

PRACTICE QUEST 1 - SOLUTIONS

①

MULTIPLE CHOICE:

1) b

2) c

3) c

4) b

5) b

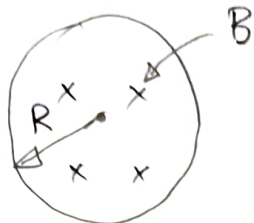
6) c

7) c

8) b

PROBLEMS

1)



$$R = 0.04 \text{ m}$$

$$B_f = 0.2 \text{ T}$$

$$B_i = 0.6 \text{ T}$$

$$\Delta t = 0.1 \text{ s}$$

a)

$$\mathcal{E} = \left| \frac{\Delta \Phi_B}{\Delta t} \right| \quad (N=1)$$

$$= \left| \frac{\Delta B A \cos \theta}{\Delta t} \right| = \left| \frac{A \Delta B}{\Delta t} \right| \quad \begin{array}{l} \cos \theta = 1 \\ \text{A CONST.} \end{array}$$

$$= \left| \frac{\pi r^2 (B_f - B_i)}{\Delta t} \right| = \left| \frac{\pi (0.04 \text{ m})^2 (0.2 \text{ T} - 0.6 \text{ T})}{0.1 \text{ s}} \right|$$

$$\boxed{\mathcal{E} = 2 \times 10^{-2} \text{ V} = 0.02 \text{ V}}$$

b) CW BY RHR

$$2) a) \mathcal{E} = IR$$

$$I = \frac{\mathcal{E}}{R} = \frac{1.2V}{2\Omega} = \boxed{0.6A = I}$$

$$b) I = \frac{\mathcal{E}}{R} ; I' = \frac{\mathcal{E}}{3R}$$

$$I' = \frac{1}{3} \left(\frac{\mathcal{E}}{R} \right) = \boxed{\frac{1}{3} I = I'}$$

OR

$$I = \frac{\mathcal{E}}{R} = \frac{1.2V}{6\Omega} = \boxed{0.2A = I}$$

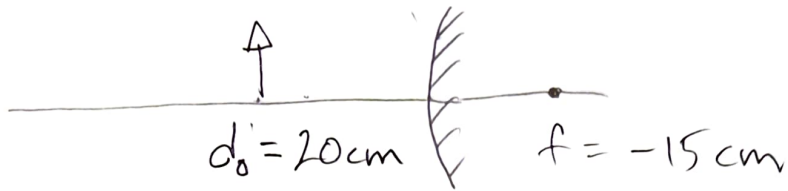
$$3) a) c = \lambda f$$

$$f = \frac{c}{\lambda} = \frac{3 \times 10^8 \text{ m/s}}{3 \text{ m}} = 1 \times 10^8 \text{ Hz}$$

b) RADIO WAVE

4)

A



$$a) \frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

$$\frac{1}{d_i} = \frac{1}{f} - \frac{1}{d_o}$$

$$d_i = \left(\frac{1}{f} - \frac{1}{d_o} \right)^{-1} = \left(\frac{1}{-15 \text{ cm}} - \frac{1}{20 \text{ cm}} \right)^{-1}$$

$$d_i = -8.57 \text{ cm}$$

$$b) d_i < 0 \Rightarrow \text{VIRTUAL}$$

$$c) m = -\frac{d_i}{d_o} = -\frac{-8.57 \text{ cm}}{20 \text{ cm}}$$

$$m = 4.28$$

b)

5



$$a) \quad \frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

$$\frac{1}{d_i} = \frac{1}{f} - \frac{1}{d_o}$$

$$d_i = \left(\frac{1}{f} - \frac{1}{d_o} \right)^{-1} = \left(\frac{1}{-12 \text{ cm}} - \frac{1}{30 \text{ cm}} \right)^{-1}$$

$$\boxed{d_i = -8.57 \text{ cm}}$$

$$b) \quad d_i < 0 \Rightarrow \boxed{\text{VIRTUAL}}$$

$$c) \quad m = -\frac{d_i}{d_o} = -\frac{-8.57 \text{ cm}}{30 \text{ cm}}$$

$$m = 0.29$$

$$m > 0 \Rightarrow \boxed{\text{UPRIGHT}}$$

6) a) $n = \frac{c}{v} = \frac{3 \times 10^8 \text{ m/s}}{2 \times 10^8 \text{ m/s}}$

$$n = 1.5$$

b) $v = \lambda f$
 $\uparrow$
 CONST!

IF v DECREASES, λ MUST DECREASE