

- 7 A step-down transformer is used to change a supply voltage to 5.0 V r.m.s. for use in a home appliance, as shown in Fig. 7.1. The primary and secondary coils are wound around the same iron core. Assume that the transformer is ideal.

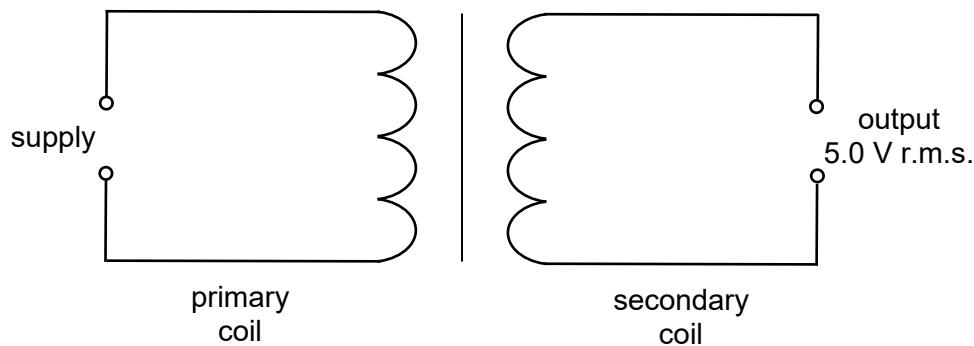


Fig. 7.1

- (a) Explain why the current in the primary coil must be an alternating current.

[1]

- (b) The transformer has a turns ratio of 0.022.

Determine the r.m.s. value of the supply voltage.

$$\text{supply voltage} = \dots \text{V r.m.s.} \quad [2]$$

- (c) The output in Fig. 7.1 has a frequency of 50 Hz and is connected to an ideal diode and a resistor R as shown in Fig. 7.2.

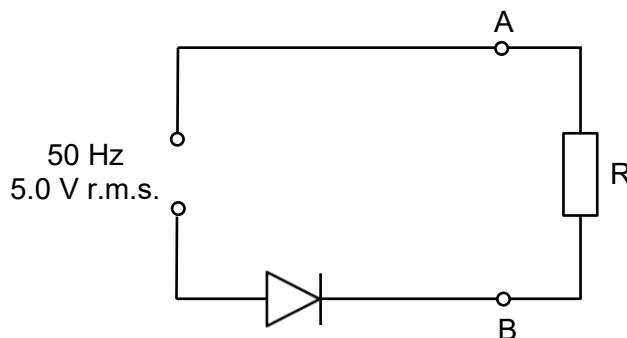


Fig. 7.2

- (i) Calculate the maximum potential difference across the diode during one cycle.

potential difference = V [1]

- (ii) State and explain the potential difference across R when the diode has maximum potential difference across it.

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 [2]

- (iii) The Y-plates of a cathode-ray oscilloscope (c.r.o.) are connected to points A and B.

Fig. 7.3 shows the screen of the c.r.o., which is used to display the variation with time of the potential difference across R. On the vertical scale, 1.0 cm represents 2.0 V. On the horizontal scale, 1.0 cm represents 5.0 ms.

On Fig. 7.3, draw the waveform that is seen on the screen of the c.r.o.

[2]

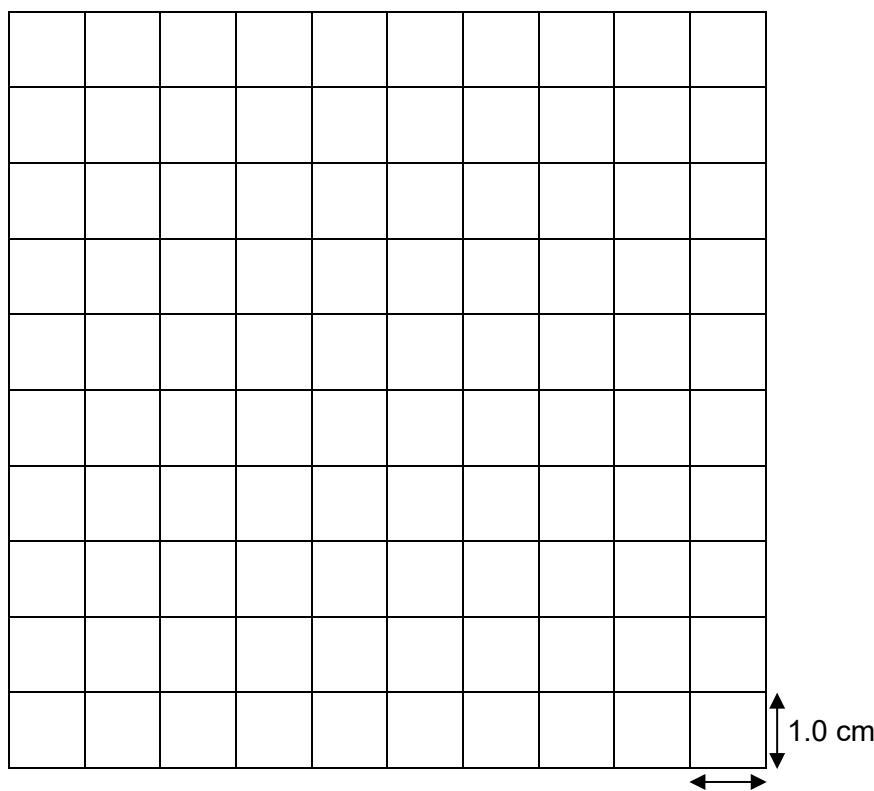


Fig. 7.3

1.0 cm