

## **APPC2001 ELECTRONICS MEASUREMENT & INSTRUMENTATION (3-0-0)**

### **Course Objectives:**

- This course enables the students to help students grasp how to use instruments for electronic measurement.
- This course enables the students to be knowledgeable about CRO and various Function Generator circuit.
- This course enables the students to be familiar with Frequency Counter design and usage.
- This course enables the students to understand Data Acquiring Systems and Interfacing.

### **Module I (8 hrs)**

Basics of Measurements: Accuracy, Precision, resolution, reliability, repeatability, validity, Errors and their analysis, Standards of measurement. Bridge Measurement: DC bridges-wheat stone bridge, AC bridges – Kelvin, Hay, Maxwell, Schering and Wien bridges, Wagner ground Connection. Electronic Instruments for Measuring Basic Parameters: Amplified DC meter, AC Voltmeter, True- RMS responding Voltmeter, Electronic multi-meter, Digital voltmeter, Vector Voltmeter.

### **Module II (5hrs)**

Cathode Ray Oscilloscope: Block diagram of CRO, cathode ray tube, Deflection amplifier, Vertical deflection system, horizontal deflection systems, Oscilloscope probes, Measurements with CRO-voltage, frequency and phase measurements, Digital storage Oscilloscope.

### **Module III (5 hrs)**

Signal Generator: Sine-wave generator, pulse and square wave generator, Triangular wave generator, Frequency synthesized signal generator, Frequency divider generator, Function generators.

### **Module IV (6 hrs)**

Frequency And Time Interval Measurement: Simple frequency counter, extending frequency range of counter, Automatic computing counter, Phase detector, Spectrum analyzer, Network analyzer.

### **Module V (6 hrs)**

Analog And Digital Data Acquisition Systems: Introduction, Signal conditioning of input, Single channel and multi-channel data acquisition systems, Data conversion, ADC, DAC,IEEE-488 GPIB Bus.

### **Course Outcomes:**

After the completion of this course, graduate students will be able to:

- CO1: Understand the significance of instrument specification.
- CO2: Become familiar with the CRO measurement instrument's design, operation, and usage.
- CO3: Investigate various methods for standard signal generation.
- CO4: Examine the different frequency measurement tools.
- CO5: Understand the hardware needed for data acquisition systems.

**Essential Reading**

- D. A. Bell, Electronic Instrumentation and Measurement, PHI
- H. S. Kalsi, Electronic Instrumentation, TMH
- A. K. Sawhney, Electrical and Electronics Measurements and Instrumentation, Dhanpat Rai, 2003

**Supplementary Reading**

- A. D. Helfrick, W. D. Cooper, Modern Electronic Instrumentation and Measurement Techniques, PHI
- D. Patranabis, Principles of Electronic Instrumentation, PHI
- J. P. Bentley, , Principles of Measurement Systems, Longman Group Ltd. (Pearson Education), 1995