SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

Course Title: ELECTRICAL FUNDAMENTALS

Code No.: ELR 100-7

Program: ELECTRICAL/ELECTRONIC/COMPUTER TECHNOLOGY

Semester: ONE

Date: SEPTEMBER, 1985

Author: ROBERT PALO

New: _____ **Revision:** X

APPROVED: L.P. Arozetto
Chairperson

June 1985
Date

ELECTRICAL FUNDAMENTALS — Course Name

ELR 100-7 — Course Number

PHILOSOPHY/GOALS:

To provide a basic understanding of electricity and magnetism.

GRADING:

1. Written tests conducted at regular intervals and assigned equal weight. Missed tests are graded zero percent provided a legitimate excuse such as illness can be supported by a doctor's certificate. Comprehensive make-up tests at the end of the semester for people who missed tests with legitimate excuses.

2. Grading:
   A - 80 - 100%
   B - 66 - 79%
   C - 55 - 65%
   R - Repeat

3. 70% for tests, 30% for labs.

4. Lectures, labs and tutorials attendance mandatory.

TEXTBOOK(S):

"Fundamentals of Electric Circuits", 3rd Edition, David A. Bell

BLOCK #1

TOPIC	CHAPTER	HOURS
The nature of electricity	1	1
The intenational system of units	2	1
The electrical units	3	5
Conductors, insulators and resistors	5	2
Voltage cells and batteries	6	2
Series resistive circuits	7	3
Parallel resistive circuits	8	3
Series-parallel circuits	9	3
Network theorems	11	3
		23

TOPIC	CHAPTER	HOURS
Magnetism	12	5
Magnetic circuits	13	5
Inductance	15	5
		15

BLOCK #3

TOPIC	CHAPTER	HOURS
Capacitance	16	5
Inductance & capacitance in DC circuits	17	5
		10

SPECIFIC OBJECTIVES: BLOCK #1

The student should be able to recall, explain or apply:

1. The electrostatic laws
2. Atomic structure
3. Electromotive Force (EMF) & Current
4. Scientific notation
5. The force-mass relation
6. Potential energy eqn.
7. Kinetic energy eqn.
8. Power eqn.
9. Heat eqn.
10. Coulomb's law
11. Conventional & electron current flow
12. Force, work & power required to move charge through an electric field
13. Resistance & conductance
14. OHM's Law for electric circuits
15. Electric power formulas
16. Efficiency
17. Types of atomic bonding
18. Breakdown voltage in insulators
19. Conductor resistivity eqn.
20. Resistor construction & color core
21. Resistor power ratings
22. Simple voltage cell
23. AMP-HR rating
24. Difference between primary & secondary cells
25. Equivalent cell model of a battery
26. The types of dry cells
27. How voltage cells behave in series
28. How voltage cells behave in parallel
29. Construction of lead-acid batteries
30. The student shall be able to calculate the equivalent resistance, drops and power dissipation in the following single source DC circuits with
    a) Series resistance
    b) Parallel resistance
    c) Series-parallel resistance
31. The student shall be able to recall and explain
    a) The voltage divider law
    b) The current divider law
32. The student shall be able to explain and apply the superposition THM to resistive networks with more than one voltage or current source.

SPECIFIC OBJECTIVES - CONTINUED

BLOCK #1

39. The student shall be able to determine Thevenin's equivalent for a resistive network with one or more sources.

BLOCK #2

The student shall be able to recall, explain or apply:

1. The fundamental law of magnetism.
2. The fundamental law of electromagnetism.
3. Types of magnetic materials.
4. Magnetic moment & magnetic domains.
5. Magnetic flux and flux density.
6. Magnetomotive force (MMF) and magnetic field strength.
7. Force on a current carrying conductor in a magnetic field.
8. The relationship between flux density and field strength (permeability)
9. Reluctance equation.
10. Ampere's law for magnetic circuits.
11. The student shall be able to calculate the reluctance, flux, MMF drops in simple homogeneous and composite magnetic circuits composed of air and/or iron.
12. The student should be able to calculate the force of attraction between magnetic materials.

The student shall be able to recall, explain or apply:

13. Magnetization curves.
14. Hysteresis curves.
15. Eddy currents.
16. The fundamentals law of electromagnetic induction (Faraday's law).
17. Self Inductance equation.
18. Inductance of a solenoid.
19. Mutual inductance equation.
20. Mutual inductance between magnetically coupled solenoids.
21. Types of inductors.
22. Energy stored in an inductor.
23. Equivalent inductance for uncoupled inductors in series and parallel.

BLOCK #3

The student shall be able to recall, explain or apply:

1. Electric flux and flux density.
2. Electric field strength.
3. The relationship between electric flux density and electric field strength (permittivity).
4. Capacitance equation.
5. Capacitance between parallel electrical charged plates.
6. Capacitor types and characteristics.
7. Equivalent capacitance of series and parallel connected capacitors.
8. Energy stored in a charged capacitor.
9. The student shall be able to calculate the instantaneous current in a switched DC, R-L Circuit and a switched DC, R-C circuit.
10. The student shall be able to define and calculate the time constant for R-L and R-C circuits.