

(III) Area of Specialization Courses in Applied Electricity
TEACHING OF APPLIED ELECTRICITY

Course Code: EDBET361

Credit Hours: 3

Course Description:

A process based on the needs of the program's various constituencies in which the Learning Outcomes are determined and periodically evaluated; a curriculum and processes that ensure the achievement of these Learning Outcomes; and a system of ongoing evaluation that demonstrates achievement of these Learning Outcomes and uses the results to improve the effectiveness of the program.

The objective of the Department of Technology Education at Institute of Education & Research is to produce alumni who contribute to our society and to the economic base of our country, our nation and the world to the best of their abilities. We recognize that our students have very diverse interests and talents, and although the majority may find employment in one of the many specialties or interdisciplinary activities in industry or academe to which electrical engineers traditionally gravitate. Regardless of the intended career, our educational objective is to have them use the analytical discipline, problem-solving experience and collaborative skills of their undergraduate education in creative endeavours as professionals and to avail themselves of opportunities to learn new skills and advance their careers through continuing education.

Learning Outcomes

- a. An ability to apply knowledge of science and engineering
- b. An ability to design and conduct experiments, as well as to analyze and interpret data
 - An ability to function on multi-disciplinary teams
- c. An ability to identify, formulate and solve engineering problems
 - An understanding of professional and ethical responsibilities
 - An ability to communicate effectively
 - The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context
- d. A recognition of the need for, and an ability to engage in life-long learning
 - Knowledge of contemporary issues
- e. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice
- f. Learn basic physics concepts
- g. Learn basic function / operations of electric circuits
- h. Learn operations in different / various electric components.
- i. Understand the nature, functions and scope of electric components.
 - Understand basic function, individual behavior and operation in electric equipment.

Course's Syllabus:

1. Understanding electricity
 - 1.1 Concept of electricity
 - 1.2 States of matter
 - * Solid, liquid & gas

- 1.3 Atomic structure
 - * Electronic, protons & neutrons
- 1.4 Electric current theory
 - * Current direction
 - * Current through a metallic conductor
- 1.5 Source of current
 - * Heating effect
 - * Magnetic effect
 - * Chemical effect
- 1.6 Ohm's Law
 - * Series & parallel combinations of resistors
- 1.7 Color code for carbon resistance
 - * Rheostat
 - * Thermistors
- 1.8 Electromotive force (EMF)
2. Kerchief's Law
 - 2.1 Kickoffs first law
 - 2.2 Kerchiefs second law
 - 2.3 Wheat stone bridge
 - 2.4 Potentiometer
3. Electromagnetism
 - Magnetic field due to current in a straight wire
 - Force on a current carrying conductor in a uniform magnetic field.
 - Magnetic flux & flux density
 - Force on a moving charge in a magnetic field
 - Cathode ray oscilloscope
 - Uses of CRO
 - Galvanometer.
 - * Ammeter
 - * Voltmeter
 - * Ohmmeter
4. Electromagnetic induction
 - 4.1 Induced EMF& induced current
 - 4.2 Motional EMF
 - 4.3 Faradays law & induced EMF
 - 4.4 Lenz Law
 - 4.5 Mutual induction
 - 4.6 Self-induction
 - 4.7 Energy stored in a an inductor
 - 4.8 Alternating current generator
5. Alternating current
 - 5.1 Instantaneous value
 - 5.2 Peak value

- 3 Peak to peak value
 - 4 Root mean square value
 - 5 Phase lag & phase lead
 - 6 Phase of AC
 - 7 Practical
- 8 AC circuits
- 8.1 AC through a resistor
 - 8.2 AC through a capacitor
 - 8.3 AC through an inductor
 - 8.4 Impedance
 - 8.5 RC & RL circuits
 - 8.8 Exercises and Problems
- 9 Modulation
- 9.1 Amplitude modulation
 - 9.2 Frequency modulation
- 10 Capacitor
- 10.1 Coulombs law
 - 10.2 Electric field
 - 10.3 Electric flux
 - 10.4 Practical
- 11 DC generator
- 11.1 Shunt generator
 - 11.2 Series generator
 - 11.3 Compound generator
 - 11.4 Losses & efficiency
- 12 DC motor
- 12.0.1 Back emf
 - 12.0.2 Torque
 - 12.0.3 Shunt motor
 - 12.0.4 Practical
- 13 Transformer
- 13.1 No load current
 - 13.2 EMF equation
 - 13.3 Ratio of transformation
- 14 Final Project/ practical

Text- Book(s) & Suggested Readings Material:

- 1. B. Theraja "Electrical Technology"
- 2. R. Ghargali "Examples in electrical engineering"
- 3. R. S. Khapuria "Motors & Generators"

Instructional Aids/Resources

1. Handouts
2. OHP/Transparencies

Teaching Strategies

1. Lecture
2. Group Project/Class Presentation
3. Discussion
4. Questions-Answers
5. Solving Numerical Problems

Teaching-learning Strategies

The instructional strategies will focus on constructionist learning approach. These strategies will be diverse in line with the course contents. Therefore, these strategies will include but not limited to demonstration, cooperative learning, collaborative learning, teacher and student-led discussion, individual and group presentations, reflective practices and classroom activities.

Assessment and Examinations

The students will be assessed according to the following criteria.

Examination	Marks Distribution
Sessional work	25 %
Mid Semester	35%
Final Semester	40%

Suggested Readings

- AIOU. (2006). *Population Education Course MA EPM 584*. Islamabad: AIOU.
- Govt. of Pakistan. (2003). *Education for All*. Islamabad: Ministry of Education Curriculum Wing.
- Haltak, J. (1990). *Investing in the Future, Setting Educational Priorities in the Developing World*. Paris, UNESCO: McGraw-Hill Kogakusha.
- Heywood, D. (2010). *The Pedagogy of Physical Science (Contemporary Trends and Issues in Science Education)*.
- Indira, M. (2003). *Changing Demands of Technical and Vocational Education*. New Delhi: Annual Publication.
- John, C. P.(2007). *The Marine Electrical and Electronics Bible*.

- Fazlani, Fujitaki, K. (2009). *The Manga Guide to Electricity Paperback*. Co Ltd Trend
- Ministry of Education, Curriculum Wing. (2010). *13 Modules on Various Core Themes of Population Education*, Islamabad: _____.
- National Research Council, *Optics and Photonics: Essential Technologies for Our Nation*
- Patel, V. K. (2004). *Population Education*. New Delhi: Efficient Printer.
- Reid, J. N.(). *Instructional Technology for Teaching and Learning: Designing Instruction, Integrating Computers, and Using Media (2nd ed.)*
- Tomecek, S. (1999). *Teaching Electricity: Yes, You Can! : Grades 3-6*.
- UNESCO. (2004). *Quality of education in Pakistan*. Islamabad: UNESCO.