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Index No.....

School.....

Signature

535/1
PHYSICS
PAPER 1
July/August 2018
2¼ 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 $= 10\text{ms}^{-2}$
 - specific heat capacity of water $= 4200\text{ J kg}^{-1}\text{K}^{-1}$
 - specific heat capacity of copper $= 400\text{ J kg}^{-1}\text{K}^{-1}$
 - density of water $= 1000\text{kgm}^{-3}$
 - density of mercury $= 13600\text{kgm}^{-3}$
 - speed of sound in air $= 340\text{ms}^{-1}$
 - specific latent heat of vaporization of water $= 2.3 \times 10^6\text{ J kg}^{-1}$
 - Speed of light in Vacuum $= 3.0 \times 10^8\text{ms}^{-1}$
 - Refractive index of air $= 1$
 - Specific latent heat of ice $= 336,000\text{ J kg}^{-1}$

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. The term given to physical quantities used to define other quantities is...
A. scalar quantities.
B. vector quantities.
C. fundamental quantities.
D. derived quantities.
2. Which of the following observations about a liquid in a narrow tube shows that cohesion is greater than adhesion?
(i) Concave meniscus. (ii) Convex meniscus.
(iii) Capillary fall. (iv) Capillary rise.
A. (i) and (iii) only.
B. (i) and (iv) only.
C. (ii), (iii) and (iv) only.
D. (i), (ii), (iii) and (iv).
3. On which of the following factors does lowness and highness of sound depend?
A. Frequency.
B. Amplitude.
C. Intensity.
D. Velocity.
4. A sinusoidal wave display can be observed on a cathode ray oscilloscope when
A. a cell is connected to the Y-plates with the time base off.
B. a low frequency alternating voltage is connected to the Y-plates with time base on.
C. a high frequency alternating voltage is connected to the Y-plates with time base on.
D. a cell is connected to the Y-plates, with time base on.
5. A force of 10N acts on a body and produces an acceleration of 2ms^{-2} . If the density of the body is 2.5kgm^{-3} , find the volume occupied by the body.
A. 50m^3
B. 8.0m^3
C. 4.0m^3
D. 2.0m^3
6. **Figure 1** below shows a 6V battery P of internal resistance 0.5Ω connected in series with a 3V battery Q of internal resistance $r\Omega$ and in series with a 3Ω resistor. If the current flowing in the circuit is 0.6A, find the value of r .

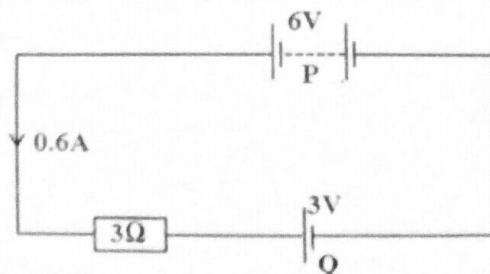


Figure 1

- A. 0.5Ω
B. 1.5Ω
C. 2.9Ω
D. 11.0Ω

7. Which of the following arrangements of colours of white light shows increasing frequency?
A. Yellow, Green, Indigo and Violet.
B. Green, Yellow, Indigo and Violet.
C. Violet, Indigo, Green and Yellow.
D. Indigo, Violet, Yellow and Green. ☐
8. The temperature at which a body has minimum internal energy is called
A. thermodynamic temperature.
B. lower fixed point.
C. absolute zero.
D. final steady temperature. ☐
9. What is observed when a wave travels from shallow to deep water in a ripple tank?
(i) Increase in frequency.
(ii) Increase in wave length.
(iii) Increase in speed.
(iv) Maintaining a constant direction.
A. (i), (ii) and (iv) only.
B. (ii) and (iii) only.
C. (ii) and (iv) only.
D. (i) and (ii) only. ☐
10. When a body is lifted from the ground to a given height, its gravitational potential energy
A. increases while mass is not changed.
B. is not changed while the mass increases.
C. and mass are both not changed.
D. decreases while mass is not changed. ☐
11. The movement of molecules from a region of high concentration to a region of low concentration is faster in
A. liquids.
B. gases.
C. solids.
D. vacuum. ☐
12. One of the following options is correct about a positively charged cloud passing over a building onto which a lightning conductor is connected.
A. Positive charges are induced on the spikes.
B. Both positive and negative charges are induced on the spikes.
C. Negative charges are induced on the spikes.
D. Positive charges are conducted to the ground. ☐
13. All virtual images formed by mirrors and lenses in optics are always
A. magnified.
B. diminished.
C. inverted.
D. upright. ☐

14. **Figure 2** below shows an inclined plane.

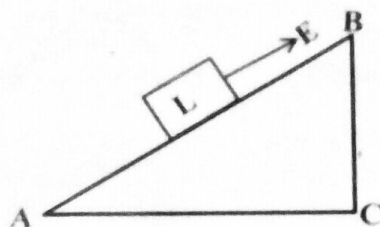


Figure 2

The distance moved by the load and distance moved by effort is:

	Load distance	Effort distance
A	AB	BC
B	AB	AC
C	BC	AB
D	AC	AB

15. A gas of mass 2kg and density 1.6kgm^{-3} is heated from 250K to 400K at constant pressure. What is the density of the gas at 400K?

- A. 0.4kgm^{-3}
 B. 1.0kgm^{-3}
 C. 1.5kgm^{-3}
 D. 2.0kgm^{-3}

- 16.

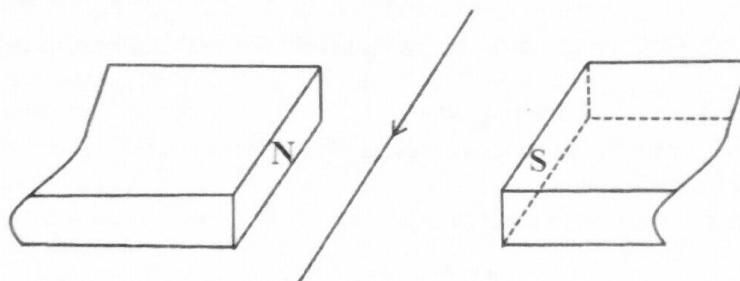


Figure 3

Figure 3 above shows a wire carrying a current between poles of a magnet. It is observed that the wire moves

- A. upwards according to Fleming's left hand rule.
 B. upwards according to Fleming's right hand rule.
 C. downwards according to Fleming's left hand rule.
 D. downwards according to Fleming's right hand rule.

17. A uniform beam of length 100cm is acted upon by a downward force of 4N at the 0cm mark and an upward force of 5N at the 100cm mark as shown in **figure 4**. Find the weight of the beam.

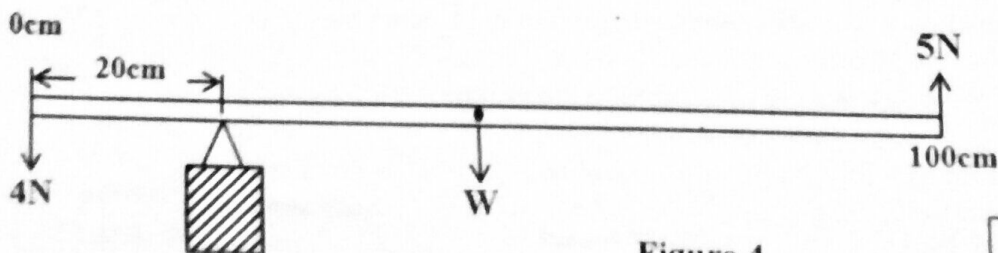


Figure 4

- A. 8.0N
 B. 10.0N
 C. 15.0N
 D. 16.0N

18. Which of the following is/are true about ultra-violet light of the electromagnetic spectrum

- (i) has longer wavelength than visible light.
- (ii) has same speed as normal light.
- (iii) has shorter wavelength than visible light.
- (iv) is faster than normal light.

☐

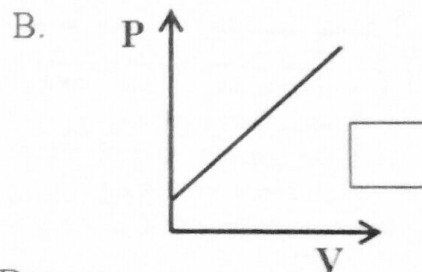
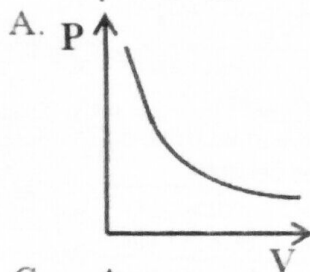
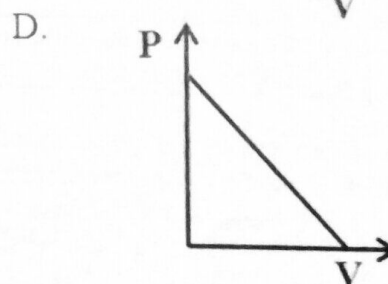
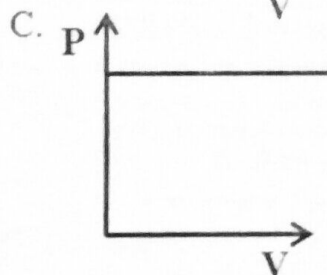
- A. (i) only.
- B. (i) and (ii) only.
- C. (ii) and (iii) only.
- D. (i), (ii) and (iii) only.

19. Find the angle of inclination between two mirrors which produce **five** images from an object placed in front of them.

- A. 80°
- B. 60°
- C. 20°
- D. 15°

☐

20. The correct graph for variation of pressure against volume for a fixed mass of gas at constant temperature is:.

☐

21. A cone resting on its tip is said to be unstable because it has a

- A. wide base and high centre of gravity.
- B. wide base and low centre of gravity.
- C. narrow base and low centre of gravity.
- D. narrow base and high centre of gravity.

☐

22. The level of cooking oil in a burette fell from 16cm^3 to 15cm^3 after dropping on the surface of water in a beaker sprinkled with lycopodium powder.

The oil drop formed a patch of radius 2.1cm . Find the thickness of the oil molecule.

- A. 0.011cm
- B. 0.002cm
- C. 0.072cm
- D. 0.130cm

☐

23. For an ideal single movable pulley system the ☐
- effort is equal to the load.
 - effort is less than the load.
 - effort is greater than the load.
 - mechanical advantage is one.

24. The main function of the condenser lens in a slide projector is to ☐
- collect light and focus it onto the slide.
 - reflect back the light rays that would otherwise be wasted.
 - focus the image on the screen.
 - receive the image on the slide.

25. The rate at which electric charge flows past a point in a circuit is measured in... ☐
- watts.
 - volts.
 - coulombs.
 - amperes.

26. Pure water at 0°C is heated up to 10°C . What happens to its volume and density between this interval?

	Density	Volume
A.	Increases to a maximum at 4°C and decreases again.	Decreases to a minimum at 4°C and increases again.
B.	Decreases to a minimum at 4°C and increases again.	Increases to a maximum at 4°C and becomes constant.
C.	Constant up to 4°C and increases again.	Increases to a maximum at 4°C and then becomes constant.
D.	Decreases up to a minimum at 4°C and becomes constant.	Constant up to 4°C and then decreases.

27. An object is placed at a distance of 40cm from a convex lens of power 5 dioptries. Which of the following are properties of the image formed? ☐

A	Real	Inverted	Diminished
B	Virtual	Erect	Same size as object
C	Real	Inverted	Same size as object
D	Real	Erect	Same size as object

28. When two coherent sound waves overlap they produce regions of loud sound and regions of soft sound. This is due to ☐

- destructive and constructive interference respectively.
- constructive and destructive interference respectively.
- reflection and refraction of sound respectively.
- refraction and reflection of sound respectively.

29. Magnetic flux leakage in a practical transformer can be minimised by ☐

- laminating the soft iron core.
- using soft iron material to make the core.
- using thick copper wires.
- winding the secondary coil over the primary coil.

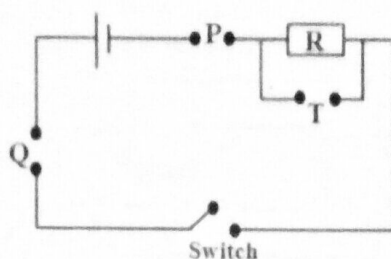


Figure 5

Electrical appliances P, Q and T are arranged as shown in **figure 5** above. Find their correct arrangement in the circuit.

	P	Q	T
A	Rheostat	Ammeter	Voltmeter
B	Rheostat	Voltmeter	Ammeter
C	Ammeter	Voltmeter	Rheostat
D	Voltmeter	Rheostat	Voltmeter

☐

31. Find the speed of a sound wave if the distance between one of its compressions and its successive rarefaction is 0.15m and having a period of 2×10^{-3} seconds.

A. 330ms^{-1}
 B. 750ms^{-2}
 C. 150ms^{-1}
 D. 300ms^{-1}

☐

32. The propulsion of a rocket and movement of a jet works on the principle/law which states that;

A. energy can neither be created nor destroyed.
 B. action and reaction are equal but opposite.
 C. force always opposes motion.
 D. energy is always conserved in a closed loop.

☐

33. The lower fixed point of a thermometer is 22.0°C and upper fixed point is 62°C . What is the length of mercury thread at temperature of 50°C ?

A. 240cm
 B. 35.5cm
 C. 40.0cm
 D. 42.0cm

☐

34. Which of the following statements is/are true about a discharged lead acid cell?

(i) both plates slowly change to lead sulphate.
 (ii) the acid becomes more dilute.
 (iii) the density of the acid increases.
 (iv) the density of the acid falls.

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

☐

35.

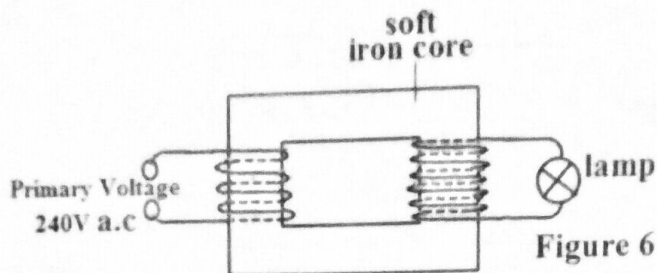


Figure 6

Figure 6 above shows a transformer having 500 turns in a primary coil. Calculate the number of turns in the secondary coil if an output current of 0.1A flows through a lamp of 120Ω .

- A. 20turns.
 B. 25turns.
 C. 100turns.
 D. 2500turns.

36. A spherical body of diameter 10cm has a mass of 78g. What is its density in gcm^{-3} ?

- A. $\frac{78}{10\pi}$
 B. $\frac{78}{4\pi \times 26}$
 C. $\frac{78}{4\pi \times 125}$
 D. $\frac{78 \times 3}{4\pi \times 125}$

37. 1kg of solid wax at 60°C is melted by a 100W heater in 3 minutes and 20 seconds. Calculate the specific latent heat of fusion of solid wax

- A. $1.0 \times 10^4 \text{ Jkg}^{-1}$
 B. $2.0 \times 10^4 \text{ Jkg}^{-1}$
 C. $3.0 \times 10^4 \text{ Jkg}^{-1}$
 D. $6.0 \times 10^4 \text{ Jkg}^{-1}$

38. What happens to an occupant in a lift moving freely downwards under the influence of gravitational force?

- A. The occupant becomes weightless.
 B. His apparent weight becomes greater than his weight in air.
 C. His apparent weight becomes equal to his weight.
 D. His apparent weight is less than his weight in air.

39. The number of field lines per cubic meter area is

- A. magnetic field.
 B. flux leakage.
 C. magnetic flux.
 D. flux linkage.

40. Coherent sources of waves are waves of

- A. the same frequency with a constant phase difference.
 B. the same velocity with different amplitudes.
 C. the same frequency with different phase difference.
 D. decreasing frequency and increasing phase difference.

SECTION B (40 Marks)

Answer **all** questions in this section.

41. (a) What is meant by term “maximum pressure”?

(01 mark)

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- (b) A pile of crates of soda have dimensions 100cm by 200cm by 300cm while resting on a floor. If the average density of the pile is 40kgm^{-3} , find the maximum pressure the crates exert on the floor.

(03 marks)

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42. (a) Define the term refractive index.

(01 mark)

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- (b) A ray of light is incident on a glass block of refractive index 1.49 as shown in figure 7 below.

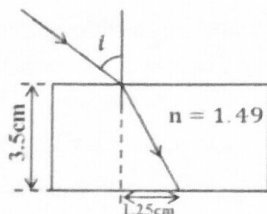


Figure 7

Calculate the angle of incidence i .

(03 marks)

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43. (a) State Hooke's law.

(01 mark)

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- (b) Sketch a graph of **extension** against **load** for a ductile material up to a point beyond the elastic limit.

(02 marks)

Turn Over

- (c) State **two** factors which affect Tensile stress of an elastic material. (01 mark)

44. (a) Define an **Ohm**. (01 mark)

- (b) State **two** examples of non-Ohmic conductors. (01 mark)

(c)

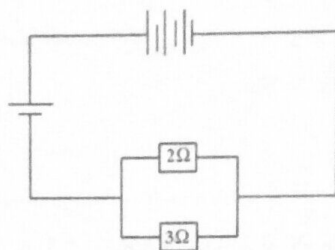


Figure 8

Four cells each of emf 1.5V and negligible internal resistance are connected in series across two resistors of 2Ω and 3Ω in parallel as shown in **figure 8** above. Calculate the current supplied by the cells. (02 marks)

45. (a) Define the following terms:

(i) Amplitude. (01 mark)

(ii) Wave length. (01 mark)

- (b) **Figure 9** shows the profile of water wave.

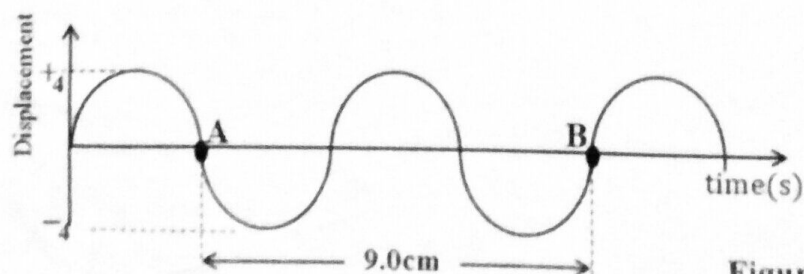


Figure 9

Given that the length between A and B is 9.0cm and the speed of the wave is 18ms^{-1} , calculate its:

(i) wave length. (01 mark)

(ii) frequency. (01 mark)

46. (a) Distinguish between a **saturated** and an **unsaturated** vapour. (02 marks)

(b) A heater of 1000W is placed in 0.5kg of ice at 0°C . How long will it take to form water at 20°C ? (02 marks)

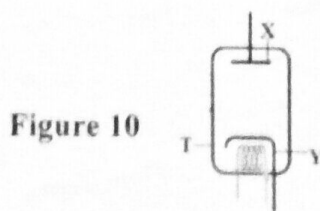
47. (a) State Lenz's law. (01 mark)

(b) A moving coil galvanometer of resistance 5Ω has full range of current of **0 – 40mA**. Find the resistance which can be connected in series with the galvanometer so as to measure a p.d of 10V. (02 marks)

(c) State **two** ways of increasing the sensitivity of a moving coil galvanometer. (01 mark)

48. (a) What is meant by the term “**thermionic emission**”? (01 mark)

(b) **Figure 10** shows a thermionic diode.



(i) Name the parts labeled X, Y and T. (1½ marks)

X

Y

T

(ii) State one use of the set up. (0½ mark)

.....

(c) A nuclide $^{226}_{88}\text{X}$ decays to nuclide $^{226}_{88}\text{Y}$ and finally to $^{226}_{87}\text{Z}$ by emitting radiations P and Q. State the radiations on P and Q.

(0½ mark)

P.....

Q..... (0½ mark)

49. (a) Define a watt. (01 mark)

.....

.....

(b) A ball of mass 1 kg falls from a height of 20m above the ground and bounces to a new height of 4.05m. Calculate the change in momentum after the bouncing of the ball. (03 marks)

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50. (a) State the law of electrostatics.

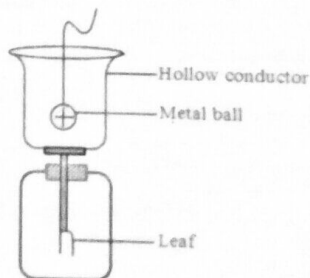
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(b) A positively charged metallic ball is held in space inside a hollow conductor resting on the cap of a gold leaf electroscope as shown in **figure 11** below:

(01 mark)

Figure 11



(i) Briefly explain what happens as the positively charged ball is lowered into the hollow conductor. (02 marks)

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(ii) State the charges acquired by the cap and the leaf when the metallic ball is made to touch the inner surface of the hollow container. (01 mark)

Cap.....

Leaf.....

- END -