Electrical Circuit (1)
Course Outcome Summary

Course Information
Project Type: Course Outline
Organization: Electricity & Water Training Institute
Developers: Electrical Networks Department team (EWT)
Development Date: 4/7/2007
Revised By: Eng. Khaled Al Duraie
Instructional Level: Diploma
Instructional Area: Electrical Engineering
Department: Electrical Networks
Potential Hours of Instruction: 60
Total Credits: 4

Description
This course will cover the calculations of equivalent resistance in the parallel / series DC electrical circuits and the calculations of the measuring current, voltage and power in the DC electrical circuits.

Target Population
High school graduated students whom finished the introductory course which is required by the Electricity and Water Training Institute.

Textbooks
Theraja. *Fundamental of electric circuits*.

Learner Supplies
Calculator.
Handout.
Text book.

Prerequisites
Introductory course

Exit Learning Outcomes
Core Abilities
A. Learn effectively
   1. learner takes responsibility for self as a learner
   2. learner uses resources to meet learning needs
   3. learner identifies, organizes, assimilates, and integrates information and ideas
   4. learner produces evidence of learning
B. Think critically and creatively
1. learner identifies a problem to be solved, task to be performed, or decision to be made
2. learner applies the principles and strategies of purposeful, organized thinking
3. learner evaluates information
4. learner distinguishes facts, inferences, and judgements
5. learner makes decisions considering alternatives and consequences
6. learner draws logical conclusions from evidence
7. learner supports viewpoints/arguments with reason and evidence

C. Act responsibly
1. learner takes responsibility for his/her own learning and actions
2. learner completes assigned tasks according to prescribed deadlines and quality standards
3. learner adheres to established attendance criteria/standards
4. learner maintains a safe and healthy work environment for self/group

D. Work cooperatively
1. learner contributes to a work-based team to accomplish common goals
2. learner exchanges information, ideas, and opinions in a team/group setting
3. learner participates in shared problem-solving.
4. learner demonstrates respect in relating to people
5. learner resolves conflicts in a constructive manner
6. learner completes his/her share of tasks necessary to complete a project

E. Solve problems
1. learner identifies problems to be solved, tasks to be performed, or decisions to be made.
2. learner formulates alternative solutions, processes, or decisions and identifies potential consequences.
3. learner selects appropriate solutions, processes or decisions.
4. learner evaluates problems, monitors the feedback and revises plans indicated by the findings.

F. Communicate effectively
1. learner comprehends written materials
2. learner writes clearly, concisely, and accurately
3. learner speaks so others can understand
4. learner demonstrates active listening skills

G. Use technology
1. learner analyzes technology resources to meet needs.
2. learner selects and uses appropriate technology
3. learner uses technology to communicate
4. learner solves problems using technology
5. learner uses appropriate technology to manage information

Program Outcomes
A. Apply The Electrical Safety Rules
B. Use the Sub-Station Lay Out
C. Maintain Protective Relays and C.T., P.T. (O/C, E/F, Diff., etc.)
D. Carry Out the Preventive Maintenance For Circuit Breaker (Oil, SF6, Vacuum, Air)
E. Maintain the SwitchGear Panel (Bus-Bar, Isolator, Terminals, Cable End Box, Local Cubical)
F. Prepare And Maintain Batteries And Battery Chargers (220V, 110V, 50V)
G. Carry Out the Preventive Maintenance For Power Transformer
H. Maintain The Motor-Starter
I. Use Electrical Measuring Instruments
J. Use Electrical Maintenance Forms In English

**Competencies**

1. **Analyze series DC electrical circuits**
   - You will demonstrate your competence:
     - In the classroom
     - By a written assignment
   - You performance will be successful when:
     - Learner will follow the given procedure in the given assignment
     - Learner will solve the given assignment on time
     - Learner will submit the assignment report on time
     - Assignment report meets the given requirement
   - **Learning Objectives**
     a. Identify the series DC electrical circuit elements.
     b. Draw series resistance circuit.
     c. Calculate the equivalent resistance in the circuit.
     d. Calculate total (equivalent) voltage of series voltage sources
     e. Apply voltage divider rule on series electrical circuit.

2. **Analyze parallel DC electrical circuits**
   - You will demonstrate your competence:
     - In the classroom
     - By a written assignment
   - Your performance will be successful when:
     - Learner will follow the given procedure in the given assignment
     - Learner will solve the given assignment on time
     - Learner will submit the assignment report on time
     - Assignment report meets the given requirement
   - **Learning Objectives**
     a. Identify the parallel DC electrical circuit elements.
     b. Combine parallel resistance in the circuit.
     c. Calculate the equivalent resistance in the circuit.
     d. Apply current divider rule on parallel electrical circuit.

3. **Analyze series/parallel DC electrical circuits**
   - You will demonstrate your competence:
     - In the classroom
     - By a written assignment
   - Your performance will be successful when:
     - Learner will follow the given procedure in the given assignment
4. **Classify sine wave signals characteristics**

You will demonstrate your competence:
- In the classroom
- By a written assignment

Your performance will be successful when:
- Learner will follow the given procedure in the given assignment
- Learner will solve the given assignment on time
- Learner will submit the assignment report on time
- Assignment report meets the given requirement

**Learning Objectives**
- Identify sine wave signals parameters
- Draw a sine wave signal
- Identify the phase shift of the sine wave signal
- Apply current & voltage equations

5. **Identify magnetic & electromagnetic basic circuits**

You will demonstrate your competence:
- In the classroom
- By a written assignment

Your performance will be successful when:
- Learner will follow the given procedure in the given assignment
- Learner will solve the given assignment on time
- Learner will submit the assignment report on time
- Assignment report meets the given requirement

**Learning Objectives**
- Identify the magnetic circuit elements.
- Analyze the relation between magnetic and electric circuits.
- Identify the parameters effecting the E.M.F & M.M.F.
- Identify the applications of the electromagnetic circuits.

6. **Apply KVL & KCL in AC electrical circuits**

You will demonstrate your competence:
- In the classroom
- By a written assignment

Your performance will be successful when:
- Learner will follow the given procedure in the given assignment
- Learner will solve the given assignment on time
Learning Objectives
a. Differentiate between DC & AC circuits.
b. Apply Kirchhoff Current Law in single phase AC circuits.
c. Apply Kirchhoff Voltage Law in single AC circuits.
d. Identify the application of wattmeter in AC circuits.
e. Identify the Active power in AC circuits.

7. Evaluate the effect of the capacitors in AC electrical circuits

You will demonstrate your competence:
o In the classroom
o By a written assignment
Your performance will be successful when:
o Learner will follow the given procedure in the given assignment
o Learner will solve the given assignment on time
o Learner will submit the assignment report on time
o Assignment report meets the given requirement

Learning Objectives
a. Describe the capacitors construction
b. Calculate total capacitance of series & parallel capacitors.
c. Calculate capacitive reactance of series & parallel capacitors.
d. Identify the phase shift between current and voltage in capacitor
e. Draw circuits of capacitors.
f. Calculate reactive power in capacitors.

8. Evaluate the effect of the inductors in AC electrical circuits

You will demonstrate your competence:
o In the classroom
o By a written assignment
Your performance will be successful when:
o Learner will follow the given procedure in the given assignment
o Learner will solve the given assignment on time
o Learner will submit the assignment report on time
o Assignment report meets the given requirement

Learning Objectives
a. Describe the inductors construction
b. Calculate total inductance of series & parallel inductors
c. Calculate inductive reactance of series & parallel inductors
d. Identify the phase shift between current and voltage in inductors
e. Draw circuits of inductors.
f. Calculate reactive power in inductors.