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A step-up transformer near a power plant increases the plant's output root-mean square (r.m.s) voltage from 12.0 kV to 240 kV. Step-down transformers near the consumers reduce the r.m.s voltage to 240 V.

The power station produces 20.0 MW of power. The total resistance of the transmission cables is $200\,\Omega$.

(a)

Explain what is meant by *root-mean-square voltage* when applied to a sinusoidal alternating voltage.

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……………………………………………………………………………………….............

………………………………………………………………………………………………

[2]

(b)
(i)
Determine the turns ratio of the transformer that is located near the power plant.

turns ratio = ...
[1]

(ii)
Determine the peak power lost during transmission.

peak power = ... kW
[3]