Course Title	**Electric Circuit 1**
Course Code	**EE2401**
No. of Credit Hrs (Lecture + Tutorial + Lab)	**4 (3+0+1)**
No. of Contact Hrs (Lecture + Tutorial + Lab)	**5 (3+0+2)**
Level-Year	**4 – 2**
Prerequisite (if any)	**MATH2301 - PHYS 1414**

1) Course Objectives:

This course provides the basic concepts and theories for the analysis of electrical circuits. It offers an understanding of the methodologies used to solve electrical circuits and has expertise in the study of electrical circuits. Use Kirchhoff's laws, circuit theorems and node voltage methodology to solve DC and AC circuits and demonstrate a basic understanding of batteries, Resistors, Inductors and Capacitors and its connections.

2) Expected Learning Outcomes:

By the end of this course the student will be able to:

1. Identify and explain basic electrical circuit elements and laws including Ohm's Law and Kirchhoff's Laws. KLO1 [1]
2. Analyze DC circuits using network theorems such as Thevenin, Norton, and Superposition. KLO1 [1]
3. Connect and evaluate the behavior of resistors, inductors, capacitors, and batteries in series and parallel configurations. KLO3 [6]
4. Explore and apply suitable self-learning strategies to reinforce theoretical concepts through experimental validation. KLO9
5. Demonstrate ethical responsibility and commitment to safe practices during circuit experiments involving lab instruments. KLO6 [4]

3) Course Contents

1. Introduction - SI units, basic concepts of charge, current, voltage, electrical active and passive elements, power, energy, electrical sources-independent and dependent voltage and current sources.
2. Fundamental concepts of electrical circuits-Ohm's Law, series and parallel circuits, node, loop, branch, mesh, Kirchhoff's current and voltage law, concept of open circuit and short circuit, star-delta transformations
3. Network Theorems- source transformation, mesh, and nodal analysis, Thevenin's theorem, Norton's theorem, superposition theorem, maximum power transfer theorem.
4. AC Circuits Introduction, 'j' operator, rectangular and polar coordinates- periodic and non-periodic waveforms- instantaneous, peak, average and rms values-ac circuit configurations, phase angle, phasor diagram, power factor-apparent, active and reactive power.

4) Lab Contents:

1. Introduction to basic Electrical components and assemble of simple circuits

2. Series and Parallel Connection of Resistors, Inductors and Capacitors.
3. VDR on No-Load operation, VDR under Load
4. Series and parallel connection of Batteries
5. Determining the Internal Resistance of batteries connected in series and Parallel
6. Experimental verification of Ohms law, Kirchhoff's voltage and current laws
7. Experimental verification of network theorems (Thevenin, Norton, Superposition Theorem).

5) Teaching Methods:

- Lectures and Discussion
- Videos
- Self-learning
- Laboratory demonstrations

6) Mode of Evaluation:

Course Assessment Methods

- Quizzes and assignment
- Major Exams
- Final Exam
- Lab Work

Evaluation

- **Semester Work**
  - Major Exams 30%
  - Quizzes 5%
  - Assignments 5%
  - Lab/Tutorial 20%
- **Final**
  - Paper work 40%

7) Textbook(s):

– Basic Engineering Circuit Analysis, J. D. Irwin, Fourth edition, Macmillan, most recent edition.

8) References:

– Engineering Circuit Analysis (6th Edition), W. H. Hayt, J.E. Kemmerly, and S. Durbin.
– Electronic Devices and Circuit Theory (7th ed.) by R. Boylestad and L. Nashelsky.

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