UEI701: DATA ACQUISITION AND SYSTEM DESIGN

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Course Objectives: To understand concepts of acquiring the data from transducers/input devices, their interfacing and instrumentation system design.

Data Acquisition Techniques: Analog and digital data acquisition, Sensor/Transducer interfacing, unipolar and bipolar transducers, Sample and hold circuits, Interference, Grounding and Shielding.

Data Acquisition with Op-Amps: Operational Amplifiers, CMRR, Slew Rate, Gain, Bandwidth. Zero crossing detector, Peak detector, Window detector. Difference Amplifier, Instrumentation Amplifier AD 620, Interfacing of IA with sensors and transducer, Basic Bridge amplifier and its use with strain gauge and temperature sensors, Filters in instrumentation circuits,

Data Transfer Techniques: Serial data transmission methods and standards RS 232-C: specifications connection and timing, 4-20 mA current loop, GPIB/IEEE-488, LAN, Universal serial bus, HART protocol, Foundation-Fieldbus, ModBus, Zigbee and Bluetooth.

Data Acquisition System (DAS): Single channel and multichannel, Graphical Interface (GUI) Software for DAS, RTUs, PC-Based data acquisition system.

Laboratory Work: Op-amp as a comparator and its application, Integrator and differentiator, Active filters, Simulation of the above applications using ORCAD, Instrumentation Amplifier/AD 620, Interfacing of sensors and transducers using DAQ cards.

Course Learning Outcomes (CLO):
After the successful completion of the course the students will be able to:
1. elucidate the elements of data acquisition techniques.
2. design and simulate signal conditioning circuits.
3. explain various data transfer techniques
4. understand the components of data acquisition system

Text Books:
1. *Coughlin, R.F., Operational Amplifiers and Linear Integrated Circuits, Pearson Education (2006).*
2. *Kalsi, H.S., Electronic Instrumentation, Tata McGraw Hill (2002).*
3. *Gayakwad, R.A., Op-Amp and Linear Integrated Circuits, Pearson Education (2002).*
4. *Mathivanan, N., Microprocessor PC Hardware and Interfacing, Prentice Hall of India Private Limited (2007).*

Reference Books:
1. *Ananad, M.M.S., Electronic Instruments and Instrumentation Technology, Prentice Hall of India Private Limited (2004).*
2. *Murthy, D.V.S., Transducers and Instrumentation, Prentice Hall of India Private Limited (2006).*

Evaluation Scheme:

S.NO.	Evaluation Elements	Weightage (%)
1	MST	25
2	EST	40
3	Sessional (May include Assignments//Quizzes/Lab Evaluations)	35