6 **(a)** A simple iron-cored transformer is illustrated in Fig. 5.1.

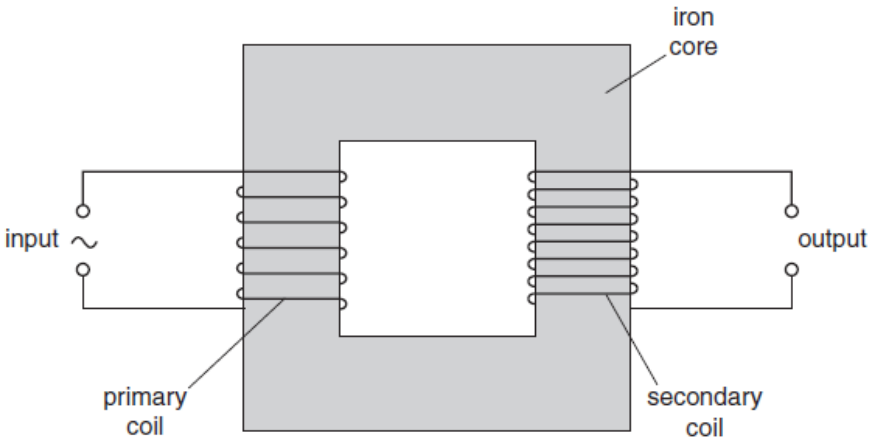

Fig. 5.1

(i) Explain why the primary and secondary coils are wound on a core made of iron.

.....

..... [1]

(ii) Suggest why thermal energy is generated in the core when the transformer is in use.

.....

.....

.....

.....

.....

.....

..... [2]

(b) A student is asked to design a circuit by which a direct voltage of peak value 9.0 V is obtained across a load from a 240 V alternating supply. The student uses a transformer that may be considered to be ideal and a rectifier incorporating an ideal diode.

The partially completed circuit diagram is shown in Fig. 5.2.

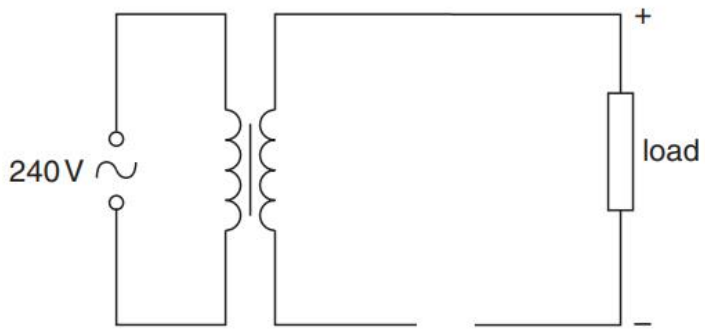

Fig. 5.2

(i) On Fig. 5.2, insert a symbol for the diode so as to produce the polarity across the load as shown on the diagram. [1]

(ii) Calculate the ratio

$$\frac{\text{number of turns in the secondary coil}}{\text{number of turns in the primary coil}}.$$

ratio = ... [3]

(iii) The load has a resistance of 4.5 Ω.

Calculate the mean power dissipated in the load.

mean power = ... W [2]

[Total: 9]

Section B

Answer **one** question from this Section in the spaces provided.