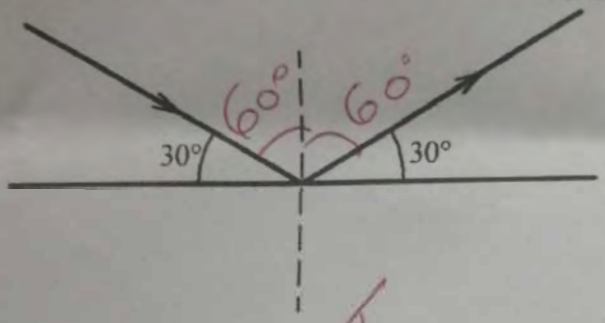
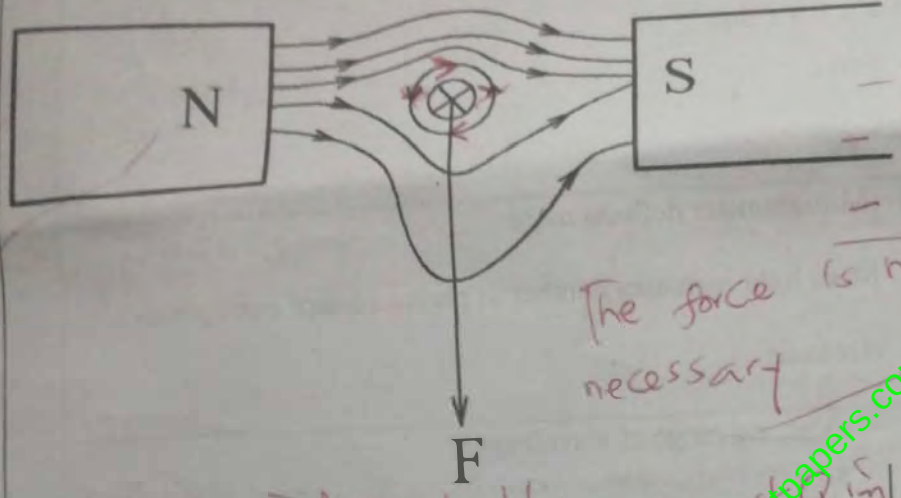
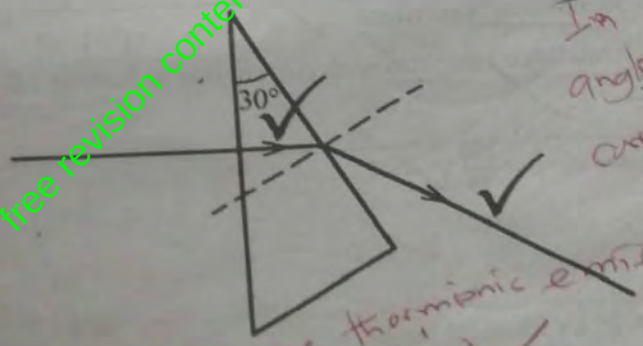
232/2 MS

SECTION A: (25 marks)

1.		(1 mark)
2.	a) The electroscope is earthed thus the electrons flow from the leaf to the earth. This reduces the force of repulsion between the leaf and the plate to zero hence the leaf falls.	(3 marks)
3.	– Smoothing circuits – Tuning circuits – Delay circuits (any one)	(1 mark)
4.	a) P b) Dipoles in 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 shorter time to get saturated	(1 mark) (2 marks)
5.	It is a point on the principal axis where rays parallel and close to the principal axis appear to diverge from after reflection	(1 mark)

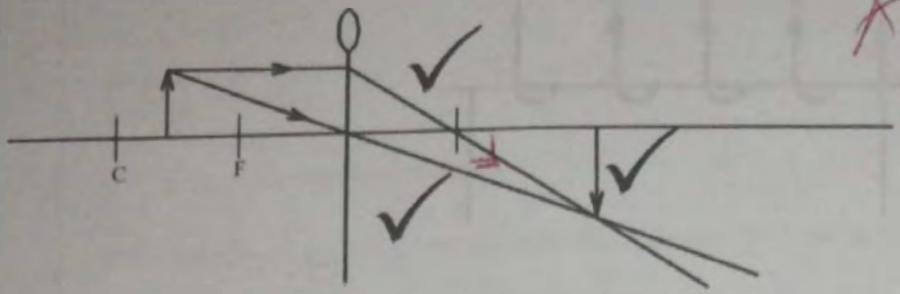
6.		(2 marks)
7.	Loud sound is heard at Q: Sound from A and B are in phase hence interfere constructively since they arrive at Q at the same time.	(3 marks)
8.	- Temperature - density (any one correct)	(1 mark)
9.		(2 marks)
10.	Higher current leads to higher temperature hence more electrons are produced. Thus more cathode rays	(2 marks)

11.	$Q = It$ ✓1 $= 2 \times 2.5 \times 60$ ✓1 $= 300\ C$ ✓1	(3 marks)
12.	a) Milliammeter deflects more b) More light increases number of photons hence more photo-electrons	(1 mark) (1 mark)
13.	- Varying range of wavelengths - Longer wavelengths can be reflected round hills	(1 mark) (Any one)
	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 ✓	(1 mark) (2 marks)
	(c) Voltage per lamp $= \frac{240}{20}$ ✓1 $= 12V$ ✓1	(2 marks)
	(d) (i) $\frac{0.5}{2} = 0.25A$ (identical lamps) ✓1 $A_2 = A_3$	(1 mark)
	(ii) Bulbs ~~are identical or~~ have same resistance hence they share the current through A_1 equally ✓1	(2 marks)

15. a) To magnify the image formed by the objective lens ✓ 1 (1 mark)

(b) – object between F and 2F (3 marks)

– any two rays correctly drawn to show a magnified inverted real image.

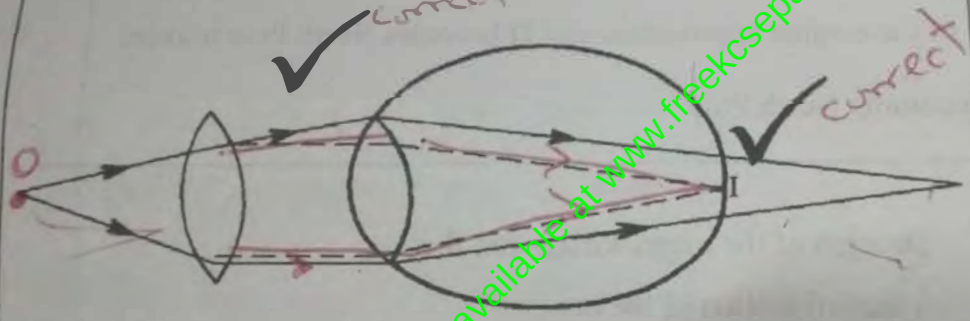


Award one mark for the image.

(c) (i) Long sightedness ✓ Hypermetropia (1 mark)

(ii) Convex lens ✓ "converging lense (1 mark)

(iii) (2 marks)



correct lense

correct rays.

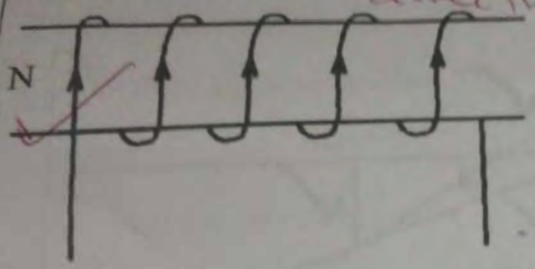
The candidate must use the same object.

(d) (i) Mark X at the point where U and V=20 cm Award on the graph. (1 mark)

(ii) (I) when U=V the object is at C (2 mark)

$\therefore r = 20\ cm$

(II) $f = \frac{r}{2} = \frac{20}{2} = 10cm$ (1 mark)

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)
	(b) (i) 	(1 mark)
	(ii) North Pole at D	(1 mark)
	(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) – 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	a) By melting when current that exceeds the fuse rating flows hence switching off the device	(2 marks)
	b) To minimize power loss : high voltages leads to small output current thus less resistance and low heating effect on the cables since $P = I^2R$	(3 marks)
	c) (i) P is a step – up transformer.	(1 mark)
	(ii) $N_s > N_P$ hence a greater magnetic flux linkage that induces greater e.m.f	(3 marks)
	(iii) To keep it at zero potential (keep it neutral)	(1 mark)
	d) $V_P I_P = V_S I_S$ $I_S = \frac{11000\ X\ 1}{160,000}$ $= 0.069A$	(3 marks)
18	a) (i) A shadow is formed: cathode rays travel in a straight line	(2 marks)
	(ii) The speed of the cathode rays increases	(1 mark)
	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.	(2 marks)

	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 the to S gradually (positive voltage)	(1 mark)
d	~~(iii)~~ As the applied voltage (~~Negative 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)	~~OR~~ The oil is mixed with a radio-active substance (radiation) at the source. At the leakage point ~~the mixture seeps out and~~ a radioactive detector ~~is used to locate the point.~~ records a higher reading/radiation.	(2 marks)