

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
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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
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