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Electro-Optics
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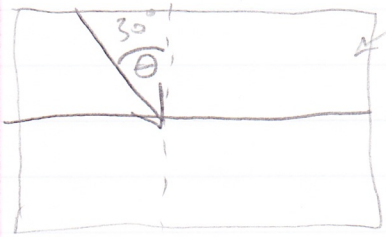
Exam Make-Up

(1)



$$n_1 \sin\theta_1 = n_2 \sin\theta_2$$
$$\sin 30 = 1.51 \sin\theta_2$$
$$\theta_2 = \sin^{-1}\left(\frac{\sin 30}{1.51}\right)$$
$$\theta_2 = 19.337^\circ$$

$$t_s = \frac{2 n_i \cos\theta_i}{n_i \cos\theta_i + n_t \cos\theta_t} \qquad t_p = \frac{2 n_i \cos\theta_i}{n_t \cos\theta_i + n_i \cos\theta_t}$$

Angle of orientation = 60°

$$\Rightarrow \frac{2\sin\theta_t \cos 60}{\sin(60+\theta_t)} = \frac{2\sin\theta_t \cos 60}{\sin(60+\theta_t)\cos(60-\theta_t)}$$

$$\Rightarrow 2\sin\theta_t \cos 60 = \frac{[2\sin\theta_t \cos 60]\sin(60+\theta_t)}{\sin(60+\theta_t)\cos(60-\theta_t)}$$

$$2\sin\theta_t \cos(60) = \frac{2\sin\theta_t \cos 60}{\cos(60-\theta_t)}$$

$$\Rightarrow \cos(60-\theta_t)[2\sin\theta_t \cos(60)] = 2\sin\theta_t \cos 60$$
$$[\cos(60-\theta_t)]\sin\theta_t = \sin\theta_t$$
$$\cos(60-\theta_t) = 1$$
$$60-\theta_t = 0$$
$$\theta_t = 60$$

$$t_s = \frac{2\cos 30}{\cos 30 + 1.5\cos 19.337} = \frac{1.732}{2.2814} = .759202758$$

$$.759202758 = \frac{2\cos 60}{\cos 60 + 1.5\cos\theta_t}$$

$$\Rightarrow .759202758 = \frac{1}{\cos 60 + 1.5\cos\theta_t}$$

$$.756075824$$

$$.759202758\left(\cos 60 + 1.5\cos\theta_t\right) = 1$$

$$1.14 \cos\theta_t = .620398624$$

$$\cos\theta_t = .541172905$$

$$\boxed{\theta_t = 57.23647554}$$

$$.756075824\left(1.5\cos\theta_t\right) = .621982058$$

$$1.141674783\cos\theta_t =$$

$$\cos\theta_t = .544780392$$

$$\boxed{\theta_t = 56.99034^\circ}$$