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|  | **NAGARJUNA COLLEGE OF ENGINEERING & TECHNOLOGY****(An Autonomous under VTU)****DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGG.**4th Semester 2019-2020 **COURSE HANDOUT** |

**Course Code : 18ECI443**

**Course Title : Electronic Instrumentation (IC)**

**Course Teachers : Mr. Vinay Kumar N**

**Course Co-ordinator : Mr. Vinay Kumar N**

**1. COURSE DESCRIPTION:**

 The course focuses on understanding that is needed to analyze properties of Transmission lines and waveguides. The main concepts included understand the Transmission Lines and Equations, basic concepts, working and applications of Microwave diodes, Microwave Network Theory and Passive Devices, strip lines and Introduction to RADAR, working and its applications.

**2. COURSE OBJECTIVE:**

* + Understand the concepts of errors and characteristics of the measurement systems.
	+ Understand the basic working principle of DVM, DMM, CRO, DFM.
	+ Study the fundamental concepts and working of CRT.
	+ Describe the functioning of different Signal Generators and Bridge Circuits.
	+ Understand the principle of Different types of Transducers.

**3. COURSE PLAN:**

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| **Class Sl No** | **Module and Title / Page No.** | **Topics to be covered** | **% of portions covered** |
| **Covered in the chapter** | **Cumulative** |
|  | **Module-I****Measurement Errors:** **Voltmeters and Multimeters****T2**: Page No. 14-17.**T1**: Page No.  79-87. 107-109. | Gross errors and systematic errors | **20%** | **20%** |
|  | Absolute and relative errors |
|  | accuracy |
|  | Precision |
|  | Resolution and Significant figures. |
|  | Introduction, Multirange voltmeter |
|  | Extending voltmeter ranges |
|  | Loading |
|  | Pea responding and True RMS voltmeters |
|  | **Module-II****Digital Instruments****T1: Page No.** **147-155** | Digital Voltmeters – Introduction | **20%** | **40%** |
|  | DVM’s based on V – T |
|  | V– F and Successive approximation principles |
|  | Resolution and sensitivity |
|  | General specifications |
|  | Digital Multi-meters |
|  | Digital frequency meters |
|  | Digital measurement of time |
|  | **Module-III****Oscilloscopes****T1: Page No.** **176-180.** **191-200.** | Introduction | **20%** | **60%** |
|  | Basic principles |
|  | CRT features |
|  | Block diagram and working of each block |
|  | Typical CRT connections |
|  | Dual beam and dual trace CROs |
|  | Electronic switch |
|  | **Module-IV****Signal Generators.** **Measurement of resistance, inductance and capacitance.****T1: Page No.** **233-244.** **336-354.** | Introduction  | **20%** | **80%** |
|  | Fixed and variable AF oscillator |
|  | Standard signal generator |
|  | Laboratory type signal generator |
|  | AF sine and Square wave generator |
|  | Function generator |
|  | Square and Pulse generator |
|  | Sweep frequency generator |
|  | Frequency synthesizer |
|  | AC bridges |
|  | Capacitance |
|  | Comparison Bridge |
|  | Maxwell’s bridge  |
|  | Wein’s bridge |
|  | Wagner’s earth connection |
|  | **Module-V****Transducers-I and Transducers-II****T1: Page No.** **406-479.** | Introduction | **20%** | **100%** |
|  | Electrical transducers |
|  | Selecting a transducer |
|  | Resistive transducer |
|  | Resistive position transducer |
|  | Strain gauges |
|  | Resistance thermometer |
|  | Thermistor |
|  | Inductive transducer |
|  | Differential output transducers and LVDT |
|  | Piezoelectric transducer |
|  | Photoelectric transducer |
|  | Photovoltaic transducer |
|  | Semiconductor photo devices |
|  | Temperature transducers-RTD, Thermocouple |

### 4. TEXT BOOKS:

1. H. S. Kalsi: “Electronic Instrumentation”, 3rd Edition, TMH, New Delhi, 2010, ISBN: 978-0-07-070206-6.
2. David A Bell: “Electronic Instrumentation and Measurements”, 3rd Edition, PHI, New Delhi, 2006, ISBN: 9788120323605.

### 5. REFERENCE BOOKS:

1. Cooper D and A D Helfrick: “Modern electronic instrumentation and measuring techniques”, PHI, New Delhi, 1990, ISBN: 978-81-203-0752-0.

**6. EVALUATION SCHEME:**

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| --- | --- | --- |
| **Component** | **Weightage** | **Date** |
| CIE-1 | 20% |  |
| CIE-2 | 20% |  |
| Makeup CIE | 20% |  |
| AAT-1 (Surprise Test) | 5% |  |
| AAT 2 (Quiz) | 5% |  |
| Integrated lab  | 50% |  |
| SEE | 50% |  |

### 7. COURSE OUTCOMES :

On completion of this course, students will be able to:

* Analyze characteristics of various measuring instruments and different types of errors.
* Describe the various technologies available to measure R, L, C using current and voltage meters.
* Describe working principle of CRO and able to measure different parameters.
* Explain different types of Signal generators and function generator.
* Describe the working of different types of Transducers.

 **Course Co-ordinator HOD**

 Mr. Vinay Kumar N Dr.Nagesh K N