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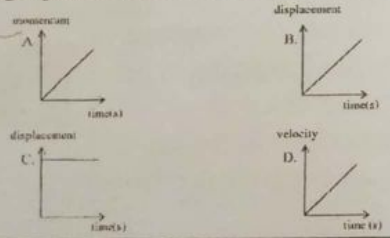
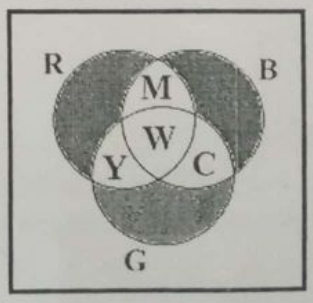
WAKISSHA JOINT MOCK EXAMINATIONS
MARKING GUIDE
Uganda Certificate of Education
July/August 2023
PHYSICS 535/1

WAKISSHA 2023 PHYSICS 535/PAPER 1 MARKING GUIDE		
1. Which of the following substances undergoes plastic deformation? A. Copper B. Wood C. Glass D. Concrete **A**	Plastic deformation is only possible for ductile materials like **Copper**	**A**
2. A body of mass 120g and density $2.5gcm^{-3}$ is placed in a measuring cylinder containing water and the level of water rises to $80cm^{-3}$. Find the initial level of the water. A. $48cm^3$ B. $40cm^3$ C. $32cm^3$ D. $30cm^3$ **C**	Volume of water $= \frac{mass}{density} = \frac{120}{2.5} = 48cm^3$ The initial level of the water$=80-48=$ $\mathbf{32cm^3}$	**C**
3. A body of a given mass is moving with uniform momentum. Which of the following graphs describes its its motion?  **B**	A body moving with uniform momentum also moves with uniform velocity obtained from **B**	**B**
4. The following statements are true about light colour filters. (i) Magenta filter absorbs red and transmits blue and green. (ii) Magenta filter absorbs green and transmits red and blue. (iii) Cyan filter absorbs blue and transmits red and green. (iv) Yellow filter absorbs blue and transmits red and green. A. (ii) and (iv) only. B. (i), (ii) and (iii) only. C. (i) and (iii) only. D. (i) and (iv) only. **A**	 Magenta filter absorbs red **because they are complementary** and transmits blue and green. Yellow filter absorbs blue **because they are complementary** and transmits red and green.	**A**

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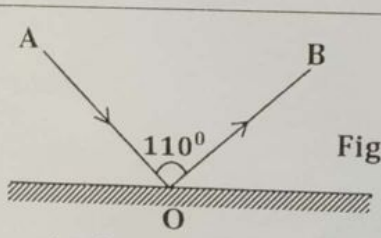
5. The process of using a material of low thermal conductivity to prevent heat loss is called A. lagging B. cooling C. absorption D. contraction	**A**	Lagging is the process of using a material of low thermal conductivity to prevent heat loss.	**A**
6. In an experiment to find how the force of repulsion between two magnets varies with their distance apart, the following results in a table were obtained. From the results it be deduced that: A. $F \alpha d^2$ B. $F \alpha d$ C. $F \alpha \frac{1}{d}$ D. $F \alpha \frac{1}{d^2}$	**B**	Force (N) / Distance (m) 30 / 1 120 / 4 480 / 16 $30 \div 1 = 30$ $120 \div 4 = 30$ $480 \div 16 = 30$ $F \alpha d$; $F \div d = 30$(constant)	**B**
7. A ray of light AO is incident on a plane mirror and it is reflected along OB as shown in figure 1 below. The glancing angle is; A. 35° B. 40° C. 55° D. 60°	**A**	 Fig. 1 The angle of reflection (angle of incidence) $= 110 \div 2 = 55^0; 90 - 55 = 35$	**A**
8. In order to charge a gold leaf electroscope positively by induction the following is the correct order of process involved (i) A negative rod is brought close to the cap. (ii) The cap is earthed (iii) The negative rod is withdrawn. A. (i), (iii) and (ii) B. (ii), (iii) and (i) C. (ii), (i) and (iii) D. (i), (ii) and (iii)	**D**	In order to charge a gold leaf electroscope positively by induction the following is the correct order of process involved is: a negative rod is brought close to the cap, the cap is earthed and the negative rod is withdrawn.	**D**
9. Two girls are swinging in turns. One of them complained how it was hard to set her friend in motion. Name the property that accounts for this tendency. A. Friction B. Inertia C. Gravitational force D. Momentum	**B**	Inertia is the tendency which makes it hard for to set a swinging body in motion.	**B**

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10. Two boys P and Q of masses 40kg and 60kg respectively climb a distance of 8m each in 10seconds and 15seconds respectively. One of the following statements is correct about them.
A. The power of P equals to the power of Q
B. The power of P is greater than that of Q.
C. The power of Q is greater than that of P.
D. The work done by P is greater than that of Q.

A

The power of P equals to $\frac{40\times10\times8}{10} = 320W$
The power of Q equals to $\frac{60\times10\times8}{15} = 320W$
The work by $P = 40 \times 10 \times 8 = 3,200J$
Work by $Q = 60 \times 10 \times 8 = 4,800J$

A

11. Figure 2 above shows motion of a body which covered a total displacement of 50m. Find the value of its initial velocity u.
A. $4.5ms^{-1}$
B. $10ms^{-1}$
C. $16ms^{-1}$
D. $20ms^{-1}$

D

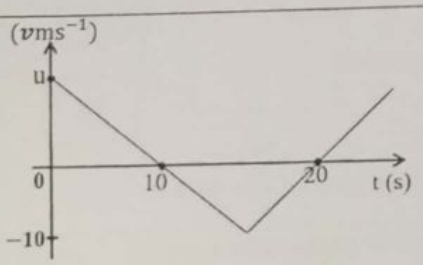
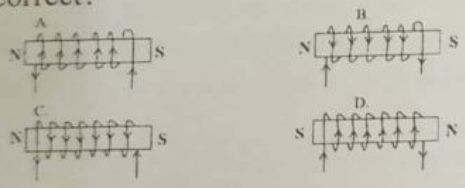


Fig. 2

$D = \frac{1}{2}bh - \frac{1}{2}bh$
$50 = \frac{1}{2} \times 10 \times u - \frac{1}{2} \times 10 \times 10$
$5u = 100; \quad u = 20ms^{-1}$

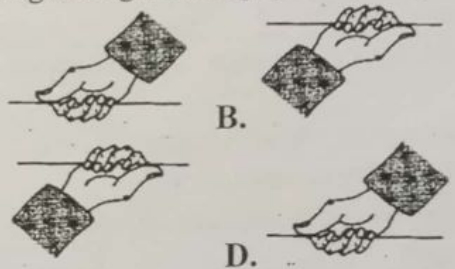
D

12. The diagrams below show electric field and polarity of an electromagnet. Which of them is correct?



A

Using the right hand grip rule;

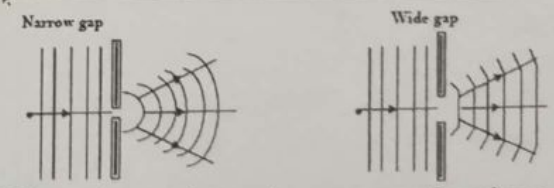


The right hand fingers should face in the direction of the current while the thumb should face in the north.

A

13. Plane waves are diffracted as circular waves in a narrow gap. When the gap is made narrower the plane waves become
A. straight waves.
B. more circular.
C. standing waves.
D. reflected.

B



When the gap is made narrower the plane waves become **more circular**

B

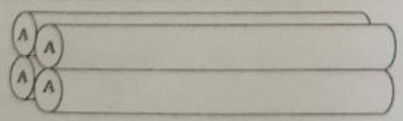


Fig.3

14. Four identical cylindrical resistors each of cross sectional area A, resistivity, **ρ** and length ***l*** are combined in a bundle as shown in figure 3 above.

$R \propto \frac{l}{A}$; By introducing a constant ρ;
$R = \frac{\rho l}{A}$
For 4 resistors
$R = \frac{\rho l}{4A}$

A

Their effective resistance **R** is given by: A. $\frac{\rho l}{4A}$ B. $\frac{4\rho l}{A}$ C. $\frac{4A}{\rho l}$ D. $4A\rho l$ **A**		
15. Which of the following are true about a wave travelling from deep to shallow water? (i) wavelength reduces (ii) velocity reduces (iii) wave length increases A. (i) and (iv) only B. (ii) and (iii) only C. (i) and (iii) only D. (i) and (ii) only **D**	When a wave travels from deep to shallow water, it will have travelled from **less dense** to **denser** medium. At this point its: wavelength reduces and its velocity reduces and its wave length reduces.	**D**
16. A magnified virtual image can only be produced by a A. plane mirror. B. convex mirror. C. concave mirror. D. driving mirror. **C**	A magnified virtual image can be produced by only a concave mirror when the object is between the pole and the focal point.	**C**
17. The density of a substance can be termed as the A. quantity of matter per unit square metre B. space occupied by a substance C. quantity of matter per unit space occupied by a substance D. gravitational force working on a substance. **C**	Density of a substance is mass per unit Square metre. This is quantity of matter in a body per unit space occupied by a substance	**C**
18. Full wave rectification can be achieved by; (i) one diode (ii) two diodes (iii) three diodes (iv) four diodes A. (i) only B. (ii) and (iv) only C. (iii) and (iv) only D. (iv) only **B**	Full wave rectification can be achieved by two diodes while centre tapped and four diodes in shape of a rhombus.	**B**
19. A fixed mass of an ideal gas has temperature, **T**, volume, v and pressure **P**. When its pressure is halved and volume is trippled, its new temperature becomes. A. $\frac{3}{2}T$ B. $\frac{2}{3}T$ C. $\frac{1}{6}T$ **A**	From ideal gas equation, $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ $T_2 = \frac{P_2V_2 \times T_1}{P_1V_1}$ $T_2 = \frac{\frac{1}{2}P_1 3V_1 \times T_1}{P_1V_1} = \frac{3}{2}T_1$	**A**

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D. $6T$

20. Four bar magnets A, B, C and D were placed next to **one** another as shown in fig. 4 below.

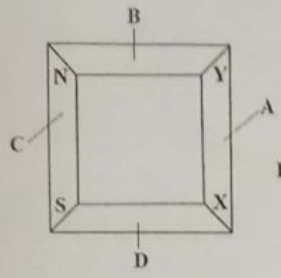


Fig. 4

The poles of magnet **A** marked **X** and **Y** are respectively

A. south and north
B. south and south
C. north and north
D. north and south

A

When four bar magnets A, B, C and D were placed next to **one** another we obtain:

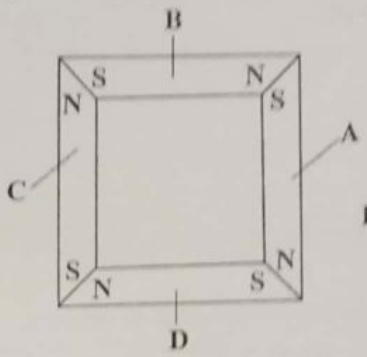


Fig. 4

X and **Y** **are** south and north

A

21. A nuclide $^{10}_{6}\mathbf{X}$ decays to nuclide **Y** by emission of a Beta particle and Alpha particle. The nucleon number of **Y** is:

A. 16
B. 11
C. 6
D. 1

C

The nucleon number of **Y** is got by:

$^{10}_{6}\mathbf{X} \rightarrow {}^{6}_{5}\mathbf{Y} + {}^{4}_{2}\mathbf{He} + {}^{0}_{-1}\mathbf{e}$

C

22. A high AC voltage can be obtained from a low DC voltage by use of a

A. rectifier
B. inverter and transformer
C. transformer
D. diode and a transformer.

B

B

23. A uniform beam of mass 250g is pivoted at point P as shown fig 5 below.

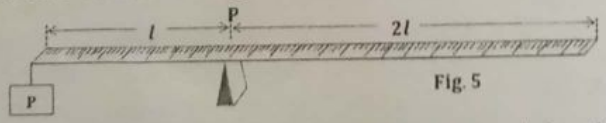
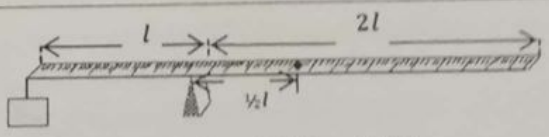


Fig. 5

Determine the mass P to be put at one end for the beam to balance.

A. 120g
B. 122g
C. 125g
D. 250g

C



$P \times l = 250 \times 0.5l$

$P = 125g$

C

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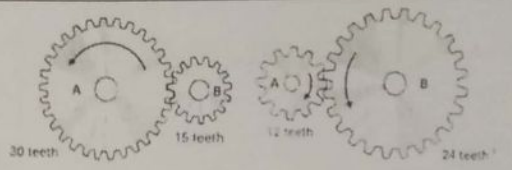
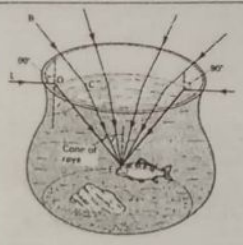
24. Which of the following statements is/are correct about a body moving with uniform velocity. (i) Resultant force is zero. (ii) Acceleration is zero. (iii) Momentum is zero. A. (i) and (ii) B. (i) and (iii) C. (iii) only D. (i) (ii) and (iii) A	When a body moving with uniform velocity, its acceleration is zero, resultant force is zero and momentum is constant **not zero**.	A
25. In gears a large velocity ratio is obtained when; A. effort is applied on a small gear to drive a large gear. B. effort is equal to the load. C. effort is applied on a large gear to drive a small gear. D. the gears move in opposite directions. A	 **In gears** always a large velocity ratio is obtained when effort is applied on a small gear to drive a large gear	A
26. 26. A fish in a pond sees a man standing besides the pond. To the fish, the man appears to be A. smaller and nearer than he actually is. B. smaller and further than he actually is C. larger and nearer than he actually is D. larger and further than he actually is C	 A fish in a pond always has a wide field of view and sees a nearer and bigger image because the object appears nearer.	C
27. When Action and Reaction forces act on a body, the resultant is A. greater than zero B. one C. less than zero D. zero D	Since action and Reaction forces are always equal, then their **difference** or **resultant** is **zero**	D
28. A liquid of density 1.0×10^3 fills a vessel of uniform cross-sectional area of $200cm^2$ to a depth of 500mm. Calculate the force exerted by the liquid at the bottom of the vessel. A. 50N B. 100N C. 150N D. 200N B	**In liquids; P=h × ρ × g the same as $\frac{F}{A}$** **Therefore F = P × A = h × ρ × g × A** $F = \frac{500}{1000} \times 1000 \times 10 \times \frac{200}{10,000}$ $= 100N$	B
29. Three resistors are connected to a 12.0V battery of negligible internal resistance as shown in the circuit below in fig.6.	For the parallel combination, $R = \frac{product}{sum} = \frac{1 \times 4}{1+4} = \frac{4}{5} = 0.8\Omega$ Effective resistance = 1.2+0.8=2.0V By resistor ratio method; The voltmeter reading$=\frac{1.2}{2.0} \times 12 = 7.2\Omega.$ Also by current method;	B

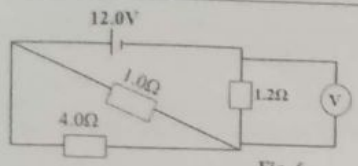


Fig. 6

Find the voltmeter reading.
A. 6.0V
B. 7.2V
C. 8.0V
D. 12.0V

B

Battery delivered current $= \frac{\sum E}{\sum R} = \frac{12}{2} = 6A$
The voltmeter reading = IR = $6 \times 1.2 =$ 7.2Ω

30. Clouds are 1650m from the observer on the ground. Find the time that elapses between the lightening flash and thunder. (Speed of sound in air = $330ms^{-1}$)
A. 0.005s
B. 050s
C. 5.0s
D. 50s

C

$Time = \frac{distance}{speed} = \frac{1650}{330} = 5ms^{-1}$

C

31. The advantage(s) of mercury over alcohol as a thermometric liquid is/are
(i) mercury is opaque
(ii) mercury has a high temperature coefficient of expansion.
(iii) mercury is more sensitive.
(iv) mercury is a good conductor of heat.
A. (i), (iii) and (iv) only.
B. (i) and (ii) only.
C. (iv) only.
D. (i), (ii) and (iii) only.

A

The advantage(s) of mercury over alcohol as a thermometric liquid are:
- mercury is opaque
- mercury is more sensitive
- mercury is a good conductor of heat but **with a low temperature coefficient of expansion.**

A

32. One of the following statements is true about the working of simple cells.
A. Polarisation is caused by **impure** zinc.
B. the hydrogen is produced at the zinc plate and causes polarisation.
C. The formation of hydrogen bubbles at the copper plate causes local action.
D. Potassium dichromate is used to minimise polarisation

D

In simple cells,:
- local action is caused by impure zinc
- the hydrogen is produced at the copper plate and causes polarisation
- the formation of hydrogen bubbles at the zinc plate causes local action.
- Potassium dichromate is used to minimise polarisation

D

33. It is easier to charge insulators than conductors because
A. insulators do not allow the charge to flow away but conductors allow the charge to flow away
B. conductors allow the charges to flow through them but insulators don't.
C. it is impossible to charge conductors under any condition.

B

- Both **conductors** and insulators allow the charge to flow away.
- conductors allow the charges to flow through them but insulators don't.
- it **is not** impossible to charge conductors under any condition.
- conductors just receive charge from the atmosphere without being rubbed.

B

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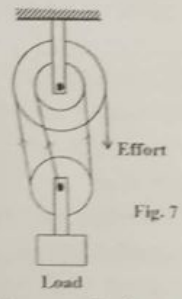
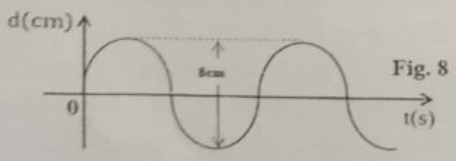
D. insulators just receive charge from the atmosphere without being rubbed.		
34. State what would happen to the size of a foot ball inner tube when its pressure is increased if it exactly obeys Boyle's law. A. It would increase B. It would reduce C. It would not change D. It would lead to immediate bursting. B	When an insulated vapour is compressed it	B
35. 93.75% of a radioactive material decays after 80days find itshalf life. A. 20 days B. 40 days C. 80 days D. 120 days A	$100 - 93.75\% = 6.25$ $100 \rightarrow 50 \rightarrow 25 \rightarrow 12.5 \rightarrow 6.25$ $4t = 80days;\ t = 20days$	A
36.  Fig. 7 A **The diagram in figure 7 above shows a pulley system which of the following statements is true about it?** (i) The mechanical advantage of the system increases up to a limit as the load increases. (ii) The mechanical **advantage cannot** exceed 3 depending on the load. (iii) The efficiency of the system increases as the the load increases. A. (i) and (ii) only B. (ii) and (iii) only C. (i) and (iii) only D. (iii) only	**For a pulley system of velocity raratio 3;** - The mechanical advantage of the system increases up to a limit as the load increases. - The mechanical **advantage cannot** exceed 3 depending on the load. - The efficiency of the system decreases as the the load increases.	A
37.  Fig. 8 Figure 8 above shows a wave in motion. If its wavelength is half the amplitude **with a frequency 50Hz**, calculate its velocity. A. $0.5\ ms^{-1}$ B	$\lambda = \frac{4}{2} = 2cm$=0.02m from v=$f\lambda$; $v = 50 \times 0.02 = 1ms^{-1}$	B

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B. $1.0\ ms^{-1}$ C. $2.0\ ms^{-1}$ D. $4.0\ ms^{-1}$		
38. A charge of 30C flows through a coil for one sixth of a minute. If the resistance of the coil is 4.0Ω find the pd across it. A. 10.0V B. 12.0V C. 14.0V D. 16.0V **B**	From Q = It; $30 = I \times 10;\ \ I = 3A$ $From\ V = IR;$ $V = 3 \times 4 = 12V$	**B**
39. In Optics, which of the following is true in both concave mirrors and convex lenses during image formation? A. An incident ray parallel and close to the principal axis passes through the principal focus after reflection or refraction. B. An incident ray through the principal focus is reflected/refracted through the centre of carvature. C. A ray through the principal focus is reflected/refracted through the same path D. A ray through the optical centre is undeviated during reflection from the lens. **A**	Both concave mirrors and convex lenses: -have real focal points -form real inverted images - their incident ray parallel and close to the principal axis passes through the principal focus after reflection or refraction. - A ray through the principal focus is reflected/refracted parallel to the principal axis	**A**
40. An electric heater is used to heat $2x10^{-4}m^3$ of water for 200s. Find the p.d across the heater if the current through it is 0.5A and the temperature of the water rises by 25°C. A. 145V B. 175V C. 210V D. 240V **C**	$IVt = mC\theta$ $IVt = v \times \rho \times C \times \theta$ $0.5 \times V \times 200 = 0.0002 \times 1000 \times 4200 \times 25$ $V = 210V$	**C**

SECTION B

41.	(a) (i) What is meant by gravitational pull?	Is the force that attracts bodies towards the centre of the earth. ✓01	01
	(ii) State any two factors affecting a freely falling body in a vacuum.	(ii) mass ✗ 0½ -density ✗ 0½	01
	(b) A doctor of mass 80kg is moving in a lift accelerates at $2ms^{-2}$ from sixth to ground floor. Find the reaction of the lift on the doctor.	F= ma ✗ 0½ $mg - R = ma$ $80 \times 10 - R = 80 \times 2$ $800 - R = 160$ $R = 640N$	02

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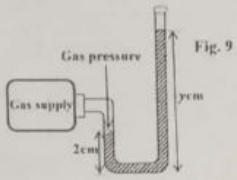
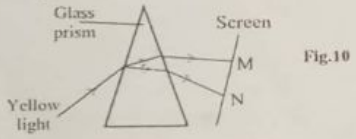
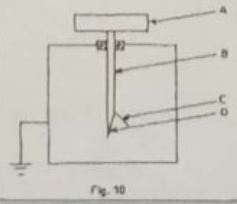
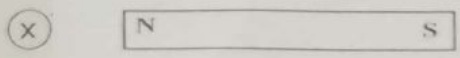
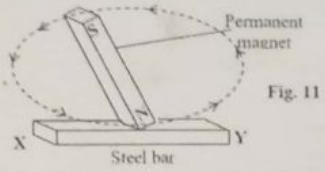
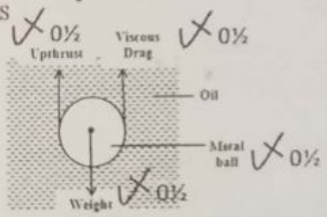
42.	(a) Define Pressure.  Fig. 9 (b) The diagram in figure. 9 shows an instrument for measuring gas pressure in a laboratory. If the gas pressure is 123,760Pa, find the value of y	(a) Pressure is the force acting normally per unit square metre. ✓01 (b) $P=(P_{atm}+P_h)\rho g$ ✓01 $123{,}760=\left[\frac{76+(y-2)}{100}\right]\times 13600\times 10$ $123{,}760=136000\left[\frac{76+(y-2)}{100}\right]$ ✗0½ $0.91\times 100=76+(y-2)$ $y-2=91-76$ ✗0½ $y=15+2=17\text{cm}$ ✗0½ ✗0½	01 03
43.	(a) (i) Differentiate between a virtual and a real image.	a. (i) A ~~virtual~~ real image is the one whiich can be formed on the screen while a ~~real~~ virtual image is the one which cannot be formed on the screen. ✓01 **Accept alternative**	01
	(ii) State the conditions for total internal reflection to occur. (b) Yellow light is incident on a glass prism as shown in fig.10.  Fig.10 (i) Name the colours M and N. (ii) Colour M is mixed with Cyan. Name the resultant colour.	a. (ii)-Light should be travelling from denser to less dens medium ✗0½ -Angle of incidence in the denser medium must exceed the critical angle ✗0½ b. (i) M is red while N is green ✗0½ ✗0½ b. (ii) the colour is white ~~(cmplementary colours)~~ ✓01	03
44.	(a) Define Latent heat of fusion. (b) An electrical heater rated 1000W is immersed in a plastic bucket of ice of mass 500g at 0^oC . If it takes 10minutes for the ice to raise its temperature to θ, determine the value of θ.	(a) Latent heat of fusion is the quantity of heat required to convert solid to liquid at a constant temperature. ✓01 **(b) $Q=Mlf+mc\Delta\theta$** ✗0½ **$Pt=Mlf+mc\Delta\theta$** ✗0½ **$1000\times 600=\frac{500}{1000}\times 3.4\times 10^5+\frac{500}{1000}\times 4200\theta$** ✓01 **$600{,}000=170{,}000+21{,}000\theta$** **$\theta=20^0C$** or ✓01 205·7°C	04
45.	(a) What is meant by a fundamental note? (b) (i) A column of air 26.25cm in a closed tube resonates to a sounding tuning fork and produces a note of lowest frequency. If the velocity of sound in air $330ms^{-1}$, determine the frequency of the fork. (ii) State one advantage of using open over	(a) Fundamental note is a note of lowest frequency of a periodic wave form. ✓01 b.(i) $l=\frac{1}{4}\lambda$; ✗0½ $\lambda=4l=4\times 0.2625=1.05\text{m}$ from $v=f\lambda$; $330=1.05\,f$ ✗0½ $f=314.3\text{Hz}$ ✗0½ ✗0½ (ii) Open pipes can produce both odd and even	04

	closed pipes as musical instruments.	harmonics hence sweet music.	
46.	(a) An energy bulb saver is rated 240V,15W. What is meant by this statement? (b) (i) Give one difference between a shunt and a multiplier. (ii) A multiplier of internal resistance 5.0Ω and full scale deflection of 20mA. Calalate the value of the resistor which will enable it to be converted to a shunt so that a maximum current of 5A can be measured.	(a) It means that when the bulb is connected to a 240V mains supply, it consumes electrical energy of 15joules per second. ✓01 (b) a shunt is connected in parallel to a galvanometer while a multiplier is connected in series. ✓01 -A shunt does not consume the same current as the galvanometer while the multiplier consumes the same current as the galvanometer -shunt has lower resistance than the gavanometer while the multiplier has higher resistance. (ii) Vg=IgRg $Vg=0.02\times 5 = 0.1V$ ✗0½ $I_S = 5 - I_g = 5 - 0.02 = 4.98A$ $Vs=I_g \times R_S$ $0.1=4.98\times R_S$ ✗0½ $R_S = 0.02\Omega$ ✗0½ ✗0½	04
47.	(a) (i) What is meant by Corona discharge? (ii) Write two applications of Corona discharge (b) Draw a lebelled diagram of a gold leaf electroscope.	(a) (i) Corona discharge is the loss of charge by sharp points due to ionised air around them. ✓01 (ii) -lightening conductor ✗0½ aircraft -photocopying machines ✗0½ windmetre bmy blades -vander graaf generators  Fig. 10 A-metal cap ✗0½ B- metal rod ✗0½ D- metal plate ✗0½ C- gold leaf ✗0½	04
48.	(a) (i) Define nuclear fusion. (ii) Mention two conditions for nuclearfusion to occur. (b) The nuclide Po decays to nuclide X by emission of two alpha particles and one Beta particle. Write a balanced equation for the decay.	Nuclear fusion is the combining of two unstable lighter nuclides to form a heavier stable nuclide with a release of energy. ✓01 (ii) High temperature ✗0½ -High pressure ✗0½ (b) $^{215}_{84}Po \rightarrow {}^{a}_{b}X + 2^{4}_{2}He + {}^{0}_{-1}e$ ✗0½ ✗0½ 215=a+8+0; a=215-8=207 ✗0½ 84=b+4-1 84=b+3; b=81 $^{215}_{84}Po \rightarrow {}^{207}_{81}X + 2^{4}_{2}He + {}^{0}_{-1}e$	04

✓0½

49.	(a) (i) Define magnetic saturation.  (ii) Explain briefly why increase in temperature destroys the magnetism of a magnet. (b) Figure 11 below shows magnetisation of a steel bar by a permanent magnet. Name the polarity X and Y.	.a.(i)Magnetic saturation is a point beyond which a magnet cannot be magnetised any further. ✓01 (ii) increase in temperature increases vibrations leading to disorganised dipole arrangement. ✓01 (b) X-north ✓01 Y-south ✓01  Fig. 11	04
50.	(a) (i) Define capillarity. (ii) State any two applications of capillarity (b) A small spherical metal ball was dropped in oil contained in a vessel. Draw a diagram to show the forces acting on the metal ball.	(a) (i) capillarity is the phenomenon in which a liquid rises or falls in a narrow tube. ✓01 (ii) wicks of lanterns ✓0½ -bathing towels ✓0½ -mopping rags ✓0½  ✓0½ ✓0½ ✓0½ ✓0½	04
	END		

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