

Learning Outcomes:

After successful completion of the course, student will be able to understand:

- Describe the fundamental concepts and principles of instrumentation.
- Explain the operations of the various instruments required in measurements.
- Apply the measurement techniques for different types of tests.
- To select specific instrument for specific measurement function.
- Understand principle of operation, working of different electronic instruments like digital multi meter, vector voltmeter.
- Learners will apply knowledge of different oscilloscopes like CRO, DSO.

SYLLABUS

Unit No.	Topics	Lectures (Hours)
1	BASICS OF INSTRUMENTATION & MEASUREMENT: Generalized instrumentation system – Units and standards- Calibration methods- Standards of measurement, input impedance, loading effect etc.	2
2	BRIDGE MEASUREMENT: Wheatstone Bridge, Kelvin Bridge, AC Bridge and their applications, Maxwell Bridge, Hay's Bridge, Unbalance Conditions, Wein Bridge. Anderson's Bridge, De Sauty's Bridge, Schering Bridge.	4
3	AMMETERS AND VOLTMETERS : Basic Meter movement, PMMC galvanometer principle, D.C. ammeter, D.C. voltmeter, loading in voltmeter, A.C. voltmeter using rectifiers, FET based voltmeter, Peak reading, Average reading, True RMS reading voltmeter. Digital voltmeters: Principles of working of ramp type, dual slope, Successive approximation type, Integrating type and staircase type.	8
4	ELECTRONICS INSTRUMENT FOR MEASURING BASIC PARAMETERS: True RMS Responding Voltmeter, Digital Frequency Meter, Circuit for Measurement of Frequency, High Frequency Measurements, Period Measurement, Ratio and Multiple Ratio Measurements, Time Interval Measurements, Vector Impedance Meter, Q Meter.	5
5	FUNCTION GENERATOR AND ANALYZERS Function Generators. Signal Analyzer: Wave Analyzer, Spectrum Analyzer.	6
6	DISPLAY AND RECORDING SYSTEMS: Display: LED, LCD, Plasma and gas discharge displays; Dot-matrix and Bar graph displays Recorders: Strip chart recorders, Galvanometer type recorder, Potentiometric recorder, Circular chart recorder, X-Y recorder, Digital X-Y plotter, and Magnetic recorders.	6
7	OSCILLOSCOPES : CRT tube, CRT features, Block diagram study of C.R.O, Electro focusing lens, Horizontal deflecting system, Frequency and phase measurement, types of Sweep, Oscilloscopes: Dual trace type, Dual beam type, Storage oscilloscope, Sampling oscilloscope, Digital storage oscilloscope	6

8	DATA ACQUISITION SYSTEMS : Objectives of DAS, Components of Analog and digital DAS system, Single channel and multichannel DAS. Types of multiplexing: Time and frequency division based.	6
9	GROUNDING AND SHIELDING: Grounding generalities, Grounding for fault and personnel protection, High frequency grounding configuration, Shielding, CMS grounding,	2

Term Work and Practical shall be based on the above syllabus.

Text Books

1. Electronic Instrumentation by H.S.Kalsi
Tata McGraw Hill, 1999
2. Electronic Instrumentation and Measurements by Bell David A.
PHI / Pearson Education, 2006
3. A course in Electrical and Electronic Measurements and Instrumentation by Sawhney
A. K Dhanapat Rai and Sons, New Delhi, 1995.

Reference Books:

1. Modern Electronic Instrumentation & Measurements Techniques by Albert.D.Hellfrick,
William Cooper
Prentice Hall of India Ltd-2003
2. Electronic Measurements & Instrumentation by Oliver.B.H & Cag.J.M.
McGrawHill-1992
3. Applied Electronic Instrumentation& Measurements by David Buchla, Wayne
Melachlan
Prentice Hall-1992
4. Digital Instrumentation by A.J.Bouwens
Tata McGrawHill
5. Instrumentation Devices & Systems by Rangan, C.S.Sharma
Tata McGrawHill
6. Instrumentation Devices And Systems by Rangan C. S., Sarma G. R. and Mani V. S. V
Tata McGraw-Hill, 2nd Ed., 2004.