

Sault College of Applied Arts and Technology
Sault Ste. Marie, Ontario
Course Outline

Course Title: Electrical Fundamentals
Code No.: ELR 104-3
Program: Aviation
Author: A. Gooderham
Date: Aug.31, 1993 Previous Outline Date: Aug.1992

Approved: Coordinator _____ Date _____

Dean _____ Date _____

Topics to be Covered:

- 1. Electrical units
- 2. Conductors and resistors
- 3. Series circuits
- 4. Parallel circuits
- 5. Resistive circuits
- 6. Inductance
- 7. Magnetic circuits
- 8. Inductance
- 9. Capacitance
- 10. Alternating current fundamentals
- 11. AC circuit analysis
- 12. Electronic devices
- 13. Power supplies
- 14. Digital components
- 15. Digital circuits

Course Name:
Electrical Fundamentals

Code No.:
ELR 104-3

Total Credit Hours: 51
Prerequisites: None

I. Philosophy/Goals:

An introduction to electrical quantities and units; Ohm's and Kirchhoff's Laws; DC series, parallel, series/parallel circuits; DC network analysis; magnetism and electromagnetism; capacitance and inductance; sine wave characteristics and phasors; basic series and parallel RLC circuit analysis; electronic devices and power supplies; fundamental digital electronics

II. Student Performance Objectives:

Upon successful completion of this course the student will:

- 1) Have a fundamental knowledge of AC and DC circuit theory
- 2) Be able to simplify and analyze basic AC and DC circuits comprised of resistors, capacitors and inductors
- 3) Understand basic magnetic and electromagnetic principles
- 4) Use phasors and complex numbers to assist in analysis of AC circuits
- 5) Be able to identify basic electronic components and analyze power supply operations
- 6) Be able to identify and analyze basic digital electronic components and circuits

III Topics To Be Covered:

- 1) Electrical units
- 2) Conductors and insulators
- 3) Series circuits
- 4) Parallel circuits
- 5) Series/parallel circuits
- 6) Magnetism
- 7) Magnetic circuits
- 8) Inductance
- 9) Capacitance
- 10) Alternating current fundamentals
- 11) AC circuit analysis
- 12) Electronic devices
- 13) Power supplies
- 14) Digital components
- 15) Digital circuits

ELECTRICAL FUNDAMENTALS

IV.	LEARNING ACTIVITIES	REQUIRED RESOURCES
		BELL TEXT
1	SYSTEM OF UNITS Fundamental Units, Scientific Notation, Electric Current, Resistance, Conductance, Potential Difference, Voltage (EMF), Ohm's Law, Electrical Power and Energy, Electrical Measurement	CH. 1 & 3
2	CONDUCTORS, INSULATORS, RESISTORS Construction, Temperature Effect, Resistor Colour Code, Dry Cells	CH. 4
3	SERIES CIRCUITS Voltage and Current in a Series Circuit, Voltage Drops in a Series Circuit, Voltage Divider, Power, Open & Short Circuit, Problems	CH. 5
4	PARALLEL CIRCUITS Voltage, Current, Resistance in a Parallel Circuit, Parallel equivalent Circuits, Open & Short Circuits, Problems	CH. 6
5	SERIES-PARALLEL CIRCUITS Voltage & Current in a Series-Parallel Circuit, Equivalent Circuits of a Series-Parallel Circuit, Open and Short Circuits of a Series-Parallel Circuit, Analysis and Problems on Series-Parallel Circuits	CH. 7

Electrical Fundamentals

ELR104-3

LEARNING ACTIVITIES

REQUIRED RESOURCES

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| 6 | CAPACITANCE & INDUCTANCE
Definition of capacitance,
Capacitance in series & parallel,
Time constants, Types of Induction,
Inductors in series & parallel,
Inductive & capacitive circuits, Problems | CH. 14,15 & 16 |
| 7 | INTRODUCTION TO MAGNETISM
Permanent magnets, Electro-magnetic
theory, Reluctance and permeability,
Hysteresis, Eddy currents | CH. 11 & 12 |
| 8 | A.C. FUNDAMENTALS
Generation of AC voltage,
Analysis of sinewaves,
AC loads, Phasors and complex numbers,
Problems | CH. 17 |
| 9 | POWER IN AC CIRCUITS
An overview of impedance, RL,RC,RLC
series & parallel circuits, Power &
power factor correction | CH. 18,19,20 &
21 |
| 10 | PRINCIPLES OF DIODE AND TRANSISTOR
OPERATION | INSTRUCTORS
NOTES |
| 11 | POWER SUPPLY ANALYSIS, REGULATED
AND FILTERED | |
| 12 | BASIC GATES, AND, OR, NAND, FLIP FLOPS | |
| 13 | CIRCUIT OPERATION, TIMING DIAGRAMS | |
| OPTIONAL: BASIC AIRCRAFT ELECTRICAL CIRCUITRY
DC 8 SCHEMATIC ANALYSIS
DASH 8 SCHEMATIC ANALYSIS
LABORATORY EQUIPMENT FAMILIARIZATION | | |

