7 **(a)** Alternating current (a.c.) is converted into direct current (d.c.) using a full-wave rectification circuit. Part of the diagram of this circuit is shown in Fig. 7.1.

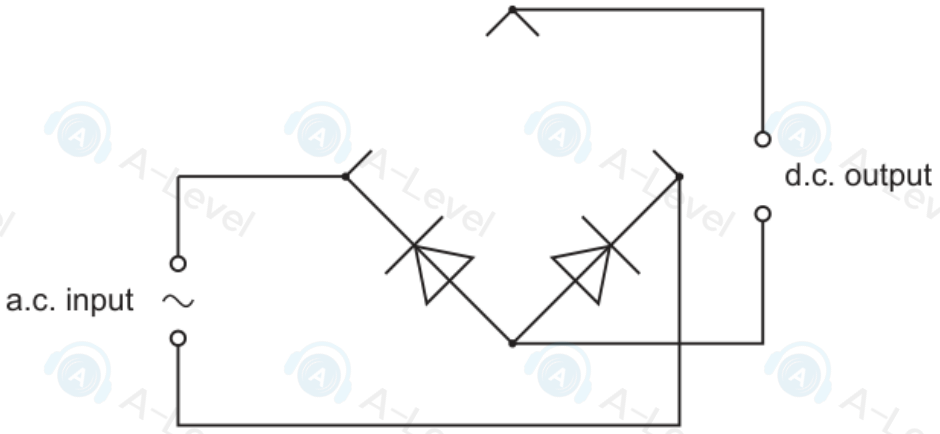

Fig. 7.1

(i) Complete the circuit in Fig. 7.1 by adding the necessary components in the gaps. [1]

(ii) On Fig. 7.1 mark with a + the positive output terminal of the rectifier. [1]

(b) The output voltage V of an a.c. power supply varies sinusoidally with time t as shown in Fig. 7.2.

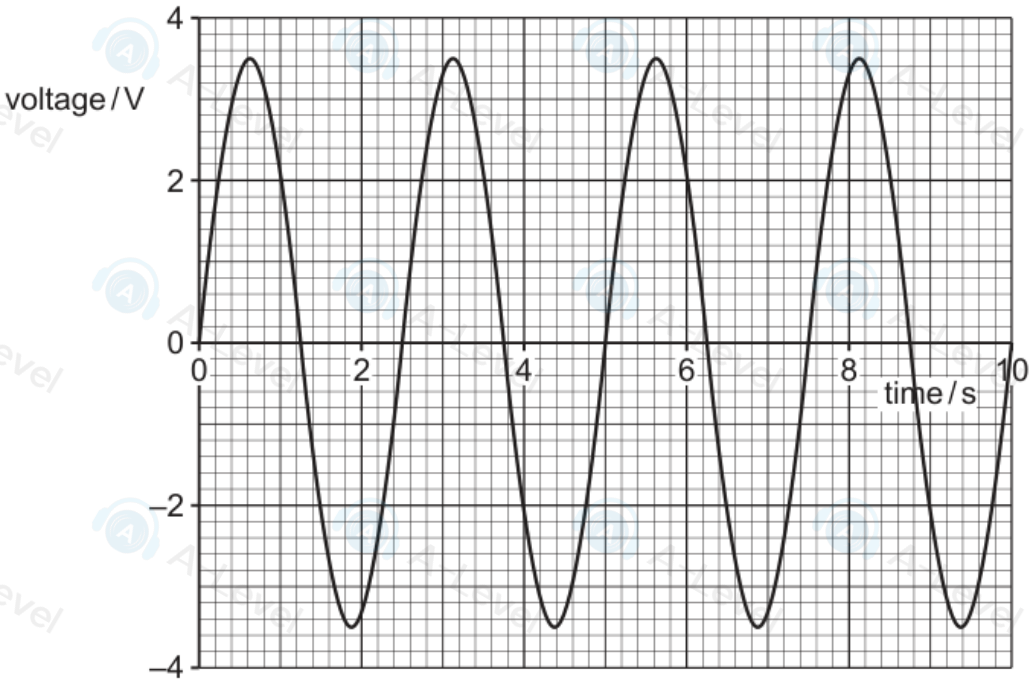

Fig. 7.2

(i) Determine the equation for V in terms of t, where V is in volts and t is in seconds.

V = ... [2]

(ii) The supply is connected to a 12 Ω resistor. Calculate the mean power dissipated in the resistor.

4 **(a)** State what is represented by an electric field line.

.....

..... [2]

(b) Two point charges P and Q are placed 0.120 m apart as shown in Fig. 4.1.

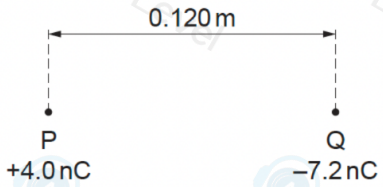

Fig. 4.1

(i) The charge of P is +4.0 nC and the charge of Q is –7.2 nC.

Determine the distance from P of the point on the line joining the two charges where the electric potential is zero.

distance = ... m [2]

(ii) State and explain, without calculation, whether the electric field strength is zero at the same point at which the electric potential is zero.

.....

.....

..... [1]

(iii) An electron is positioned at point X, equidistant from both P and Q, as shown in Fig. 4.2.