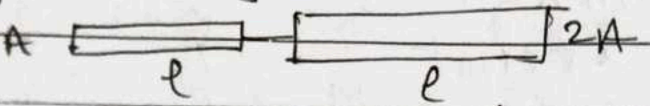
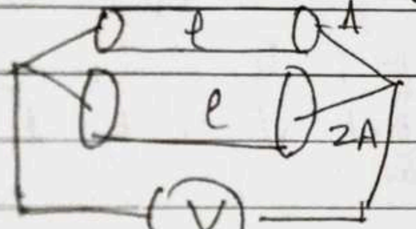
BHARTIYA SHIKSHA BOARD
MARKING SCHEME
SAMPLE QUESTION PAPER 2025-26
CLASS - XII
PHYSICS (150)

Q.No.:	Expected Answer/ Value Points	Marks
(1)	(a) increases Work is done against repulsion.	1
(2)	(a) is always zero $F = +q\vec{E} + -q\vec{E} = 0$	1
(3)	(c) 1:4 $\xrightarrow{I}$ R 2R $I^2Rt : I^2 2Rt$	1
(4)	(a) zero $\tau = iAB\sin\theta$ $\vec{m} \parallel \vec{B}$, $\theta = 0^\circ$ $= 10 \times 1 \times 10^{-4} \times 0.1 \times 0$ $= 0$	
(5)	(a) along the electric field.	(1)
(6)	(a) $5\,\Omega$ $Z = \sqrt{R^2 + X^2}$ $= \sqrt{4^2 + 3^2} = 5\,\Omega$	(1)
(7)	(b) $c = \frac{1}{\sqrt{\mu_0 \varepsilon_0}} = \frac{E_0}{B_0}$ $\Rightarrow \frac{B_0}{E_0} = \sqrt{\mu_0 \varepsilon_0}$ Ans-(b)	(1)
(8)	(c) wave length is halved and freq.-uency is unchanged. as $v = \frac{1}{\sqrt{\varepsilon\mu}} = \frac{1}{\sqrt{\mu_0 \mu_r \varepsilon_0 \varepsilon_r}}$ $v = \frac{1}{\sqrt{\mu_0 \varepsilon_0}} \cdot \frac{1}{\sqrt{\varepsilon_r \mu_r}}$ $v = 3 \times 10^8 \times \frac{1}{\sqrt{4 \times 1}} = \frac{3 \times 10^8}{2}$ $\lambda = \frac{v}{2\nu}$	(1)

Expected Answer/ Value Points	of Marks
(9) (b) 100 cm $\frac{1}{f} = (\mu - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$ $= (1.6-1)\left(\frac{1}{60} - \frac{1}{\infty}\right)$ $\frac{1}{f} = \frac{0.6}{60} = \frac{1}{100} \Rightarrow f = 100\,cm$	(1)
(10) (a) Both increase. $E = h\nu = \frac{hc}{\lambda}$ & $\frac{E}{c} = \frac{h}{\lambda} = p$ (momentum)	(1)
(11) (d) $\frac{1}{\lambda} = R_H\left(\frac{1}{n_f^2} - \frac{1}{n_i^2}\right)$ $R_H\left(1 - \frac{1}{4}\right)$ $\lambda \rightarrow$ in Lyman series U-V rays.	(1)
(12) (c) $\frac{R_1}{R_2} = \left(\frac{A_1}{A_2}\right)^{1/3} = \left(\frac{8}{27}\right)^{1/3} = \frac{2}{3}$	(1)
13. (c) Nuclear force are strong forces.	(1)
14. (d) optical communication is more efficient and all ~~x~~ em waves travel with speed c.	(1)
15. (d) Reduction in speed reduces the wave length not the energy.	(1)
16. (d) diamagnetic atoms do not have any magnetic moment so no question of alignment with temperature.	(1)

Q.No..	Expected Answer/ Value Points	of Marks
17.	for series	
		
	same current - I	$\frac{1}{2}$
	$I = \cancel{n e} A_1 v_{d_1} = \cancel{n e} A_2 v_{d_2}$	
	$v_d \propto \frac{1}{A}$	
	$v_{d_1} : v_{d_2} = A_2 : A_1 = 2:1$	$\frac{1}{2}$
	for parallel	
	V applied voltage is same	
		$\frac{1}{2}$
	$v_d = \frac{eE\tau}{m} = \frac{eV}{ml}\tau$	
	~~$v_d \propto$~~ $v_d \rightarrow$ independent of Area.	$\frac{1}{2}$
	as $e, m, l, V, \tau \rightarrow$ all same	
	$v_{d_1} : v_{d_2} = 1:1$	
	or	
17	No current will pass through $2\mu F$ capacitor when it will be fully charged.	$\frac{1}{2}$
	So $R_{eq} = (2\Omega \parallel 3\Omega) + 2.8\Omega = 4\Omega$	1
	$I = \frac{6}{4} = 1.5$ A	

19. $\beta = \frac{\lambda D}{d}$

$\beta \propto \frac{1}{d}$ $\quad \beta \rightarrow$ decreased

Centre $\rightarrow$ Bright $\rightarrow$ white colour

then 1st dark point at Blue colour

then 1st Bright point for Blue colour — 1

— $\frac{1}{2}$

20. $\lambda = \frac{h}{p} = \frac{h}{\sqrt{2mKE}} = \frac{h}{\sqrt{2mqV}}$ — 1

$$\frac{\lambda_p}{\lambda_\alpha} = \frac{h}{\sqrt{2m_p eV}} \times \frac{\sqrt{2m_\alpha 2eV}}{h}$$

$$= \frac{\sqrt{4m_\alpha}}{\sqrt{2m_p}} = \sqrt{\frac{4 \times 4m_p}{2m_p}} = \frac{2\sqrt{2}}{1}$$

— $\frac{1}{2}$

$$\frac{\lambda_p}{\lambda_\alpha} = \frac{h}{\sqrt{2m_p KE}} \times \frac{\sqrt{2m_\alpha KE}}{h}$$

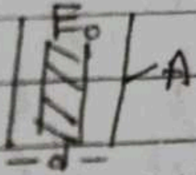
$$= \sqrt{\frac{m_\alpha}{m_p}} = 2:1$$

21 (i) – ve sign mean bound system or attractive force. Energy is required to make the electron free. 1

(ii) first excited state $E_2 = \frac{E_1}{2^2}$ $\frac{1}{2}$

$= \frac{-13.6}{4} = -3.4\ eV$

$\Delta E = -3.4 - (-13.6) = 10.2\ eV$ $\frac{1}{2}$

22 

For ‖ Plate air capacitor

$C = \frac{A\epsilon_0}{d}$ $\frac{1}{2}$

When metal plate of thickness 't' is introduced

PD $V' = E_0(d-t) + 0 \times t$ $\frac{1}{2}+\frac{1}{2}$

as inside the metal $E = 0$

$C' = \frac{q}{V'} = \frac{\sigma A}{E_0(d-t)}$ $\frac{1}{2}$

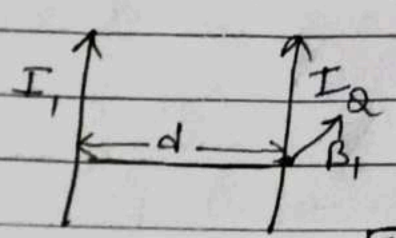
$= \frac{\sigma A \epsilon_0}{\sigma(d-t)} = \frac{A\epsilon_0}{d-t}$

$= \frac{A\epsilon_0}{d(1-\frac{t}{d})} = \frac{C_0}{(1-\frac{t}{d})}$ $\frac{1}{2}$

23 (i) False example - Electric field at the centre of equal like charges zero but Potential $\neq 0$, Electric field inside the charged sphere is zero but Potential $\neq 0$ — $\frac{1}{2}$ for False, 1 mark for any one example

(ii) True - Any equipotential surface. — $\frac{1}{2}+1$

24.



$B_1 = \frac{\mu_0}{4\pi} \frac{2I_1}{d}$ — $\frac{1}{2}$

dir → ⊗ — $\frac{1}{2}$

$F_2 = I_2 l B_1$ — $\frac{1}{2}$

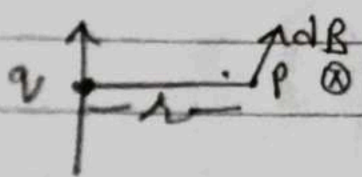
$f_2 = \frac{F_2}{l} = I_2 \times \frac{\mu_0}{4\pi} \times \frac{2I_1}{d}$

$f_2 = \frac{\mu_0}{4\pi} \cdot \frac{2I_1 I_2}{d}$ — $\frac{1}{2}$

dir. Cross product Rule towards I_1 — $\frac{1}{2}$

because of their magnetic fields — $\frac{1}{2}$

25. (i)



magnetic field produced by moving proton at pt. P

Biot-Savart law

$dB = \frac{\mu_0}{4\pi} \cdot \frac{I\,dl \sin\theta}{r^2}$ — $\frac{1}{2}$

$dB = \frac{\mu_0}{4\pi} \cdot \frac{qv}{r^2}$ — $\frac{1}{2}$

direction ⊗

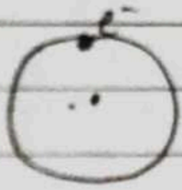
$F = qv(dB)\sin 90^0$

$= qv \times \frac{\mu_0}{4\pi} \frac{qv}{r^2}$ — $\frac{1}{2}$

$$F_m = \frac{\mu_0}{4\pi}\frac{q^2 v^2}{r^2}$$

$$F_e = \frac{1}{4\pi\epsilon_0}\cdot\frac{q^2}{r^2} \qquad \frac{1}{2}$$

(ii)



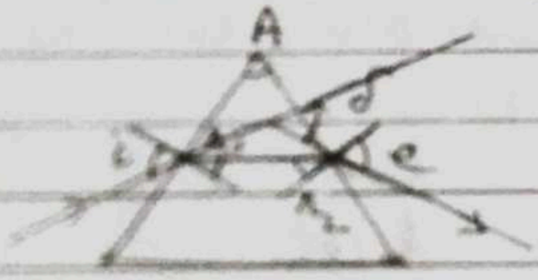
$$I = \frac{e}{T} = \frac{ev}{2\pi r} \qquad \frac{1}{2}$$

$$B = \frac{\mu_0}{4\pi}\cdot\frac{2\pi I}{r}$$

$$= \frac{\mu_0}{4\pi}\cdot\frac{2\pi}{r}\cdot\frac{ev}{2\pi r} \qquad \frac{1}{2}$$

$$= \frac{\mu_0}{4\pi}\frac{ev}{r^2}$$

25



$$i + e = \delta + A$$

$$\delta \to \delta_m$$

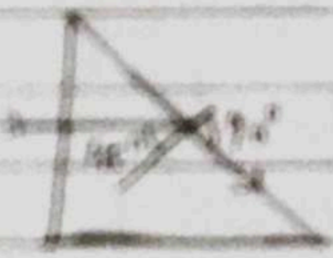
$$i = e$$

Ray diagram (1)

$$i = \frac{\delta_m + A}{2} \qquad (1)$$

$$r_1 = r_2 = \frac{A}{2}$$

$$r = \frac{A}{2}$$



$$\mu = \sqrt{2} = \frac{1}{\sin i_c} \qquad (1)$$

$$\sin i_c = \frac{1}{\sqrt{2}}$$

$$i_c = 45^\circ$$

1170×10

$= 1170 \times 10^{-6}$

$= 1.17 \times 10^{-3}$

$= 1.17$ mm.

$$\frac{n \lambda_1 D}{d} = \frac{m \lambda_2 D}{d} \qquad 1$$

$$\frac{n}{m} = \frac{\lambda_2}{\lambda_1} = \frac{520}{650} = \frac{4}{5}$$

$$\frac{4 \lambda_1 D}{d} = \frac{4}{3} y_3 . \qquad 1$$

$= \frac{4}{3} \times 1.17$

$= 4 \times 0.39$

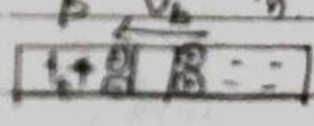
$= 1.46$ mm.

27 Diffusion — due to concentration diff.
in p, n region ½

Drift — Movement of minority carrier
from p → n region ½

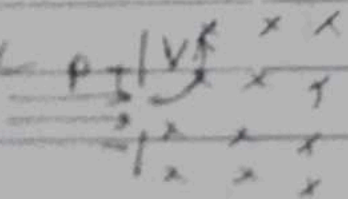
when rate of diffusion ⇌ rate of
drift . ½

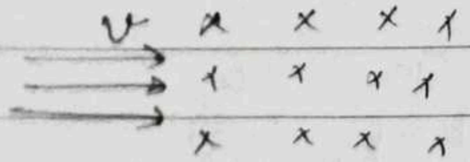
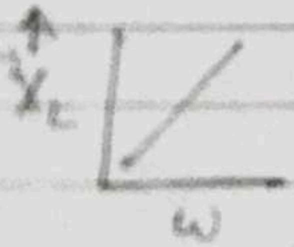
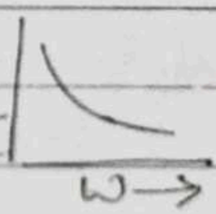
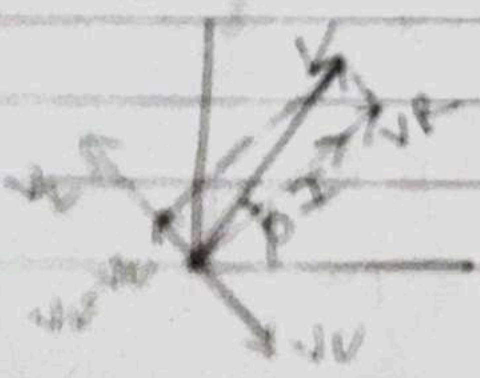
PD from n → p section across
the junction that stops any more
movement of majority charge carrier.



1½

Q.No.	Expected Answer/ Value Points	Marks
28	(a) Intrinsic – $n_i = n_e = n_h$	$\frac{1}{2}$
	No dopping	
	only valance & conduction band with forbidden energy gap	$\frac{1}{2}$
	< 3eV	
	conductivity very low.	
	Extrinsic P type – $n_h >> n_e$	
	Majority charge carriers are hole.	$\frac{1}{2}$
	conductivity – high	
	Just above the valance band a acceptor energy level is formed	$\frac{1}{2}$
	(b) Majority charge carrier increase and the immobile ions increases	1
	width of depletion layer decreases	
	& $E = \frac{V}{d}$ increases	
29	(i)(a) $v = \frac{E}{B}$ as $F_m = F_e$ $qvB = qE$	1
	(ii)(c) $F = qvB$ $q \rightarrow$ max for α-particle	1
	(iii) d All of these	
	(iv) $KE = qV$	



Q.No.:	Expected Answer/ ...	
	K.E $\propto q$ max for proton, min for electron.	(1)
	$r = \frac{mv}{qB} = \frac{p}{qB} = \frac{\sqrt{2mqV}}{qB}$	
	$r = \cancel{\sqrt{\frac{2mV}{qB}}}\ \frac{1}{B}\sqrt{\frac{2mV}{q}}$	
	$r \propto \sqrt{\frac{m}{q}}$ least for electron.	
	 $v = \frac{E}{B}$ or $qvB = qE$, $F_m = F_e$	(1)
	for all charged particles with velocity $\vec{v}$ $F_m = F_e$	
30	(i) (a)	(1)
	(ii) (b) $\frac{KE_{max}}{e}$	(1)
	(iii) (c) $h\nu - \phi = \frac{1}{2}mv^2_{max} = eV$	(1)
	$5 - 3 = 2eV$	
	(iv) (c) Photo cell	(1)
	or	
	(d) More than double	(1)
31	 $X_L = \omega L$  $X_C = \frac{1}{\omega C}$	(1+1)
	(b) 	(1)

Expected Answer/ Value Points | Marks

(c) $I = 0.25\ A$

current lag behind by $\frac{\pi}{2}$

$X \longrightarrow$ inductor — ½

I in phase with voltage

$Y \longrightarrow$ Resistor — ½

$$Z = \sqrt{(R^2 + X_L^2)}$$ — ½

$$R = \frac{220}{0.25} = \frac{4400}{5} = 880\ \Omega$$

$$X_L = \frac{220}{0.25} = 880\ \Omega$$

$$Z = R\sqrt{2}$$

$$= 880\sqrt{2}$$ — ½

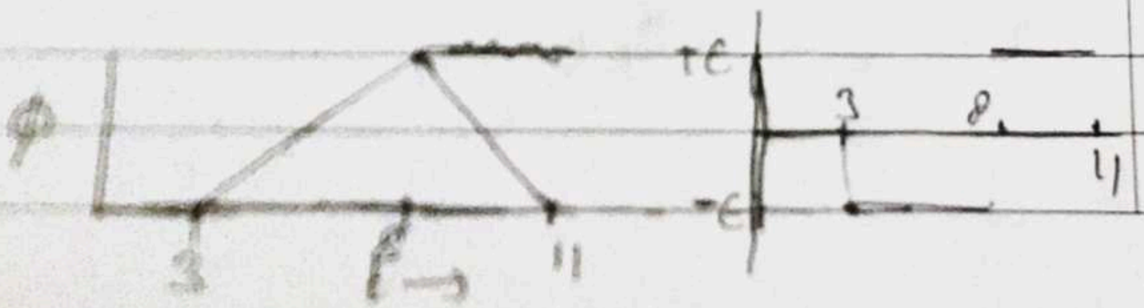
$$I' = \frac{V}{Z} \quad I' = \frac{0.25}{\sqrt{2}}\ A$$ — ½

Or

(a) $\phi_2 = M_{21} I_1$

$$M_{21} = \frac{\phi_2}{I_1}$$ — 1

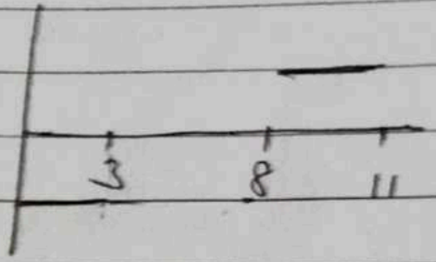
No of turns, common Area, core, rel. orientation — 1



1

1

$= \frac{E}{R}$ I



(1)

32 (a) $E_{eq} = 2V$

$r_{eq} = \frac{r}{4}$ $\frac{1}{2}$

$R_{eq} = \frac{15}{2}\Omega = 7.5\,\Omega$

$V = E_{eq} - I r_{eq}$

$I \times R_{eq}$ = terminal voltage $\frac{1}{2}$

$I \times 7.5 = 1.6$

$I = \frac{1.6}{7.5}$ A

$I r_{eq} = E_{eq} - V$ $\frac{1}{2}$

$= 2 - 1.6$

$r_{eq} = \frac{(2-1.6)\,7.5}{1.6}$

$r = \frac{4 \times 0.4 \times 7.5}{1.6}$ $\frac{1}{2}$

$= 7.5\,\Omega$

(b) Junction Rule $- \Sigma I = 0$ $\frac{1}{2}$

Loop Rule $- \Sigma E - iR = 0$ $\frac{1}{2}$

For PRSP

$- I_3 \times 20 - I_2 \times 200 + 5 = 0$ 1

For PRQP

$- 20 I_3 - 60 I_1 + 40 = 0$ 1

or

$P = I^2 R$

$200 = I^2 \times 2$

$I^2 = 100$ or $I = 10A$ 1

$\frac{1}{R_{11}} = \frac{1}{30} + \frac{1}{6} = \frac{1+5}{30} = \frac{6}{30}$

$R_{11} = 5\Omega$

$R_{11} + 5\Omega = 10\Omega$ 1

$I_1 \times 10 = I_2 \times 40$

$\frac{I_1}{I_2} = \frac{40}{10} = \frac{4}{1}$

$I_1 = 8A$

Power through 5Ω

$= I_1^2 \times 5 = 8 \times 8 \times 5$

$= 320$ W. 1

(b) In steady state no current through capacitor & 5Ω resistor.

Equivalent Resistance $10 + 20 = 30\Omega$

$I = \frac{2}{30}$ A 1

V across capacitor = Voltage across 10Ω Resistor

$= \frac{2}{30} \times 10 = \frac{2}{3}$

$q = CV = 6 \times \frac{2}{3} = 4\mu C$ 1

Expected Answer/ Value Points | of Marks

33 (a)(i) In telescope $f_0 > f_e$
& aperture of objective should be bigger $\Rightarrow$ Y will be used as objective. — 1

(ii) In normal adjustment
distance between lenses
$L = f_0 + f_e$ — $\frac{1}{2}$
$= 60 + 4$
$= 20$ cm
So lenses have to be moved apart by 4 cm more. — $\frac{1}{2}$

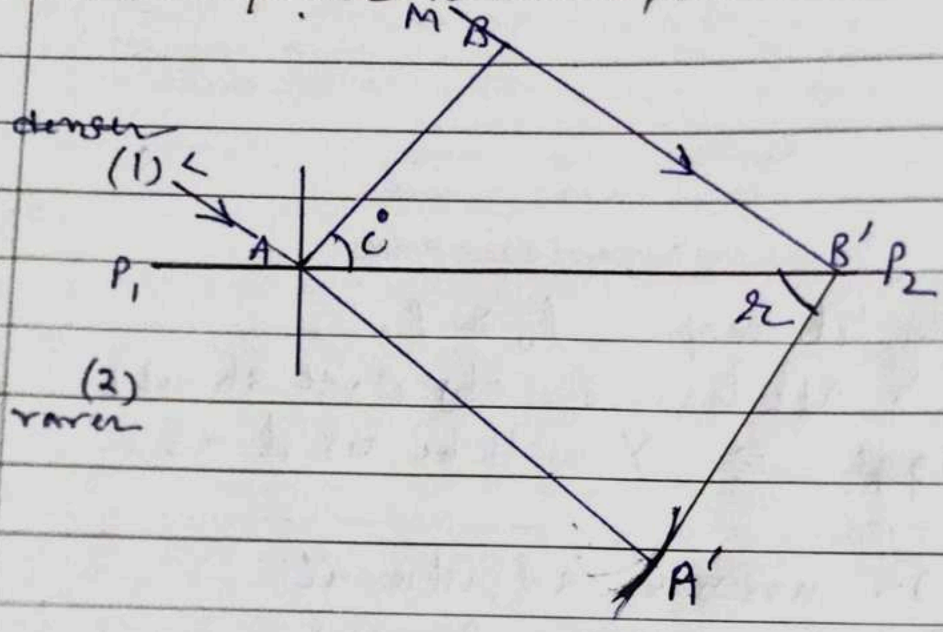
(iii) $M = \frac{f_0}{f_e} = \frac{16}{4} = 4$.

In microscope $f_0 < f_e$ & both are small focal lengths (w/thin) of small aperture. — $\frac{1}{2}$
object is very close to focus. — $\frac{1}{2}$
In telescope $f_0 >> f$ objective is of very large focal length
Object is very far from objective — $\frac{1}{2}$
& first image is at focus of objective
objective is of large aperture — $\frac{1}{2}$

Q.No.: Expected Answer/ ...

or

Locus of all the points vibrating in same phase is wave front. $\frac{1}{2}$



1 for diagram

If in time t wavelets reaches from B to B' distance travelled by wavelets from A in time $t = v_2 \times t$ v_2 is vel. of light in medium (2). $\frac{1}{2}$

$$t = \frac{dis}{vel} = \frac{BB'}{v_1} = \frac{AA'}{v_2}$$

$$AA' = \left(\frac{v_2}{v_1}\right) BB'$$

here $v_2 > v_1$

so $AA' > BB'$

draw arc from A with radius $> BB'$

draw tangent from B' to the arc.

A'B' is refracted wave front

Q.No.:	Expected Answer/ Value Points	
	(b) Source which emit the light with constant phase difference and same frequency. Coherent sources are originated from the same source.	(1)
	$I_1 = I_2 = 5\times10^{-2}\ W/m^2$	
	Path diff. $\Delta x = \frac{\lambda}{6}$	
	Phase diff. $\phi = \frac{2\pi}{\lambda}\cdot$ Path diff.	
	$= \frac{2\pi}{\lambda}\times\frac{\lambda}{6}$	$\frac{1}{2}$
	$= \frac{\pi}{3}$	
	$I = I_1 + I_2 + 2\sqrt{I_1 I_2}\cos\phi$	$\frac{1}{2}$
	$= 5\times10^{-2} + 5\times10^{-2} + 2\times5\times10^{-2}\times\cos\frac{\pi}{3}$	
	$I = 5\times10^{-2} + 5\times10^{-2} + 5\times10^{-2}$	
	$= \cancel{5\sqrt{3}}\ 15\times10^{-2}\ W/m^2$	$\frac{1}{2}$
	I_{max} is for $\phi = 0^0$	
	$I_{max} = 20\times10^{-2}\ W/m^2$	
	So $I = \frac{3}{4} I_{max}$.	$\frac{1}{2}$
	—— X ——	