

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics & Instrumentation Engg.)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR7E5 Data Acquisition System	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning objectives: This course educates students in the use, selection, and design of instrumentation and data acquisition systems for agricultural, food, environmental and biological systems. Measurement of position (GPS), force, pressure, power, torque, flow, temperature and environmental sensors will be emphasized. Labs will focus on building and using measurement systems, and programming PC computers for data acquisition and analysis.

Prerequisites: Basic knowledge of instrumentation and measurement.

Course Contents

Unit-I

To introduce the concepts of precision, bias, calibration, linearity when monitoring a static system, basic concepts of electrical circuits (DC and AC) and their components (resistance, capacitance, impedance).

Unit-II

Introduce the concepts of sensor responsiveness; zeroth, first, and second order sensors; decibel plots.

Unit-III

Time constant of various temperature sensors when exposed to changing conditions. To understand the basics of signal transmission, signal noise, and grounding for safety and signal transmission.

Unit-IV

To learn the basics of signal conditioning including passive and active, low- and high-pass filter circuits, amplification and mathematical properties of op amp circuits

Unit-V

. Digital information is storage and accessed via stand-alone and computer based DAQ systems, concepts associated with environmental data collection, including measurement of meteorological variables, self-contained data logging systems, and sensor placement, additional exposure to measurement systems.

Learning Outcomes:

1. Understand the principles of operation and limitations of common measuring instruments.
2. Model instruments and their operating conditions to use the instruments.
3. Design and use signal conditioning devices.
4. Program computers to automate the acquisition and processing of data.
5. Design systems for the acquisition, analysis, and communication of data
6. Gain awareness of economical and societal aspects of instrumentation systems

BOOKS RECOMMENDED

1. Doebelin, E., Measurement Systems, 5th ed., McGraw-Hill, New York, 2004.
2. Pallas-Areny, R. and J. G. Webster, Sensors and Signal Conditioning, 2nd ed., John Wiley and Sons, New York, 2001.
3. Webster, J. G. (editor), The Measurement, Instrumentation, and Sensors Handbook, CRC Press and IEEE Press, 1999.
4. Fraden, J., Handbook of Modern Sensors: Physics, Designs and Applications, 3rd.ed., AIP Press and Springer, New York, 2004.