

III B.Tech I Semester

15AEC27 - ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

L T P C

3 1 0 3

Course Objectives:

1. To study about functioning of different meters associated with measurements of signal characteristics
2. To study and employ CRO for measuring Signal characteristics
3. To study in detail about different bridges employed for Electronic measurements
4. To study working of advanced measuring instruments such as logic analyzers and spectrum analyzers

UNIT-I

Performance characteristics of Instruments: Static characteristics, Accuracy, Precision, Resolution, Sensitivity, static and dynamic calibration, Errors in Measurement, and their statistical analysis, dynamic characteristics-speed of Response, fidelity, Lag and dynamic error. DC ammeters, DC voltmeters-multirange, range extension/solid state and differential voltmeters, AC voltmeters-multirange, range extension. Thermocouple type RF ammeter, ohm meters, series type, shunt type, multimeter for voltage, current and resistance measurements.

UNIT-II

Oscilloscopes: Introduction, Basic Principle, Standard specifications of CRO,CRT features, vertical and horizontal amplifiers, horizontal and vertical deflection systems, sweep trigger pulse, delay line, sync selector circuits, probes for CRO – active, passive, and attenuator type, triggered sweep CRO, and Delayed sweep, dual trace/beam CRO, Measurement of amplitude, frequency and phase (Lissajous method). Principles of sampling oscilloscope, storage oscilloscope, and digital storage oscilloscope, Digital frequency counters, time & Period measurements.

UNIT-III

Review of DC Bridges: Wheatstone bridge, Wein Bridge, errors and precautions in using bridges, AC bridges: Measurement of inductance-Maxwell's bridge, Anderson Bridge. Measurement of capacitance- Shearing Bridge, Kelvin Bridge, Q-meter, Interference and noise reduction techniques.

UNIT-IV

Signal generator-fixed and variable, AF oscillators, function generators, pulse, random noise, sweep, and arbitrary waveform generators, their standards, specifications and principles of working (Block diagram approach). Wave analyzers, Harmonic distortion analyzers, Spectrum analyzers, and Logic analyzers.



UNIT-V

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

Course Outcomes: After the completion of the course the students will be able to

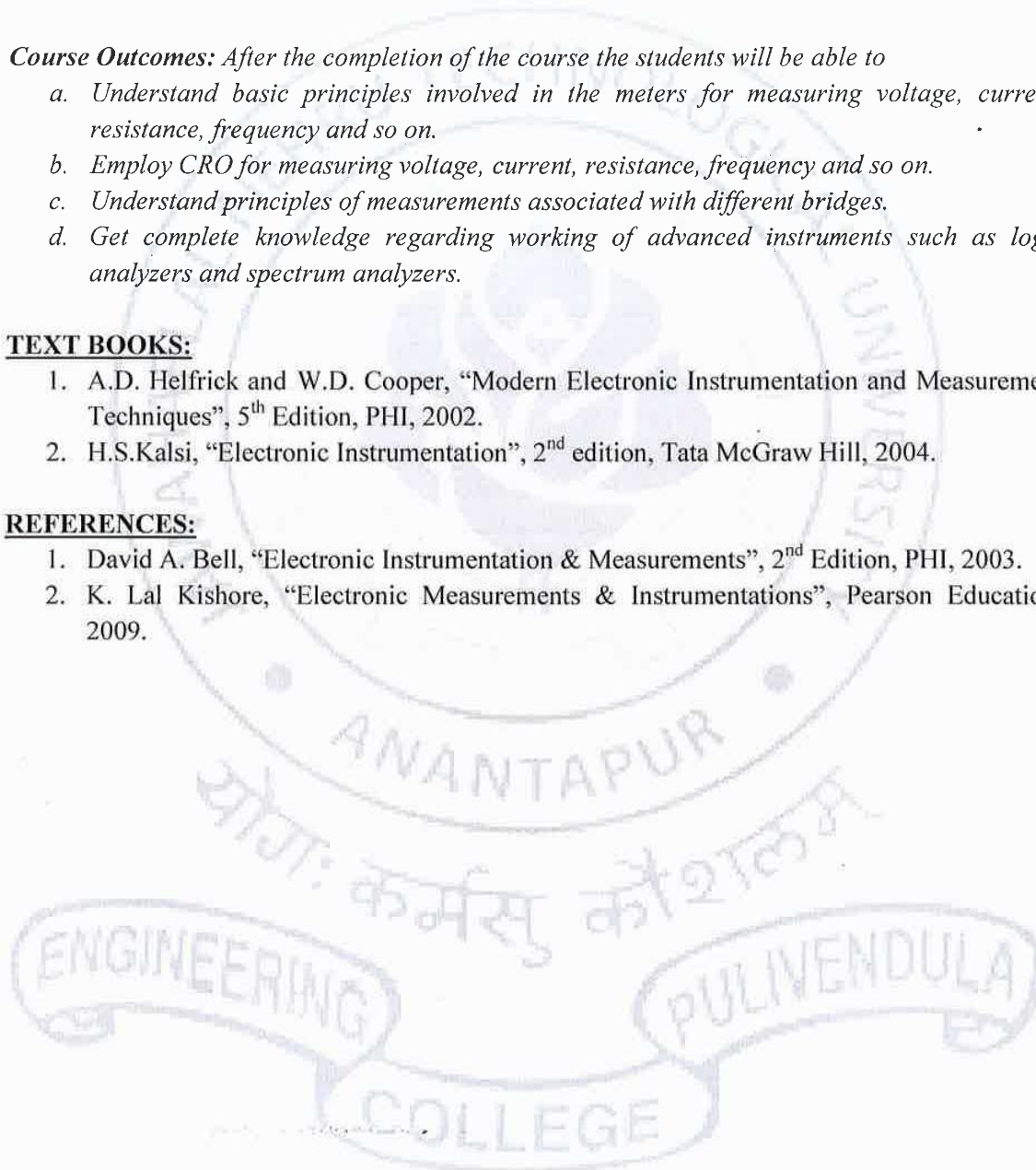
- Understand basic principles involved in the meters for measuring voltage, current, resistance, frequency and so on.
- Employ CRO for measuring voltage, current, resistance, frequency and so on.
- Understand principles of measurements associated with different bridges.
- Get complete knowledge regarding working of advanced instruments such as logic analyzers and spectrum analyzers.


TEXT BOOKS:

- A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", 5th Edition, PHI, 2002.
- H.S.Kalsi, "Electronic Instrumentation", 2nd edition, Tata McGraw Hill, 2004.

REFERENCES:

- David A. Bell, "Electronic Instrumentation & Measurements", 2nd Edition, PHI, 2003.
- K. Lal Kishore, "Electronic Measurements & Instrumentations", Pearson Education, 2009.




 Head of Electronics & Communication Engineering Dept
 ANUTG College of Engineering
 PULIVENDULA - 516 390