

Q- The tuning circuit of an AM radio contains an LC combination. The inductance is 0.200 mH, and the capacitor is variable, so that the circuit can resonate at any frequency between 550 KHz and 1650 KHz. Find the range of values required for C.

The frequency of a tuning circuit is given by

$$f = \frac{1}{2\pi\sqrt{LC}}$$

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

Hence for the minimum frequency the capacitance should be

$$C = \frac{1}{4\pi^2 f^2 L} = \frac{1}{4 * (3.1416)^2 * (550 * 10^3)^2 * 0.200 * 10^{-3}} = 4.19 * 10^{-10} F$$

And for the maximum frequency it should be

$$C = \frac{1}{4\pi^2 f^2 L} = \frac{1}{4 * (3.1416)^2 * (1650 * 10^3)^2 * 0.200 * 10^{-3}} = 4.65 * 10^{-11} F$$

Hence the variable capacitor should have the range of 46.5pF to 419 pF.