231/2

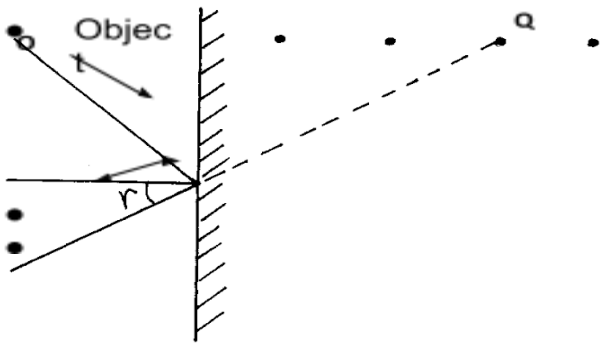
Physics paper 2

FORM 4

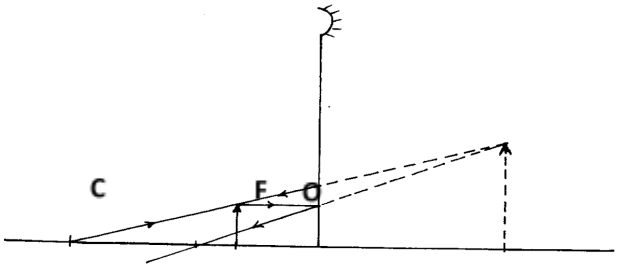
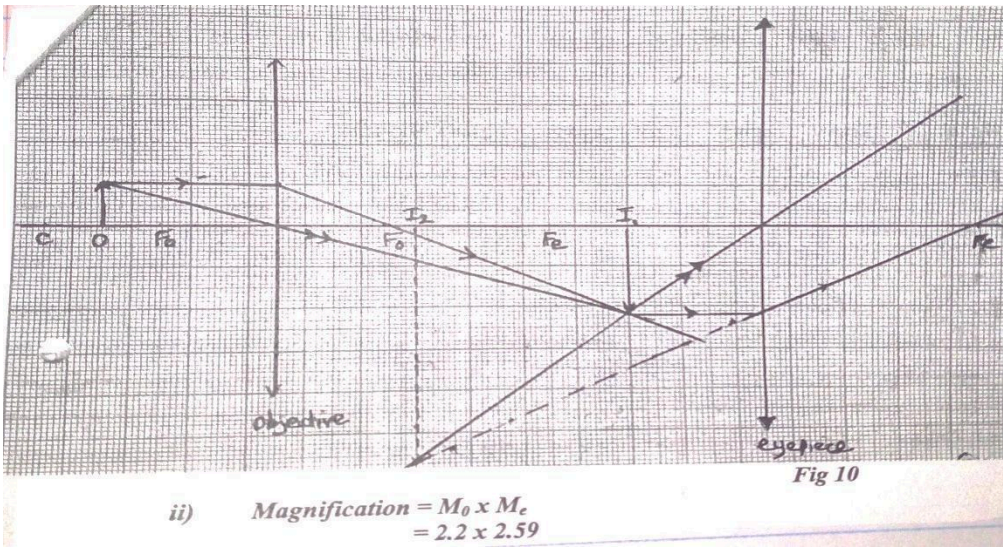
MID TERM II 2020

TIME: 2HRS

Marking Scheme

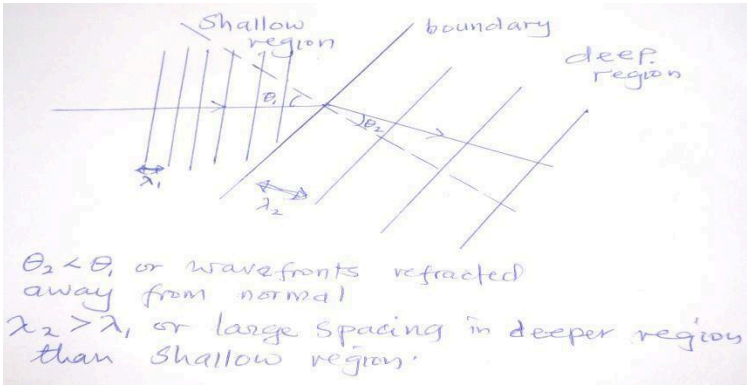
1.	Section A. 1.  ***2mrks***	
2.	Speed of sound $=\frac{2\times distance}{time}$ depth = 1450x 0.20/2 =145 m	
3.	**B**.√ Loses its magnetism faster thereby becoming weaker hence attracting fewer iron filings√ ***(2mrks***	
4.	Leaf initially falls due to negative charges neutralizing the positive charges. Excess negative charges on the cap are repelled towards the leaf and the stem of the electroscope, causing the leaf to rise.	

5. (a) (b)	Current 1 $\frac{power}{p.d} = \frac{100000}{500\,V} = 20$ Power loss = 1^2 R = 20^2 X 5 = 2000w Power available for factory = 100,000 – 2,000 = 98,000W or 98KW Resistance of cables/supply of high currents.	
6.	Resistors in parallel RT = $\frac{5\,X\,5}{5\,X\,5} = \frac{25}{10} = 2.5\,4\cap = 10A = \cap$ *Resistors in series* $RT = 3.5 + 2.5 + 4\cap = 10\cap$	
7. (b)	By the human skin to synthesize/manufacture vitamin D - In bacteriology to kill harmful organisms - In manufacture of washing powder and paints that fluoresce - To detect forged documents such as cheques and fake currency notes in banks - In burglar alarms - In automatic door openers (any 1 mark) Photographic plates/ films Photocells Light dependant resistors (LDR)	
8.	Photographic plates/ films Photocells Light dependant resistors (LDR)	
9. (i) (ii)	X – south poole Y – noth pole : using Flemings left-hand rule - Increasing current - Strengthening magnetic field - Turns of the coil (any 1 mark)	

10.	Q = it But 1 = 3A and Q = 30Ah 30 = 3 X t t= 10hours	
	Section B	
11. **12** **13** **(b)**	a= 236-4 = 232 b = 72 – 2 = 70 (a) (i) √ Both rays √ Virtual image  (ii) Magnification = image height / 2.8√ = 2.545√ Object height 1.1 NB: Image and object heights must be measured accurately.  Fig 10 ii) Magnification = M_o x M_e = 2.2 x 2.59 Marking of graph Construction rays to for image I (2 marks) Construction to form image 2 (2 marks)	

12.

14 a



$Q_2 < Q_1$ or wavefronts refracted Away from normal

or larger spacing in deep shallow region

(b) i

$4\frac{3}{4}\ \lambda\ = 237.5\ CM$

1 $\lambda = \frac{237.5cm}{4\frac{3}{4}}\ 50.0\ cm$

(ii)

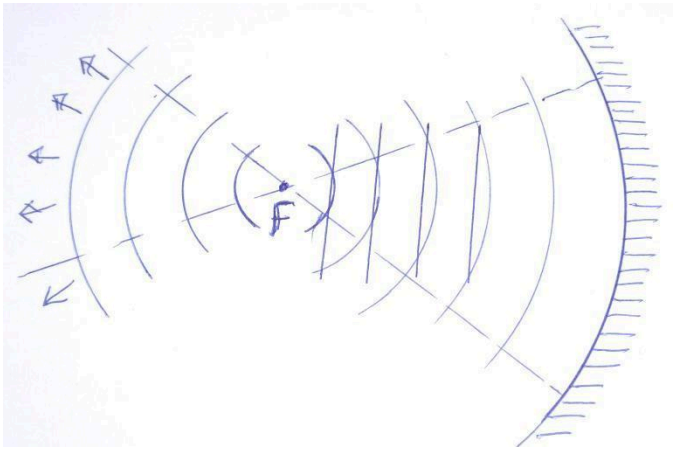
Speed = $\frac{distance}{time} = \frac{224.0\ cm}{2.8} = V = 80.0cm/s$

(iii)

V = f λ

80 = f x 50; f = 1.6Hz

(c)



- Wave length spacing maintained
- Reflected wave fronts takes the shape of the reflector and more towards focal point F

13. a

Q: target/anode

R; concave focusing cathode

(b)	Q – target/anode; tungsten or molybdenum It has a very high melting point (hence not likely to melt due to very high temperatures of the target)	
(c)	R- Concave focusing cathode. To concentrate (focus) the electron beam onto the target/anode	
(d)	Current flows through the filament in the cathode and electrons are produced through thermionic emission. When the electrons at very high speed are suddenly stopped by the target their kinetic energy is transformed into X-rays and heat.	
(e)	To remove air molecules so that the electrons do not lose some of their kinetic energy through collision	
	High density/ its ability to absorb most of the X-rays	
(f)	Harder/more penetrating/higher quality X-rays are produced	
(g)	Intensity/quality of X-rays produced increases	
(ii)		
16(a	The setting free of electrons from a surface of a metal when illuminated/irradiated with radiation of suitable frequency.	
c(i)	Increase in intensity increases the number of emitted photoelectrons (photoelectrons increases)	
	increase in frequency of incident radiation increases the kinetic energy of photoelectrons emitted	
(d) i)	threshold frequency fo = 4.6 X 10^{14} H_z (graph line extended to cut the frequency axis) NB: must be from the graph	
(ii)	$\frac{h}{e} = \frac{\Delta Vs}{\Delta f}$ $\frac{\Delta Vs}{\Delta f} = \frac{1.3-0.65}{(7.8-6.2)\times 10^{14}}$ $\frac{0.65}{1.6\times 10^{14}}$ $= 4.0625\times 10^{-15}$ $h = e \times gradient$ $= 1.6\times 10^{-19}\times 4.0625\ 10^{15}$ $= 6.5\times 10^{-34}\ J_5$	

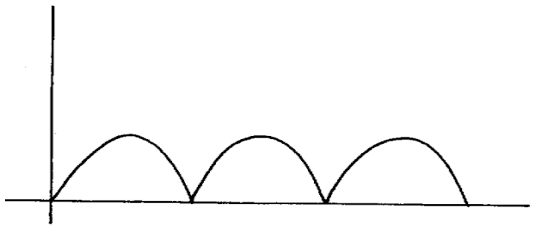
(iii) $work\ functon\ W_0 = hf_o$

$W_o = 6.5 \times 10^{-34} \times 4.6 \times 10^{14}$

$= 2.99 \times 10^{-19} JA = \pi r^2$

17(a)

19. (a)



b)(i) (b) During the first half –cycle D_1 is forward biased while D_2 is reverse biased. Hence , current takes the path A , D_1 RT .√

(ii) During the next half –cycle, D_2 is forward biased while D_1 is reverse biased and the path of the current is BD_2RT.√

20 (c) - Protects a circuit from damage √
- As a switch √ Any 2
- In charging a battery using solar panels.

20i) The galvanometer deflects on one side and then back to zero

ii) A greater deflection will be obtained in the opposite direction as current takes less time to die off than to build up.

Bi) The changing current in the primary coil induces a current in the secondary coil due to charging magnetic field of the primary current.

ii) $\frac{VS}{VP} = \frac{NS}{NP} = VS = \frac{240 \times 200}{1000} = 48V$

iii) $E = \frac{\text{Power output}}{\text{Power input}} \times 100$

$= \frac{48 \times 0.7}{240 \times 0.2} \times 100$

$= 70\%$