**17EE3101- ELECTRONIC MEASUREMENTS**

**(EEE)**

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| **Course Category:** | Professional core | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture-Tutorial-practical:** | 3-0-0 |
| **Pre-requisite:** | Basic Electrical Engineering  Electronic Devices and Circuits  Electrical Measurements | **Sessional Evaluation:**  **Univ.Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Objectives:** | Students undergoing this course are expected to : | |
| 1. Learn the basics of oscilloscopes 2. Learn the different types of oscilloscopes 3. Learn the working of digital voltmeters, multimeter, tachometer and phase meter. 4. Impart the knowledge on wave analyzers. 5. Impart the knowledge on various transducers and the data acquisition systems. 6. Measure the Physical Parameters. | |
| **Course Outcomes:** | After completing the course the student will be able to: | |
| **CO1** | Understand the working of CRO, time base generators and CRO circuits. |
| **CO2** | Understand the different types of oscilloscopes and ability to measure voltage, current, frequency and phase with Oscilloscope. |
| **CO3** | Use Digital voltmeters, multimeter, tachometer and phase meter. |
| **CO4** | Understand the analysis of waveforms using wave analyzers. |
| **CO5** | Understand about different transducers and their working principles. |
| **CO6** | Measure the physical parameters like strain, displacement, Velocity, Angular Velocity, temperature, Pressure and Vacuum. |
| **Course Content:** | **UNIT–I**  **Cathode Ray Oscilloscope-I:** Block diagram of CRO, CRT, Electrostatic focusing, Electrostatic deflection sensitivity, Time Base generators, Oscilloscope amplifiers– Basic CRO Circuits, Observation of waveform on CRO  **UNIT-II**  **Cathode Ray Oscilloscope-II:** Principle of operation of Dual beam, Dual trace, Sampling and Storage CROs – Measurements with CRO (voltage, current, frequency, phase angle, lissajous figures).  **UNIT-III**  **Digital instruments:** Digital voltmeters-Ramp- Dual slope- stair case- successive approximation types- Digital multimeter- universal counter- Digital tachometer- Digital phase meter-Auto ranging- 3,3 ,3Digit display.  **UNIT- IV**  **Signal Analyzers:** AF, HF Wave Analyzers. Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Power Analyzers, Potentiometric recorders, Rectifier type instrument- half wave and full wave, true RMS voltmeter, Q-meter.  **UNIT-V**  **Transducers:** Classification, Strain gauges-Bonded, unbonded; Force and Displacement Transducers, Resistance Thermometers, Thermocouples, LVDT, Piezoelectric Transducers, Variable Capacitance Transducers, Magneto strictive Transducers.  **UNIT-VI**  **Measurement of Physical Parameters:** Flow Measurement, Liquid level Measurement, Measurement of Humidity and Moisture, Velocity, Pressure - High Pressure, Vacuum level, Data Acquisition Systems. | |
| **Text books**  **&**  **Reference books:** | **Text books:**  1. “Electrical and Electronic Measurements and Instrumentation”, by A.K.Sawhney, Dhanpat Rai & Co. 2. “Electronic Instrumentation”, by H.S.Kalsi TMH, 2nd Edition 2004.  **Reference books:**  1.“Electronic Instrumentation and Measurements”, by David A. Bell, Oxford Univ. Press, 1997.  2.“Modern Electronic Instrumentation and Measurement Techniques” , by A.D. Helbincs. W.D.Cooper: PHI 5aEdition 2003. | |
| **e-Resources:** | <http://nptel.ac.in/courses>  <http://iete-elan.ac.in>  <http://freevideolectures.com/university/iitm>  http://instrumentationtoday.com | |