

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

.....  
 .....  
 ..... [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  $0.50 \text{ T}$ . The coil has a resistance of  $0.60 \Omega$  and it is connected to an external load of resistance  $11 \Omega$  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,  $\omega$  is the angular velocity of the coil, and  $t$  is time.

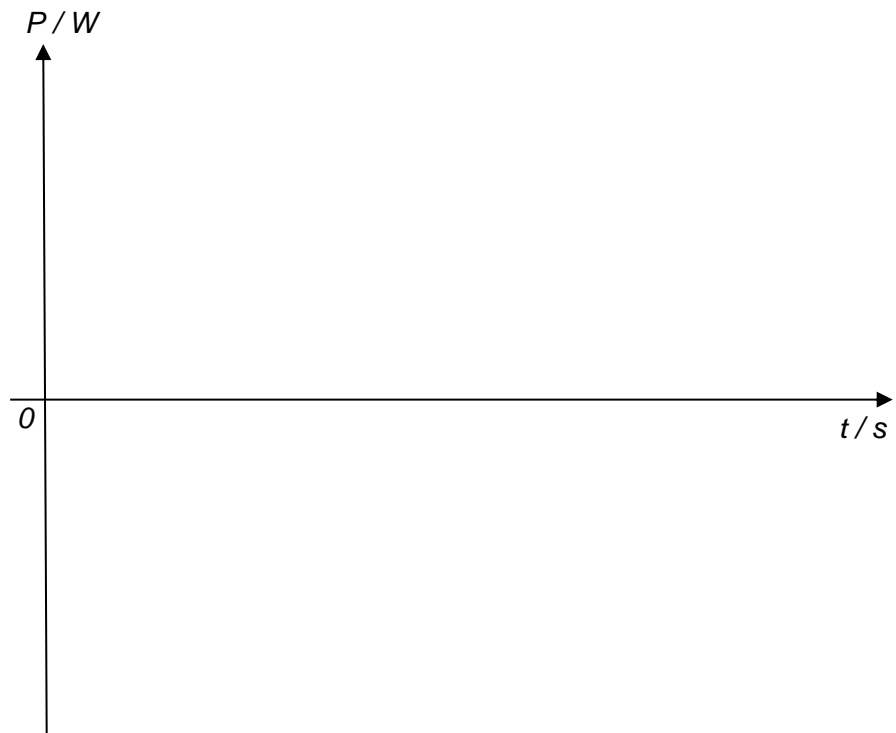
- (i) Determine the maximum voltage produced by this generator.

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]