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

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

535/1
PHYSICS
PAPER 1
August 2019
$2^{1}/_{4}$ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

PHYSICS

Paper 1

2hours 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* = $10ms^{-2}$
  - *specific heat capacity of water* = $4200J\ kg^{-1}K^{-1}$
  - *specific heat capacity of copper* = $400J\ kg^{-1}K^{-1}$
  - *density of water* = $1000kgm^{-3}$
  - *density of mercury* = $13600kgm^{-3}$
  - *density of hydrogen* = $0.089kgm^{-3}$
  - *density of air* = $1.29kgm^{-3}$
  - *speed of sound in air* = $340ms^{-1}$
  - *specific latent heat of vaporization of water* = $2.3 \times 10^{6}J\ kg^{-1}$
  - *Speed of light in Vacuum* = $3.0 \times 10^{8}ms^{-1}$
  - *Refractive index of air* = 1
  - *Specific latent heat of ice* = $336,000\ J\ kg^{-1}$

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

Turn Over

SECTION A (40 Marks)

Answer **all** questions in this section.

1. In a support system, a beam was replaced by a tight rope. The beam replaced was a
   A. strut
   B. tie
   C. girder
   D. notch

2. Which of the following electromagnetic waves lies between ultraviolet radiation and infrared radiation?
   A. Gamma rays
   B. X-rays
   C. Visible radiation
   D. Micro-wave radiation

3. A goal keeper kicked a ball upwards from a goal mouth to meet players in the centre of a football pitch during inter-school competitions. Which of the following is correct about the motion of the ball?
   A. Horizontal velocity component is constant.
   B. Vertical velocity component increases and decreases.
   C. Horizontal velocity component increases.
   D. Vertical velocity component is constant.

4. The number of diodes found in a half wave rectified electronic circuit system is/are
   A. four
   B. three
   C. two
   D. one

5. An object is placed at a distance of 6.0cm from a curved mirror and the image is formed at 10cm behind the mirror.
   Which of the following is true about the type of mirror used and the nature of image formed?

	Mirror	Image
A	Concave	Virtual
B	Concave	Real
C	Convex	Virtual
D	Convex	Real

6. A material held with bare hands is placed into contact with the cap of a positively charged gold leaf electroscope and the leaf divergence does not alter at all.
   This means that
   A. there is charge leakage.
   B. there is no charge leakage
   C. the material is an insulator
   D. the material is a conductor.

7. In order to increase current from a lead acid accumulator, the plates must be of
   A. small area and placed close together.
   B. large area and placed far from each other.
   C. small area and placed far from each other.
   D. large area and placed close together.

8. The pressure, P of a fixed mass of gas at a temperature of -73^0C has a volume of $5.0cm^3$. If both the temperature and pressure double, what will be the volume of the gas?
   A. $10.0cm^3$
   B. $7.5cm^3$
   C. $5.0cm^3$
   D. $2.5cm^3$

9. A glass container with a rectangular base of 5cm×2cm contains water up to a height of 100cm. A piece of metal of mass 6g is gently immersed into water and the level rises to 120cm. Find the density of the metal.
   A. $3000kgm^{-3}$
   B. $300kgm^{-3}$
   C. $30kgm^{-3}$
   D. $3.0kgm^{-3}$

10. A block of wood of mass 800g is pushed along a rough surface with an initial velocity of $20ms^{-1}$. If the frictional force is 4N, find the work done against friction before the block comes to rest.
   A. 160J
   B. 200J
   C. 240J
   D. 320J

11. Self-demagnetization is caused by
   A. poles of magnets having atomic dipoles inside them aligned in the same direction.
   B. keeping magnets in keepers with their like poles adjacent.
   C. not keeping magnets in keepers made of steel.
   D. poles of magnets tending to reverse the direction of the atomic dipoles inside it.

12. In order to move in a circle at constant speed, a body needs
   A. centripetal force away from the centre.
   B. centripetal force towards the centre.
   C. centrifugal force away from the centre.
   D. centrifugal force towards the centre.

13.

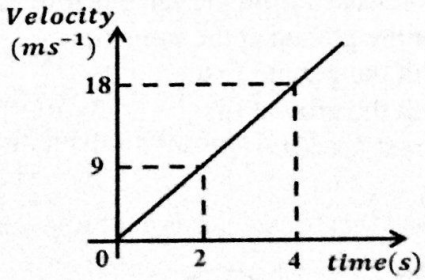


Fig. 1

The figure 1 above shows a velocity-time graph for a body in motion. Determine the total displacement of the body.
   A. $(18 \times 4)m$
   B. $\left(\frac{18\times4}{2}\right)m$
   C. $\left(\frac{18\times1}{4}\right)m$
   D. $\left(\frac{27}{2}\times4\right)m$

Turn Over

14. Which of the following is true about viscosity in gases?
A. It causes transfer of molecules from one state to another.
B. It decreases as the kinetic energy of molecules increases.
C. It is due to transfer of momentum between neighboring layers of gas.
D. It increases as the temperature decreases.

15. An immersion electrical heater connected to a 240V mains supply raises the temperature of 200g of water from 10^0C to 70^0C in 7minutes.
Calculate the current supplied to the heater.
A. 0.5A
B. 1.5A
C. 2.0A
D. 5.0A

16. The temperature at which there is dynamic equilibrium between outgoing molecules of a liquid and incoming molecules of its vapour is called
A. vapour pressure.
B. dew point.
C. saturated vapour pressure.
D. boiling point.

17. At critical angle $\boldsymbol{C}$, for a ray of light travelling from glass of refractive index 1.5 to air, produced an angle between the incident and refracted rays which was
A. greater than 180^0
B. less than 90^0
C. equal to 90^0
D. equal to the sum of 90^0 and the critical angle

18. Four bulbs each rated at 75W operate for 5days. If the cost of electricity is sh.500 per unit, find the total cost of power consumed.
A. shs. 15,000
B. shs. 18,000
C. shs 20,000
D. shs. 25,000

19. Which of the following statements is true about stones of masses of 2kg and 1kg respectively when both are released from the same height at the same time?
A. Both masses will hit the ground at the same time.
B. The 1kg mass will hit the ground first.
C. The 2kg mass will hit the ground first.
D. They fall with different speeds.

20.

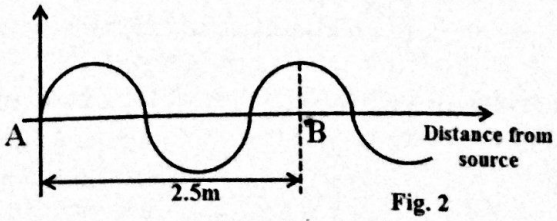


Fig. 2

Figure 2 above shows a wave travelling from a fixed position. If the time taken by the wave particle to move from A to B is 12.5seconds, calculate the wave frequency.
A. 10.00Hz
B. 5.00Hz
C. 1.50Hz
D. 0.10Hz

21. A ticker timer is connected to mains supply of frequency 40Hz. It takes 5.0×10^{-2} s to print consecutive dots. Find the number of dots printed.

A. five
B. four
C. three
D. two

22. When a weight of 10N is hang on a vertical spring, the length of the spring becomes 9cm. When a further 5N is added, the length of the spring increases to 11 cm. What is the length of the spring in an un-stretched state?

A. 2cm
B. 5cm
C. 7cm
D. 8cm

23. A neutral atom of element X has 138 neutrons and 88 electrons. What is its correct symbol?

A. $^{226}_{88}X$
B. $^{138}_{50}X$
C. $^{138}_{88}X$
D. $^{134}_{86}X$

24. A transformer has twice as many turns in the secondary as in the primary coil. If the a.c input in the primary coil is 4.0V, find the output voltage.

A. 2.0V
B. 4.0V
C. 6.0V
D. 8.0V

25. The following are similarities between mechanical waves and electromagnetic waves **except** that they

A. carry energy from one place to another.
B. undergo interference.
C. can be deflected, refracted and reflected.
D. require a material medium for transmission.

26. During the power stroke of a four-stroke petrol engine the

(i) plug sparks
(ii) piston moves upwards
(iii) two engine valves move upwards.
(iv) piston moves downwards.

Which of the above statements are true;

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

Turn Over

27. A boy was standing in a room lit with bulbs of a given colour. It was discovered that under this light, the respective colours of his shirt and trousers were red and black. What were the respective original colours of the bulbs, shirt and trousers?

	Bulb	Shirt	Trousers
A	Red	Red	Blue
B	Green	Red	Blue
C	Green	Green	Red
D	Blue	Blue	Red

28. Figure 3 below shows four forces of **10N, 6N, 3N** and $\boldsymbol{X}$**N** acting on a particle O. Find the magnitude of force $\boldsymbol{X}$ if the resultant force is 5N.

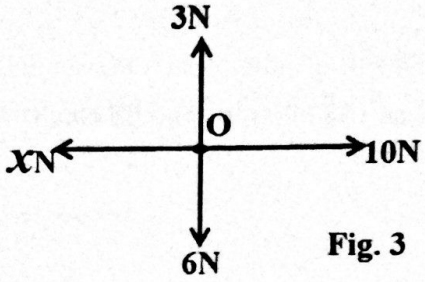


Fig. 3

A. 3N
B. 4N
C. 5N
D. 6N

29. The ability of a material to resist change of its size and shape is called?
A. ductility
B. stiffness
C. strength
D. brittleness

30. A thermometer is said to be less sensitive if it has a
A. narrow capillary tube and thin walled glass bulb.
B. narrow capillary tube and thick walled glass bulb.
C. wide capillary tube and thick walled glass tube.
D. wide capillary tube and thin walled glass tube.

31. During a sunny day, the sea is normally cooler than land. This is because
A. land has a higher heat capacity than water.
B. water has an abnormal expansion.
C. water has a higher heat capacity than land.
D. land is a poor emitter of heat

32. The refractive index of each of the colours of white light depends on
A. wave length.
B. dispersion.
C. intensity.
D. frequency.

33. Figure 4 below shows a piece of wood of volume $0.2m^3$ and density $600kgm^{-3}$ floating in a liquid of density $800kgm^{-3}$.

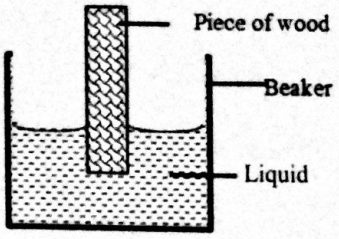


Fig. 4

Find the fraction of the wood submerged in the liquid.

A. $^1/_4$

B. $^2/_3$

C. $^3/_4$

D. $^4/_3$

34. Molecules at the surface of a liquid have got resultant force acting on them unlike those molecules in the middle of the liquid. This is because

A. molecules in the middle experience all round attraction from other molecules.

B. molecules in the middle are widely spread in the liquid.

C. the liquid exerts equal cohesion and adhesion forces.

D. there is more viscosity inside the liquid.

35. Figure 5 below shows two vertical walls **P** and **Q**, 55m apart. A man standing at point A, 22m from P, claps his hands once.

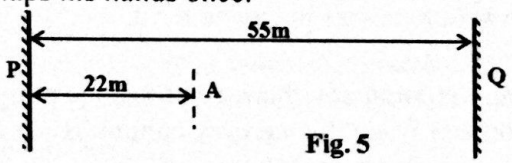


Fig. 5

What is the time interval between the original clap and the first echo that he hears?

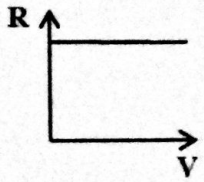
A. 0.333s

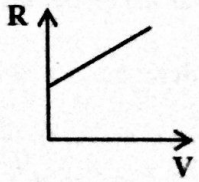
B. 0.200s

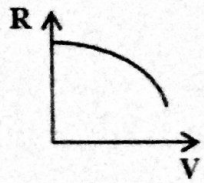
C. 0.133s

D. 0.067s

36. Which of the following graphs in figure 6 represents variation of resistance (R) against voltage (V) for a thermistor?

A.


C.


B.


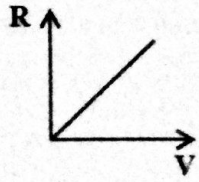
D.


Fig. 6

Turn Over

37. In which one of the following situations must frictional force be kept low?
A. Walking along a road.
B. Ski-ing down a snow slope.
C. Leaning a ladder against a wall.
D. Application of brakes for a moving bicycle.

38. 4g of a radioactive nuclide reduce by 75% of the original mass in 10 days. What is the half-life of the nuclide?
A. 5 days
B. 4 days
C. 3 days
D. 2 days

39.

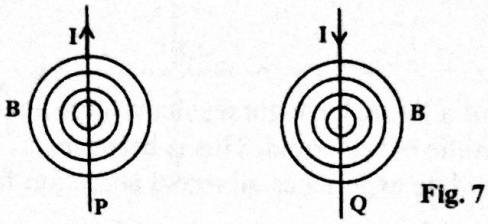


Fig. 7

Which of the following is true about two close wires **P** and **Q** each carrying current **I** so as to develop a magnetic field **B** as shown in the figure 7 above?
A. P attracts Q
B. P develops a clockwise magnetic field.
C. P repels Q
D. Q develops an anticlockwise magnetic field.

40. The length of a mercury column of a thermometer at ice point is 22cm. If the correct reading of the thermometer when the mercury column is 42cm long is 50^0C, calculate the length of the mercury column at steam point.
A. 62.0cm
B. 52.0cm
C. 50.0cm
D. 42.0cm

SECTION B (40 Marks)

*Answer **all** questions in this section.*

41. (a) (i) Define **viscosity.**

(01 mark)

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(ii) State any **two** factors affecting viscosity.

(01 mark)

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(b) (i) Sketch a velocity time graph for a spherical metal ball falling through a viscous liquid. *(01½ marks)*

(ii) Give any **two** examples of viscous liquids. *(0½ mark)*

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42. (a) State **Pascal's principle.** *(01 mark)*

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(b)

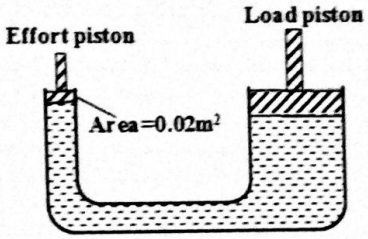

Fig. 8

Figure 8 shows a simple jerk of mechanical advantage 2 used to lift a load. If the force acting on the load piston is 100N.Calculate the

(i) force needed to raise the load *(01 mark)*

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(ii) area of the load piston. *(02 marks)*

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Turn Over

43. (a) Define **internal resistance of a cell.** *(01 mark)*

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(b) Figure 9 below shows a battery of internal resistance 1.0Ω connected to resistors of 6.0Ω, 2.5 Ω and 2.0Ω. The voltmeter reading across 6.0Ω and 2.0Ω is 3V. *(03 marks)*

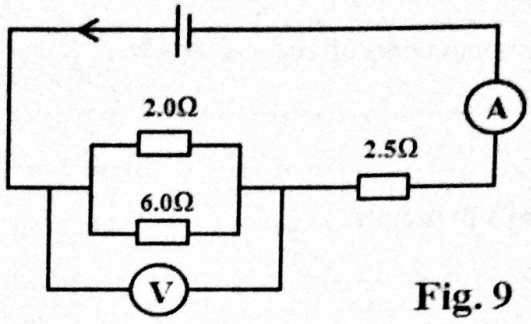

Fig. 9

Calculate the e.m.f of the cell.

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44. (a) Distinguish between **reverberation and resonance.** *(02 marks)*

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(b) A burette filled with water is held vertically. A tuning fork vibrating at 264Hz is held above the burette and water is allowed to flow out slowly. First resonance occurs when the water level is at 31.5cm from the top while the second resonance occurs when the water level is at 96.3cm from the top. Find the velocity of sound in air. *(02 marks)*

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45. (a) State **one** advantage of a moving coil galvanometer compared to other electrical measuring equipment. *(01 mark)*

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(b) A moving coil galvanometer has a resistance of 5Ω. A shunt of resistance 0.002Ω is connected across the galvanometer. If the galvanometer is to be used to convert to an ammeter measuring a current of 10A. What is its full scale deflection? *(03 marks)*

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46. (a) What is meant by **a dew point?** *(01 mark)*

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(b) (i) An engine cooling system, cools 500g of water from 90^0C to 30^0 in one minute. What is the power expended? *(02 marks)*

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(ii) State any **two** factors affecting the rate of cooling of a liquid. *(01 mark)*

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47. (a) How does a yellow light filter function? *(01 mark)*

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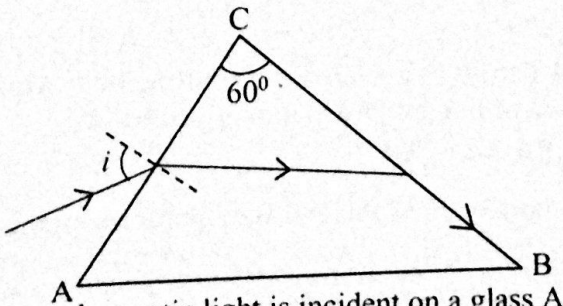
(b)



A ray of monochromatic light is incident on a glass ABC of refractive index 1.5 as shown in figure 10 above. Calculate the angle of incidence ***i***. *(03 marks)*

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Turn Over

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48. (a) Distinguish between a **conductor** and an **insulator** as applied to electricity. *(02 marks)*

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(b) (i) Briefly state how an insulator gets charged by rubbing. *(01 mark)*

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(ii) Why is it difficult to perform experiments of electrostatics under dump conditions? *(01 mark)*

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49. (a) State the **law of floatation.** *(02 mark)*

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(b) A balloon has a capacity of $10m^3$ and is filled with hydrogen. The balloon's fabric and the container have a mass of 1.25kg. Calculate the maximum mass the balloon can lift. *(02 marks)*

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50. (a) What is **mass number** of an atom? *(01 mark)*

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(b) (i) Nuclide **A** decays to nuclide B by emitting both **Alpha** and **Beta** particles according to the equation given below.

$$^{238}_{92}\mathbf{A} \rightarrow {}^{234}_{92}\mathbf{B}$$

(i) State the number of **Alpha** and **Beta** particles emitted. *(02 marks)*

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(01 mark)

(iii) State **one** difference between **Alpha** and **Beta** particles.

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END