EC217- Measurements & Instrumentation

CREDIT HOURS

3 Hours

CONTACT HOURS (Hours/week)

Lecture: 2; Tutorial: 2; Lab: 2

COURSE COORDINATOR

Dr. Amr Byoumi

TEXT BOOK

GUPTA,J.B., A Course in Electronic & Electrical Measurements & Instrumentations, 13th edition, S.K. KATARIA 2005

COURSE DESCRIPTION

Measurements of errors, Accuracy, Precision, Resolution, Sensitivity. Statistical analysis (Mean, Standard Deviation, and Variance). Units and standards of measurement. Electromechanical indicating instruments. Analog Instruments (DC Ammeter (Ayrton Shunt), DC Voltmeter, Ohmmeter (Series type, Shunt Type), AC- Instruments with Rectifiers, Bridge measurements (AC Bridges, DC Bridges), Digital instruments for measuring basic parameters, oscilloscope techniques.

PREREQUISITE:

EE 231

RELATION OF COURSE TO PROGRAM

Required

COURSE INSTRUCTION OUTCOMES

The student will be able to understand the basic measurement techniques such as accuracy, precision, standards. To study the operation and construction of analog, electronic and digital multi-meters.

TOPICS COVERED

- Definitions, The importance of electronic measurements for engineers, Types of errors
- Statistical analysis
- Review on the fundamental and derived units, Classification of standards, Electrical standards, IEEE standards
- Permanent magnet moving coil
- DC voltmeters, sensitivity, Use the sensitivity method for the design of DC voltmeter, Analyze a circuit taken into consideration in loading effect
- Series type and shunt type ohmmeters, Calibration of DC instruments

- Alternating current indicating instruments, AC voltmeters with full wave rectifiers and half Wave rectifiers.
- DC bridges and sources of error, AC bridges
- AC voltmeters using rectifiers
- True RMS – Responding Voltmeter
- Component measuring instruments, Basic Q-meter circuits: a- Direct connection b- Series connection c- Parallel connection Sources of error"
- Oscilloscope measurements (phase shift, period and voltages)
- Oscilloscope block diagram
- Oscilloscope techniques, Special oscilloscopes, (a) storage oscilloscope, (b) sampling oscilloscope (c) Digital storage oscilloscope"

CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:

Professional component Content			
Math and Basic Sciences	**Engineering Topics**	**General Education**	**Other**
	✓		

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:

Student Outcomes		Course aspects
A	An ability to apply knowledge of mathematics, science, and engineering	a_1 a_2
B	An ability to design and conduct experiments, analyze and interpret data.	b_1 b_2 b_3 b_4
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economics, environmental, social, political, ethical, health, and safety, manufacturability, and sustainability	
D	An ability to function on multi-disciplinary teams.	
E	An ability to identify, formulate, and solve engineering problems	e_1
F	An understanding of professional and ethical responsibility	
G	An ability to communicate effectively	
H	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and social content	
I	A recognition of the need for, and an ability to engage in life-long learning.	
J	A knowledge of contemporary issues within and outside the electrical engineering profession.	
k	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	k