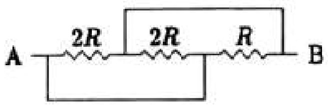
Q 17

The equivalent resistance between points A and B of the given circuit is ...... (1997)

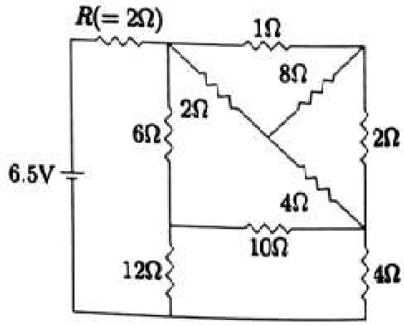


Sol. All the three resistors are connected in parallel. The equivalent resistance is $R_{eq} = (2R \parallel 2R) \parallel R = R \parallel R = R/2$.

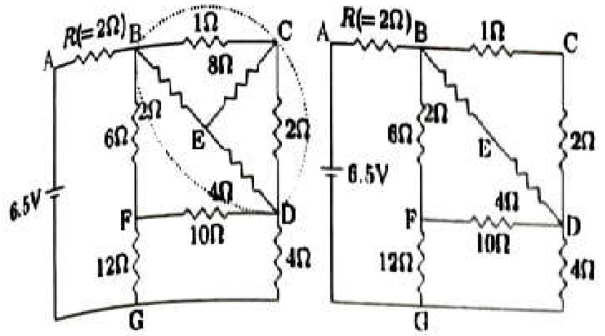
Ans. $R/2$ ⊡

Integer Type

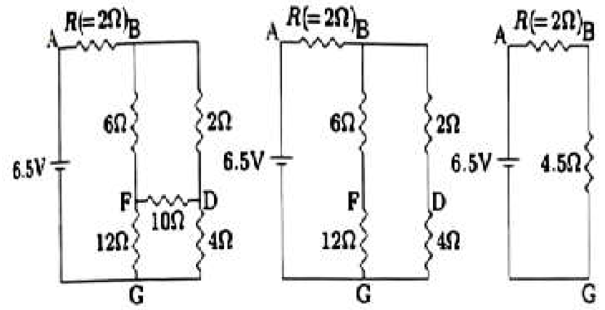
Q 48. In the following circuit, the current through the resistor $R(= 2\ \Omega)$ is I Amperes. The value of I is .... (2015)



Sol. Consider the resistors that join the nodes B, C, D, and E. These resistors form a balanced Wheatstone bridge between the nodes B and D. Thus, 8 Ω resistor in the branch CE can be removed without affecting the circuit (see the right figure below). Effective resistance between the nodes B and D is $R_{BD} = (1\ \Omega + 2\ \Omega) \parallel (2\ \Omega + 4\ \Omega) = (3\ \Omega) \parallel (6\ \Omega) = 2\ \Omega$.



The equivalent circuit is shown in the left figure below. In this circuit, consider the resistors which join the nodes B, D, F, and G. These resistors form a balanced Wheatstone bridge between B and G. Thus, 10 Ω resistor between D and F can be removed without affecting the circuit. Effective resistance between B and G is (middle figure below) $R_{BG} = (6\ \Omega + 12\ \Omega) \parallel (2\ \Omega + 4\ \Omega) = (18\ \Omega) \parallel (6\ \Omega) = 4.5\ \Omega$. Thus, the effective resistance of the entire circuit (right figure below) is $R_{eff} = 2\ \Omega + 4.5\ \Omega = 6.5\ \Omega$. The current through the resistor $R = 2\ \Omega$ is $I = V/R_{eff} = 6.5/6.5 = 1$ A.



Ans. 1 ⊡