

Rms values, transformers and power lines

Physics grades 11-12 (A Level · IB · Class 11-12) · Test

Name: _____ Date: _____ Class: _____ Mark: ____ / 20

This test covers rms values, mean power, the turns-ratio equation and transmission losses. Show formulas, substitutions and units. Calculators are allowed. Treat all transformers as ideal unless a question says otherwise.

Level: Physics grades 11-12 (A Level · IB · Class 11-12) · **Curriculum:** A Level 3.7.5

Time: 45 minutes · 8 questions · Total: 20 marks · Calculator allowed

Question 1 Defining rms (2 marks)

Explain what is meant by the rms value of an alternating current.

Question 2 Peak to rms (2 marks)

The peak value of an alternating voltage is 340 V. Calculate the rms value.

Question 3 Power in a resistor (3 marks)

A sinusoidal voltage of peak value 18 V is applied across a $12\ \Omega$ resistor. Calculate the mean power dissipated.

Question 4 Transformer turns (3 marks)

An ideal transformer has 800 primary turns and is connected to 230 V rms. Its secondary voltage is 11.5 V.

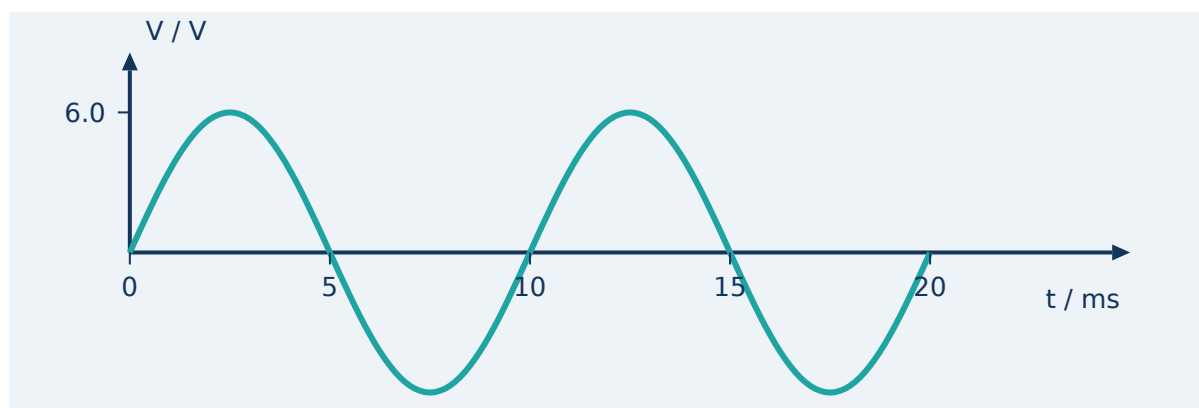
- Calculate the number of secondary turns. (1 mark)
- The secondary supplies 23 W. Calculate the secondary and primary currents. (2 marks)

Question 5 Why high voltage? (3 marks)

Explain why electrical energy is transmitted at very high voltage over long distances.

Question 6 Reading a trace (3 marks)

The graph shows an alternating voltage.



Voltage across a load.

- Read the period and calculate the frequency. (2 marks)
- Calculate the rms voltage. (1 mark)

Question 7 Efficiency (2 marks)

A transformer takes 250 W from the mains and delivers 235 W. Calculate its efficiency.

Question 8 Laminated core (2 marks)

State one way of reducing eddy-current losses in a transformer core and explain how it works.