Q10: An arc lamp requires a direct current of 10A at 80V to function. If it is connected to a 220V (RMS), 50 Hz AC supply, the series inductor needed for it to work is close to

(a) 0.065 H

(b) 80 H

(c) 0.08 H

(d) 0.044 H

Solution

I = 10A

V = 80 V

R = 8 Ω

$10 = 220/(8^2 + X_L^2)^{1/2}$

$64 + X_L^2 = 484$

$X_L = \sqrt{420}$

$2\pi \times 50L = \sqrt{420}$

$L = \sqrt{420}/100\pi$

L = 0.065 H

Answer: (a) 0.065 H