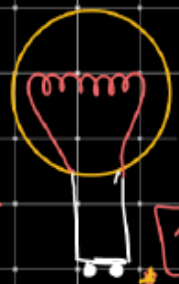
#



[220V, 50W]

Indian System of Electricity:

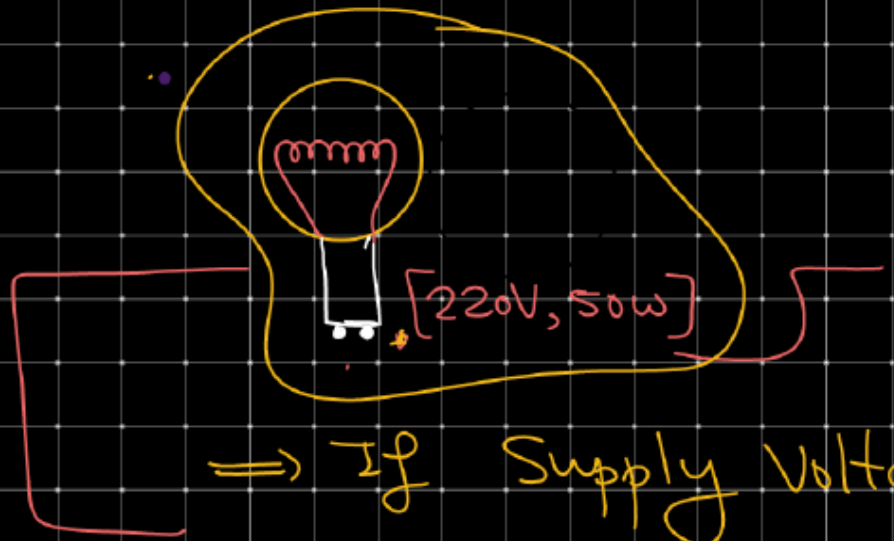
Home supply → 220 Volt, 50 Hz

→ With help of Reading we find Resistance of bulb. $\left[P = \frac{V^2}{R}\right]$

$$R = \frac{V^2}{P}$$

→ Meaning of Reading (220V, 50W)

this bulb operate 220 Volt supply with full brightness that's mean power dissipated is 50W [50 J/sec]



$\Rightarrow$ If Supply Voltage

$V_{Supp} < V_{Reading}$ → low brightness.

$V_{Supp} = V_{Reading}$ → full brightness.

$V_{supply} > V_{Reading}$ $\Rightarrow$ bulb will be fuse.

NEET16) A filament bulb (500W, 100V) is to be used in 230V main supply. When a resistance R is connected in series, its work perfectly & the bulb consume 500W. The value of R.

(a) 230Ω

(b) 46Ω

(c) 26Ω

(d) 13Ω

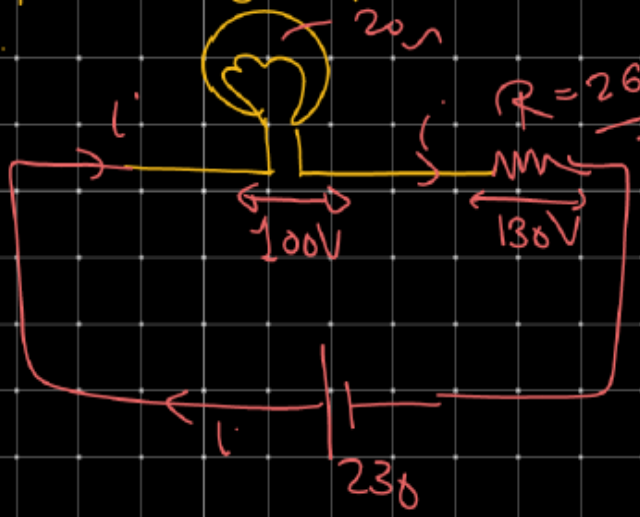
$i \times 20 = 100$

$i = 5\,Amp$

$iR = 130$

$5 \times R = 130$

$R = 26\,\Omega$



Reading [500W, 100V]

$R = \frac{V^2}{P}$ $P = \frac{V^2}{R}$

$R = \frac{100 \times 100}{500}$

$R = 20\,\Omega$

JEE(m) 2015

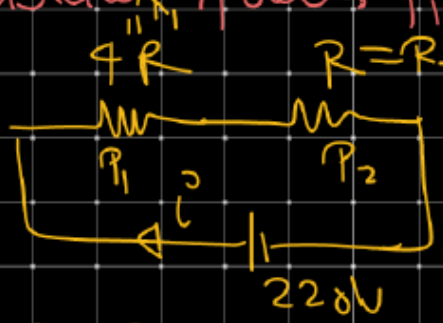
Q Two electric bulb, rated at (25W, 220V) and (100W, 220V) are connected in series across a 220V source. If the 25W & 100W bulbs draw powers P_1 & P_2 respectively, then

(a) $P_1 = 9W$, $P_2 = 16W$

(b) $P_1 = 16W$, $P_2 = 9W$

(c) $P_1 = 4W$, $P_2 = 16W$

(d) $P_1 = 16W$ $P_2 = 9W$.



$i = \frac{220}{5R}$ $\quad P_2 = i^2 \times R_2$

25W, 220V: $R_1 = \frac{V^2}{P_1} = \frac{220 \times 220}{25}$, $R_1 = 4R$, $\boxed{R_1 = 9R}$

100W, 220V: $R_2 = \frac{220 \times 220}{100}$, $\boxed{R_2 = R}$

$P_1 = \frac{220 \times 220}{25R^2} \times 4R$ $\quad P_1 = i^2 \times R_1$

$P_1 = \frac{220 \times 220 \times 4}{25 \times 220 \times 220} \times 100 = \frac{4 \times 100}{25} = 16W$ Ans

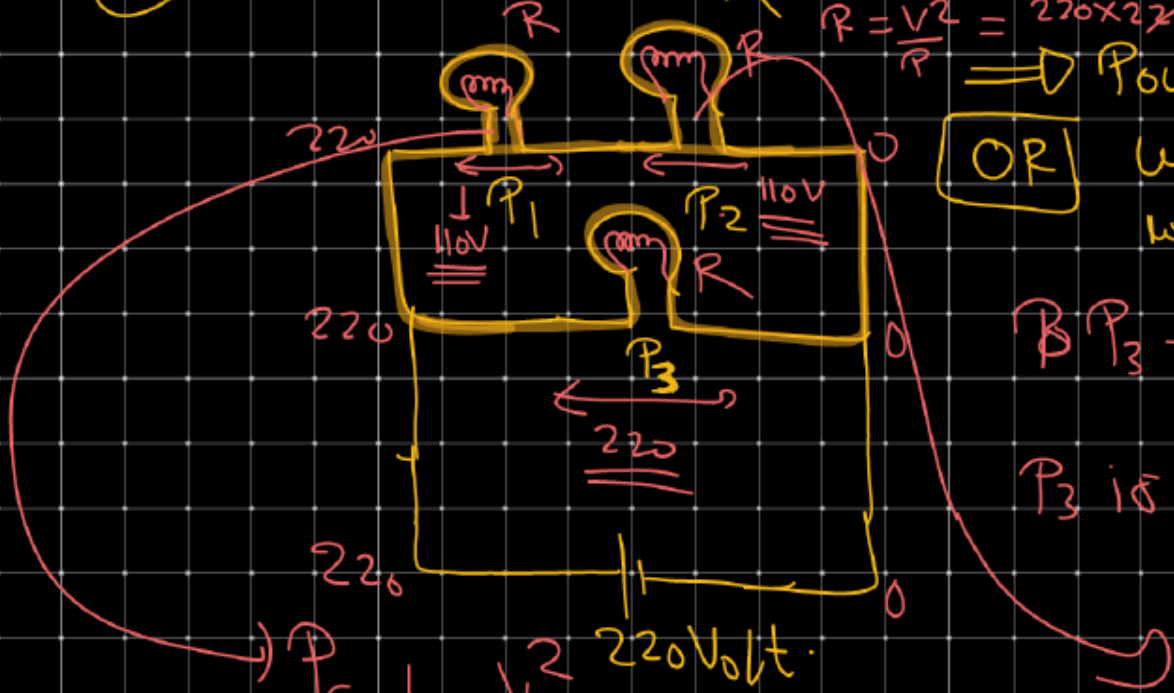
$\boxed{P_2 = 9W \text{ Ans}}$

(#) Three bulb, $(P = 110w, 220V)$ → Reading.

$R = \frac{V^2}{P} = \frac{220 \times 220}{110} = 440\,\Omega$

⇒ Power emmision by P_1, P_2 & P_3.

OR Which bulb is operate with full brightness.



B P_3 — gives full brightness bcz potential across P_3 is 220Volt

$P_{actu} = \frac{V^2}{R} = \frac{110 \times 110}{440} = \frac{110}{4} = 27.5$ Watt

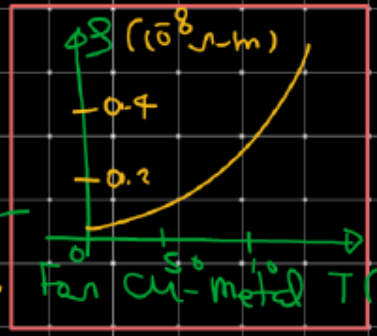
Some Important Points of NCERT

For Conductors, $R = R_0(1 + \alpha \Delta T)$

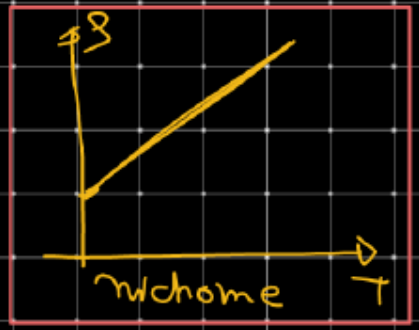
↳ α → Co-eff of Thermal resistance

$\rho = \rho_0(1 + \alpha \Delta T)$

α = +ive, $T \uparrow R \uparrow \rho \uparrow$ (and vice versa)



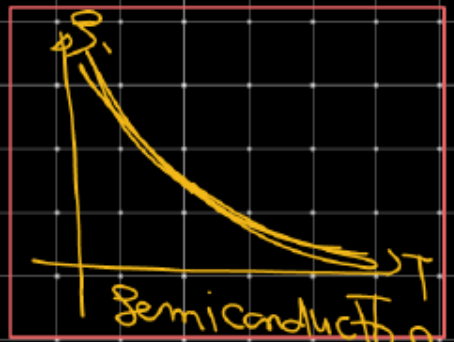
NEET



For Semiconductor, α = -ive

$R_f = R_0(1 - \alpha \Delta T)$

$T \uparrow R \downarrow, \rho \downarrow, T \downarrow R \uparrow, \rho \uparrow$



For Insulators α = -ive

NEET 2023

⑧ I-V graph

NCERT