

SAULT COLLEGE OF APPLIED ARTS & TECHNOLOGY
SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE OUTLINE: AC CIRCUITS AND MACHINES
CODE NO.: ELR 200 - 4
PROGRAM: MECHANICAL ENGINEERING TECHNOLOGY
SEMESTER: THREE
DATE: SEPTEMBER 1990
PREVIOUS OUTLINE DATED: OCTOBER 1987
AUTHOR: ENO LUDAVICIUS

NEW: _____ REV.: X

APPROVED:

W Filipowich
COORDINATOR

Aug 28/90
DATE

J P Crockett
DEAN

90/08/29
DATE

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TOTAL CREDIT HOURS: 60

PREREQUISITE(S): ELR110 - 4

PHILOSOPHY/GOALS:

THE STUDENT WILL DEVELOP AN UNDERSTANDING OF SINGLE PHASE AND THREE PHASE AC CIRCUITS. THE STUDENT WILL ALSO ACQUIRE THE BASIC FUNDAMENTALS OF DC & AC GENERATION AND OF DIFFERENT TYPES OF DC AND AC MOTORS & CONTROL EQUIPMENT. THIS COURSE WILL PREPARE THE STUDENT FOR THE ELECTRICAL/MECHANICAL INDUSTRIAL WORK ENVIRONMENT.

STUDENT PERFORMANCE OBJECTIVES:

UPON SUCCESSFUL COMPLETION OF THIS COURSE, THE STUDENT WILL BE ABLE TO:

- 1) DETERMINE THE AC CIRCUIT ANALYSIS OF ELEMENTARY ELECTRICAL NETWORKS.
- 2) DISTINGUISH THE DIFFERENCE BETWEEN SINGLE AND THREE PHASE AC CIRCUITS.
- 3) DISCUSS THE AC ENERGY TRANSFERS THROUGH ALTERNATORS, MOTORS AND TRANSFORMERS.

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TOPICS TO BE COVERED:

- 1) INTRODUCTION TO SINGLE PHASE AC CIRCUIT ANALYSIS.
- 2) OVERVIEW OF THREE PHASE AC CIRCUITS.
- 3) INTRODUCTION TO AC POWER DISTRIBUTION WITH TRANSFORMERS.
- 4) INTRODUCTION TO AC ALTERNATORS AND MOTORS.

LEARNING ACTIVITIES

REQUIRED RESOURCES

1.0 INTRODUCTION TO SINGLE PHASE AC CIRCUIT ANALYSIS

- 1.1) OVERVIEW THE FUNDAMENTAL SYSTEM OF UNITS.
- 1.2) OVERVIEW BASIC ELECTRICAL LAWS AND CONCEPTS.
- 1.3) INTRODUCTION TO ALTERNATING CURRENT.
- 1.4) INTRODUCTION OF SINGLE PHASE CIRCUITS.

TEXT: CHAPTER #1
TEXT: CHAPTER #2 & #4
TEXT: CHAPTER #10
TEXT: CHAPTER #11

2.0) OVERVIEW OF THREE PHASE AC CIRCUITS

- 2.1) DISCUSS THE USES OF THREE PHASE CIRCUITS.
- 2.2) DISCUSS VOLTAGE RELATIONS IN DIFFERENT TYPES OF GENERATORS
- 2.3) DISCUSS CURRENT RELATIONS IN DIFFERENT TYPES OF GENERATORS
- 2.4) DISCUSS POWER AND LOADING IN THREE PHASE CIRCUITS.

TEXT: CHAPTER #12

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<u>3.0) INTRODUCTION TO AC POWER</u> <u>DISTRIBUTION WITH TRANSFORMERS</u>	<u>REQUIRED RESOURCES</u>
3.1) DEFINE TRANSFORMER TERMINOLOGY AND THEORY OF OPERATION.	TEXT: CHAPTER #13
3.2) DISCUSS THE DIFFERENT TYPES OF TRANSFORMERS & CONNECTIONS	
3.3) OVERVIEW OF THREE PHASE TRANSFORMERS.	
3.4) DISCUSS TRANSFORMER COOLING, CONSTRUCTION AND TAP CHANGING	
<u>4.0) INTRODUCTION TO ALTERNATORS</u> <u>AND MOTORS</u>	
4.1) DISCUSS THE CONSTRUCTION AND OPERATION AC GENERATORS.	TEXT: CHAPTER #14
4.2) DISCUSS THE CONSTRUCTION AND OPERATION OF INDUCTION MOTORS	TEXT: CHAPTER #15
4.3) DISCUSS THE CONSTRUCTION AND OPERATION OF SYNCHRONOUS	TEXT: CHAPTER #16
4.4) DISCUSS THE OPERATION OF SINGLE PHASE MOTORS	TEXT: CHAPTER #17

**REQUIRED STUDENT RESOURCES
(INCLUDING TEXTBOOKS & WORKBOOKS)**

- 1) LISTER & GOLDING, ELECTRIC CIRCUITS AND MACHINES
McGRAW-HILL/RYERSON 1987

ADDITIONAL RESOURCE MATERIALS

- 1) D. BELL, FUNDAMENTALS OF ELECTRIC CIRCUITS
PRENTICE HALL 1988 FOUR EDITION
 - 2) L. KOSOW, CIRCUIT ANALYSIS
WILEY 1988
 - 3) WEBB & GRESHOCK, INDUSTRIAL CONTROL ELECTRONICS
MERILL, 1990
 - 4) ADAMS & ROCKMAKER, INDUSTRIAL ELECTRICITY PRINCIPLES AND PRACTICES
McGRAW HILL, 1985 THIRD EDITION
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METHOD(S) OF EVALUATION

THE FINAL GRADE OF THIS COURSE WILL BE DIVIDED BETWEEN THE AC CIRCUIT AND MACHINES THEORY (60%), & LABWORK(40%). EACH UNIT OF THE COURSE WILL BE INDEPENDENTLY ASSESSED, AND EACH MUST BE SUCCESSFULLY COMPLETED TO COMPLETE THE COURSE.

THE FINAL GRADE FOR AC CIRCUITS AND MACHINES WILL BE DERIVED FROM THE RESULTS OF THREE TEACHER ASSIGNED TESTS, AND EIGHT LAB ASSIGNMENTS.

THREE TESTS	60%	(20% PER TEST)
ASSIGNMENTS	40%	(5% PER ASSIGNMENT)
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TOTAL	100%	

THE GRADING SYSTEM USED WILL BE AS FOLLOWS:

A+	>= 90%	CONSISTENTLY OUTSTANDING ACHIEVEMENT
A	80-89%	EXCELLENT ACHIEVEMENT
B	70-79%	ABOVE AVERAGE ACHIEVEMENT
C	55-69%	SATISFACTORY ACHIEVEMENT
R		REPEAT
X		INCOMPLETE

NOTE: THERE ARE NO REWRITES IN THIS COURSE!