4/4 B.Tech - EIGHTH SEMESTER

EC8T2 Electronic Measurements and Instrumentation Credits: 4

Lecture : 4 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

Course Objectives:

- To study performance characteristics of various electronic measuring instruments in detail.
- To study the principles of working of various signal generators and wave analysers in detail.
- To study the principle of working of CRO , is specifications , applications in detail and study the working of various advanced CRO's and their applications.
- To study the principle of working of Q-Meters various AC bridges and their applications.
- To study the principles of operation of various active and passive transducers and their views to measure various physical parameters using electronic measuring instruments and data acquisition systems.

UNIT- I

Performance characteristics of instruments: Static characteristics, Errors in Measurement, Dynamic Characteristics, DC Voltmeters- Multi range, Range extension, AC voltmeters- multi range, Range Extension, Thermocouple type RF ammeter, Ohmmeters series type, shunt type, Multimeters for Voltage, Current and resistance measurements.

UNIT- II

Signal Generator: Fixed and variable signal generators, AF oscillators, Standard signal generator, AF sine and square wave signal generators, Function Generators, Square & pulse generator, sweep generator.

UNIT -III

Wave Analyzers: Basic wave analyzers, Frequency selective wave analyzers, Hetero- dyne wave analyzer, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

UNIT- IV

Oscilloscopes: Basic block diagram, CRT features, simple CRO, vertical amplifiers, horizontal deflection system, triggered sweep CRO,delay line , Dual beam CRO, Dual trace oscilloscope, Measurement of amplitude, period and frequency, Lissajous method of frequency measurement.

UNIT- V

Special Oscilloscopes: Sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, probes for CRO- Active & Passive, Frequency counter, Time and Period measurement.

UNIT- VI

Bridges: Wheatstone Bridge, AC Bridges Measurement of inductance- Maxwell's bridge, Measurement of capacitance - Schearing Bridge. Wien Bridge, Errors and precautions in using bridges. Q-meter, Errors in Q meter.

UNIT- VII

Transducers- Resistance, Capacitance, inductance, Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors

UNIT- VIII

Measurement of physical parameters: force, pressure, velocity, humidity, moisture, speed, proximity & displacement, Data acquisition system

Learning Resources

Textbooks:

1. Electronic instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill, 2004.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI,5th Ed. , 2002.

References:

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2nd Edition,2003.
2. Electronic Test Instruments, Analog and Digital Measurements - Robert A.twitter, Pearson Education, 2nd Ed., 2004.