

NAME:

STREAM: SIGNATURE:

535/1
Physics
Paper 1
March, 2020
1 hr 40 min



Uganda certificate of education
PHYSICS MONTHLY TESTS
MARCH, 2020

S.4 PHYSICS

Paper one

Time allowed: 1 Hour 40 Minutes

INSTRUCTIONS TO CANDIDATES:

Attempt *all* questions in this booklet

Answers to *Section A* must be placed in the answer table provided on *page 2*

Answers to *Section B* must be placed in the *spaces provided*.

All rough work must be done in **pencil** in this booklet at the last page.

Where necessary assume;

- Acceleration due to gravity, g = 10 ms^{-2}
- Speed of sound in air = 320 ms^{-1}
- Density of mercury = $1.36 \times 10^3 \text{ kgm}^{-3}$

Turn over

PLEASE WRITE ANSWERS TO SECTION, A HERE:

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SECTION A

- Materials which **break** as soon as their elastic limit is exceeded are said to be
 - Ductile
 - Brittle
 - Plastic
 - Weak
- A force of **2N** causes an extension of **0.4 cm** in a string. Find the force in newtons, required to cause a **0.3 cm** extension in the same string.
 - $\frac{2 \times 0.3}{0.4}$
 - $\frac{0.4 \times 0.3}{2.0}$
 - $\frac{2 \times 0.4}{0.3}$
 - $2.0 \times 0.3 \times 0.4$
- Which of the following properties of **x-rays** enables them to investigate a bone fracture?
 - They ionize gases
 - They darken a photographic plate
 - They travel in a straight line
 - They travel at the speed of light in a vacuum
 - (i) and (ii) only
 - (ii) and (iv) only
 - (ii) and (iii) only
 - (iii) and (iv) only
- The activity of a radioactive substance X changes from 30 counts per minute to of a 3.75 counts per minute in 2 hours. Calculate the half-life
 - 30 minutes
 - 40 minutes
 - 37.5 minutes
 - 2 minutes
- Which of the following energy changes occurs when a gun is cocked and a bullet fired from it?
 - Kinetic energy to potential energy
 - Chemical energy to kinetic energy
 - Sound energy to kinetic energy
 - Potential energy to kinetic energy
- The **pressure exerted** by a solid on a surface depends on the
 - Mass of the solid and the area of contact
 - Volume of the solid and the area of contact
 - Weight of the solid and the time of contact
 - Density of the solid and the time of contact

Turn Over

7. Which of the following traces is obtained when a microphone is connected to a cathode ray oscilloscope and both **x** and **y-plates** are switched on?



A



B



C



D

8. From **Archimedes'** principle,

- A. the up thrust is equal to the weight of the body immersed
- B. the up thrust is equal to the weight of the displaced fluid
- C. the up thrust is equal to the mass of the fluid displaced
- D. the up thrust is equal the mass of the body immersed.

9. An arrow of mass 30 g is struck from a bow using 6 J of energy. The maximum speed of the arrow is

- A. $\sqrt{\frac{6 \times 30}{1000}} \text{ ms}^{-1}$
- B. $\sqrt{\frac{2 \times 6 \times 1000}{30}} \text{ ms}^{-1}$
- C. $\sqrt{\frac{2 \times 6}{30 \times 1000}} \text{ ms}^{-1}$
- D. $\sqrt{\frac{2 \times 30 \times 1000}{6}} \text{ ms}^{-1}$

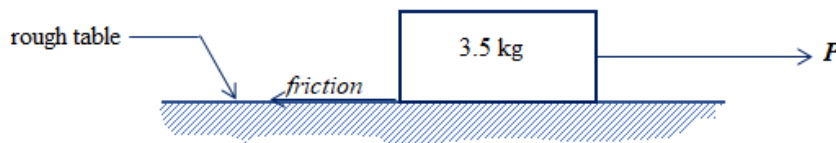
10. An oil drop of volume 10^{-4} cm^3 spreads to form a patch of radius 2.5 cm. Estimate the thickness of the oil molecule

- A. $5.1 \times 10^{-6} \text{ m}$
- B. $1.91 \times 10^{-6} \text{ m}$
- C. $5.1 \times 10^{-9} \text{ m}$
- D. $5.1 \times 10^{-9} \text{ cm}$

11. A small phone battery is charged for two hours till full using a charger rated '**d.c 5.0V, 500mA**', calculate the maximum charge the battery can hold.

- A. 5.0×2 coulombs
- B. $\frac{500 \times 2 \times 3600}{1000}$ coulombs
- C. $5.0 \times 2 \times 500$ coulombs
- D. $\frac{5.0 \times 2 \times 3600}{1000}$ coulombs

12. The figure below shows a wooden block of mass 3.5 kg lying on a rough horizontal table. If the coefficient of friction between the wood and the table is 0.14, calculate the force P required to move the block at an acceleration of 2 ms^{-2}



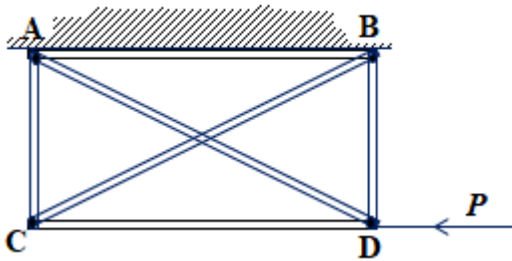
- A. $P = (3.5 \times 2.0) - (3 \times 10 \times 0.14) \text{ N}$
- B. $P = (3.5 \times 2.0) + (3 \times 10 \times 0.14) \text{ N}$

- C. $P = (3 \times 10 \times 0.14) N$
D. $P = (3.5 \times 2.0) - 0.14 N$

13. In a kitchen, smoke from the **concrete chimney** will
- A. move out faster on a hot day because the chimney expands
 - B. move out faster on a hot day because the temperature outside is high
 - C. move out faster on a cold day because the temperature outside is low
 - D. move out slower on a cold day because the chimney contracts
14. Alpha – particles are more ionizing than beta-particles moving at the same speed because;
- A. they have less mass, hence they are more energetic
 - B. they have more mass, hence they are less energetic
 - C. they are positively charged, hence they are more energetic
 - D. they have more mass, hence they are more energetic
15. Which of the following statements is/are true about identical dry cells arranged in parallel?
- (i) Effective e.m.f is the sum of all e.m.f's
 - (ii) Effective e.m.f is equal to the e.m.f of only one cell
 - (iii) Effective internal resistance is the sum of all individual internal resistances
 - (iv) Effective internal resistance is the quotient of one internal resistance and their number
- A. (i) only
 - B. (ii) and (iii) only
 - C. (ii) and (iv) only
 - D. (i) and (iii) only
16. Which of the following can be used to study wave forms?
- A. X-ray tube
 - B. Vacuum diodes
 - C. cathode ray oscilloscope
 - D. Maltese cross tube
17. Which of the following changes when a force is applied on a body?
- (i) Mass
 - (ii) Velocity
 - (iii) Displacement
- A. (i) and (ii) only
 - B. (i) and (iii) only
 - C. (ii) and (iii) only
 - D. (i), (ii) and (iii)
18. A ball of 3 kg moves at 10ms^{-1} towards a volley ball player. If the player hits the ball and it moves back with a velocity of 5ms^{-1} , find the change in momentum.
- A. $3(10 - 5)$
 - B. $\frac{3 \times 5}{10}$
 - C. $3(10 + 5)$
 - D. $\frac{3 \times 10}{5}$

Turn Over

19. The figure below shows a rectangular structure $ABCD$ under the action of force P .



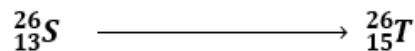
Which of the girders prevents the structure from shearing under P ?

- A. AB
- B. CD
- C. BD
- D. AD

20. Images formed by diverging mirrors are

- A. laterally inverted
- B. real
- C. diminished
- D. upside down

21. The equation below shows changes that occur when a nuclide S decays to T .



Which one of the following radiations are emitted?

- A. Two alpha particles
- B. One beta particle and one alpha particle
- C. Two beta particles
- D. One alpha particle

22. A car radiator is painted black and filled with water because

- (i) Black bodies are good absorbers and emitters of heat
- (ii) Water transfers heat by convection
- (iii) Water is a poor conductor of heat

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

23. The reluctance of a body to remain in motion depends on its

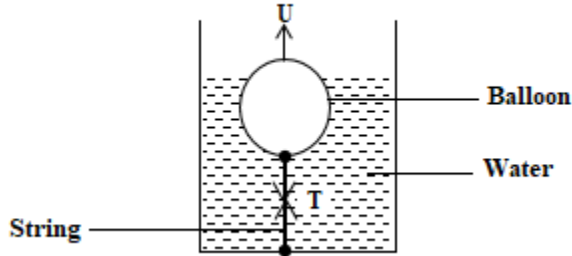
- (i) Mass
- (ii) Velocity
- (iii) Direction of motion

- A. (i) only
- C. (i) and (ii) only

B. (i) , (ii) and (iii)

D. (ii) and (iv) only

24. The figure below shows a balloon inflated with air and tied to the bottom of a water tank using a string. If W is the weight of the balloon and T , the tension in the string, which of the following is correct?



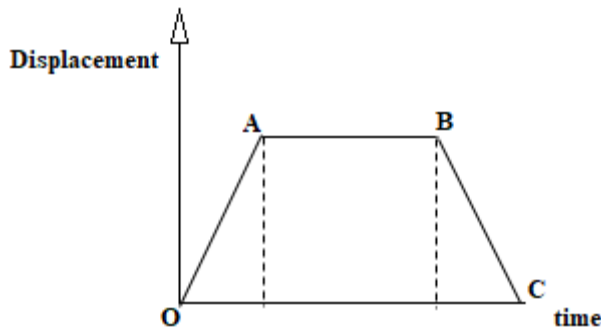
A. $U + W = T$

B. $W = U + T$

C. $T = W + U$

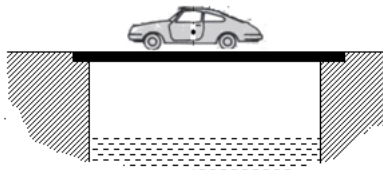
D. $T = U - W$

25. The figure below shows the motion graph of a car. The car is at rest;



- A. between O and A
- B. between A and B
- C. between B and C
- D. between O and C

26. The figure below shows a car moving over a bridge.



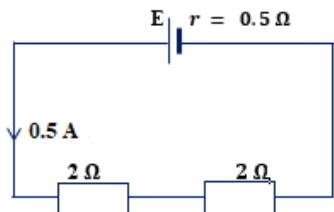
Which of following is true about the mechanical structural state the bridge layers?

	<i>Upper layer</i>	<i>Middle layer</i>	<i>Under layer</i>
A	Under compression	Neutral	Under tension
B	Under tension	Neutral	Under compression
C	Under tension	Neutral	Under tension
D	Under compression	Under tension	Under compression

Turn Over

27. Two insulators **Y** and **Z** are rubbed together. **Z** loses electrons to **Y**. Which of the following happens when **Z** is brought near the cap of a positively charged gold leaf electroscope?
- A. The leaf diverges further
 - B. The leaf collapses
 - C. The leaf collapses and then diverges
 - D. The leaf remains stationary
28. The efficiency of a simple machine can be increased by
- (i) Increasing the effort
 - (ii) Increasing the effort distance
 - (iii) Increasing the load
- A. (i) and (ii) only
 - B. (ii) and (iii) only
 - C. (i) and (iii) only
 - D. (iii) only
29. An object of height 12 cm is placed 24 cm in front of a pinhole camera in which the screen is 8 cm from the hole. The image received is;
- A. Erect and 4 cm tall
 - B. Inverted and 4 cm tall
 - C. Erect and 16 cm tall
 - D. Inverted and 12 cm tall
30. A sphere of radius 15 cm floats with $\frac{1}{2}$ of it submerged in water. Calculate the volume of water displaced.
- A. $\frac{3\pi \times 15^3}{2 \times 4} \text{ cm}^3$
 - B. $\frac{2\pi \times 15^3}{3 \times 4} \text{ cm}^3$
 - C. $\frac{4\pi \times 15^3}{2 \times 3} \text{ cm}^3$
 - D. $\frac{4 \times 15^3}{2 \times 3\pi} \text{ cm}^3$
31. The acceleration of a body depends on
- A. Force applied only
 - B. Mass of the body only
 - C. Force applied and mass of the body
 - D. Mass of the body and time for which the force is applied

32. The figure shows a cell of emf E , and internal resistance, 0.5Ω connected to two 2Ω resistors arranged as shown. Calculate the emf of the cell



- A. 2.25V
- B. 2.0 V
- C. 9.0 V
- D. 2.5 V

SECTION B

33. (a) What is meant by the term **up-thrust**? (01 mark)

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(b) A block of wood of volume $1.2 \times 10^{-3} m^3$ floats in water of density $10^3 kgm^{-3}$ floats in water with $\frac{4}{5}$ of its volume submerged.

(i) Sketch a diagram to show the forces acting on the block in equilibrium (01 mark)

(ii) determine the **density** of the wood block. (02 marks)

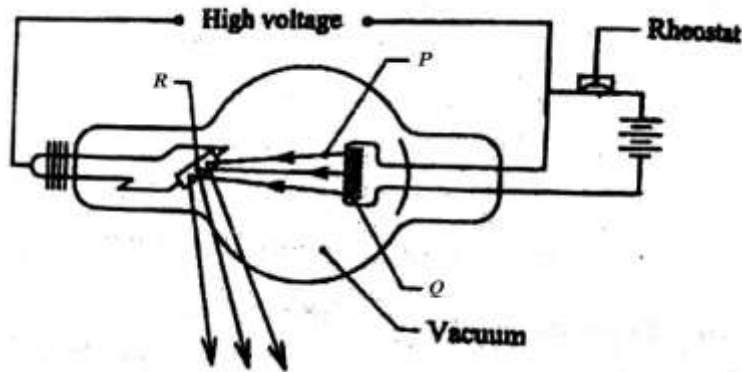
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34. (a) State two differences between **x-rays** and **cathode rays** (02 mark)

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 **Turn Over**

(b) The figure below is of an *x-ray* tube.



(i) Name the parts labelled **P** and **Q** (01 mark)

P =

Q =

(ii) Of what importance is the part labeled **R**? (01 mark)

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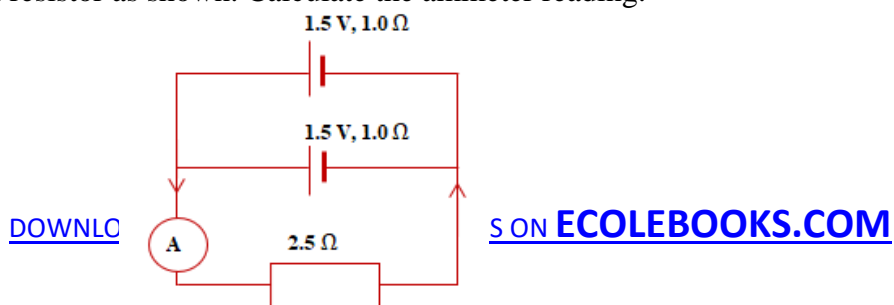
35. (a) What is meant by **emf** of a cell? (01 mark)

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(b) State two ways of **increasing** the resistance of a conductor. (01 mark)

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(c) The figure below shows two identical cells of emf **1.5 V** and internal resistance **1.0 Ω** connected to a **2.5 Ω** resistor as shown. Calculate the ammeter reading. (02 marks)



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36. (a) What is **fluorescence**? (01 mark)

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(b) (i) State the energy changes that occur when a **torch bulb** lights from a **dry cell** (01 mark)

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(ii) Explain why a **parabolic mirror** is preferred to a **concave mirror** for use as a torch reflector. (02 marks)

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37. (a) Define the **frequency** as applied to waves. (01 mark)

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(b) A wave has a frequency of **50 Hz**. Calculate the period of its source. (01 mark)

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(c) Explain why a good solar panel should be **curved** and painted **black**. (02 marks)

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END

With determination, you too can!