Name of the Student:_____
Max. Marks : 20 Marks **Time : 20 Minutes**

Q1

A sinusoidal alternating voltage source of frequency 500 Hz is connected to a resistor of resistance 2.0 kΩ and an oscilloscope, as shown in **Figure 1**.

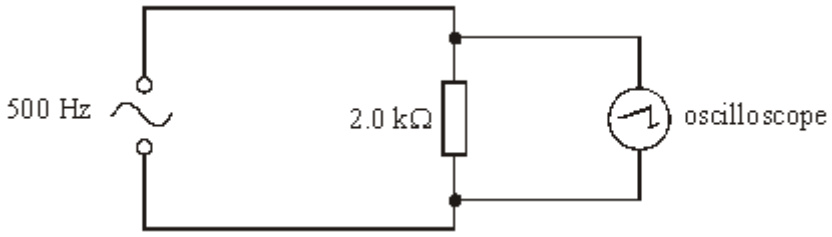


Figure 1

(a) The rms current through the resistor is 5.3 mA. Calculate the peak voltage across the resistor.

_____

_____

_____

(2)

(b) The settings on the oscilloscope are

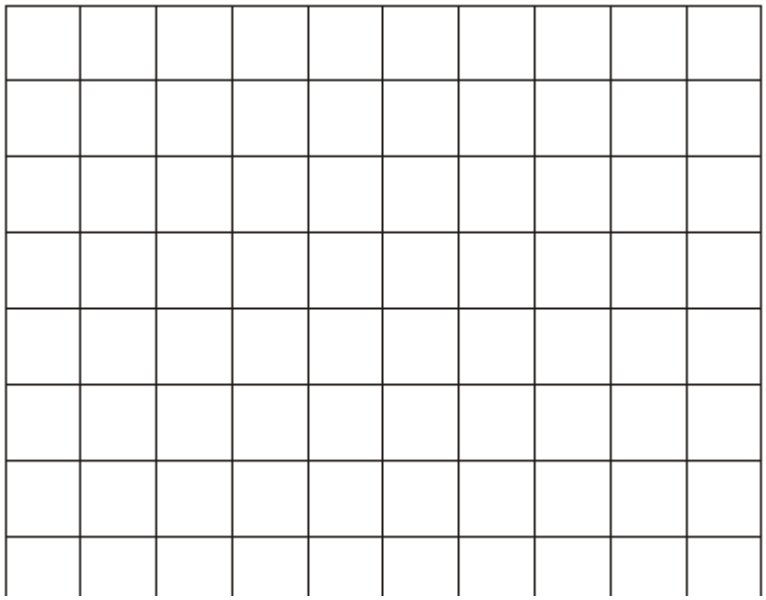
timebase: 250 µs per division,
voltage sensitivity: 5.0 V per division.

Draw on the grid, which represents the screen of the oscilloscope, the trace that would be seen.

_____

_____

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(4)
(Total 6 marks)

Q2.

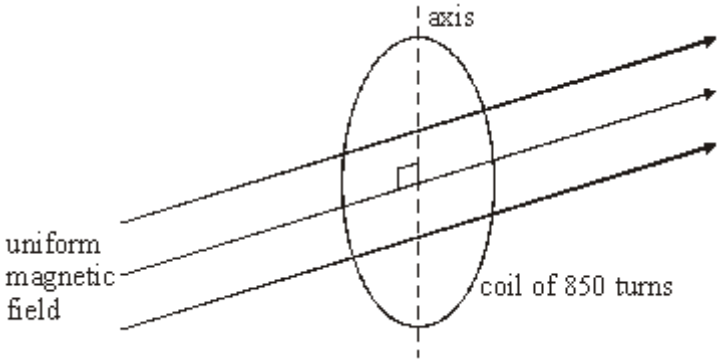


Figure 1

A circular coil of diameter 140 mm has 850 turns. It is placed so that its plane is perpendicular to a horizontal magnetic field of uniform flux density 45 mT, as shown in **Figure 1**.

(a) Calculate the magnetic flux passing through the coil when in this position.

_____

_____

(2)

(b) The coil is rotated through 90° about a vertical axis in a time of 120 ms.

Calculate

(i) the change of magnetic flux linkage produced by this rotation,

_____

_____

(ii) the average emf induced in the coil when it is rotated.

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_____

_____

_____

(4)

(Total 6 marks)

Q3.

An oscilloscope is connected to a sinusoidal ac source as shown in **Figure 1**.
The frequency and the voltage output of the ac source can be varied.

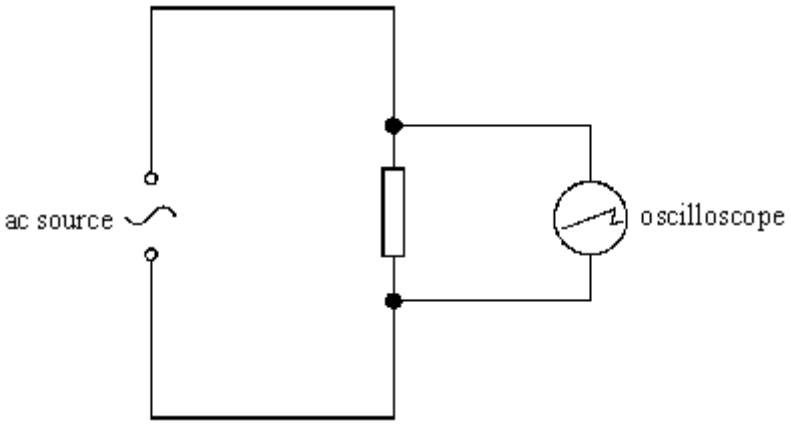


Figure 1

At a certain frequency the ac signal has an rms output of 7.1 V. **Figure 2** shows the trace obtained on the screen of the oscilloscope when one horizontal division corresponded to a time of 5.0 ms.

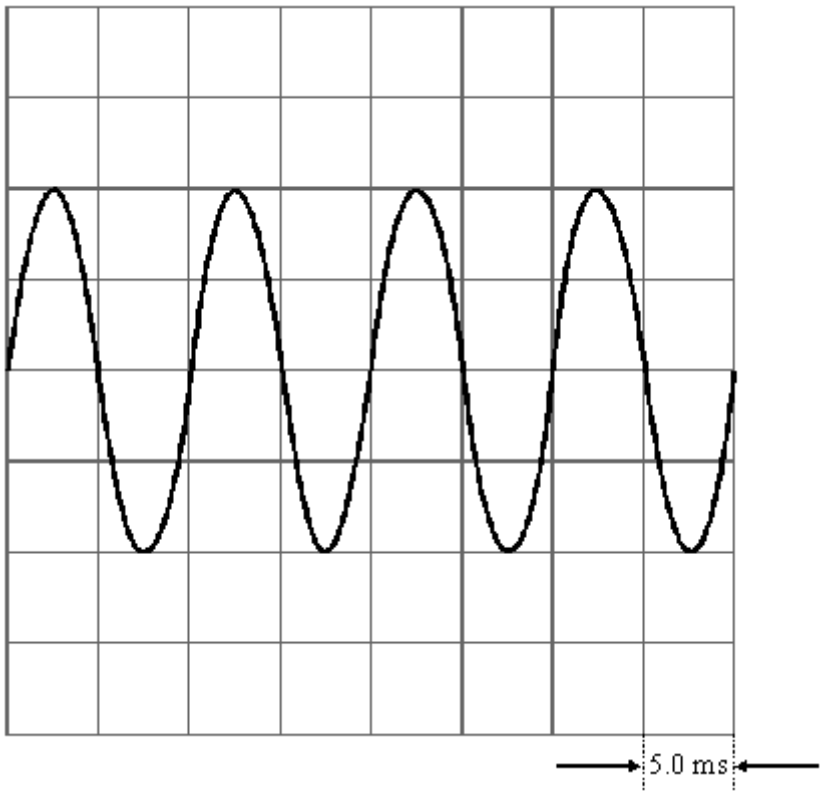


Figure 2

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(a) Calculate, for the signal shown in **Figure 2**,

(i) the peak voltage,

_____

(ii) the frequency.

_____

_____

(3)

(b) The voltage output and frequency of the signal are now changed so that the peak voltage is 80 V and the frequency is 200 Hz.

State which **two** controls on the oscilloscope have to be altered so that **four** full cycles again appear on the screen but the peak to peak distance occupies the **full** screen.

Determine the values at which these two controls have to be set.

control 1: _____

value of the setting: _____

_____

_____

control 2: _____

value of setting: _____

_____

_____

(5)
(Total 8 marks)

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