Q1. A lamp rated at 12 V 60 W is connected to the secondary coil of a step-down transformer and is at full brightness. The primary coil is connected to a supply of 230 V. The transformer is 75% efficient.
What is the current in the primary coil?

A 0.25 A

B 0.35 A

C 3.75 A

D 5.0 A

Q2. A transformer has 1150 turns on the primary coil and 500 turns on the secondary coil. The primary coil draws a current of 0.26 A from a 230 V ac supply. The current in the secondary coil is 0.50 A. What is the efficiency of the transformer?

A 42%

B 50%

C 84%

D 100%

(Total 1 mark)

Q3. Which one of the following statements concerning power losses in a transformer is **incorrect**?

Power losses can be reduced by

A laminating the core.

B using high resistance windings.

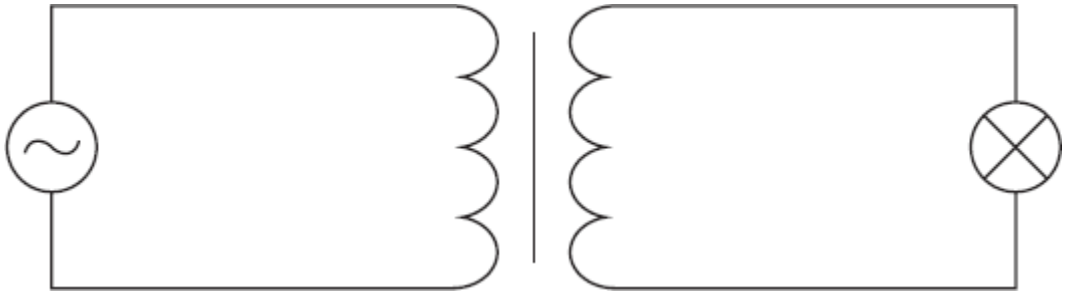
C using thick wire.

D using a core made of special iron alloys which are easily magnetised.

(Total 1 mark)

Q4. A transformer with 3000 turns in its primary coil is used to change an alternating pd from an rms value of 240 V to an rms value of 12 V.

When a 60 W, 12 V lamp is connected to the secondary coil, the lamp lights at normal brightness and a rms current of 0.26 A passes through the primary coil.



Which line, **A** to **D**, in the table gives correct values for the number of turns on the secondary coil and for the transformer efficiency?

	number of turns on the secondary coil	**efficiency**
A	150	96%
B	60 000	96%
C	150	90%
D	60 000	90%

(Total 1 mark)

Q5. Which one of the following would **not** reduce the energy losses in a transformer?

A using thinner wire for the windings
B using a laminated core instead of a solid core
C using a core made from iron instead of steel
D using a core that allows all the flux due to the primary coil to be linked to the secondary coil

(Total 1 mark)

Q6. Which one of the following is **not** a cause of energy loss in a transformer?

A good insulation between the primary and secondary coil

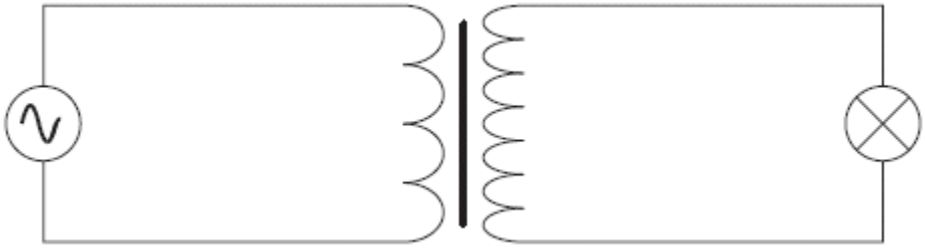
B induced currents in the soft iron core

C reversal of magnetism in the soft iron core

D resistances in the primary and secondary coil

(Total 1 mark)

Q7. The primary coil of a step-up transformer is connected to a source of alternating pd. The secondary coil is connected to a lamp.



Which line, **A** to **D**, in the table correctly describes the flux linkage and current through the secondary coil in relation to the primary coil?

	$\frac{\text{secondary magnetic flux linkage}}{\text{primary magnetic flux linkage}}$	$\frac{\text{secondary current}}{\text{primary current}}$
A	>1	<1
B	<1	<1
C	>1	>1
D	<1	>1

(Total 1 mark)

Q8. A transformer has 1200 turns on the primary coil and 500 turns on the secondary coil. The primary coil draws a current of 0.25 A from a 240 V ac supply. If the efficiency of the transformer is 83%, what is the current in the secondary coil?

A 0.10 A

B 0.21 A

C 0.50 A

D 0.60 A

Q9. A 230 V, 60 W lamp is connected to the output terminals of a transformer which has a 200 turn primary coil and a 2000 turn secondary coil. The primary coil is connected to an ac source with a variable output pd. The lamp lights at its normal brightness when the primary coil is supplied with an alternating current of 2.7 A.

What is the percentage efficiency of the transformer?

A 3%

B 10%

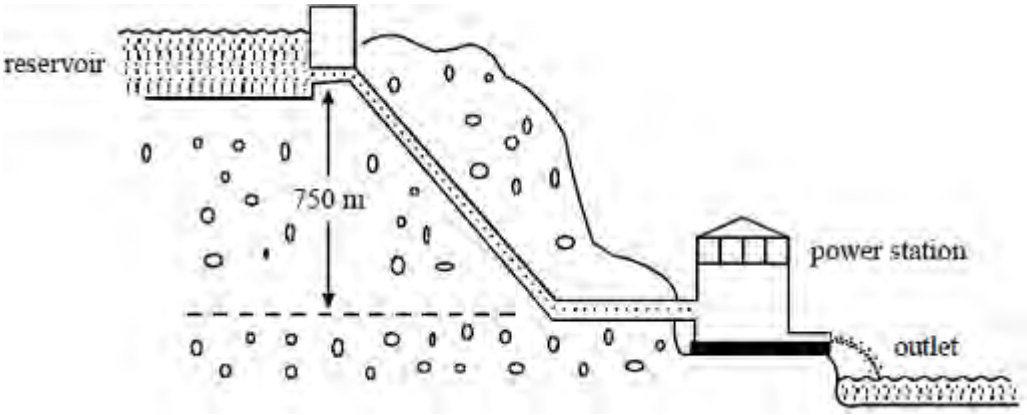
C 97%

D 100%

(Total 1 mark)

Q10. A hydroelectric power station has a power output of 2.0 MW when water passes through its turbines at a rate of 1.4 $m^3 s^{-1}$. The water is supplied from a reservoir which is 750 m above the power station turbines, as shown in the diagram below.

density of water = 1000 kg m^{-3}



(a) Calculate

(i) the mass of water passing through the turbines each second,

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(ii) the loss of potential energy per second of the water flowing between the reservoir and the power station turbines,

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(iii) the efficiency of the power station.

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(6)

(b) The turbines drive generators that produce alternating current at an rms potential difference of 25 kV which is then stepped up to an rms potential difference of 275 kV by means of a transformer.

(i) Calculate the rms current supplied by the generators to the transformer when the power output of the generators is 2.0 MW.

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(ii) The transformer has an efficiency of 95%. Calculate the output current of the transformer.

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(4)
(Total 10 marks)

Q11. (a) Calculate the length of copper wire that has a diameter of 1.6×10^{-3} m and a resistance of 25 Ω.

resistivity of copper = 1.7×10^{-8} Ω m

Length of wire .....

(3)

(b) The resistance of copper wire is **not** zero. Explain why this fact leads to the use of alternating current rather than direct current when transmitting electrical energy.

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(3)
(Total 6 marks)

Q12.(a) Explain what is meant by the term *magnetic flux linkage*. State its unit.

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(2)

(b) Explain, in terms of electromagnetic induction, how a transformer may be used to step down voltage.

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(4)

(c) A minidisc player is provided with a mains adapter. The adapter uses a transformer with a turns ratio of 15:1 to step down the mains voltage from 230 V.

(i) Calculate the output voltage of the transformer.

(2)

(ii) State **two** reasons why the transformer may be less than 100% efficient.

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(2)

(Total 10 marks)