Report

6.1 $I_{line} = 0.14\,A$

$V_R = I_{line} R_{line}$

$R_{line} = 0.27 \div 0.14 = 1.55\,\Omega$

$V_X = I_{line} X_{line}$

$X_{line} = 0.476 \div 0.14 = 3.4\,\Omega$

$\%\ error = \frac{1.55 - 1.5}{1.5} \times 100\% = 3.33\%$

$\%\ error = \frac{3.4 - 2\pi(50)(10\times10^{-3})}{2\pi(50)(10\times10^{-3})} \times 100\% = 8.23\%$

$L = \frac{3.4}{2\pi(50)} = 10.8\,mH$

6.2 a) Real power consumed by load $= I_{load} V_{load}$

$= (2.05)(6.560)$

$= 13.448\,W$

b) Real power loss in transmission line $= I_{line}^2 R_{line}$

$= (0.14)^2(1.55)$

$= 0.03038\,W$

c) Total power loss $= P_{source} - P_{load}$

$= 18.0 - 13.448$

$= 4.552\,W$

d) Efficiency $= \frac{P_{load}}{P_{source}} \times 100\%$

$= \frac{13.448}{18.0} \times 100\%$

$= 74.7\%$

e) Percentage voltage drop $= \frac{V_{source} - V_{load}}{V_{source}} \times 100\%$

$= \frac{1.54}{8.10} \times 100\%$

$= 19.0\%$

6.3 a) Real power consumed by load resistor $= I_{load} V_{load}$

$= 1.25 \times 3.884$

$= 4.855\,W$

b) Real power loss in transmission line $= I_{load}^2 R_{line}$

$= (1.25^2)(1.55)$

$= 2.4219\,W$

c) Total power loss $= P_{source} - P_{load}$

$= 8.2 - 4.855 = 3.345\,W$