Course Objective and Outcome Form

Department of Electrical and Computer Engineering

North South University, Bashundhara, Dhaka-1229, Bangladesh

Course Number and Title: EEE-141 Electrical Circuits I

Credits: 3

Course type : Required, Engineering, Lecture

Course Prerequisites: Basic knowledge of Calculus

Course Schedule/Timing: Lecture – 3 Hours/Week, Lab works 3 Hours/Week

Instructor(s)-in-charge: Mohd Azfar Nazim
Office:SAC 1047,
Email: azfar.nazim@northsouth.edu

Office Hours and Location: MW 8:30 AM - 11:00 AM
Office hour location is the same as the Instructor's office location.

Course Assessment: Homework/Assignment
Lab works : 7/8
Exam: Quizzes – 4, Midterm - 2, Final - 1

Grading policy: Attendance- 5%, Homework-15%, Quiz – 15%, Midterm- 25%, Final – 40%

Course Description: The primary goal of this course is to introduce the basics of DC Electrical Circuits. The concepts of current, voltage, power, and energy are studied. Topics include DC sources, resistance, capacitance, inductance, and magnetism. Resistive circuits are analyzed using Ohm's and Kirchhoff's Laws. Circuits are also solved using superposition, Thevenin, Norton, nodal, and mesh analyses. Computer-aided analysis techniques using PSPICE are also introduced.

Course Objective

Upon the completion of the course, the student should be able to:

- Develop in-depth knowledge of circuit elements (active and passive), their characteristics and their functioning when networked.
- Analyze many engineering problems by tracing the various elements in the set processes in terms of the electrical equivalents.
- Gain knowledge and understanding that would also help design systems after analyzing the circuit under all conditions.

Catalog Description (Syllabus**):** Formulation and solution of circuit equations, network theorems, sinusoidal steady-state analysis. Topics include loop and nodal analysis, superposition and thevenin theorem, properties of sinusoids, phasor representation and vector diagrams.

Textbook and related course materials:

Introductory Circuit Analysis, Robert L. Boylestad, Prentice Hall, 12th Edition

Electric Circuits, James W. Nilson, Susan A. Riedel, Prentice Hall, 8th Edition

Topics covered and level of coverage (Topic/Hours**):**

1. **o Ohm's Law, Power, and Energy (3Hours)**
   - o Ohm's Law
   - o Plotting Ohm's Law
   - o Power, Energy, and Efficiency

2. **Series DC circuit (3 Hours)**
   - o Series Resistors
   - o Series Circuits
   - o Power Distribution in a Series Circuit
   - o Voltage Sources in Series
   - o Kirchhoff's Voltage Law
   - o Voltage Division in a Series Circuit
   - o Voltage Regulation and the Internal Resistance of Voltage Sources
   - o Loading Effects of Instruments

3. **Parallel DC circuit (3 Hours)**
   - o Parallel Resistors
   - o Parallel Circuits
   - o Power Distribution in a Parallel Circuit
   - o Kirchhoff's Current Law
   - o Current Divider Rule
   - o Voltage Sources in Parallel
   - o Open and Short Circuits
   - o Voltmeter Loading Effects

4. **Series-Parallel Circuits (4.5 Hours)**
   - o Series-Parallel Networks
   - o Reduce and Return Approach
   - o Block Diagram Approach
   - o Ladder Networks
   - o Voltage Divider Supply (Unloaded and Loaded)

5. **Methods of Analysis and Selected Topics (6 Hours)**

- o Current Sources
- o Source Conversions
- o Current Source in Parallel
- o Current Source in Series
- o Branch-Current Analysis
- o Mesh Analysis
- o Nodal Analysis
- o Bridge Networks
- o Y-Δ (T-π) and Δ-Y (π-T) Conversions

6. Network Theorems (4.5 Hours)

- o Superposition Theorem
- o Thevenin's Theorem
- o Norton's Theorem
- o Maximum Power Transfer Theorem

7. Capacitors (4.5 Hours)

- o The Electric Field
- o Capacitance and Capacitors
- o Transient in Capacitive Networks (Charging and Discharging Phase)
- o Thevenin Equivalent $\tau = R_{Th}C$
- o The Current i_C
- o Capacitor in Series and Parallel

8. Inductors (4.5 Hours)

- o Magnetic Field
- o Inductance and Induced Voltage v_L
- o Transient in Inductive Networks (Storage and Release Phase)
- o Thevenin Equivalent $\tau = L/R_{Th}$
- o Inductors in Series and Parallel

Material available to students and department at the end of the course:

Course Objectives and Outcomes Form: Student, Department, Instructor
Lecture notes, homework assignments and solutions: Student, Department, Instructor
Student work sample solutions (homework, quiz, exam, report etc.): Department
Course performance form including student surveys: Department, Instructor

Involve computer assignments? Yes

Will this course have TA(s) when it is offered? Lab Instructor

Level of contribution of course to Learning Outcomes (a-k:Strong, average, low**)**

Learning Outcome	A	B	C	D	E	F	G	H	I	J	K
Contribution of Course	***	**		*						*	

***** Strong ** Moderate *Low**

Course Learning Outcomes (ABET Criteria):

Student who pass this course will have demonstrate the ability of:

(A) an ability to apply knowledge of mathematics, science, and engineering
(B) an ability to design and conduct experiments, as well as to analyze and interpret data
(D) an ability to function on multidisciplinary teams
(J) a knowledge of contemporary issues

[N:B: Sub-titles of learning outcome will attach after discussion]