**Q. 08** Two electric bulbs rated 25W–220 V and 100W–220V are connected in series to a 440 V supply. Which of the bulbs will fuse? [2012]
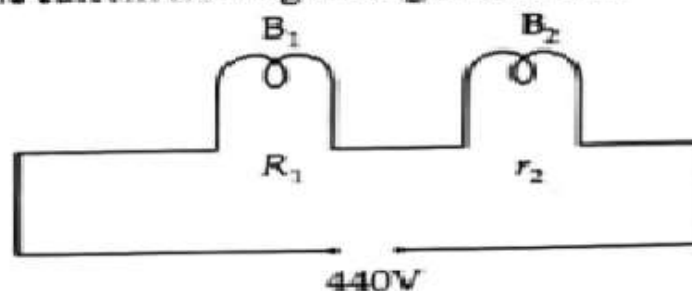
(a) Both   (b) 100W   (c) 25 W   (d) Neither

(c) The current upto which bulb rated 25W–220V, will not fuse

$$I_1 = \frac{W_1}{V_1} = \frac{25}{220} \text{ Amp}$$

Similarly, $I_2 = \frac{W_2}{V_2} = \frac{100}{220} \text{ Amp}$

The current flowing through the circuit



440V

$$I = \frac{440}{R_{eff}}$$

$$R_{eff} = R_1 + R_2$$

$$R_1 = \frac{V_1^2}{P_1} = \frac{(220)^2}{25} ; \quad R_2 = \frac{V_2^2}{P} = \frac{(220)^2}{100}$$

$$I = \frac{440}{\frac{(220)^2}{25} + \frac{(220)^2}{100}}$$

$$= \frac{440}{(220)^2 \left[ \frac{1}{25} + \frac{1}{100} \right]}$$

$$I = \frac{40}{220} \text{ Amp}$$

$$\therefore I_1 \left( = \frac{25}{220} A \right) < I \left( = \frac{40}{220} A \right) < I_2 \left( = \frac{100}{200} A \right)$$

Thus the bulb rated 25 W–220 will fuse.