



**SILVER OAK UNIVERSITY**  
**College of Technology (01)**  
**Diploma in Electrical Engineering**  
**Subject Name: Electrical & Electronics Measurement**  
**Subject Code: 1010082218**  
**Semester: 3rd**

**Prerequisite: Zeal to learn the subject.**

**Objective:** Electrical installations ranging from residential consumers to huge industrial estates all are equipped with measuring instruments. In view of this, study of principles of Electrical measurements and measuring instruments becomes mandatory for all electrical engineers. This subject deals with principles of measurements, analog and measuring instruments as well as transducers.

**Teaching and Examination Scheme:**

Teaching Scheme					Evaluation Scheme				Total Marks
L	T	P	Contact Hours	Credits	Theory		Practical		
					CIE (TH)	ESE (TH)	CIE (PR)	ESE (PR)	
3	0	2	5	4	40	60	20	30	150

**Content:**

Unit No.	Course Contents	Teaching Hours	Weightage %
1	<b>Fundamentals of Measurement &amp; Instrumentation</b>  Methods of Measurement – Direct Method & Indirect Method, Types of Instruments, Damping Torque, Deflecting and Controlling Torque, Different values of Measurements, Accuracy, Precision, Sensitivity and other terms related to Measurement, Types and Source of Errors.	08	15

<b>2</b>	<b>Electro-Mechanical Instruments</b> Moving Iron Instruments, PMMC Instruments, Electro-dynamometer type Meter, Induction type Energy Meter, Frequency Meter, Extension of Range using Shunt Multiplier, Extension of Range of Meter using Instrument like CT and PT.	<b>12</b>	<b>25</b>
<b>3</b>	<b>Measurement of R, L and C</b> Different methods of measuring low, medium and high resistances, Wheatstone Bridge, Measurement of inductance & capacitance with the help of AC Bridges (Hays Bridge, Schering Bridge, Maxwell bridge, Anderson Bridge), LCR meter -working principle with block diagram	<b>10</b>	<b>25</b>
<b>4</b>	<b>Display Devices</b> CRO, Digital Recorder, Digital Storage Oscilloscope- Block Diagram, theory and application, Power scope, Function generator, Digital Multi meter, Clamp on meter, Megger	<b>08</b>	<b>20</b>
<b>5</b>	<b>Transducers and Sensors</b> Definition, different types of transducers, criteria for selection, general characteristics and dynamic characteristics, transducers for measurement of temperature ((Thermocouple and RTD), transducers for measurement of pressure, strain, transducers for measurement of displacement, speed, torque, Hall Effect transducer, Opto-Electronic Devices : Photodiode, Phototransistor, Photovoltaic Cell.	<b>08</b>	<b>15</b>

**Course Outcome:**

<b>Sr. No.</b>	<b>CO statement</b>	<b>Unit No</b>
<b>CO-1</b>	Comprehend the basics of electrical measurements.	<b>1</b>
<b>CO-2</b>	Prepare the specifications of required measurement systems to be used for measurement of parameters for a specified application.	<b>2</b>
<b>CO-3</b>	Apply AC and DC bridges for measurement of electrical parameters like resistance, inductance and capacitance.	<b>3</b>

<b>CO-4</b>	Comprehend the basics of Display Devices.	<b>4</b>
<b>CO-5</b>	Explain basic principle, working, characteristics and applications of the various measuring instruments and transducers.	<b>5</b>

**Teaching & Learning Methodology:** Lectures with discussions, question and answer sessions, informal quizzes, video sessions where students have an opportunity to clear concepts and doubts. E – Resources for the virtual learning environment. Practical sessions for developing skills which are required in occupation. Occasional Flipped classroom exercise for students for development of presentation skills.

- **List of Experiments/Tutorials:**

1. To measure value of unknown capacitance by Schearing's bridge.
2. To measure unknown inductance by Maxwell's bridge
3. To demonstrate distance measurement using LVDT.
4. To demonstrate the Kelvin Double Bridge for Low resistance measurement.
5. To measure value of unknown inductance using LCR meter.
6. To measure high resistance and insulation resistance using Megger
7. To demonstrate usage of DSO for steady state periodic waveforms produced by a function generator.
8. Demonstration of Function generator by understanding different waveform.
9. Demonstration of Multimeter by measuring various electronics devices.
10. To measure value of unknown capacitance by Owen's bridge.

- **Major Equipment/ Instrument:**

- Function Generator
- Digital Storage Oscilloscope
- Different Bridge Kit
- Multimeter
- Megger

- **Books Recommended:**

1. A.K.Sawhney, “Electrical and Electronic Measurements and Instrumentation”, DHANPAT RAI & CO
2. Gupta J. B., “A Course in Electronics and Electrical Measurements and Instrumentation”, S.K. Kataria & Sons
3. H. S. Kalsi, " Electronic Instrumentation”, Tata McGraw-Hill Education.
4. D. Patranabis, ‘Sensors & Transducers’, PHI.

- **List of Open Source Software/learning website:**

1. Scilab
2. Virtual Lab