7.10 Electrical energy is transmitted over large distances at high alternating voltages. Which of the following statements is (are) correct?

(a) For a given power level, there is a lower current.

(b) Lower current implies less power loss.

(c) Transmission lines can be made thinner.

(d) It is easy to reduce the voltage at the receiving end using step-down transformers.

10. For given power level,

$$Power = (E_{rms})(I_{rms}) = (I_{rms}^2) R$$

Option (a)   For a given power level (i.e. P is constant)

(✓) $E_{rms} \propto \dfrac{1}{I_{rms}}$

As E_{rms} is high (Given)

⇒ I_{rms} is low

Option (b)   As $P \propto I_{rms}$

(✓)   ⇒ Lower current is implies less power loss.

Option (c)   Transmission lines cannot be made thinner
(✗)   as it may lead to current overflow which
can result in heavy accidents.

Option (d)   Step-down transformers are used in reducing
the voltage level, So, they can be used to
reduce voltage at receiving end,

11. $P = I^2 Z \cos\phi$ (Given)