Chapter 1: Introduction to Electrical Engineering – Instructor Notes

Chapter 1 is introductory in nature, establishing some rationale for studying electrical engineering methods, even though the students' primary interest may lie in other areas. The material in this chapter should be included in every syllabus, and can typically be thoroughly covered in a single-day introductory lecture. Oftentimes, reading of this material is left up to the discretion of the student.

Problem 1.1

Solution:

A few examples are:

Bathroom
- ventilation fan
- electric toothbrush
- hair dryer
- electric shaver
- electric heater fan

Kitchen
- microwave fan
- microwave turntable
- mixer
- food processor
- blender
- coffee grinder
- garbage disposal
- ceiling fan
- electric clock
- exhaust fan
- refrigerator compressor
- dish washer

Utility Room
- clothes washer
- dryer
- air conditioner
- furnace blower
- pump

Family Room
- VCR drive
- cassette tape drive
- reel-to-reel tape drive
- record turntable drive
- computer fan
- treadmill

Miscellaneous
- lawn tools
- power tools

Problem 1.2

Solution:

Several examples are listed below for each system:

a) A ship

- Circuit Analysis
  - design of the ship's electrical system
- Electromagnetics
  - radar
- Solid-State Electronics
  - radio
  - sonar
- Electric Machines
  - pump
  - elevator
- Electric Power Systems
  - lighting
  - generators
- Digital Logic Circuits
  - elevator control
- Computer Systems
  - navigation
- Communication Systems
  - radio
  - telephone
- Electro-Optics
  - Morse light
  - bridge displays
- Instrumentation
  - compass
  - speed indicator
- Control Systems
  - rudder
  - HVAC

b) A Commercial Passenger Aircraft

- Circuit Analysis
  - Design of the plane's electrical system
- Electromagnetics
  - radar
  - microwave oven
- Solid-State Electronics
  - radio
- Electric Machines
  - turbines
  - fans
- Electric Power Systems
  - lighting
  - HVAC
- Digital Logic Circuits
  - seat belts
- Computer Systems
  - navigation

Communication Systems
radio
telephone
Electro-Optics
cockpit displays
Instrumentation
compass
air speed indicator
inclinometer
altimeter
Control Systems
rudder
flaps

c) Household
Circuit Analysis
design of the home's electrical system
Electromagnetics
microwave oven
stereo speakers
Solid-State Electronics
television
stereo
VCR
Electric Machines
appliances
power tools
fans
Electric Power Systems
lighting
HVAC
receptacles
Digital Logic Circuits
clocks
timers
Computer Systems
microwave oven
programmable
VCR
Communication Systems
telephone
CB radio
television
radio
Electro-Optics
digital clocks
Instrumentation
electric meter
Control Systems
thermostat

Problem 1.3

Solution:

Some examples are:

a) HVAC
lighting
office equipment
- typewriter
- computer
- copy machine
- clock
- stapler
- shredder

elevator

b) conveyor
punch press
lighting
ventilation
drill press
hoist
lathe

c) power saw
drill
lighting
elevator
pump
compressor
