

Ch 4 (30, 31, 40, 46, 47, 59, 61)

4-30

GIVEN: 120V COFFEE MAKER RATED @ 960W

REQD: RESISTANCE & RATED CURRENT

SOLN:

$$P = \frac{V^2}{R} \Rightarrow R = \frac{V^2}{P} = \frac{(120V)^2}{960W} = \boxed{15\Omega = R}$$

$$P = IV \Rightarrow I = \frac{P}{V} = \frac{960}{120} = \boxed{8A = I}$$

4-31

GIVEN: 1200W HEATER HAS $R = 6\Omega$

REQD: I

SOLN

$$P = I^2 R \Rightarrow I = \sqrt{\frac{P}{R}} = \sqrt{\frac{1200W}{6\Omega}} = \boxed{14.1A = I}$$

4-40

GIVEN: LOADS ON 120V CKT: 6 100W LAMPS, 1200W HEATER, 1500W MOTOR
CKT FUSED @ 30A

REQD: EFFECT OF ADDING 900W TOASTER?

SOLN:

$$P_{TOT} = 6(100W) + 1200 + 1500W = 3700W$$

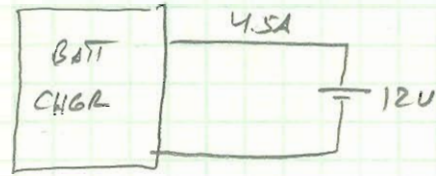
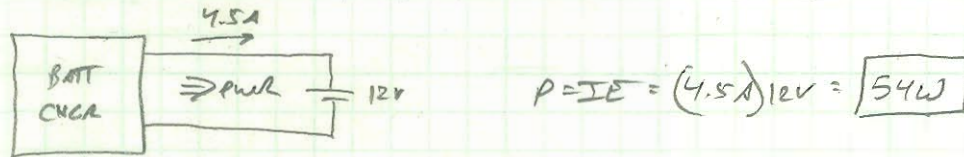
$$I = \frac{P}{V} = \frac{3700}{120} = 27.5 < 30A \text{ FUSE} \rightarrow \text{CKT NOT OVERLOADED}$$

$$\text{ADD } 900W \rightarrow P = 4200W$$

$$I = \frac{P}{V} = \frac{4200}{120} = \boxed{35A > 30A \rightarrow \text{FUSE WILL BLOW}}$$

4-46GIVEN: 12V BATTERY IS CHGD AT 4.5AREAD:

- direction of CURRENT
- direction of POWER
- POWER TO BATTERY

SOLNBATT CHGR VOLTAGE \approx BATTERY VOLTAGE WHEN CHARGING4-47GIVEN: 40W NIGHT LIGHT BURNS FOR 9 HOURSREAD: ENERGY (J), W-Hrs, COST @ 8.0¢/kWhSOLN

$$E = P t = \frac{40W}{9 \text{ hrs}} = \boxed{360 \text{ W-hrs}}$$

$$E = \frac{360 \text{ W-hr}}{3600 \text{ sec/hr}} \times \frac{1 \text{ J}}{1 \text{ W-sec}} = \boxed{1.3 \text{ MJ}}$$

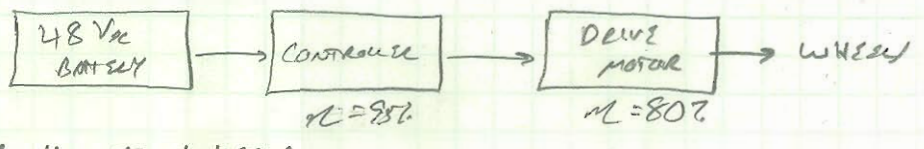
$$C = E c = \frac{360 \text{ W-hr}}{1000 \text{ W}} \times \frac{0.08}{\text{kWh}} = \boxed{2.9 \text{¢}}$$

4-59GIVEN: 120 Vac motor @ $\eta = 89\%$ w/ $I = 15A$ READ: OUTPUT HpSOLN:

$$P_{out} = \eta P_{in} = \eta VI = \frac{0.89}{120 \text{ V}} \times \frac{15 \text{ A}}{746 \text{ W}} = \boxed{2.1 \text{ Hp}}$$

4-61

GIVEN: $I = 180A$



REQ H_p TO WHEELS

SOLN

$$P_{in} = VI = 48V_{dc}(180A) = 8640W$$

$$P_{out} = \eta_{cont} \eta_{motor} P_{in} = 0.95(0.80) 8640W = 6566W$$

$$P_{out} = \frac{6566W}{746W} = \boxed{8.8 H_p}$$