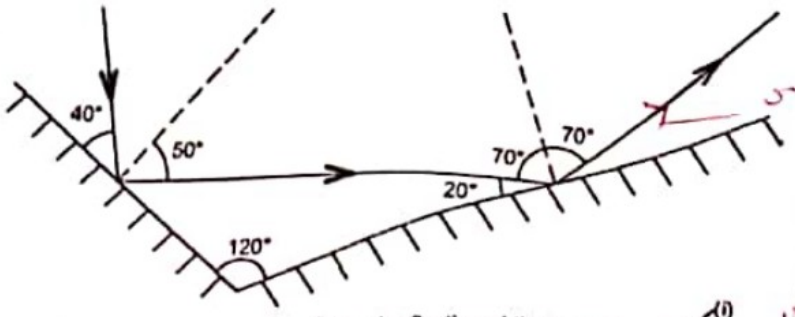
SECTION A (25 marks)

1.	 Correct reflection at the two mirrors ✓ (i) Angle of reflection =70° ✓ (i) Correct reflections at the two mirrors. ✓ Angle of reflection = 70° ✓	(2 marks)
2.	An uncharged body will also cause a decrease on the divergence of the leaf. **OR** Both positively charged body and an uncharged body cause a decrease in divergence.	(1 mark)
3.	- Do not cross one another. - They are complete loops. - Direction of field is from North to South. - They are normal to the surface at the poles. **Any two ✓**	(2 marks)

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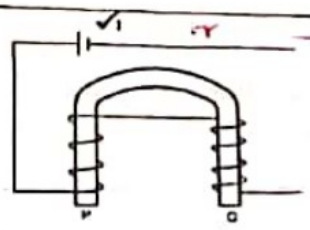
4.		(1 mark)
	(b) - Increasing the number of turns in the coil. ✓ - Increasing the current (or number of cells). ✓	(2 marks)
5.	Increasing speed increases the frequency of the sound ✓ causing an increase in the pitch (higher pitch). ✓	(2 marks)
6.	Polarization occurs. ✓	(1 mark)
7.	$I = \frac{V}{R} = \frac{1.5}{2+0.5} = 0.6A$ ✓	(3 marks)
8.	- To sterilize medical equipment ✓ - To kill cancerous cells and malignant growths in the body. ✓	(2 marks)
9.	During the first half cycle of the input signal, current flows in the first diode, ✓ During the second half cycle of the input signal, current flows in the second diode, ✓ When the currents through the two diodes are combined a fully rectified wave signal is obtained as the output signal. ✓	(3 marks)
10.	By increasing the heating current in order to produce more electrons. ✓	(1 mark)
11.	- Fuse in the neutral wire ✓ instead of the live wire. - Switch to lamp on the neutral ✓wire instead of live wire. - Connection of lamp B on Live wires only.	(2 marks)

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$^{4}_{2}He$ x deny.

Helium atom x
Helium alone - deny.

12.	Alpha particle. ✓ / Helium nucleus / Helium ion /	(1 mark)
13.	Shows the object as being further than it actually is. ✓ / forms / produces diminished images / smaller	(1 mark)
14.	Infrared ✓ / IR	(1 mark)

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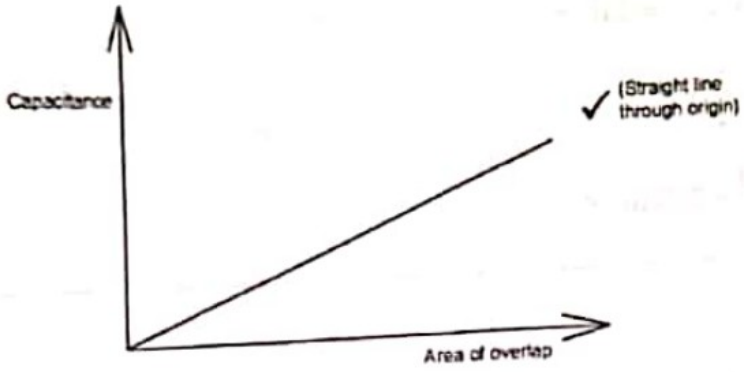
SECTION B (55 Marks)

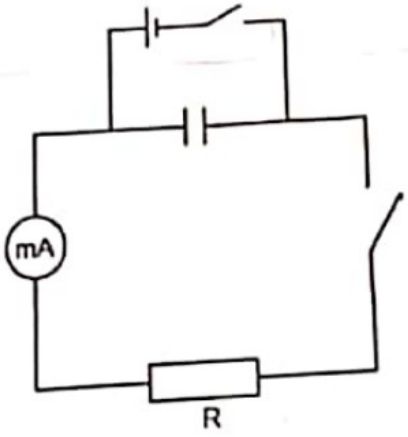
15. (a)



✓ (Straight line through origin)

(1 mark)

(b) (i)



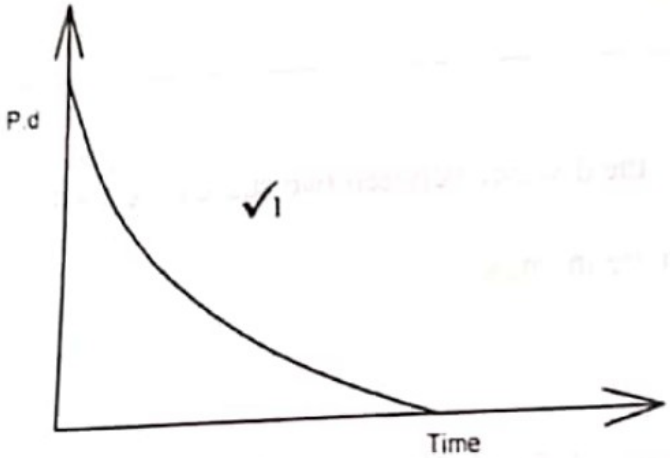
Milliammeter and resistor ✓

Cell and switch ✓

(1 mark)

(1 mark)

(ii)



✓1

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(c)	(i) $C_{parallel} = 2+3 = 5\mu F$ ✓ $\frac{1}{C_s} = \frac{1}{5} + \frac{1}{4}$ ✓ $C_T = \frac{20}{9} = 2.22\mu F$ ✓	or $\frac{5\times4}{5+4} = 2.22\mu F$ ✓✓ $\frac{1}{C} = \frac{1}{5} + \frac{1}{4}$ ✓	(3 marks)
	(ii) $Q = CV$ $= 2.22\times10^{-6}\times6$ ✓ $= 1.332\times10^{-5}C$ ✓	Allow for E.T	(2 marks)
	(iii) $V = \frac{Q}{C}$ $= \frac{1.33\times10^{-5}}{4\times10^{-6}}$ ✓ $= 3.33V$ ✓	$V_p = \frac{1.332\times10^{-5}}{5\times10^{-6}} = 2.664$ $6 - 2.664 = 3.336V$	(2 marks)
16. (a)	(i) Amplitude is the maximum displacement of a particle from ✓ the mean position.		(1 mark)
	(ii) Wavelength is the distance between two successive points in a wave ✓ which are in phase. **OR** Distance between two successive crests or troughs in a transverse wave/between rarefaction or compressions in a longitudinal wave. distance between successive particles in		(1 mark)

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(b) (i)

(3 marks)

(ii)

(I) Wavelength = $\frac{\text{distance}}{\text{number of waves}}$

$= \frac{15}{4}$ ✓

$= 3.75\text{cm}$ ✓

(II) $f = \frac{v}{\lambda}$

$= \frac{40}{3.75}$ ✓

$= 10.67\text{Hz}$

(2 marks)

(2 marks)

(c) (i) (I) - due to constructive interference ✓

(II) – due to destructive interference ✓

(2 marks)

(ii) The fringes get closer ✓

OR

When the frequency is higher the wavelength reduces ✓ hence the fringe separation decreases.

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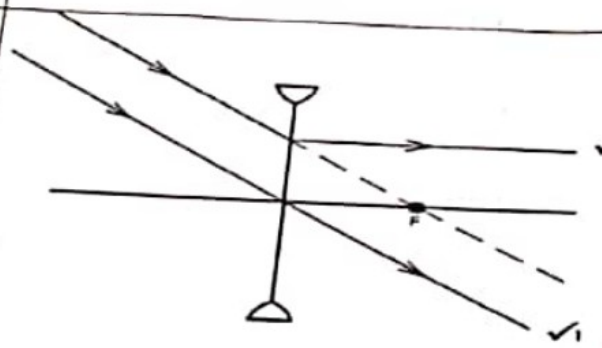
48% but allow E.T.

17. (a)	(i) Critical angle = 42° ✓since the angle of refraction is 90°.	(1 mark)
	(ii) $\text{Sin } c = \frac{1}{n}$ $n = \frac{1}{\sin 42°}$ ✓ $= 1.495$ ✓	(2 marks)
(b)	Refractive index = $\frac{\text{real depth}}{\text{apparent depth}}$ ✓ $\therefore$ apparent depth = $\frac{15}{1.32}$ ✓ $= 11.36\text{cm}$ ✓	(3 marks)
(c)	 ✓1 ✓1	(2 marks)
(d)	(i) - Eye has a variable focal length while the focal length of camera lens is fixed. / Image distance from the lens is almost ✓constant in the eye while in a camera it can be varied. ✓ - Eye views multiple images while the camera takes only one photograph at a time. **(Any two correct @ 1 mark each)**	(2 marks)
	(ii) Ciliary muscles. ✓	(1 mark)

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18. (a)	Place the bar magnet inside a solenoid placed in an East, West direction then pass an alternating current through the solenoid ✓ withdraw the magnet slowly from the solenoid while the a.c is still passing ✓	(2 marks)
(b)	- Suspend each of the bars through its centre of gravity and set it swinging in a horizontal plane about a vertical axis through its centre. ✓ - The magnetized bar will always come to rest in a north-south direction. ✓	(2 marks)
(c)	(i) The galvanometer pointer first deflects then moves back ✓ when the switch is closed a current builds up in coil X and due to change in flux linkage an emf is induced ✓ in coil Y making an induced current flow through the galvanometer during the time current in coil X is rising. When current through coil X is steady no induced current flows through the galvanometer since there is no change in flux ✓ linkage. Therefore pointer deflects back. ✓	(4 marks)
	(ii) Pointer deflects in the opposite direction ✓ (iii) Magnitude of deflection increases. ✓	(1 mark) (1 mark)

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19. (a)	Half life is the time taken for half the number of nuclides initially present in a sample to decay. ✓		(1 mark)
(b)	(i)	Expansion cloud chamber	(1 mark)
	(ii)	Due to collisions between the radiations from the radiation source and the air molecules.	(1 mark)
	(iii)	When the piston is pulled down air expands hence cools ✓ The ions form nuclei for condensation upon cooling on ✓ which the saturated alcohol vapour condenses ✓	(3 marks)
(c)	(i)	- The work function of the metal. ✓ - Energy of incident radiation frequency/wavelength. ✓	(2 marks)
	(ii) I	Energy $= ev = 1.6\times10^{-19}\times2.21$ $= 3.54\times10^{-19}$ J ✓	(1 mark)
	II	$E = hf$ $f = \frac{E}{h}$ $= \frac{3.54\times10^{-19}}{6.63\times10^{-34}}$ ✓ $= 5.33\times10^{14}$ Hz ✓	(2 marks)

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