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| **III B.TECH- I SEMESTER** | **L** | **T** | **P** | **INTERNAL**  **MARKS** | **EXTERNAL**  **MARKS** | **TOTAL**  **MARKS** | **CREDITS** |
| **3** | **0** | **0** | **30** | **70** | **100** | **3** |
| **Code: R20EC3106** | **ELECTRONIC MEASUREMENTS AND INSTRUMENTATION (PROFESSIONAL ELECTIVE–I)** | | | | | | |

### COURSE OBJECTIVES:

1. List out Performance Characteristics of Different Electronic Measuring Instruments, Analysis and Calibration Techniques.
2. Describe Concepts of Passive and Active Transducers and about the description, classification & selection criterion of Transducers.
3. Review the concepts of electrical and electronics measurements with different techniques.
4. Memorize Signal Generator and Wave Analyzers for Analysis
5. Illustrate concepts of computer controlled test systems, storage elements and display instruments and Basic CRO circuits & CRO Probes, of EM Spectrum and Explain about all AC bridges and Q-meters, Design Methods and its Applications Techniques of Measurement of frequency and about measurement techniques of signals by using various types of Signal Analyzers.

**COURSE OUTCOMES:** After going through this course, the student will be able to

**CO1:** List out Electronic Instruments, their Characteristics and use, Peculiar Errors Associated with the Instruments and how to minimize such Errors. **[K1]**

**CO2:** Identify with transducers, electrical and electronic instruments**. [K2]**

**CO3:** Apply the Principle of Operation of Electronic Measuring Instruments**. [K3]**

**CO4:** Illustrate various concepts of electronic instruments. Computer controlled test systems. **[K4]**

**CO5:** constructed Storage and display instruments for experimenting andAnalysis the working & uses of Electronic voltmeter & multimaster, Digital multimaster, Q meter **[K5]**

### SYLLABUS:

**UNIT-I**: **BASIC MEASUREMENTS:** Functional Elements of measurement system- Examples - Characteristics of instruments: Static characteristics, Dynamic characteristics, Types of errors, sources of errors, methods of eliminating Errors, Histogram, Mean, Measure of dispersion from the mean, Range Deviation Average deviation, Standard Deviation, Variance, Bourdon Tubes.

**UNIT-II: TRANSDUCERS**: Classification of Transducers, Characteristics, Basic Requirements of a Transducer, Resistive Transducer, Strain Gauge, Inductive Transducer, Capacitive displacement transducer, LVDT, Load cell Transducers, Thermocouple, Thermistor, Radiation Pyrometers.

**UNIT-III: ELECTRICAL MEASUREMENTS:** Measurement of Voltage and Current: D‘Arsonval Galvanometer, permanent magnet moving coil, permanent magnet moving iron, Dynamometer, Measurement of Resistance, Inductance and Capacitance: Wheat stone bridge, Kelvin double bridge, Wien Bridge, Hay‘s bridge, Maxwell bridge, Anderson bridge, Q- Meter, Schering bridge, Ohmmeter.

**UNIT-IV: ELECTRONIC MEASUREMENTS:** Signal generators: Function Generator, RF Signal Generator, Random Noise Generator, Sweep generators, Wave Analyzer- Harmonic, Distortion Analyzer - Spectrum Analyzer - DC & AC Voltmeters, Digital Voltmeters, Electronic Multimeters, VOM meters. Measurement of physical parameters force, pressure, velocity, humidity and Data acquisition systems.

**UNIT-V: STORAGE AND DISPLAY INSTRUMENTS**: Cathode Ray Oscilloscopes– CRT Circuit, Vertical Deflection System, Delay Line, Horizontal Deflection System, Oscilloscope Techniques, Special Oscilloscopes, Recorders -XY & Magnetic Tape Dot Matrix Display.

### TEXT BOOKS:

1. A.K.Sawhney ‖ Electrical, Electronic measurement & Instrumentation‖, 18th Edition, Dhanpat Rai & Sons, Reprint 2010
2. Albert.D.Helfrick & William.D.Cooper, ― Modern Electronic Instrumentation & Measurement Techniques‖, PHI, 2003.

### REFERENCE BOOKS:

1. E.W.Golding and F.C.Widdis ―Electrical Measurements and measuring Instruments‖, 5th Edition, AH Wheeler & Company, 1993.
2. Electronic instrumentation: H.S.Kalsi - TMH, 2nd Edition 2004.
3. Alan Morris, "Principles of Measurements & Instrumentation", 2nd Edition, PHI, 2003.
4. R. K. Rajput, ―Electronic Measurements & Implementation‖, S. Chand Pu