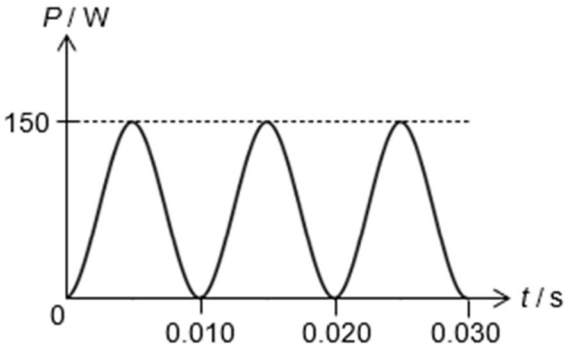
H2 Physics Revision Topic : Alternating Current

Multiple Choice Questions Name: _____

1 The graph shows the variation with time t of the power P dissipated in a resistor of resistance 6.0 Ω when it is connected to an alternating supply.

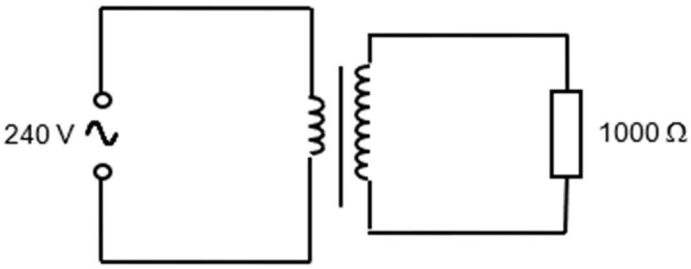


Which equation represents the sinusoidal alternating current through the resistor?

A $I = 5.0 \sin 100\pi t$ **B** $I = 5.0 \sin 200\pi t$

C $I = 25 \sin 100\pi t$ **D** $I = 25 \sin 300\pi t$

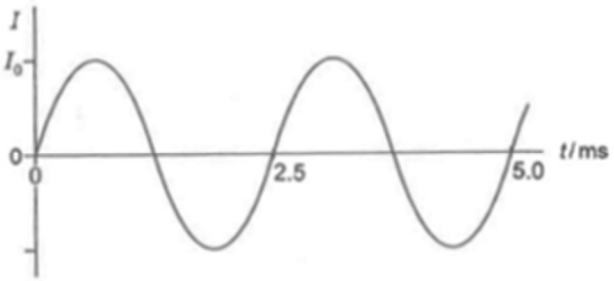
2 An ideal transformer is used to step-up a 240 V a.c. power supply. The output is used to heat a 1000 Ω resistive load. The ratio of the primary turns to secondary turns is 1:5.



What is the current in the primary coil?

A 0.24 A **B** 1.2 A **C** 6.0 A **D** 36 A

3 The graph shows the variation with time t of an alternating current I.
The peak current is I_0.



Which expression gives the alternating current I?

A $I = I_o \sin(5\pi t)$

B $I = I_o \sin\left(\frac{2\pi t}{2.5}\right)$

C $I = I_o \sin\left(\frac{\pi t}{0.0025}\right)$

D $I = I_o \sin(800\pi t)$

4 A sinusoidal voltage supply at 50 Hz connected across a resistor of 200 Ω delivers a peak current of 2.0 A. The frequency of the supply is doubled to 100 Hz.

What is the mean power dissipated in the resistor at the higher frequency?

A 200 W **B** 400 W **C** 800 W **D** 1600 W

5 An alternating sinusoidal supply is connected to a resistor.

How does the power that dissipates in the resistor change when the frequency of the alternating supply doubles?

A Power drops to half the initial value.

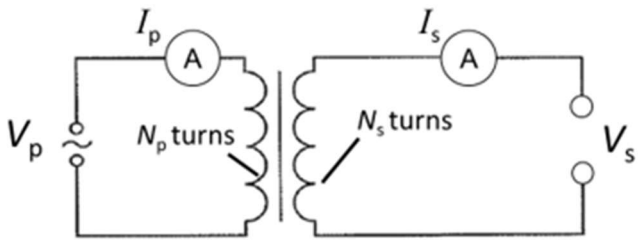
B Power stays the same.

C Power doubles.

D Power quadruples.

6

In a laboratory experiment to test a transformer, a student used the circuit as shown to take measurements.



Two of the data entries are missing from the student's table below:

V_p / V	I_p / mA	N_p turns	V_s / V	I_s / mA	N_s turns
240	2.0	?	?	50	50

Assuming the transformer is 100% efficient, what should the missing data entries be?

	N_p turns	V_s / V
A	25	9.6
B	25	480
C	1250	9.6
D	1250	6000

7 A circuit with a sinusoidal alternating power supply is rectified with a diode as shown.

before rectification **after rectification**

The mean power of the circuit before rectification is *P*.

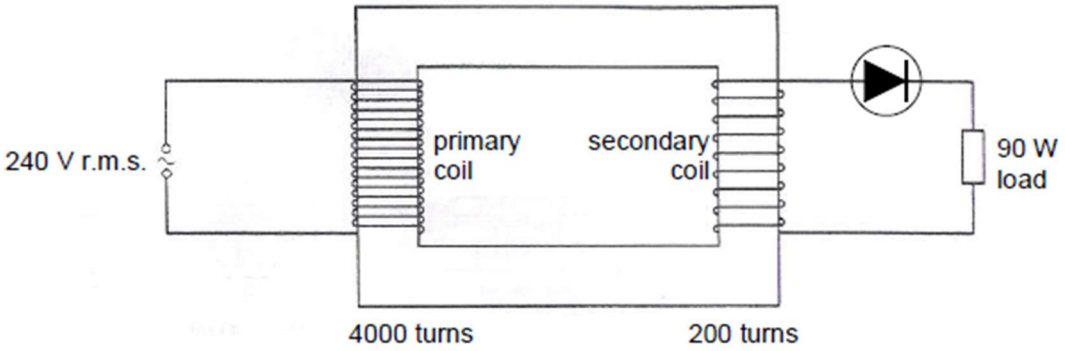
What is the peak and mean power of the circuit after rectification?

	peak power	mean power
A	0.5*P*	0.5*P*
B	*P*	0.5*P*
C	2*P*	0.5*P*
D	2*P*	*P*

8 A device that produces a pointer deflection proportional to the heating effect of a current is correctly calibrated for direct current. What will it read when used to measure an alternating current of 12 A r.m.s.?

A 0 A **B** 8.5 A **C** 12 A **D** 17 A

9 The diagram shows an iron-cored transformer assumed to be 100% efficient. The primary coil of the transformer has 4000 turns and is connected to a 240 V r.m.s. supply. The secondary coil has 200 turns and is connected, through an ideal diode, to a resistive load which is dissipating energy at a mean rate of 90 W.



What is the r.m.s. current in the secondary coil.

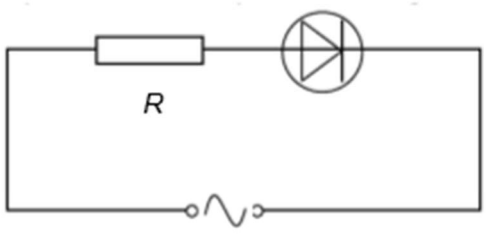
A 0.375 A **B** 0.750 A **C** 7.50 A **D** 10.6 A

10 When an alternating current, $I = I_0 \sin \omega t$, passes through a resistor, the mean power dissipated in the resistor is P. The peak value of the alternating current is then changed to $2 I_0$ and the frequency is halved.

What is now the mean power dissipated in the resistor?

A P **B** $\sqrt{2}\,P$ **C** $2P$ **D** $4P$

11 A sinusoidal current of peak value I_0 is passed through the circuit shown.



What is the mean rate of heat dissipated in terms of R?

A $1.41\, I_0^2 R$ **B** $I_0^2 R$

C $0.5\, I_0^2 R$ **D** $0.25\, I_0^2 R$

12

The ratio of turns of the primary coil to the secondary coil of a practical transformer is 10:1. The primary coil p.d. and current are 20 V and 3 A respectively. The efficiency of the transformer is 0.8.

Assuming that the energy loss is purely due to the resistance of the windings, which of the following statements is false?

A The secondary voltage is 2 V.

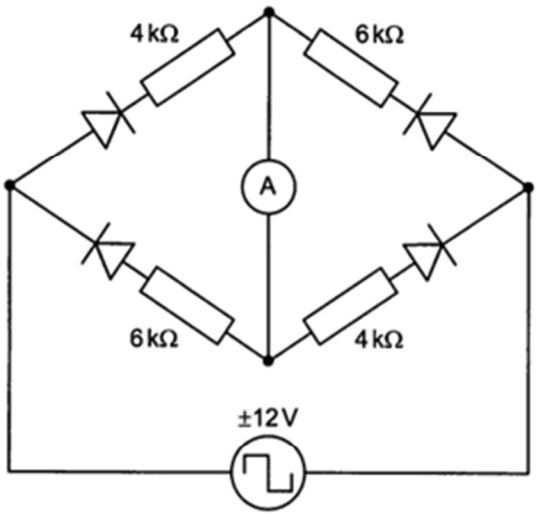
B The secondary current is 24 A.

C The output power is 60 W.

D The power loss is 12 W.

13

The diagram shows a diode-resistor network. The network is connected to a 12 V source that changes it polarity at regular intervals. The direction of the current leaving the source is either left to right or right to left.



The ammeter records the mean current in the central link between the upper and lower parts of the network. The diodes have either zero or infinite resistance.

What is the mean reading on the ammeter?

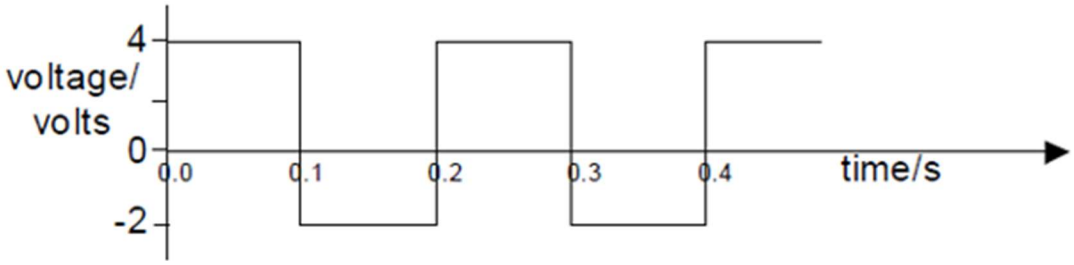
A 1.00 mA **B** 1.25 mA **C** 1.50 mA **D** 2.50 mA

14

An alternating potential difference $V = V_0 \sin(\omega t)$ is applied across a resistor in a circuit, causing a current $I = I_0 \sin\omega t$ *to* flow in the resistor . The mean power dissipated in the resistor is

A $V_0 I_0 \sqrt{2}$ **B** $\frac{V_0 I_0}{2}$ **C** $\frac{V_0 I_0}{\sqrt{2}}$ **D** zero

15 A 20 Ω resistor is connected to an AC power supply with a voltage output that varies from 4V to −2V at equal time intervals as shown on the graph below. What is the average heating power dissipated in the resistor?



A 0.20 W **B** 0.50 W **C** 0.80 W **D** 1.0W