

Solutions

2.1 D The parallel branches have 12 V, so the 6 Ω branch carries $12/6=2$ A.

Compare the rejected options: 12 A; 6 A; 4 A; 1 A. Use the stated model and conditions.

2.2 B $I_{\text{rms}}^2 R = 9 \cdot 4 = 36$ W; no extra half factor applies to rms current.

Compare the rejected options: 18 W; 72 W; 12 W; 9 W. Use the stated model and conditions.

2.3 $1/3$. Angular frequency is $|q|B/m$.

2.4 True. It conducts in one polarity and blocks in the other.

3.1 Flux linkage changes at rate $NBav$, so $|\mathcal{E}| = NBav$ and $I = NBav/R$. The N edges still in the field give opposing force $F = NIaB = N^2 B^2 a^2 v/R$. $Fv = N^2 B^2 a^2 v^2/R = I^2 R$; external work supplies the resistor heat. Lenz's law sets the force opposite motion. Award flux rate, emf/current, force, power check and direction. These results hold only during boundary crossing.