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Signature: School

535/1
PHYSICS
Paper 1
Jul/Aug.2016
2 hours 15minutes

MARKING GUIDE



UGANDA TEACHERS' EDUCATION CONSULT (UTEC)

Uganda Certificate of Education

PHYSICS

Paper 1

2 hours 40 minutes

INSTRUCTIONS TO CANDIDATES:

Attempt **all** questions in section **A** and **B**.

This paper 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 of each question. Section **B** has 10 structured questions. Answers to this should be written in the spaces provided.

Assume the following where necessary;

Acceleration due to gravity	=	10 ms^{-2}
Density of water	=	1000 kgm^{-3}
Density of mercury	=	13600 kgm^{-3}
Specific heat capacity of water	=	$4200 \text{ Jkg}^{-1} \text{ K}^{-1}$
Speed of sound in air	=	330 ms^{-1}

SECTION A

1. The instrument that can accurately measure the diameter of a thin wire in the lab is;
- A. Vernier caliper
 - B. Micrometer screw gauge
 - C. Meter rule
 - D. Engineers' caliper

B

2. Energy gained or lost by a body is;
- A. Called potential energy
 - B. Called kinetic energy
 - C. Called conserved energy
 - D. Equal to the work done on or by the body

D

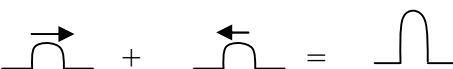
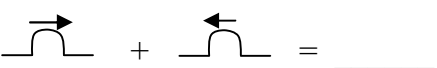
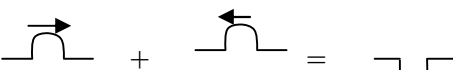
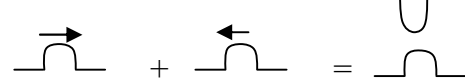
3. Water has;
- A. A minimum density at 4°C
 - B. A maximum volume at 4°C
 - C. A constant volume at all temperatures
 - D. An irregular expansion when heated from very low temperatures.

D

4. The sharp edges of a shadow shows that;
- A. Light travels in straight lines
 - B. Light is a form of energy
 - C. Light is visible energy
 - D. The obstacle is transparent

A

5. Which of the following shows superposition of waves?

- A. 
- B. 
- C. 
- D. 

A

6. Two insulators rubbed against each other get charged due to;
- A. Loss or gain of protons
 - B. Loss or gain of electrons
 - C. Loss or gain of neutrons
 - D. Production of electric charge.

B

7. The charge delivered by a cell driving a current of 2 microamperes for 2 hours is;

- A. 4C
- B. 720C
- C. 0.0072C
- D. 72C.

C

8. With reference to magnetism, which of these is the odd man out?

- A. Cobalt
- B. Copper
- C. Nickel
- D. Iron

B

9. For nuclear fusion to occur;

- A. Temperature must be very low
- B. Pressure must be very low
- C. Volume must be very large
- D. Temperature must be very high

D

10. The state of matter whose volume is easily changed is;

- A. Gas
- B. Solid
- C. Liquid
- D. Gel

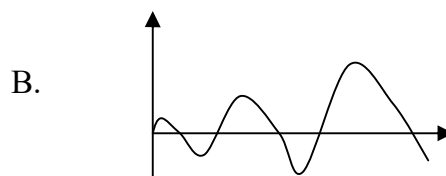
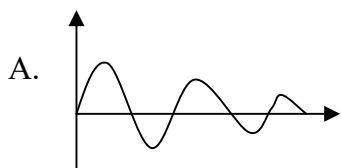
A

11. When the change in the displacements of a body is constant over equal time intervals, the body is;

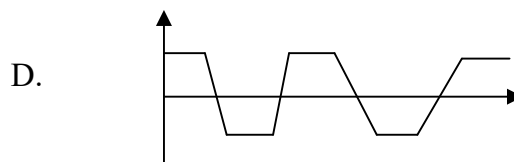
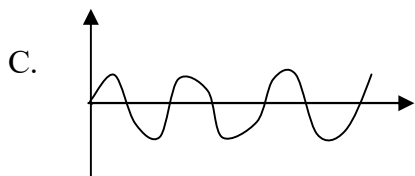
- A. Under uniform velocity
- B. Under uniform acceleration
- C. Under uniform speed
- D. Under uniform retardation

A

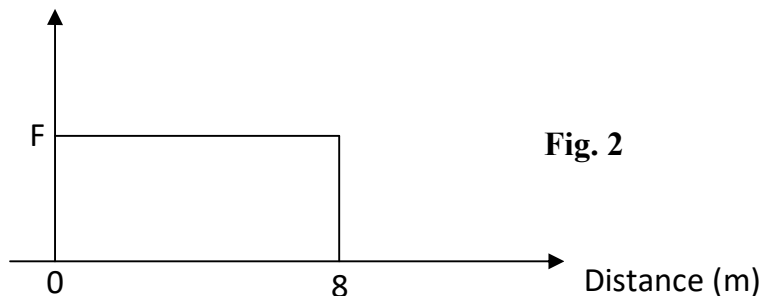
12. Which of the following shows a damped wave?



A



13. Dispersion of light in a glass prism is due to;
 A. Reflection of light within the prism
 B. Reflection of light outwards by a prism
 C. Refraction of light at different angles
 D. Reflection of light at different angles
14. The most common emf sources in the national grid in Uganda are;
 A. Hydro and solar generators
 B. Hydro and thermal generators
 C. Hydro and geothermal generators
 D. Hydro and wind generators
15. A particle from an atom has atomic number zero and mass number one. It is;
 A. an Proton
 B. an Electron
 C. a Beta particle
 D. a Neutron
16. All these are examples of total internal reflection **except**;
 A. Fish eye view
 B. Reflecting prisms
 C. Mirage
 D. Parabolic mirror
17. The force that allows the moon to move around the earth is;
 A. Frictional force
 B. Centripetal force provided by gravity
 C. Weight provided by centripetal force
 D. Centripetal force provided by the circle
18. The graph in **figure 2** shows the size of the force applied on a body and the distance moved by the body in the direction of the force.



If the work done in the process is 400J, the value of F is.

- A. 8N
- B. 50N
- C. 3200N
- D. 320N

B

19. A body requires 800J to raise its temperature by 4°C. The heat required to raise its temperature by 2.5°C is.

A. $\frac{800 \times 2.5}{4}$

B. $\frac{800 \times 400}{2.5}$

C. $\frac{2.5 \times 4}{800}$

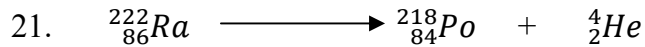
D. $800 \times 4 \times 2.5$

A

20. The charge density inside a hollow conductor is always;

- A. Maximum
- B. Higher than zero
- C. Lower than zero
- D. Zero

D



The equation represents a process called;

- A. Nuclear fission
- B. Alpha decay
- C. Nuclear fusion
- D. Atomic radiation

B

22. The pitch of a sound of a vibrating string increases if;

- A. It is made thicker and longer
- B. It is made thicker and shorter
- C. It is made thinner and longer
- D. It is made thinner and shorter

D

23. The correct order of increasing wavelength of light is;
- A. Red, Indigo, Violet
 - B. Yellow, Orange, Red
 - C. Red, Green, Blue
 - D. Blue, Green, Red

B

24. In a petrol engine, the petrol air mixture is;
- A. Ignited by the pressure in the cylinder
 - B. Ignited by the pressure on the cylinder
 - C. Ignited by the pressure outside the cylinder
 - D. Ignited by the spark from the plug

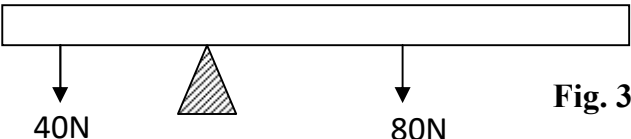
D

25. The crushing can experiment demonstrates;
- A. Gas expansion
 - B. Gas expulsion
 - C. Air expansion
 - D. Atmospheric pressure

D

26. In Fleming's left hand rule;
- A. The thumb points in the direction of current
 - B. The first finger points in the direction of the magnetic field.
 - C. The second finger points in the direction of force
 - D. The fore finger points in the direction of force.

B

27. 

The beam in **figure 3** is in equilibrium. The reaction at the pivot is.

- A. 40 N
- B. 80 N
- C. 2 N
- D. 120 N

D

28. A single fixed pulley is used to raise a load of 400N. What effort is required if the useless load is 80N?
- A. 0.2N
 - B. 480N
 - C. 5N
 - D. 320N

B

29. A convex lens refracts parallel rays of light to its principle axis. This implies that;
A. The source is at its centre of curvature
B. The source is beyond the centre of curvature
C. The source is at infinity
D. The source is at the principle focus
30. A plastic material is one which;
A. Regains its original shape but not size after deformation
B. Regains its original size but not shape after deformation
C. Regains both the original shape and size after deformation
D. Does not regain its original shape and size after deformation.
31. In house wiring, fuses are used to;
A. Reduce the power consumption
B. Stop the power consumption
C. Break the circuit when there is an electrical fault
D. Increases the power consumption
32. A 6V, 24W lamp shines at full brightness when it is connected to the output of a transformer with 800 turns on the primary coil. The voltage applied to the primary coil is 240V and there is no power loss in the transformer. The number of turns in the secondary coil is;
A. 200
B. 80
C. 20
D. 8
33. Which of the following increases the rate at which a radioactive sample gives off radiations?
A. Increase in temperature
B. Increase in pressure
C. Change in state
D. None of these
34. A hydraulic lift has a large piston of radius 2m and a small piston of radius 0.02 m. The velocity ratio of the hydraulic lift is;
A. 10000
B. 100
C. 0.01
D. 0.0001

35. The change in momentum of a body;
 A. Increases at the time of application of a force on it.
 B. Is independent of the time of application of force on it
 C. Increases as the time of application of force increases
 D. Is always zero for a body at rest
36. The refrigerator works on the principle that;
 A. Heat moves from hot to cold
 B. Gases expand when heated
 C. An evaporating liquid absorbs heat and a condensing one gives off heat.
 D. Pressure in liquids increases with depth
37. All the following instruments use convex lenses **except**;
 A. Pinhole camera
 B. Telescope
 C. Camera
 D. Microscope
38. Reverberation is due to;
 A. Reflection of sound
 B. Refraction of sound
 C. Diffraction of sound
 D. Reflection and diffraction of sound
39. An electric bell may give louder sound if;
 A. Fewer cells are used
 B. Fewer number of turns are used in the solenoid
 C. A weaker metal spring is used.
 D. The armature is further from the solenoid.
40. The diagram in **figure 4** shows a dry cell. The function of **x** is to;

C

C

A

A

C

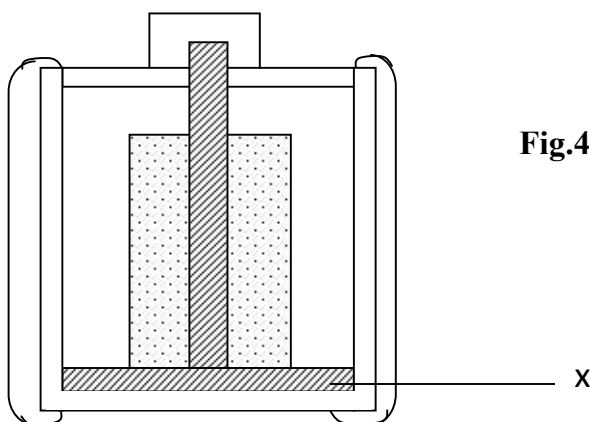


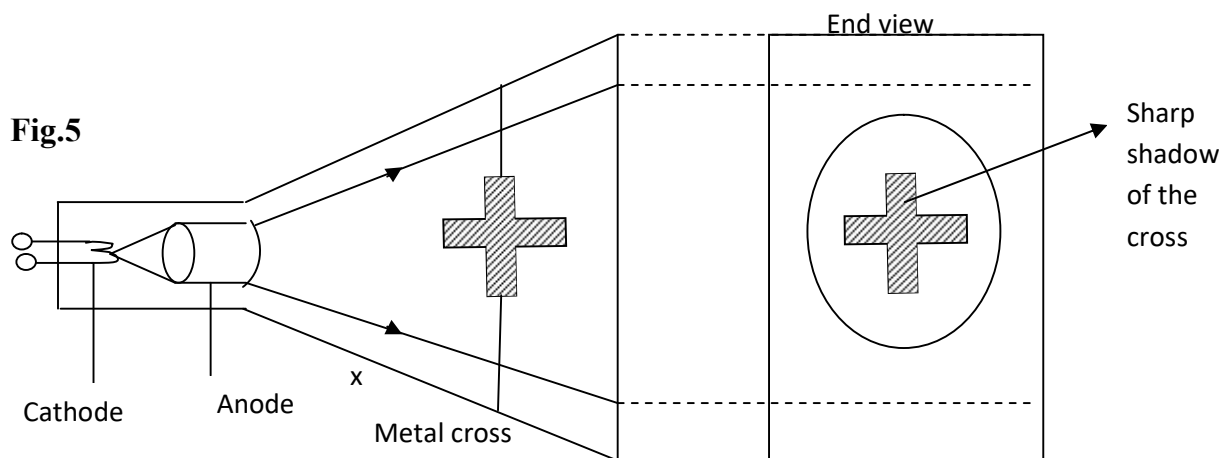
Fig.4

- A. Complete the circuit
- B. Increase the current
- C. Insulate the anode from the cathode
- D. Oxidize hydrogen into water

C

SECTION B

41. The diagram in **figure 5** shows a maltese cross tube.



- (a) Complete the diagram to show the end view of the screen. (01 mark)
- (b) Name two properties of cathode rays that are demonstrated by the observation. (02 marks)
 - (i) Cathode rays cause fluorescence
 - (ii) Cathode rays travel in straight lines
- (c) What will be observed if a negatively charged rod is held at point X of the tube. (01 mark)

The shadow of the cross is deflected upwards

42. (a) State the law of electrostatics. (01 mark)

Like charges repel and unlike charges attract

- (b) Briefly outline the steps required to use an electroscope to test the nature of charge on a body. (03 marks)

- The electroscope is charged with a known charge diverging the leaf
- The body is held near the cap of the electroscope
- In increase in the divergence of the leaf confirms the charge on the body to be a like charge

43. (a) Define the term frequency with respect to waves. (01 mark)

The number of complete cycles made by a wave in one second.

(b) A stretched string vibrates with a frequency of 300 Hz. Determine its frequency if the length is reduced to one third its original length. (03 marks)

$$f_2 L_2 = f_1 L_1$$

$$f_2 = \frac{300 \times L}{L/3}$$

$$f_2 = 900 \text{ Hz}$$

44. (a) The diagram in **figure 6** show a heater of power 2 KW fully immersed in boiling water on a weighing scale.

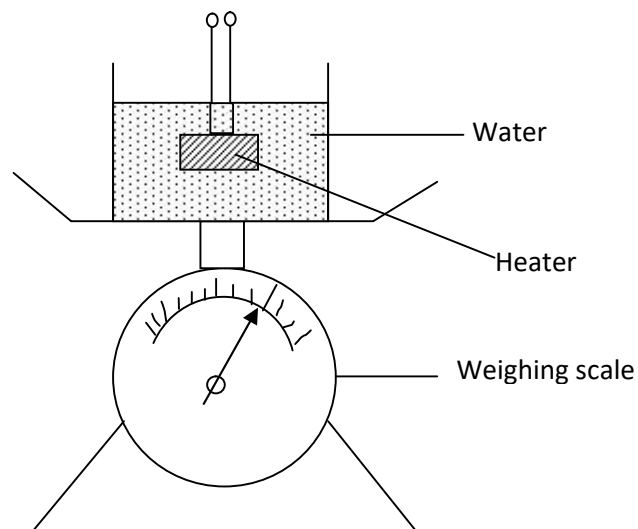


Fig. 6

Determine the reduction in the mass of water if the heater is switched on for 200 seconds. (03 marks)

$$M \times L = \text{power} \times \text{time}$$

$$\begin{aligned}
 M &= \frac{2000 \times 200}{L} \\
 &= \frac{400,000}{L} \\
 &= \text{(value of not given)}
 \end{aligned}$$

- (b) State one application of water due to its high specific heat capacity. (01 mark)

- (i) *Coolant in car engines (ac)*
(ii) *Hot water bottles to keep infants warm*

45. (a) What are isotopes? (01 mark)

Atoms of same element with the same number of protons but different numbers of neutrons.

- (b) Briefly describe a neutral atom represented as ${}_{11}^{24}\text{X}$. (03 marks)

- (i) *It has a nucleus containing 11 protons and 13 neutrons*
(ii) *It has 11 electrons revolving around the nucleus*

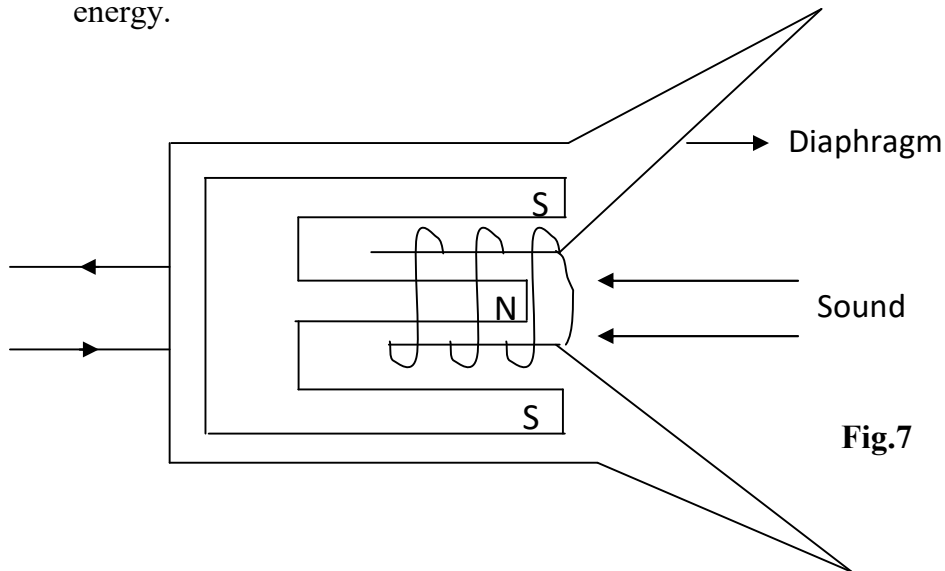
46. (a) State Archimedes' Principle. (01 mark)

When a body is wholly or partially immersed in a fluid it experiences an upthrust equal to the weight of the fluid displaced.

- (b) A boat floating in water displaces 20m^3 of sea water of density 1100kgm^{-3} . Determine the weight of the boat. (03 marks)

$$\begin{aligned}
 \text{Weight of the boat} &= \text{Weight of water displaced} \\
 &= \text{Volume} \times \text{density} \times g \\
 &= 20 \times 1100 \times 10 \\
 &= 220,000\text{N}
 \end{aligned}$$

47. The diagram in **figure 7** Represents a device that converts sound into electrical energy.



- (a) Name the device. (01 mark)

Microphone Mouth piece of a telephone

- (b) Briefly outline what happens when sound waves hit the diaphragm (03 marks)

- (i) *Diaphragm is set into vibration*
- (ii) *Coil attached to the diaphragm vibrates in a magnetic field*
- (iii) *This induces an alternating emf in the coil driving an alternating current through the speaker.*

48. (a) What is a cell? (01 mark)

A device that converts chemical energy into electrical energy

- (b) A battery of emf 12V drives a current of 2A through a load of resistance 5Ω . Determine its internal resistance. (03 marks)

$$E = I(R + r)$$

$$12 = 2(5 + r)$$

$$12 = 10 + 2r$$

$$r = I\Omega$$

49. (a) (i) With reference to materials, define the term *strength*. (01 mark)

Ability of a material to withstand a force applied on it without breaking (rapture)

- (ii) Suggest one way of increasing the strength of a material without increasing its weight. (01 mark)

- *Change the shape of the material*
- *Change the nature of the force applied on it*

- (b) Give two ways of reducing *notch effect* in material. (02 marks)

- *Placing the material under compression*
- *Drilling holes at the tips of the notch*

50. (a) Define the term *cohesion*. (01 mark)

Force of attraction between molecules of the same substance.

- (b) When an illuminated smoke cell is observed under a microscope, bright specks in continuous random motion are observed. Briefly explain the observation. (03 marks)

- *Air molecules in the cell are in continuous random motion*
- *They constantly collide with carbon particles*
- *Setting them into continuous random motion*
- *These appear as bright specks in continuous random motion*

END