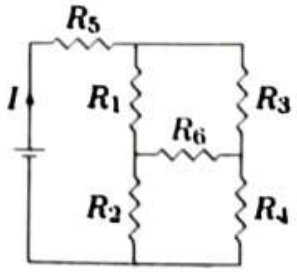
Q 06

In the given circuit, it is observed that the current I is independent of the value of the resistance R_6. Then the resistance values must satisfy (2001)



(A) $R_1R_2R_5 = R_3R_4R_6$

(B) $\frac{1}{R_5} + \frac{1}{R_6} = \frac{1}{R_1+R_2} + \frac{1}{R_3+R_4}$

(C) $R_1R_4 = R_2R_3$

(D) $R_1R_3 = R_2R_4$

Sol. Effective resistance of the circuit depends on R_6 unless Wheatstone bridge formed by R_1, R_2, R_3, R_4 and R_6 is balanced. Thus, the current becomes independent of R_6 only when the bridge is balanced i.e., $R_1/R_2 = R_3/R_4$. It might be tedious but worth to find the current I in terms of R_1, R_2, R_3, R_4, R_5 and R_6 and explicitly show the independence of I in the balanced condition. *Hint:* Use Kirchhoff's law in the three loops and solve for I.

Ans. C ⊡