

Answer on Question #38006 – Physics - Other

Question: the path difference between two wave fronts generated by coherent source is 2.1 micron. If the phase difference between these wave fronts at a point is 7.692π , the wavelength of light emitted from the source will be: a)5386 Å; b)5400 Å; c)5460 Å; d)5892 Å.

Solution: the phase of the wave is determined by the equation

$$\phi = kx - \omega t.$$

k is the wave number, $k = \frac{2\pi}{\lambda}$. The phase difference between two wave fronts at the time t is

$$\phi_2 - \phi_1 = k(x_2 - x_1) = k\Delta x = \frac{2\pi\Delta x}{\lambda}$$

Now we can calculate the value of the wavelength

$$\lambda = \frac{2\pi\Delta x}{\Delta\phi} = \frac{2\pi \cdot 2.1 \cdot 10^{-6}}{7.692\pi} = 5460 \text{ \AA}.$$

Answer: c)5460 Å.