



## **C.U.Shah University – Wadhwan City**

**Faculty Of:** -Technology and Engineering (Diploma Engineering)

**Department Of:** -Electrical Engineering

**Semester:** - III

**Code:** -2TE03EMI1

**Name –** Electrical Measurement and Instrumentation (EMI)

Subject Code	Subject Name	Teaching Scheme (Hours)				Credits	Evaluation Scheme								
		Th	Tu	Pr	Total		Theory				Practical (Marks)				Total Marks
							Sessional Exam		University Exam		Internal		University		
							Marks	Hours	Marks	Hours	Pr	Tw	Pr		
2TE03EMI1	Electrical Measurement and Instrumentation (EMI)	3	0	2	5	4	30	1.5	70	3	30	20	----	150	

### **Objectives:-**

- To Developed The Basic Knowledge of Fundamentals of Measurement & Instrumentation Principles & Concept of Electrical Parameters
- Understanding of Working Principle, Construction & Application of Electromechanical Instruments
- Understand Importance of Calibration & Testing

**Prerequisites:** - • Basic Knowledge of Electrical Instrumentation & Its Measurement

### **Course Outlines:-**

Sr. No.	Course Contents	No Of Hours
1	<b>Fundamentals Of Measurement &amp; Instrumentation :</b> Measurement, Methods of Measurement : Direct and Indirect Methods, Instrument, Types of Instruments : Indicating, Integrating and Recording, Absolute and Secondary Instrument, Torques: Deflecting, Controlling and Damping , Range, True Value, Indicated Value, Correction, Sensitivity, Repeatability, Reproducibility, Precision, Accuracy Etc., Errors, Types Of Error : Gross Error, Systematic Error , Random Error.	6
2	<b>Electromechanical Instruments</b> Analog Instrument, Classification of Analog Instrument, Electromechanical Instrument Common Errors In Electromechanical Instruments , Operating Force In Electromechanical Instrument, Moving Iron Instruments: Ammeter, Voltmeter, PMMC Instruments: Ammeter, Voltmeter, Vibration Galvanometer, Electrodynamometer Type Meter: Ammeter, Voltmeter, Wattmeter, Power, Factor Meter, Induction Type Energy Meter (Single Phase, Three Phase) , Hot Wire Type Instruments Frequency Meter, Tri Vector Meter, Maximum Demand Meter, Phase Sequence Indicator, Solid State Energy Meter, Clip On Meter.	12
3	<b>Calibration and Testing</b> Calibration and Its Importance, Calibration of Ammeter, Voltmeter and Wattmeter and Single & Three Phase Energy Meter (Along With Adjustments) As Per Is.	6

4	<b>Measurement of Power:</b> Measurement of Power In A.C.circuit, Measurement of Power In D.C.circuit, Measurement of Power In Three Phase Circuit.	4
5	<b>A.C.Bridges :</b> General Equation for Bridge Balance, Bridge Circuit – Medium Resistance By Wheatstone Bridge, Maxwell, Medium And High Resistance Kelvin's Double Bridge, Wien's Bridge, Universal Impedance Bridge, High Resistance By Megger, Earth Resistance By Earth Tester.	8
6	<b>Potentiometers</b> Basic of Potentiometer, Construction and Working of Dc Potentiometer and Its Applications.	4
7	<b>Transducers</b> Basic Requirements of Transducers, Classification Electrical Principle Involved, Different Type of Transducer- Resistive Transducers, Inductive Transducers: LVDT, RVDT, Capacitive Transducers, Piezoelectric Transducers, Strain Gauge Transducers (Unbounded and Bonded), Thermocouple, RTD, Thermistor and Semiconductor Sensors.	8

#### List of Experiments:-

- Prepare Study Report On Electromechanical Instruments.
- Calibrate Single Phase Energy Meter As Per Is.
- Calibrate Ammeter (Mi/Mc) As Per Is.
- Calibrate Voltmeter (Mi/Mc) As Per Is.
- Test Power and Power Factor (Using Power Factor Meter) Using Two Wattmeter Method For Three Phase Circuits.
- Test The Medium Resistance Using Wheatstone Bridge.
- Test The Low Resistance Using Kelvin Bridge.
- Test The Inductance By Using Universal Impedance Bridge.
- Test The Capacitance By Using Universal Impedance Bridge.
- Measure Different Electrical Parameters Using Clip On Meter.
- Prepare Study Report On Different Types Of Transducer.
- Measure Linear Displacement Using LVDT
- Find Resistance of Winding Insulation By Using Megger

#### Learning Outcomes:-

- Working & Construction of Electrical Measuring Instrument
- Application & Importance of Electrical Measuring Instrument
- Definition & Identification of Various Electrical Parameters.

#### Books Recommended:-

- Electrical and Electronic Instruments, **A .K. Sawhney**, ., Dhanpat Rai Publications, New Delhi, 2010
- A Course In Electronics & Electrical Measurement & Instrumentation **J.B.Gupta** , S.K. Kataria And Sons, New Delhi, 2011
- Electrical Instrumentation , **U.A.Bakshi, A.V.Bakshi** Technical Publication, Pune,2009