

- 6 (a) Explain the term root mean square (r.m.s.) value of a current.

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[1]

- (b) An alternating current generator consists of a rectangular coil of 800 turns with the dimensions $5.0\text{ cm} \times 8.0\text{ cm}$ in a uniform magnetic field of magnitude 0.50 T . The coil has a resistance of 0.60Ω and it is connected to an external load of resistance 11Ω in a complete circuit. The coil is rotating at a constant speed of 240 revolutions per minute.

For the rotating coil, the e.m.f. induced, E is

$$E = NBA\omega \sin (\omega t)$$

where N is the number of turns, B is the magnetic field strength, A is the cross-sectional area of the coil, ω is the angular velocity of the coil, and t is time.

- (i) Determine the maximum voltage produced by this generator.

maximum voltage = V [2]

- (ii) Calculate the r.m.s. current through the external load.

r.m.s. current = A [2]

- (iii) On the axes in Fig. 6.1, sketch a graph of power dissipated, P in the external load against time, t for 2 cycles of the A.C. current.

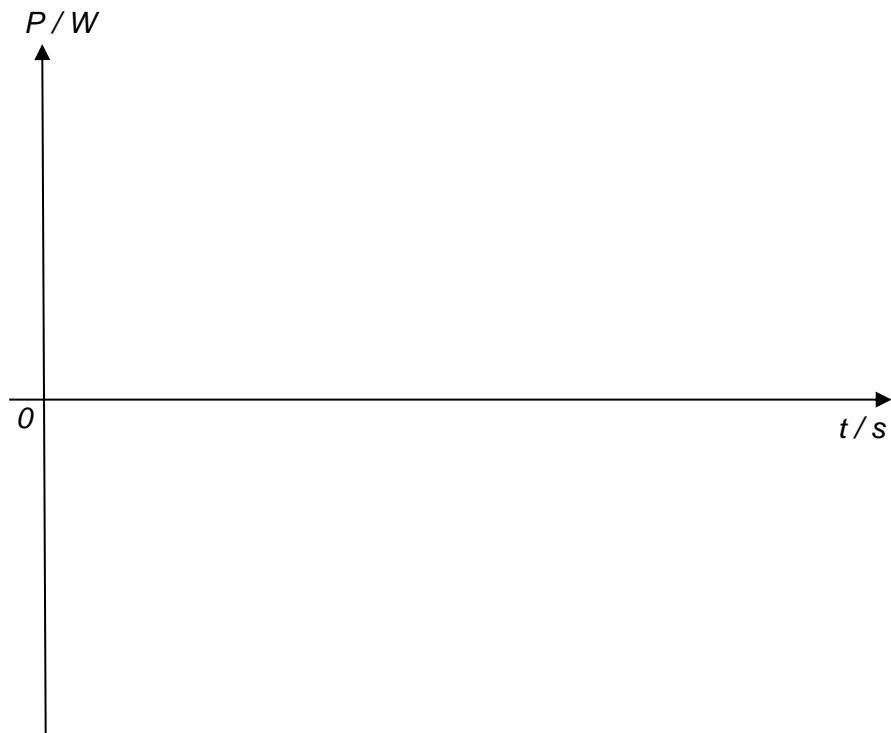


Fig. 6.1

[3]

[Total: 8]