PS # 6 Solutions

[1] A : interference maximum
A' : " minimum

(a)

Path difference at A $\Delta l_A = \overline{S_1A} - \overline{S_2A} = (\frac{L}{2} + \overline{OA}) - (\frac{L}{2} - \overline{OA})$

$= 2\,\overline{OA}$

Likewise $\Delta l_B = 2\,\overrightarrow{OA'}$

Since A & A' are interference max & min,

$\Delta l_A = \lambda + 2\pi n \cdot \lambda$
$\Delta l_B = \frac{\lambda}{2} + 2\pi n \cdot \lambda$

Thus $\boxed{\Delta l_A - \Delta l_{A'} = \frac{\lambda}{2}}$

Here $\Delta l_A - \Delta l_{A'} = 2\overline{OA} - 2\overline{OA'} = 2\overline{AA'} = 2 \times 0.2\ (m)$

Thus $\lambda = 2 \times 2 \times 0.2 = 0.8 (m)$

$v = \lambda \cdot f = 352\ (m/sec)$

(b) Note $\lambda = 0.8\ (m)$

$\Delta l_A = \overline{S_1A} - \overline{S_2A} = (\frac{L}{2} - 0.4 + \overline{OA}) - (\frac{L}{2} - \overline{OA})$

$= 2\underbrace{\overline{OA}}_{0.2} - 0.4 = 0$

$\Delta l_{A'} = \overline{S_1A'} - \overline{S_2A'} = 2\overline{OA'} - 0.4 = 0.4 = \frac{\lambda}{2}$

$\Delta l_0 = -0.4 = -\frac{\lambda}{2}$