Q 07

The resistance of the series combination of two resistances is S. when they are joined in parallel the total resistance is P. If $S = nP$ then the minimum possible value of n is [2004]

(a) 2   (b) 3   (c) 4   (d) 1

ans

(c)

Resistance of the series combination,

$S = R_1 + R_2$

Resistance of the parallel combination,

$$P = \frac{R_1 R_2}{R_1 + R_2}$$

$$S = nP \Rightarrow R_1 + R_2 = \frac{n(R_1 R_2)}{(R_1 + R_2)}$$

$$\Rightarrow (R_1 + R_2)^2 = n R_1 R_2$$

Minimum value of n is 4 for that

$$(R_1 + R_2)^2 = 4 R_1 R_2 \Rightarrow (R_1 - R_2)^2 = 0$$