

Two incandescent lamps of 25 W and 100 W rated at 220 V are connected in series across a 440 V supply. Select the correct option.

- (A) 25 W lamp will fuse
- (B) 100 W lamp will fuse
- (C) Both lamps will fuse
- (D) No lamp will fuse

*Solution*

$$R_{25} = \frac{V^2}{P} = \frac{220^2}{25} \quad \& \quad R_{100} = \frac{220^2}{100}$$

When both lamps are connected in series across 440 V supply,

$$V_{25} = \frac{R_{25}}{R_{25} + R_{100}} 440 = \frac{\frac{220^2}{25}}{\frac{220^2}{25} + \frac{220^2}{100}} \times 440$$

$$\therefore V_{25} = \frac{\frac{1}{25}}{\frac{1}{25} + \frac{1}{100}} \times 440 = \frac{1}{1 + \frac{1}{4}} \times 440 = \frac{4}{5} \times 440 = 352V$$

$\therefore V_{25} > 220V$  , the 25 W lamp will fuse

$$V_{100} = 440 - 352 = 88V$$

$\therefore V_{100} < 220V$  , the 100 W lamp will not fuse

Hence, (A)