10.2 Physics Paper 2 (232/2)
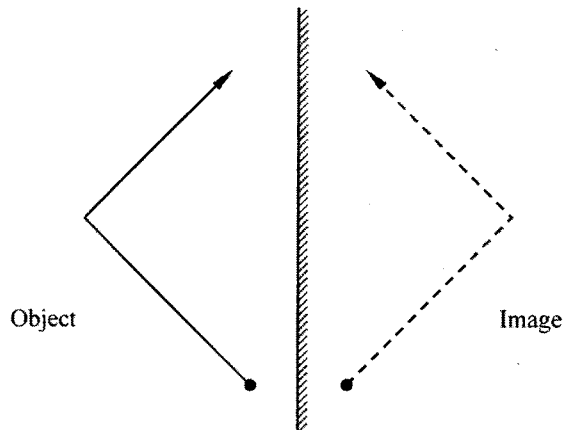
1.

Figure 1

Figure 1
Image (lateral inversion);   (1 mark)
(accept full line)
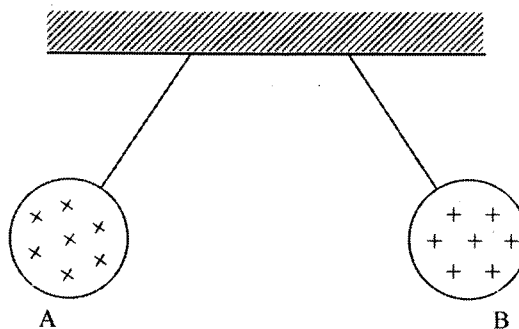
2.

Figure 2

Pithballs repelling   (1 mark)

3.   Mica raises capacitance; hence lower potential difference; since $V = Q/C$ but Q is constant.

4.   A   =   Carbon rod (+);   (1 mark)
       B   =   Manganese (VI) oxide   (1 mark)

5.   Manganese (IV) oxide is a depolarizer/oxiding agent;   (1 mark)

6.   Hammering causes domains/domains to vibrate;
       As they settle, some face North South due to earth's magnetic field;

                                                                                                      (2 mark)

7.   When S is closed, current flows in solenoid magnetizing the iron core; this attracts the iron
       armature closing the contacts; this causes current to flow in the motor circuit;
       Motor keeps running continuously;   (3 marks)

8. Steel would remain permanently magnetized causing current in mortor circuit to remain (
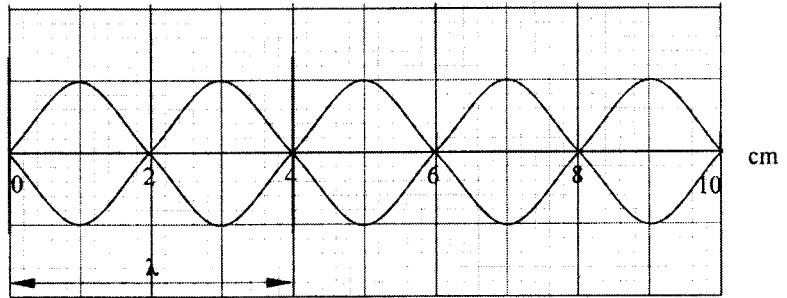when S is open. (2

9. (a)

Figure 3   Any two correct vertical lines

(1

(b) $2.5\lambda = 10 \times 5$
       $\lambda = 20$ cm;   (1

10.

Figure 4

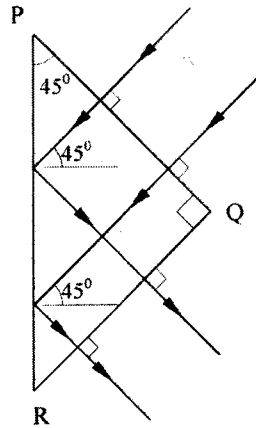Figure 4   (3

11.

$$P = \frac{V^2}{R}$$
$$= \frac{6 \times 6}{4}$$
$$= \frac{36}{4} = 9W$$

(2

12.   Radiowaves   Microwaves   Yellow light   Gamma rays;
                                                                                            (1

13.   High voltage leads to low current hence low power (I^2R) losses;   (1

14.   The minimum frequency of an incident radiation to cause emission of photo electrons.
                                                                                            (1

SECTION B

15. (a)

    (i)   Does not obey ohm's law;.   (1 mark)

          Graph is non-linear i.e. current is not directly proportional to p.d.;   (1 mark)

    (ii)   at $I = 1.5A$

$$R = \text{gradient of tangent at } I$$

$$= \frac{9.2 - 4.8}{3.6 - 0.1}$$

$$= \frac{4.4}{3.5}$$

$$= 1.26\Omega \pm 0.1 ;$$

(2 marks)

        at $I = 3.5A$

$$R = \text{gradient of tangent at } I$$

$$= \frac{9.4 - 7.2}{5.4 - 1.5}$$

$$= \frac{2.2}{3.9}$$

$$= 0.56\Omega \pm 0.1 ;$$

(2 marks)

    (iii)   R decreases as I increases;   (1 mark)

    (iv)   Change (increase) in temperature;   (1 mark)

(b)   (i) $V_{total} = 1.6 + 1.6 + 1.6 = 4.8V = E;$ (1 mark)
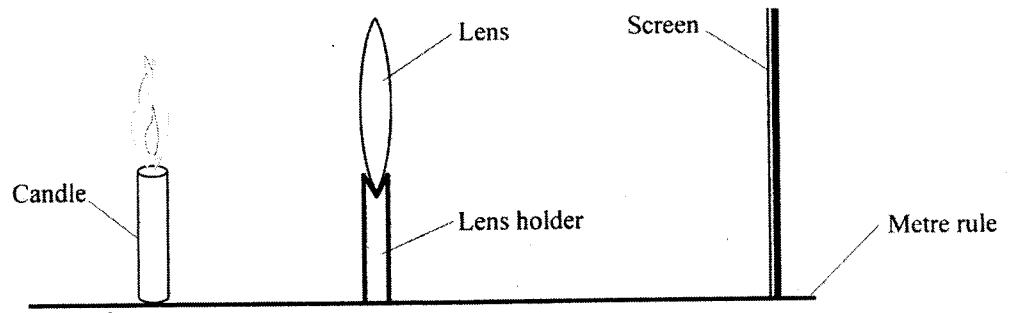
    (ii)   Let r to be the combined internal resistance

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

               $4.8 = 0.32(11.4 + r);$

        for one cell, $r = \dfrac{15 - 11.4}{3}$

$$= 1.2\Omega$$

(3 marks)

16. (a)   The point at which rays close to and parallel to the principal axis converge or seem to diverge from after striking the lens;   (1 mark)

    (b)   (i)

(ii)   Candle is placed at a certain distance from the lens. The distance between the screen and the lens is adjusted until a sharp image is focused on screen.

(iii)   The distance of candle from lens (U) is measured;
The distance of screen from lens (V) is also measured;

(3 marks)

(iv)   The values of U and V are substituted in the equation

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$$

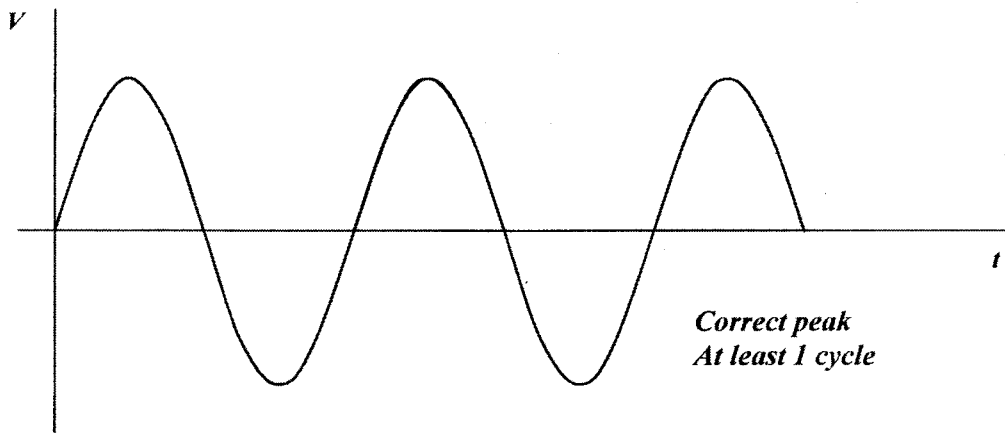f is then computed as $f = \frac{uv}{u+v}$

(2 marks)

(b)

$$\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$$

$$\frac{1}{v} = \frac{1}{-20} - \frac{1}{30}$$

$$\frac{1}{v} = \frac{-3-2}{60}$$

$$\frac{1}{v} = \frac{-5}{60}$$

$$v = -12$$

$$M = \frac{v}{u}$$

$$= \frac{-12}{30}$$

$$= 0.4$$

(4 marks)

17.   (a)   The production of induced e.m.f when the magnetic flux linking a circuit is changed;

(1 mark)

(b)   (i)   P - brushes

Q - slip rings

(ii)

Correct peak
At least 1 cycle

(1 mark)

(iii) Increasing number of turns/coils;
Increasing speed of rotation;
Increasing strength of field;
Winding the coil on soft iron core.   Any two correct

(2 marks)

(c)   (i)   Vs = 200 x 0.5
            = 100V;

(1 mark)

(ii) $\dfrac{N_p}{N_s} = \dfrac{V_p}{V_s}$

$V_p = \dfrac{100}{10} \times 1 = 10V$

(2 marks)

(iii) $\dfrac{V_p}{V_s} = \dfrac{I_s}{I_p}$

$\dfrac{10}{100} = \dfrac{0.5}{I_p}$

$I_p = \dfrac{0.5 \times 100}{10}$

$I_p = 5A$

(2 marks)

18.   (a)   -Cathode rays have charge but e.m radiations don't have charge;
            -Cathode rays are particles and have a mass but e.m radiations are waves;
            -Cathode rays travel at a speed depending on the accelerating voltage but e.m radiations
             travel at the speed of light in vacuum;
            - Different in the mode of production.

(any two correct) (2 marks)

(b)   (i)   M - grid;

            N - accelerating anode/anode/vacuum;

(2 marks)

(ii) Cathode is heated by filament;
electrons are released from cathode;
by thermionic emission

(2 marks)

(iii) (I) across Y-Y plates.
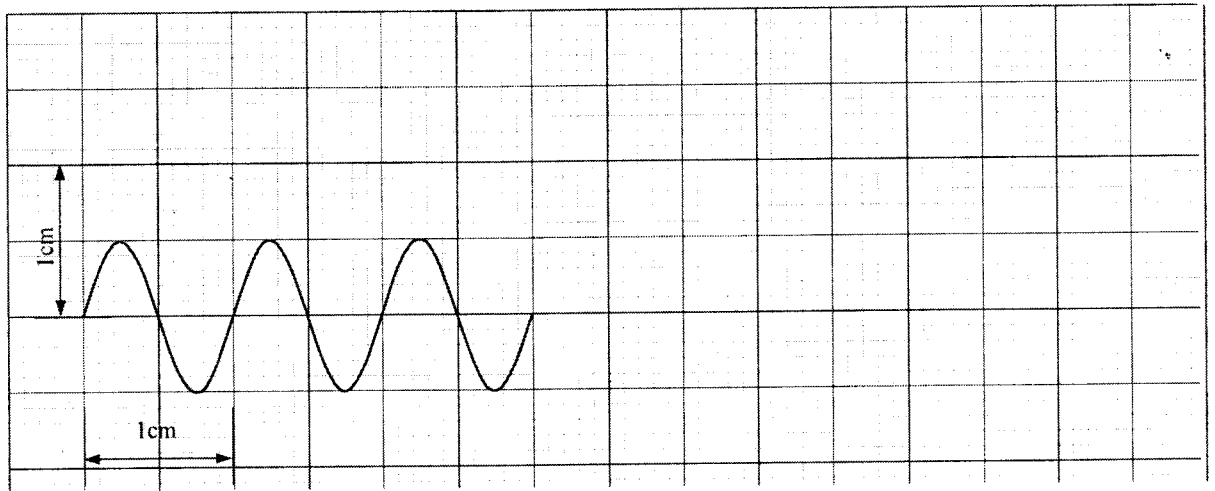
(II) across X-X plates.

(2 marks)

(iv) to reduce collisions, (hence ionization) with air molecules in the tube.

(1 mark)

(c) (i) peak-to-peak voltage = 5 x 2
= 10v

(ii)

19. (a) α - radiation;
short range with intense ionization hence thick tracks;

(2 marks)

(b) No. of half-lifes $= \frac{19.15}{3.83} = 5$

Activity

Days	0 0	1 3.83	2 7.66	3 11.49	4 15.32	5 19.15
Activity	1.6 x 10³	8 x 10²	4 x 10²	2 x 10²	1 x 10²	0.5 x 10²

Activity   = 0.5 x 10²
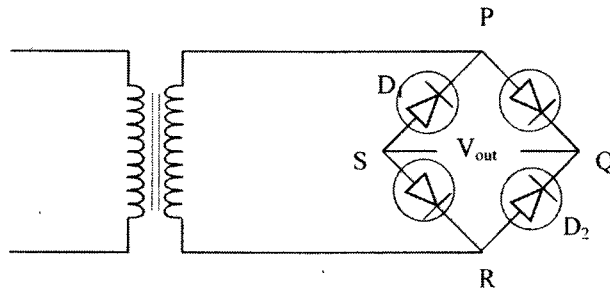= 50 disintegrations per second

(2 marks)

(c) A semiconductor in which impurities have been added to change conductivity.

(1 mark)

(d) By connecting it in forward biased mode (i.e. P to + and n to -)

(1 mark)

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(e)

      (i)   Correct diode direction;   (2 marks)
      (ii)   Across QS;   (1 mark)

10.3   Physics Paper 3 (232/3)

1.   Part A

(a)   Eo   =   3.0 ±   0.2V   (1 mark)

(d)   Table 1

AO= Bo = Xcm	25	30	35	40	45	50
p.d √ (V)	0.58	0.66	0.74	0.80	0.90	0.92
$\frac{1}{x}$ (Cm^{-1})	0.04	0.033	0.029	0.025	0.022	0.02
$\frac{1}{v}$ (V^{-1})	1.72	1.52	1.35	1.25	1.11	1.10

for V $\frac{1}{2}$ mark for each correct value   -   (3 marks)

$\frac{1}{x}$ 1 mark for at least 4 correct values   -   (1 mark)

$\frac{1}{v}$ 1 mark for at least 4 correct values   -   (1 mark)

(e)   graph (see attached)
        -      axes labelled + units   -   (1 mark)
        -      suitable scale   -   (1 mark)
        -      points plotted $\frac{1}{2}$ mark for 4 points   -   (2 marks)
        -      straight line   -   (1 mark)

(f)   Slope - correct interval $\frac{\Delta y}{\Delta x}$ (1 mark)

        correct evaluation   (1 mark)
        S = 34±3   (1 mark)

(g)   h correctly evaluated from $\dfrac{8}{E_o S}$

       substituting   (1 mark)

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evaluating (1 mark)

1 PART B

    (i)   OM and ON shown on outline. (1 mark)

$$\angle M\ddot{O}N = 2A = 144\frac{1}{2}$$

    (ii)   q correctly evaluated (1 mark)

Total (19 marks)

2. PART A

    (a) $M_1 = 53.5$g (1 mark)
    (b) $M_2 = 73.0$g (1 mark)
    (c)   Correct mass liquid L = 19.5 g. (1 mark)
          density = evaluate from candidates values of M_1 and M_2

PART B

    (f)   Table 2

Time in minutes	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
Temperature of W(¼C)	80	79	77.5	76	75	74	72.5	71	70	69
Temperature of L(¼C)	80	76	75	72	70	68	66	64.5	62.5	61.

5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
68	67	66	65	64.5	63.5	62.5	61.5	61	60	
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Correct temperatures of distilled water

      6 points x (3 marks)
       5 to 9 points (1 mark)
Correct temperatures of L
      8 and more (3 marks)
      4 to 7 points (1 mark)

    (h)   Graphs (see attached graphs)

        (i) -   axis labelled + units (1 mark)
           -      appropriate scale
           -      points plotted correctly
                      6 correct points (2 marks)
                      3- 5 correct points (1 mark)
           -      smooth curve (1 mark)

        (ii) -   points plotted correctly

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		- 6 correct points	*(2 marks)*

		- 3 - 5 correct points	(1 mark)
	-	smooth curve points	(1 mark)

(i)   (i)   (value obtained from the graph   (1 mark)

            (value obtained from the graph

                                                        (1 mark)

(j) $r = \dfrac{4.2 \times 2.5}{0.78 \times 4.5}$ correct evaluation   (1 mark)

            r = 3.0 ± 0.1   (1 mark)

                                            Total   (20 marks)