

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: ELECTRICAL FUNDAMENTALS

CODE NO.: ELR 100 - 5

PROGRAM: ELECTRICAL/ELECTRONIC SEMESTER: 1

AUTHOR: R. MCTAGGART

DATE: MAY, 1991 PREVIOUS OUTLINE DATED: AUG., 1989

APPROVED: W Filipowich
COORDINATOR

May 29/91
DATE

A. P. Crockett
DEAN

4/1/06/03
DATE

ELECTRICAL FUNDAMENTALS
COURSE NAME

ELR 100
CODE NO.

TOTAL CREDIT HOURS: 80

PREREQUISITE(S):

I. PHILOSOPHY/GOALS:

AN INTRODUCTION TO ELECTRICAL QUANTITIES AND UNITS; OHM'S AND KIRCHHOFF'S LAWS; SIMPLE DC SERIES, PARALLEL, SERIES-PARALLEL, AND VOLTAGE DIVIDER CIRCUITS; SIMPLE DC NETWORK ANALYSIS; MAGNETISM AND ELECTROMAGNETISM; INDUCTANCE AND CAPACITANCE; SINE WAVE CHARACTERISTICS AND PHASORS; BASIC SERIES AND PARALLEL RLC CIRCUIT ANALYSIS.

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 MAGNETISM AND ELECTROMAGNETISM;
4. USE PHASORS AND COMPLEX NUMBERS TO ASSIST IN ANALYSIS OF AC CIRCUITS.

III. TOPICS TO BE COVERED:

1. ELECTRICAL UNITS;
2. CONDUCTORS AND INSULATORS;
3. SERIES CIRCUITS;
4. PARALLEL CIRCUITS;
5. SERIES-PARALLEL CIRCUITS;
6. NETWORK THEOREMS;
7. MAGNETISM;
8. MAGNETIC CIRCUITS;
9. INDUCTANCE;
10. CAPACITANCE;
11. ALTERNATING CURRENT FUNDAMENTALS;
12. AC CIRCUIT ANALYSIS.

ELECTRICAL FUNDAMENTALS
COURSE NAME

ELR 100
CODE NO.

IV. LEARNING ACTIVITIES	REQUIRED RESOURCES
1. ELECTRICAL UNITS - ELECTRIFICATION BY FRICTION - PLANETARY ATOM - POTENTIAL DIFFERENCE, CURRENT AND RESISTANCE - BASIC SOURCE OF ELECTRICITY - ELECTRIC LAMP - ELECTRIC CIRCUIT - CIRCUIT DIAGRAMS - CURRENT DIRECTION - DIRECT CURRENT AND ALTERNATING CURRENT - ELECTRIC SHOCK - SCIENTIFIC NOTATION, METRIC PREFIXES, ENGINEERING NOTATION - RESISTANCE AND CONDUCTANCE - OHM'S LAW - APPLICATION OF OHM'S LAW - ELECTRICAL POWER AND ENERGY	TEXT: FUNDAMENTALS OF ELECTRIC CIRCUITS, 4th EDITION, BELL. CH.1,3
2. CONDUCTORS AND INSULATORS - ATOMIC BONDING - INSULATORS - CONDUCTORS - CONDUCTOR RESISTIVITY - TEMPERATURE EFFECTS ON CONDUCTORS - RESISTORS	CH.4
3. SERIES CIRCUITS - CURRENT IN A SERIES CIRCUIT - VOLTAGES IN A SERIES CIRCUIT - VOLTAGE DIVIDERS - POTENTIOMETERS - POWER IN A SERIES CIRCUIT - VOLTAGE DROPPING AND CURRENT LIMITING - OPEN AND SHORT CIRCUITS IN A SERIES CIRCUIT	CH.5

ELECTRICAL FUNDAMENTALS
COURSE NAME

ELR 100
CODE NO.

LEARNING ACTIVITIES	REQUIRED RESOURCES
4. PARALLEL CIRCUITS - VOLTAGE AND CURRENT IN A PARALLEL CIRCUIT - PARALLEL EQUIVALENT CIRCUITS - CONDUCTANCES IN PARALLEL - CURRENT DIVIDER - POWER IN PARALLEL CIRCUITS - OPEN AND SHORT CIRCUITS IN A PARALLEL CIRCUIT	CH.6
5. SERIES-PARALLEL CIRCUITS - EQUIVALENT CIRCUIT OF A SERIES-PARALLEL CIRCUIT - CURRENTS IN A SERIES-PARALLEL CIRCUIT - VOLTAGE DROPS IN A SERIES-PARALLEL CIRCUIT - OPEN AND SHORT CIRCUITS IN A SERIES-PARALLEL CIRCUIT - ANALYSIS OF SERIES-PARALLEL CIRCUITS	CH.7
6. NETWORK THEOREMS - VOLTAGE AND CURRENT SOURCES - NETWORK ANALYSIS USING KIRCHHOFF'S LAWS - THE SUPERPOSITION THEOREM - THEVENIN'S THEOREM - NORTON'S THEOREM	CH.8,9
7. MAGNETISM - MAGNETIC FIELD - ELECTROMAGNETISM - THEORY OF MAGNETISM - MAGNETIC FLUX AND FLUX DENSITY - MAGNETOMOTIVE FORCE AND MAGNETIC FIELD STRENGTH - FORCE ON A CURRENT-CARRYING CONDUCTOR IN A MAGNETIC FIELD	CH.11
8. MAGNETIC CIRCUITS - RELUCTANCE AND PERMEABILITY - PERMEABILITY OF FREE SPACE - SOLENOIDS - RELATIVE PERMEABILITY - MAGNETIZATION CURVES - HYSTERESIS - EDDY CURRENTS	CH.12

ELECTRICAL FUNDAMENTALS
COURSE NAME

ELR 100
CODE NO.

LEARNING ACTIVITIES	REQUIRED RESOURCES
9. INDUCTANCE - ELECTROMAGNETIC INDUCTION - INDUCED EMF AND CURRENT - SELF-INDUCTANCE - MUTUAL INDUCTANCE - TYPES OF INDUCTORS - ENERGY STORED IN AN INDUCTOR - INDUCTORS IN SERIES AND IN PARALLEL - STRAY INDUCTANCE - LR CIRCUITS	CH.14,16
10. CAPACITANCE - ELECTRIC CHARGE STORAGE - ELECTRIC FIELD - CAPACITANCE AND CAPACITOR DIMENSIONS - CAPACITOR TYPES AND CHARACTERISTICS - CAPACITORS IN SERIES AND IN PARALLEL - ENERGY STORED IN A CAPACITOR - STRAY CAPACITANCE - RC CIRCUITS	CH.15,16
11. ALTERNATING CURRENT FUNDAMENTALS - GENERATION OF ALTERNATING VOLTAGE - SINE WAVE - FREQUENCY, PHASE ANGLE, AND WAVELENGTH - RESISTIVE LOAD WITH AC SUPPLY - PEAK, AVERAGE AND RMS VALUES - CATHODE RAY OSCILLOSCOPES	CH.17
12. AC CIRCUIT ANALYSIS - PHASORS AND COMPLEX NUMBERS - POLAR AND RECTANGULAR NOTATION - SERIES, PARALLEL, AND SERIES-PARALLEL RLC CIRCUITS - RESONANCE	CH.18, 19

ELECTRICAL FUNDAMENTALS
COURSE NAME

ELR 100
CODE NO.

V. EVALUATION METHODS

TESTS	70%
QUIZZES	30%
TOTAL	100%

THE GRADING SYSTEM USED WILL BE AS FOLLOWS:

A+ = 90 - 100% A = 80 - 89% B = 66 - 79% C = 55 - 65%
R REPEAT

NOTES: IF A STUDENT MISSES A TEST HE/SHE MUST HAVE A VALID REASON (ie. MEDICAL OR FAMILY EMERGENCY). IN ADDITION THE SCHOOL MUST BE NOTIFIED BEFORE THE SCHEDULED TEST SITTING. THE STUDENT SHOULD CONTACT THE INSTRUCTOR INVOLVED. IF THE INSTRUCTOR CANNOT BE REACHED LEAVE A MESSAGE WITH THE DEAN'S OFFICE OR THE COLLEGE SWITCHBOARD. IF THIS PROCEDURE IS NOT FOLLOWED THE STUDENT WILL RECEIVE A MARK OF ZERO ON THE TEST WITH NO REWRITE OPTION.

STUDENTS WILL BE GIVEN ADVANCE NOTICE OF TEST DATES (1 WEEK MINIMUM). QUIZZES (WORTH A MAXIMUM OF 5%) MAY BE GIVEN WITHOUT NOTICE. THERE WILL BE NO REWRITES FOR STUDENTS MISSING QUIZZES WITHOUT PRIOR NOTICE AND VALID REASONS.

VI. REQUIRED STUDENT RESOURCES:

TEXT BOOKS: FUNDAMENTALS OF ELECTRIC CIRCUITS, FOURTH EDITION BY D. A. BELL. PRENTICE HALL, 1988.

VII. ADDITIONAL RESOURCE MATERIALS AVAILABLE IN THE COLLEGE LIBRARY BOOK SECTION:

VIII. SPECIAL NOTES: