

Electrical Measurements

Course Code	19EE4501B	Year	III	Semester	I
Course Category	Program Elective - I	Branch	EEE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Basics of Electrical Engineering
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Measure electrical quantities using various measuring instruments (L6)
CO2	Understand the concepts of instrument transformers (L2)
CO3	Measure electrical parameters using DC and AC bridges (L6)
CO4	Analyze transducers and digital meter for measuring physical and electrical quantities (L4)

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		2			3							3	2
CO2	2		2			2							2	2
CO3	2		2			1							2	2
CO4	2		2			2							2	2

Syllabus		
Unit No.	Contents	Mapped CO
I	Classification, deflecting, control and damping torques, Ammeters and Voltmeters, PMMC, moving iron type instruments, Extension of range using shunt and series resistance, Single phase dynamometer wattmeter, LPF and UPF, expression for deflecting torque and control torque, Single phase induction type energy meter, driving and braking torques, errors and compensations.	CO1
II	Current Transformers, theory, ratio error and phase angle error, reduction of errors, construction of C.T, effect of Secondary open circuit, permanent magnetization and demagnetization of cores. Potential Transformers - Theory, ratio error and phase angle error, Reduction of errors, Construction of P.T	CO2
III	Type of P.F meters-Single phase Electrodynamometer Power Factor meter-three phase Electrodynamometer .Power Factor meter and Moving Iron Power Factor meters. Type of Frequency meters – Mechanical Resonance type Frequency meter, Electrical Resonance type Frequency meter-Weston type Frequency meter-Ratio meter type Frequency meter, Saturable core Frequency meter.	CO1
IV	Method of measuring low, medium and high resistances, Wheat stone's bridge, Kelvin's double bridge for measuring low resistance, loss of charge method for measurement of high resistance, Megger. Measurement of inductance, Quality Factor - Maxwell's bridge, Hay's bridge, Anderson's bridge, Measurement of capacitance, Desauty's Bridge, Schering Bridge.	CO3

V	Classification of transducers, Resistive transducer, Strain Gauge, Thermistors, Thermo couples and Linear Variable Differential Transformers. Digital Voltmeters-Successive approximation, ramp and integrating type DVM, Digital frequency meter, and Digital energy meter.	CO4
Learning Resources		
Text Books		
<ol style="list-style-type: none"> 1. A course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpat Rai & Co. Publications. 2. Electrical Measurements and measuring Instruments, E.W. Golding and F.C. Widdis, 5th Edition, Wheeler Publishing company. 		
Reference Books		
<ol style="list-style-type: none"> 1. Electrical Measurements: Fundamentals, Concepts, Applications, Martin. U. Reissland, New Age International Publishers Limited. 2. Electrical and Electronic Measurements, G.K.Banerjee, PHI Learning Private Ltd. 		
e- Resources & other digital material		
<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/108/105/108105153/ 		