) (i) What is **radioactivity**? *(01 mark)*

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(ii) Briefly explain why radioactivity is said to be random and spontaneous. *(02 marks)*

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(b) State the main similarity between X-rays and Gamma radiations. *(01 mark)*

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45. Figure **8** shows a ball of mass 3.6 kg released from the top of a cliff and left to fall to the ground under the influence of its own weight.

(a) What is meant by the term **weight**? (*01 mark*)

8

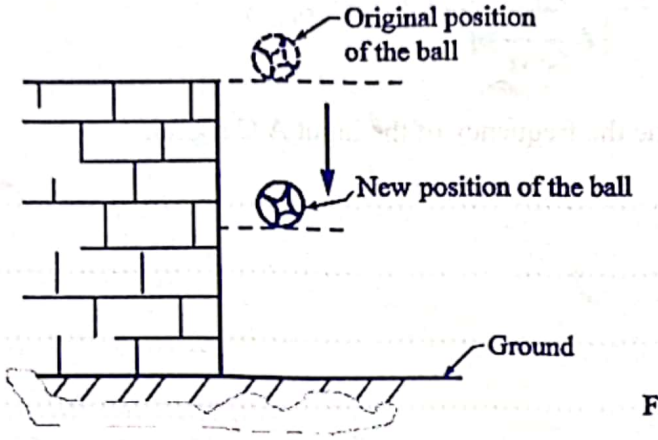

Fig. 8

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(b) If the top of the cliff is 42 m from the ground and the new position of the ball is quarter way down the cliff, calculate the gain in kinetic energy at the new position. (*03 marks*)

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46. (a) Define **magnetic field.** (*01 mark*)

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(b) Figure **9** shows a thick copper wire *XY* placed between two pole pieces of a strong U-shape permanent magnet

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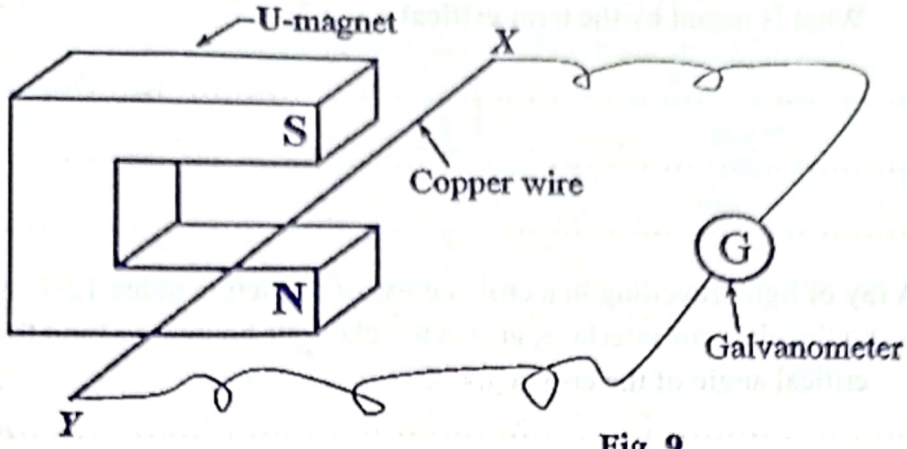

Fig. 9

(i) What is observed on the galvanometer when the wire *XY* is moved vertically and horizontally between the poles? (*01mark*)

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

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47. (a) State the **two** types of reflection of light. (*01 mark*)

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(b) (i) What is meant by the term **critical angle**? (*01 mark*)

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(ii) A ray of light travelling in a crown glass of refractive index 1.54 and incident on the glass-air interface, grazes the glass-air boundary. Find the critical angle of the crown glass. (*02 marks*)

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48. (a) What do you understand by the statement "*the specific latent heat of fusion of substance W is* 2260000 J kg^{-1}"? (*01 mark*)

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(ii) Explain why the specific latent heat of vaporization of a substance is always greater than its specific latent heat of fusion. (*03 marks*)

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49. (a) State **Pascal's principle** of transmission. (*01 mark*)

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(b) Figure **10** shows air trapped by a column of mercury in a J-tube.

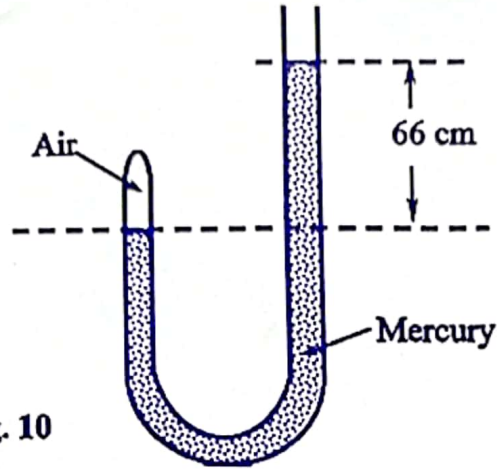

Fig. 10

Taking atmospheric pressure to be 76 cm Hg and density of mercury as 13600 kg m^{-3}, Calculate the pressure of the enclosed air. (*03 marks*)

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