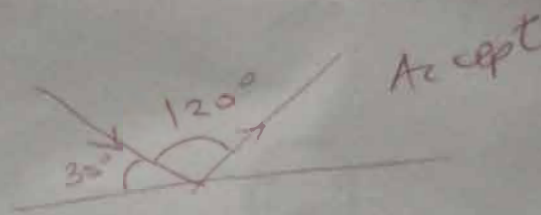


232/2 MS

SECTION A: (25 marks)



1.		(1 mark)
2.	<p>a) The electroscope is <u>earthed</u> thus the <u>electrons flow from the leaf to the earth</u>. This <u>reduces the force of repulsion</u> between the leaf and the plate to zero hence <u>the leaf falls</u>.</p>	(3 marks)
3.	<ul style="list-style-type: none"> - Smoothing circuits - Tuning circuits - Delay circuits <p>(any one)</p> <p>- Reducing sparking at contacts.</p>	(1 mark)
4.	<p>a) P ✓</p> <p>b) Dipoles of P are aligned faster than in Q for the same magnetizing field hence P had a higher magnetic strength in a shorter time than Q. Takes a <u>shorter time to get saturated</u></p>	(1 mark) (2 marks)
5.	<p>It is a point on the <u>principal axis</u> where rays parallel and close to the <u>principal axis</u> appear to diverge from after reflection</p>	(1 mark)

Arrow and Angle of 30° or 60° shown on the diagram.

The electroscope discharges or negative charges or No charge on the leaf * write

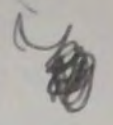
if flash for cameras, car indicators. Deny storing charges. Reducing sparking at contacts.

Allow dipoles/domains

or paraxial rays.



Award for both correct fields



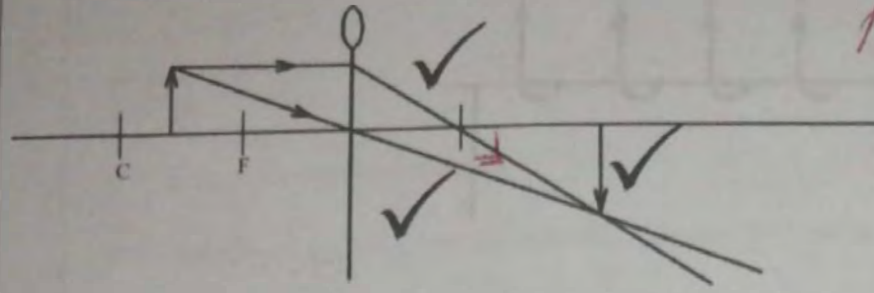
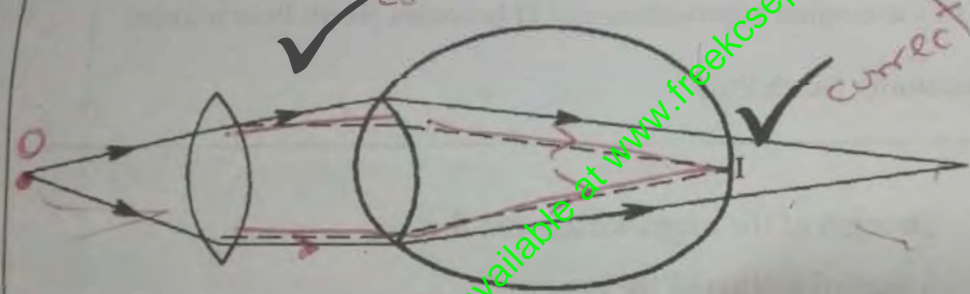
6.		<p>(2 marks)</p> <p>Marking points -</p> <ul style="list-style-type: none"> - Fields from N to S - Field for conductor - At least two field lines above the conductor but closer at the top and further below. <p>The force is not necessary</p>
7.	<p>Loud sound is heard at Q. Sound from A and B are in phase hence interfere constructively since they arrive at Q at the same time.</p>	<p>(3 marks)</p> <p>Tied</p> <p>3 path difference = 0</p>
8.	<ul style="list-style-type: none"> - Temperature - density <p>(any one correct)</p>	<p>(1 mark)</p> <p>Any one</p>
9.		<p>(2 marks)</p> <p>In case angle is shown, it correct to 30</p> <p>must be</p>
10.	<p>Higher current leads to higher temperature hence more electrons are produced. Thus more cathode rays are produced. Thus more cathode rays</p>	<p>(2 marks)</p> <p>more electrons gain K.E. to break off</p>

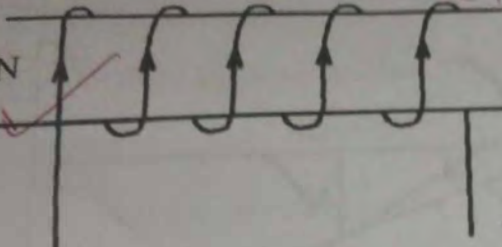
Constructive interference

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Wrong formula is allowed when the sub is correct.

11.	$Q = It$ $= 2 \times 2.5 \times 60$ $= 300 \text{ C}$	(3 marks)
12.	a) Milliammeter deflects more b) More light increases number of photons hence more photo-electrons	or ammeter reading increases (1 mark) (1 mark)
13.	- Varying range of wavelengths - Longer wavelengths can be reflected round hills - Can be deflected easily by obstacles. - Easily reflected - Have longer wavelengths hence less energy hence less harm	The absence of the formula is implied by substitution. * even small C is allowed. (1 mark) (Any one) Don't longer
SECTION B: 55 MARKS		
14.	a) Conductivity increases. increase in temperature, increases the kinetic energy of the electrons hence electrons are able to cross the valence band into the conduction band	(2 marks)
	b) (i) OA - Resistance is constant. (ii) AB - Resistance increases with current due to heating effect of current.	electrons gaining enough energy jump conduct band No option. (1 mark) (2 marks)
	(c) Voltage per lamp = $\frac{240}{20}$ $= 12\text{V}$	(2 marks)
	(d) (i) $\frac{0.5}{2} = 0.25\text{A}$ (identical lamps) $A_2 = A_3$	(1 mark)
	(ii) Bulbs are identical or have same resistance hence they share the current through A_1 equally	(2 marks)

15.	<p>a) To magnify the image formed by the objective lens ✓</p>	(1 mark)
	<p>(b) - object between f and $2f$ - any two rays correctly drawn to show a magnified inverted real image.</p> 	(3 marks)
	<p>(c) (i) Long sightedness ✓ <i>Hypermetropia</i> (ii) Convex lens ✓ <i>converging lens</i> (iii)</p> 	<p>(1 mark) (1 mark) (2 marks)</p> <p><i>Award one mark for the image.</i></p> <p><i>correct rays. The candidate must use the same object.</i></p>
	<p>(d) (i) Mark X at the point where U and $V=20$ cm (ii) (I) when $U=V$ the object is at C $\therefore r = 20$ cm (II) $f = \frac{r}{2} = \frac{20}{2} = 10$ cm</p>	<p>(1 mark) (2 mark) (1 mark)</p> <p><i>Award on graph.</i></p>

16	a) The magnitude of the induced e.m.f is directly proportional to the rate of change of the magnetic flux linkage	(1 mark)
	<i>Whenever there's a change in magnetic flux associated with a conductor, an emf is</i>	
	(b) (i) induced whose magnitude is directly proportional to the rate of change of magnetic flux linkage.	(1 mark)
		
	(ii) North Pole at D	(1 mark)
	<i>Capital N or north pole as on the diagram</i>	
	(iii) From the Lenz's law the induced current flows in the direction such that it opposes the change causing it. Therefore, as the north pole of the magnet approaches, end D becomes North Pole to repel the incoming North Pole	(2 marks)
	(iv) <ul style="list-style-type: none"> - Strength of the magnet/magnetic flux - Speed of motion of the magnet 	(2 marks)
	(c) Lamination increases the resistance of the core hence resistance to the flow of eddy current. This reduces heating effect thus efficiency increases	(2 marks)

17	<p>a) By melting when current that exceeds the fuse rating flows hence switching off the device <i>or disconnecting the device.</i></p>	(2 marks)
	<p>b) <u>To minimize power loss</u> : high voltages leads to small output <i>or energy loss or loss</i> current thus less resistance and low heating effect on the cables since</p> $P = I^2 R$ <p>c) (i) P is a step-up transformer. <i>Since</i></p> <p>(ii) $N_s > N_p$ hence a greater magnetic flux linkage that induces greater e.m.f. <i>Then $V_s > V_p$ since the induced e.m.f is \propto to number of turns, voltage is higher.</i></p> <p>(iii) To keep it at zero potential (keep it neutral).</p> <p>d) $V_p I_p = V_s I_s$</p> $I_s = \frac{11000 \times 1}{160,000}$ $= 0.069 \text{ A}$ <p><i>At least 2dp. Unit</i></p>	<p>(3 marks)</p> <p>(1 mark)</p> <p>(3 marks)</p> <p>(1 mark)</p> <p>(3 marks)</p>
18	<p>a) i) A shadow is formed: cathode rays travel in a straight line</p> <p>(ii) The speed of the cathode rays increases <i>or velocity $\propto E$ or just</i></p>	<p>(2 marks)</p> <p>(1 mark)</p>
	<p>b) More x-rays are absorbed by the bones hence less exposure to the plates/film. However, the x-rays passes through the fractures with little absorption hence more exposure to the plates/film. Thus images of the fractures are formed.</p>	(2 marks)

$$\frac{N_s}{N_p} = \frac{V_s}{V_p}$$

Since $N_s > N_p$ then $V_s > V_p$

072

	c) (i) Ammeter deflects/shows a reading ✓	(1 mark)
	(ii) Reading decreases ^{increases} as the jockey is moved from point P to Q to R and then to S ^{gradually (positive voltage)}	(1 mark)
d	(i) As the applied voltage (Negative voltage ^{positive voltage}) increases, more and more ejected electrons are attracted back to the cathode ^{anode} hence Ammeter reading decreases ^{increases} since little ^{more} current flows	(2 marks)
(e)	The oil is mixed with a radio-active substance (radiation) at the source. At the leakage point the mixture seeps out and a ^{records a higher reading/radiation.} radioactive detector is used to locate the point. ✓	(2 marks)