

Electronics in Agriculture (404205)

Teaching Scheme:
Lectures: 3 Hrs/ Week

Examination Scheme:
In Semester Assessment:
Phase I : 30
End Semester Examination:
Phase II: 70

Course Objectives:

- To inculcate the ability to recognize environmental problems and to provide solutions to agricultural sector.
- An over view of technology of advanced topics like DAS, SCADA and Virtual Instrumentation.
- The ability to select the essential elements and practices needed to develop and implement the Engineering Automation for Agricultural sector.

Course Outcomes:

After successfully completing the course students will be able to

- Understand Role of computers & virtual instrumentation.
- Provide communication solution for interpreting environmental parameters with Electronics systems.
- Describe Instrument technology used in agriculture.
- Apply knowledge of Electronics in Agriculture.
- Understand Greenhouse Technology & Role of Electronics Governance.

Unit I : Review of computers & Virtual instrumentation

6L

Data loggers, Data acquisitions systems (DAS), Supervisory control and data acquisition (SCADA), Basics of PLC, Functional block diagram of computer control system, alarms, interrupts.

Virtual Instrumentation: Historical Perspective, advantages, Block diagram and architecture of virtual instrument, data flow techniques, graphical programming in data flow, comparison with conventional programming.

Unit II : Communication Systems

6L

Use of field buses, functions, international standards, field bus advantages and disadvantages, Instrumentation network: sensor networks, Open networks-advantages and limitations, HART Network, Foundation field bus network.

Profibus PA: Basics, architecture, model, network design.

Foundation field bus segments: General consideration, network design

Unit III : Instrument technology for agriculture **6L**

Instrument for measurement of pH, Electrical conductivity, gas analysis, humidity, leaf area, chlorophyll content, and soil moisture & temperature.

Unit IV : Precision Farming **6L**

An introduction to precision farming. GIS/GPS positioning system for precision farming, Yield monitoring and mapping, soil sampling and analysis. Computers and Geographic information systems. Precision farming- Issues and conditions. Role of electronics in farm machinery for precision farming.

Unit V : Electronics in Agriculture **6L**

Instrument for crop monitoring – moisture measurement – capacitive, infrared reflectance and resistance. Monitoring soil and weather – measurement of soil properties and meteorological parameters – irrigation control systems. Instruments for crop establishment monitoring. Crop spraying – selective crop spraying – flow control. Yield monitoring. Technology for precision farming. Instruments for protected cultivation – green house environment control – transducers and control system. Instruments and systems for crop handling processing and storage.

Unit VI : Applications & Electronics Governance **6L**

Greenhouse: History of modeling and control of Greenhouse, Identification of control and manipulation variables for Greenhouse. Crop Preservation : Importance of Preservation of various commodities and parts of plants, Drying process for preservation, Variable identification for drying process, Electronic control system for grape drying process.

Agriculture & Electronics Governance: Governance products & services in agriculture sector, Role of Electronics Governance in Agricultural sector.

Text Books

1. Curtis Johnson, “Process Control Instrumentation Technology”; 8th Edition, Pearson Education
2. Stuart A. Boyer, SCADA supervisory control and data acquisition, ISA Publication

Reference Books

1. De Mess M. N. Fundamental of Geographic Information System. John Willy & sons, New York, Datta S.K.1987.
2. K. Krishna Swamy, “Process Control”; New Age International Publishers
3. Kuhar, John. E. 1977. The precision farming guide for agriculturalist. Lori J. Dhabalt, USA
4. Manual of Soil & Water conservation Engineering. Oxford & IBH Co. Sigma & Jagmohan, 1976.