IV B.Tech I Semester

15AEE52-INSTRUMENTATION
(CBCC (DEPARTMENTSPECIFIC))

L	T	P	C
3	1	0	3

Course Objectives:

This course enables the students to:

- *Understand the working of different types of transducers.*
- *Study the digital signal analyzers like digital voltmeters, Q meters.*
- *Identify the instruments, their use, peculiar errors associated with the instruments and minimization of errors.*
- *Understand the concepts of industrial and laboratory applications of LVDT & Strain gauge.*
- *Understand the methods of data transmission and modulation systems.*

UNIT-I: CHARACTERISTICS OF SIGNALS AND THEIR REPRESENTATION

Measuring Systems, Performance Characteristics, - Static Characteristics, Dynamic Characteristics; Errors in Measurement – Gross Errors, Systematic Errors, Statistical Analysis of Random Errors. Signal and Their Representation: Standard Test, Periodic, Aperiodic, Modulated Signal, Sampled Data, Pulse Modulation and Pulse Code Modulation.

UNIT-II: DATA TRANSMISSION , TELEMETRY AND DAS

Methods of Data Transmission – General Telemetry System . Frequency Modulation System (FM), Pulse Modulation (PM), Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM) Telemetry. Comparison of FM, PM, PAM and PCM. Analog and Digital Acquisition Systems – Components of Analog DAS – Types of Multiplexing Systems: Time Division and Frequency Division Multiplexing – Digital DAS – Block Diagram — Modern Digital DAS (Block Diagram)

UNIT-III:SIGNAL ANALYZERS

Wave Analysers- Frequency Selective Analyzers, Heterodyne, Application of Wave Analyzers-Harmonic Analyzers, Total Harmonic Distortion, Spectrum Analyzers, Basic Spectrum Analyzers, Spectral Displays, Vector Impedance Meter, Q Meter. Peak Reading and RMS Voltmeters Digital Voltmeter-Successive Approximation, Ramp and Integrating Type-Digital Frequency Meter-Digital Multimeter-Digital Tachometer

UNIT-IV: TRANSDUCERS

Definition of Transducers, Classification of Transducers, Advantages of Electrical Transducers, Characteristics and Choice of Transducers; Principle Operation of Resistor, Inductor, LVDT and Capacitor Transducers: LVDT Applications, Strain Gauge and Its Principle of Operation, Guage Factor, Thermistors, Thermocouples, Synchros, Piezo Electric Transducers, Photovoltaic, Photo Conductive Cells, Photo Diodes.

UNIT-V: MEASUREMENT OF NON-ELECTRICAL QUANTITIES

Measurement of strain, Gauge Sensitivity, Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque, Temperature, Pressure, Flow, Liquid level.

V. Sarada
BOS – chairman

Course Outcomes:

The students will have knowledge on the following concepts

- *Measurement of non electrical quantities like strain, displacement, velocity, angular velocity, temperature, pressure.*
- *Calibration of various instruments and their application in various fields.*
- *Different types of transducers and signal analyzers.*
- *Data transmission and telemetry system.*

TEXT BOOKS:

1. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India
2. A course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, DhanpatRai& Co.

REFERENCE BOOKS:

1. Electronic Instrumentation-by H.S.Kalsi TataMCGraw-Hill Edition, 3/e.
2. Modern Electronic Instrumentation and Measurement techniques – by A.D Helfrick and W.D.Cooper, Pearson/Prentice Hall of India.
3. Industrial Instrumentation – Principles and Design by T. R. Padmanabhan, Springer.

BOS - chairman