You are given that the equivalent resistance between A and B is R_{eq}. Find the value of R_3.

Req = 8 Ω

R1 = 6 Ω

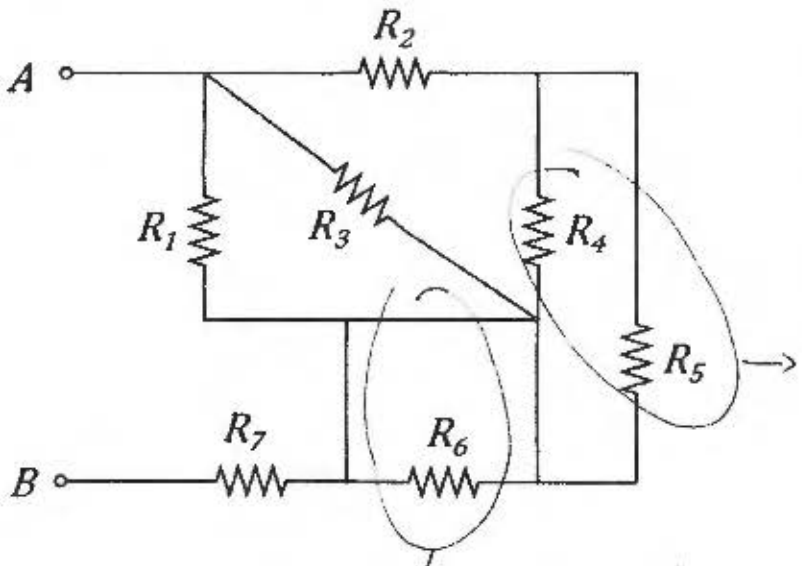
R2 = 4 Ω

R4 = 40 Ω

R5 = 10 Ω

R6 = 12 Ω

$R_7 = 5\,\Omega$



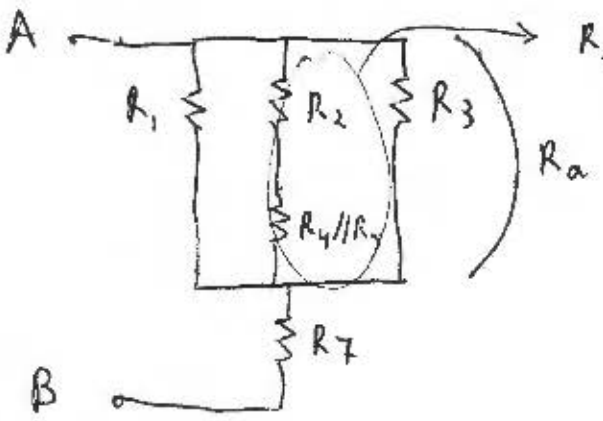
$R_4 // R_5$

$= \left(\frac{1}{40} + \frac{1}{10}\right)^{-1}$

$= \left(\frac{1+4}{40}\right)^{-1} = 8\,\Omega$

$R_6 // 0 = \left(\frac{1}{R_6} + \frac{1}{0}\right)^{-1}$

$= (\infty)^{-1} = 0\,\Omega$



$R_2 + R_4 // R_5 = 4 + 8 = 12\,\Omega$

$R_{eq} = R_a + R_7 \Rightarrow R_a = -R_7 + R_{eq}$

$= 3\,\Omega$

$$\frac{1}{R_a} = \frac{1}{R_1} + \frac{1}{12} + \frac{1}{R_3}$$

$$\frac{1}{R_3} = \frac{1}{R_a} - \frac{1}{R_1} - \frac{1}{12} = \frac{1}{3} - \frac{1}{6} - \frac{1}{12} = \frac{4-2-1}{12}$$

$$\boxed{R_3 = 12\,\Omega}$$