

SEMESTER <i>Fourth</i>	DEPARTMENT <i>General Engineering</i>	COURSE TITLE <i>Electrical Measurements</i>
COURSE CODE <i>EP409</i>	HOURS: 3 UNITS: 3	COURSE SPECIFICATIONS <i>Theoretical Contents</i>
1. Discuss and Determine Probability and Error Analysis in Measuring Systems: <ul style="list-style-type: none"> ➤ Identify precision of measurements. ➤ Discuss observational, estimation and systematic errors. ➤ Know accuracy rating of instruments, loading factor and other accuracy factors. ➤ Evaluate the load effect on the circuit and determine limits of loading. 		
2. To Learn Principles of Designing, Calibrating and Operating the DC Measuring Instruments: <ul style="list-style-type: none"> ➤ Recognize components of D'Arsonval meter movement ➤ Know how to use this meter as a DC ammeter and shunts. ➤ Know how to use this meter as a DC voltmeter and multipliers. ➤ Know how to use this meter as an ohmmeter. ➤ Learn how to draw the scale of meters 		
3. Know Principles and Instruments Design of Measuring Resistors: <ul style="list-style-type: none"> ➤ Determine the value of resistors using Wheatstone-Bridge. ➤ Usage of Wheatstone-Bridge in other applications. 		
4. Learn Principles of Design, Calibrating and Operating the AC Measuring Instruments: Should be familiar with principle of design and application of: <ul style="list-style-type: none"> ➤ D'Arsonval meter with rectifier. ➤ Iron-Vane voltmeters ➤ Electro-dynamic voltmeters, ammeters, wattmeters, varimeters, frequency meters and kW/hour meters. 		
5. Learn Using AC Bridges for Measurement: <ul style="list-style-type: none"> ➤ Be familiar with basic impedance bridge, including capacitance & inductance measuring functions. 		

- Learn using diagram of Maxwell bridge & Hay-bridge for measuring inductance and storage factor.
- Learn using basic capacitance bridge for measuring capacitance, dissipation factor and power factor measurement.

6. *To Learn the Principles of Operation Behind the Cathode Ray Oscilloscope and Its Applications:*

- Basic measurements.
- The cathode ray tube and its operation.
- The basic oscilloscope and its operation.
- Loading effects of the input circuit.
- Effects of Earth Connection through the scope.

7. *Be Able to Use Electronic and Digital Multi-Meters:*

- Know the design of digital voltmeters, volt to time conversion, volt to frequency conversion, AC/DC convertor, ohm convertor

8. *Know How to Measure the Time and Frequency Using the Frequency/ Time Period Meters:*

- The student should understand the operations of the instruments in circuits
- Recognize different types of frequency meters.
- How to measure the frequency.
- Pulse measurements
- Measurements of Transients.

References:

- 1- Olevier & Cage, McGraw Hill, 1973. *Electronic measurement and Instrumentation*
- 2 *Elements of Electrical & Electronic Instrumentation*. Kurt S., McGraw Hill, 1976.
- 3- *A Course in Electrical Measurement Instrumentation*, A.K. Sawhany.
- 4- *Electrical Measurments and Measuring Instruments*. A.k. Sawhny; DHANPAT RAI & Co.
- 5- *A Cource in Electrical and Electronic Measurements and Instrumentation*. A.K. Sawhny.

القياسات الكهربائية و أجهزتها

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