**1. Transformers and rectification**

**6 (a)** Two similar coils **A** and **B** of insulated wire are wound on to a soft-iron core, as

illustrated in Fig. 6.1.****

When the current *I* in coil **A** is switched on and then off, the variation with time *t* of the

current is shown in Fig. 6.2.

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On Fig. 6.3, draw a graph to show the variation with time *t* of the e.m.f. *E* induced in coil **B**. [3]

 **(b)** Fig. 6.4 is the circuit of a bridge rectifier.

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An alternating supply connected across PR has an output of 6.0V r.m.s.

**(i)** On Fig. 6.4, circle those diodes that are conducting when R is positive with respect

to P. [1]

**(ii)** Calculate the maximum potential difference between points Q and S, assuming

that the diodes are ideal.

potential difference = .............................. V [2]

**(iii)** State and explain how a capacitor may be used to smooth the output from the

rectifier. You may draw on Fig. 6.4 if you wish.

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**e-m Induction (Plus s.h.m.)**

**3** An aluminium sheet is suspended from an oscillator by means of a spring, as illustrated in Fig. 3.1.

****An electromagnet is placed a short distance from the centre of the aluminium sheet.

The electromagnet is switched off and the frequency *f* of oscillation of the oscillator is

gradually increased from a low value. The variation with frequency *f* of the amplitude *a* of

vibration of the sheet is shown in Fig. 3.2.

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A peak on the graph appears at frequency *f*0.

**(a)** Explain why there is a peak at frequency *f*0.

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**(b)** The electromagnet is now switched on and the frequency of the oscillator is again

gradually increased from a low value. On Fig. 3.2, draw a line to show the variation with

frequency *f* of the amplitude *a* of vibration of the sheet. [3]

**(c)** The frequency of the oscillator is now maintained at a constant value. The amplitude of

vibration is found to decrease when the current in the electromagnet is switched on.

Use the laws of electromagnetic induction to explain this observation.

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