4 **(a)** For an alternating current flowing in a heating coil, the average current is zero. Explain why there is heating effect produced in the coil.

.....

.....

..... [2]

(b) A power station needs to deliver 20.0 MW of power to a city 10.0 km away. This power is generated at 16.0 kV and then stepped up by using a transformer of turn ratio 15:1 before transmission. The resistance per unit length of the transmission cables is 20.0 $\Omega\,km^{-1}$.

The operator of the station loses \$0.10 for every kWh of electrical power lost.

(i) Calculate the power lost during transmission.

power lost = ... W [2]

(ii) Hence determine the amount of money saved by the station in one day when the energy is transmitted at the stepped-up voltage instead of the generated voltage.

amount saved = \$ ..... [2]