Section 12: Cost of Electrical Energy

Recall $E = Pt$

where ***P*** is the power in kW
t is the time in hours
E is the energy in kWh

Cost of Electrical Energy = Energy used $\times$ rate per kWh

Examples

1 Your clock radio draws a current of 42 mA of current on a 120 V line. At a cost of 8.1 ¢/kWh, how much does it contribute to your family's annual electricity bill?

$I = 42 \times 10^{-3}\ A$

$V = 120\ V$

Rate : 0.081

$t = 365 \text{ d} \times 24 \text{ h}$

$t = 8760\ h$

$P = VI$
$= (42 \times 10^{-3}\ A)(120\ V)$
$= 5.04\ W$
$= 5.04 \times 10^{-3}\ kW$

$E = Pt$
$= (5.04 \times 10^{-3}\ kW)(8760\ h)$
$= 44.15\ kWh$

$\text{Cost} = 44.15\ \text{kWh} \times \$0.081\ \text{kWh}$
$= \$3.58$

2 The elements in your hot water tank cut in for a total of 210 min/day and draws a current of 18 A on a 220 V line. If the cost is 7.0¢/kWh, how much does hot water cost for the month of February?

$t = 210\ \frac{\text{min}}{\text{d}} \times 28\ \text{d} \times \frac{1\ \text{h}}{60\ \text{min}} = 98\ \text{h}$

$I = 18\ \text{A}$

$V = 220\ \text{V}$

$P =$

$P = VI = (220\ \text{V})(18\ \text{A}) = 3960\ \text{W}$

$P = 3.96\ \text{kW}$

$E = Pt$

$= (3.96\ \text{kW})(98\ \text{h}) = 388.08\ \text{kwh}$

$\text{Cost} = (388.08\ \text{kwh})(0.07\ \text{kwh})$

$= \$27.17$

Do questions 1-3 page 617 and questions 36-40 page 623-624.