

EC522 – SMART INSTRUMENTATION

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Course Objectives:

The course is extensively hands on, giving participants considerable practical experience of the devices typically found in industry.

Courses Learning Outcome:

The students will be able to

- Identify various sensors, Transducers and their brief Performance specifications.
- Understand principle of working of various types of signal conditioning, processing and transmitter
- Make comparative study of various protocol.
- Understand applications of Instrumentation in Emmebedded system(Real Time Interface)

UNIT I (8 hours) General concepts and terminology of measurement systems, static and dynamic characteristics, errors, standards and calibration.

UNIT II (10 hours) Introduction, principle, construction and design of various active and passive transducers. Introduction to semiconductor sensors and its applications, Design of signal conditioning circuits for various Resistive, Capacitive and Inductive transducers and piezoelectric transducer.

UNIT III (8 hours) Introduction to transmitters, two wire and four wire transmitters, Smart and intelligent Transmitters. Design of transmitters.

UNIT IV

(15 hours)

Introduction to EMC, interference coupling mechanism, basics of circuit layout and grounding, concept of interfaces, filtering and shielding. Safety: Introduction, electrical hazards, hazardous areas and classification, non-hazardous areas, enclosures – NEMA types, fuses and circuit breakers. Protection methods: Purging, explosion proofing and intrinsic safety.

UNIT V (8 hours) Field bus, Mod bus, GPIB, IEEE-488, VME, VXI, Network buses – Ethernet – TCP/IP protocols; CAN bus- basics, Message transfer, Fault confinement.

TEXT BOOKS:

1. John P. Bentley, Principles of Measurement Systems, Third edition, Addison Wesley Longman Ltd., UK, 2000.
2. Doebelin E.O, Measurement Systems - Application and Design, Fourth edition, McGraw-Hill International Edition, New York, 1992.

REFERENCES:

1. M. Sze, "Semiconductor sensors", John Wiley & Sons Inc., Singapore, 1994.
2. Noltingk B.E., "Instrumentation Reference Book", 2nd Edition, Butterworth Heinemann, 1995.
3. L.D.Goettsche, "Maintenance of Instruments and Systems – Practical guides for measurements and control", ISA, 1995.