Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Second Year Bachelor of EC Engineering

Subject Code: EC406-N	**Subject Title: ELECTRONICS MEASUREMENTS AND MEASURING INSTRUMENTS**

Course Objective:

- The objective of the course is to introduce the fundamentals of Electronics Instruments and Measurement providing an in-depth understanding of Measurement errors, Bridge measurements, Digital Storage Oscilloscope, Function Generator and Analyzer, Display devices, Data acquisition systems and transducers.
- To address the underlying concepts and methods behind Electronics measurements.

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	Total Marks
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
03	00	02	05	04	03	70	30	20	30	150

Outline of the Course:

Sr. No	Title of the Unit	Hours
1.	Introduction	3
2.	Bridge Measurements	10
3.	Digital Storage Oscilloscope	6
4.	Data Acquisition Systems	5
5.	Transducers	8
6.	Display Devices	8
7.	Digital Instruments and Function Generator	8
		48

Total hours (Theory): 48

Total hours (Practical): 32

Total hours: 80

Detailed Syllabus:

Unit No	Topics	Lectures (Hours)	Weightage
1.	**Introduction**: Definitions Accuracy and Precision, Significant Figures, Types of Error Statistical Analysis, Probability of Errors, Limiting Errors.	3	**8**
2.	**Bridge Measurements:** Wheatstone bridge, Kelvin Bridge AC Bridge And Their Applications, Maxwell Bridge, Hay's Bridge AC Bridge And Their Applications, Maxwell Bridge, Hay's Bridge Unbalance Conditions, Wein Bridge.	10	**20**
3.	**Digital Storage Oscilloscope:** Introduction, Oscilloscope Block Diagram, Cathode Ray Tube, Block Diagram Of DSO, Its Principle and Working, Advantages And Applications Special Oscilloscope.	6	**15**
4.	**Data Acquisition Systems**: Introduction to DAC Objective of DAS, signal conditioning of the inputs, single channel DAS.	5	**12**
5.	**Transducers** Electrical transducer, selecting a transducer, resistive transducer, Strain gauges, resistance thermometer, thermistor, inductive transducer, Differential output transducer, LVDT, pressure inductive transducer, capacitive transducer, load cell, Piezo electric transducer, photo electric transducer, photo voltaic cell.	8	**15**
6.	**Display Devices:** Digital Display Methods, Digital Display Units, Segmental Displays Dot Matrices,, Light Emitting Diode, Liquid Crystal Diodes, Segmental Gas Discharge Displays, Decade Counting Assembly's, Display Systems Decimal Decoders, BCD To 7-Segment Converter, BCD To Dot Matrix Converter Sensitivity Of Digital Meters, Accuracy Specification of Digital Multi meters.	8	**15**
7.	**Digital Instruments and Function Generator Digital**: Frequency Meter, Digital voltmeter. Digital LCR Meter and Q Meter. Introduction, The Sine Wave Generator, Frequency Synthesized Signal Generator, Frequency Divider Generator, Vector Signal Generator, Sweep Frequency Generator,	8	**15**
	Total	**48**	**100%**

Instructional Method and Pedagogy (Continuous Internal Assessment (CIA) Scheme)

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal weight age should be given to all topics while teaching and conduction of all examinations.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- One/Two internal exams may be conducted and total/average/best of the same may be converted to equivalent of 30 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.

Learning Outcomes:

- On successful completion of the course student can learn about detailed aspects of Electronics and measurements including error as well as in the field of Digital Instruments which all the areas in day to day life. Can also learn about Bridge Measurements, DSO, Function Generator & Data acquisition systems.

TEXT BOOKS & REFERENCE BOOKS:

1. Modern electronics Instrumentation and measurement techniques by Albert D. Helfrick And William D. Cooper
2. Electronic Instruments and Measurements by David Bell
3. A course in Electrical and electronics measurement and instrumentation by A. K. Sawhney, 2nd Edition by Dhanpatrai.
4. Electronic instrumentation by H.S. Kalsi, 2nd Edition ,Tata McGraw Hill Publications

LIST OF EXPERIMENTS

Sr. No.	Experiment Title
1.	To find the value of unknown resistor using Wheatstone bridge.
2.	To find the value of unknown inductance using Maxwell's bridge.
3.	To find the value of unknown capacitance using shearing bridge.
4.	To find the value of unknown capacitance using De Sauty's bridge.
5.	To measurement of frequency using lissajous method.
6.	To study the front panel controls of storage CRO.
7.	To study and verify characteristic of variable resistor transducer (strain gauge).
8.	To study and verify characteristic of LVDT.
9.	To study characteristics of IC temperature sensor (LM 335).
10.	To study characteristics of platinum RTD.
11.	To study of LCRQ meter.
12	Mini project- using load cell/ temperature sensor/ solenoid/ opto- coupler