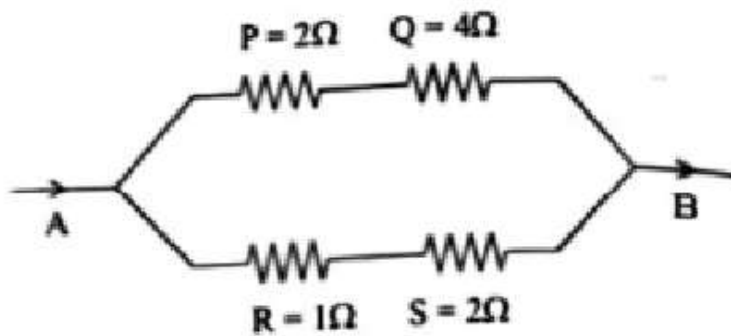


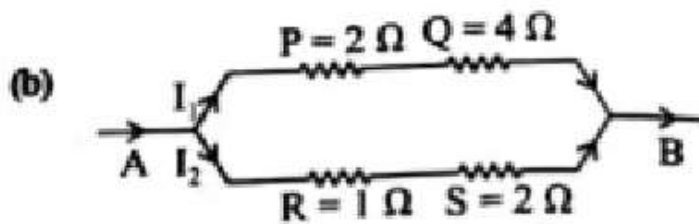
Q 07

Which of the four resistances P, Q, R and S generate the greatest amount of heat when a current flows from A to B?

[Online April 23, 2013]



- (a) Q      (b) S      (c) P      (d) R



$$R_1 = P + Q = 2\ \Omega + 4\ \Omega = 6\ \Omega$$

$$R_2 = R + S = 1\ \Omega + 2\ \Omega = 3\ \Omega$$

$$I_1 R_1 = I_2 R_2$$

$$I_1 = \frac{R_2}{R_1} I_2 = \frac{3}{6} I_2 = \frac{I_2}{2}$$

$$\text{or } I_2 = 2I_1$$

$$\text{Heat flow } H = I^2 R t$$

$$\text{For Q, } H_Q = I_1^2 Q t = \frac{I_2^2}{4} \times 4 t = I_2^2 t$$

$$\text{For S, } H_S = I_2^2 S t = I_2^2 \cdot 2 t = 2 I_2^2 t$$

$\therefore$  Greatest amount of heat generated by S.