ADAMA SCIENCE AND THECNOLOGY UNIVERSITY

School of Electrical Engineering and Computing

Department of Electrical power and control engineering

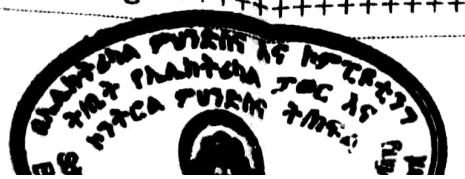
Course Name and Code: Fundamentals of electrical engineering (PCE 2201)
Prerequisite: Applied mathematics
***Course credit*:** (Lecture, Tutorial and Laboratory): (2hr, 3hr & 3hr. respectively)
Year 2nd and ***semester*** I - 2019 G.C

- **Course Objectives:**
  - To enable students to understand the basic electromagnetic phenomenon, circuit variables and parameters
  - To enable students to understand and apply the fundamental and derived circuit laws and theorems to the analysis of dc and steady state poly-phase ac circuits;
- **Course Content:**

1. **Basic concepts.....1st 2nd Week**
   - 1.1. Electric Charge and Coulomb's Law
   - 1.2. Electric field, voltage and current
   - 1.3. Energy and power
   - 1.4. Faraday's Law-self and mutual inductances
   - 1.5. Circuits parameters (R, C, L)
   - 1.6. Electric sources
     - 1.6.1. Independent/dependent current sources
     - 1.6.2. Independent/dependent voltage sources
2. **DC Circuit Analysis techniques.....3rd 4th 5th 6th Weeks**
   - 2.1. Fundamental Circuit laws
     - 2.1.1. Ohms law
     - 2.1.2. Kirchhoff's laws (KVL & KCL)
     - 2.1.3. CDR and VDR
   - 2.2. Circuit simplifications (series and parallel connections)
   - 2.3. Star (Y) - delta (Δ) transformation of resistance
   - 2.4. Mesh analysis and Nodal analysis
   - 2.5. Linearity and the superposition theorem
   - 2.6. Thevenin's and Norton's theorems
   - 2.7. Maximum power transfer theorem

- **Midterm exam.....7th Week**

3. **Transient Circuit Analysis.....8th 9th Weeks**
   - 3.1. First Order Transient Circuits
   - 3.2. RL and RC Transient Characteristics and Solutions
   - 3.3. Second Order Transient Circuits: RLC Transient Circuits
   - 3.4. Higher Order Circuits and Approximations



4. **Steady State Single Phase AC Circuit Analysis……..10th 11th Weeks**
   - 4.1. Sinusoidal terminologies
   - 4.2. Phasor representation of sinusoids and arithmetic
   - 4.3. Series and parallel RLC circuits, impedance and admittance
   - 4.4. Frequency response and resonance
   - 4.5. Active (average), reactive and apparent powers
   - 4.6. Power factor and power factor correction
   - 4.7. Maximum power transfer in ac circuits
   - 4.8. Ac circuit analysis
     - 4.8.1. Mesh and Nodal analysis
     - 4.8.2. Superposition and Thevenin's theorem
     - 4.8.3. Maximum power transfer
5. **Introduction to polyphase systems ……...11th Week**
   - 5.1. Generation of three phase voltages
   - 5.2. Star (Y) and delta (Δ) connections
   - 5.3. Load/power flow method of three phase ac circuit analysis
   - 5.4. Power in unbalanced three phase systems

- **FINAL EXAM……13th 14th Weeks**
- **Assessment**

Assignment, Quiz & lab **(30%)**
Mid-semester Examination **(30%)**
Final examination **(40%).**
85% class attendance is mandatory

- **Course Textbook:** Alexander - Fundamentals of Electric Circuits
- **References**

1. Introductory circuit analysis, by Robert boylstad
2. Basic Electrical Engineering, by A.E. Fitzgerald & D.E. Higginbotham
3. Electrical Circuits, by Siskind
4. Elements of Electrical Engineering, by Cook and Carn
5. Electric Circuits, by T.F. Bogart
6. Basic engineering circuit analysis, by Irwin

Approval (Affidavit)		
Name	**Signature**	**Date**
Instructor Name: Million Gerado (MSc.)		
Instructor Name: Gosa Feyissa (MSc.)		
Department Head: Hinsermu. A		

Instructor name: Melat
(MS