AGRI 314(ELECTIVE-III) BASIC INSTRUMENTATION AND THEIR APPLICATION IN AUTOMATION

Credit hours (1+1=2)

Objective: To make students aware of instrumentation used in agricultural sector and as per current trend of agricultural automation sector.

Unit I

Basic Controller Design:

Study of transducers: Description of transduction principles, classification, Guidelines for selection, Requirements, Types and Application of Transducers.

Measurement of Electrical and Non Electrical Quantities:

Classification, Selection Criteria, Characteristics, Sensors & Actuators Construction, Working Principles, Application of Transducers.

Force and Torque Measurement, Flow Measurement, Temperature Measurement, Liquid Level Measurement.

Unit II

Mechanical Sensors & Actuators:

Stress and Strain, Hooke's Law. Stress and Strain of Beam Structures, Cantilever, Pressure sensors, Piezo-resistance Effect, Piezoelectricity, Piezo-resistive Sensor, capacitive sensors, Inductive sensors, MEMS inertial sensors, micro machinedmicro accelerometer for MEMS, Parallel-plate Actuator, piezo-actuators.

Unit II

Advanced Technologies and Automation in Agriculture:

Introduction, Examples of Advanced Precision Agriculture Components, Objectives, Mass Flow Sensor, Site specific spraying, Fertilizer spreader, Sensors and actuators, Controllers, Networks in Agriculture. Real time irrigation control system.

Text Books

1. Electronic Instrumentation& Measurement by William D Cooper & Albert C. Helfric, PHI Pub.
2. Electrical and Electronic Measurements and Instrumentation by A. K Sawhney.
3. Analysis and Design Principles of MEMS Devices by Minhang Bao, ELSEVIER.
4. M. J. Usher, “Sensors and Transducers”, McMillian Hampshire.
5. N. P. Mahalik, “MEMS” Tata McGraw Hill
6. Analysis and Design Principles of MEMS Devices by Minhang Bao, ELSEVIER
7. M. J. Usher, “Sensors and Transducers”, McMillian Hampshire.
8. N. P. Mahalik, “MEMS” Tata McGraq Hill

Practical

1. Introduction to various transducers
2. Introduction to various controllers
3. Introduction to various types of sensing systems
4. Hall Effect
5. LASER Experiments (I, II, III)
6. Solar Cell Characteristics
7. Study of Fiber optics communication system