An RLC circuit is used to tune a radio set to receive NOUN RADIO broadcasting at 105.9MHz in the FM band. The resistance and the inductance of the circuit of the radio set are 12Ω and 1.4μH respectively. What capacitance should the circuit have?

a. 1.64pF
b. 1.51μF
c. 1.33mF
d. 2.11pF

**Solution**

We are given:

$$f = 105.9\ MHz = 105.9 * 10^6 Hz$$

$$R = 12\ \Omega$$

$$L = 1.4\ \mu H = 1.4 * 10^{-6} H$$

A radio set is tuned to receive $f = 105.9\ MHz$ thus resonance frequency of the RLC circuit $(f_0)$ is equal to $f$.

Resonance frequency of the RCL circuit is:

$$\omega_0 = \sqrt{\frac{1}{LC}}$$

$$f_0 = \frac{\omega_0}{2\pi} = \frac{\sqrt{\frac{1}{LC}}}{2\pi}$$

So:

$$\frac{1}{LC} = 4\pi^2 f^2$$

$$C = \frac{1}{4\pi^2 f^2 L}$$

$$C = \frac{1}{(4\pi^2(105.9 * 10^6)^2)(1.4 * 10^{-6})} \approx 1.613 * 10^{-12} F = \mathbf{1.6\ pF}$$

Closest answer is **A.**

**Answer: A**