

UEIXXX: VIRTUAL INSTRUMENTATION

L T P Cr.

2 0 2 3.5

Course Objective: The objective of this course is to introduce the concept of virtual instrumentation and to develop basic VI programs using loops, case structures etc. including its applications in image, signal processing and motion control.

Review of Virtual Instrumentation: Historical perspective, Block diagram and Architecture of Virtual Instruments

Data-flow Techniques: Graphical programming in data flow, Comparison with conventional programming.

VI Programming Techniques: VIs and sub-VIs, Loops and Charts, Arrays, Clusters and graphs, Case and sequence structures, Formula nodes, Local and global variables, Strings and file I/O.

Data Acquisition Basics: ADC, DAC, DIO, Counters and timers.

Common Instrumentation Interfaces: RS232C/ RS485, GPIB, PC Hardware structure, DMA software and hardware installation.

Use of Analysis Tools: Advanced analysis tools such as Fourier transforms, Power spectrum, Correlation methods, Windowing and filtering and their applications in signal and image processing, Motion Control.

Additional Topics: System buses, Interface buses: PCMCIA, VXI, SCXI, PXI, etc.

Laboratory Work : Components of Lab VIEW, Celsius to Fahrenheit conversion, Debugging, Sub-VI, Multiplot charts, Case structures, ASCII files, Function Generator, Property Node, Formula node, Shift registers, Array, Strings, Clusters, DC voltage measurement using DAQ

Course Learning Outcomes (CLO):

After the successful completion of the course the students will be able to:

1. demonstrate the working of LabVIEW.
2. explain the various types of structures used in LabVIEW.
3. analyze and design different type of programs based on data acquisition.
4. demonstrate the use of LabVIEW for signal processing, image processing etc.

Text Books:

1. Johnson, G., *LabVIEW Graphical Programming*, McGraw-Hill (2006).
2. Sokoloff, L., *Basic Concepts of LabVIEW 4*, Prentice Hall Inc. (2004).
3. Wells, L.K. and Travis, J., *LabVIEW for Everyone*, Prentice Hall Inc. (1996).

Reference Book:

1. Gupta, S. and Gupta, J.P., *PC Interfacing for Data Acquisition and Process Control*, Instrument Society of America (1988).

Evaluation Scheme:

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