

## **ELI- 702: Virtual Instrumentation**

**48 Periods**

### **UNIT 1**

Historical perspective, Need of VI, Advantages of VI, Define VI, block diagram & architecture of VI, data flow techniques, graphical programming in data flow, comparison with conventional programming.  
8 Periods

### **UNIT 2**

VIS and sub-VIS, loops & charts, arrays, clusters, graphs, case & sequence structures, formula nodes, local and global variable, string & file input and output Graphical Programming in data flow  
14 Periods

### **UNIT 3**

Data Acquisition Basics: ADC, DAC, DIO, Counters and timers, PC Hardware' structure, Timing, Interrupts, DMA Software and hardware installation. Common Instrumentation Interfaces: Current loop RS232C/ RS485, GPIB System buses, Interface buses: USB, PCMCIA, VXI, PXI, Networking basics for office and industrial applications, VISA  
14 Periods

### **UNIT 4**

Applications of VI, Advanced analysis tools, Correlation methods, windowing & filtering. Application in Process Control projects, DMM, waveform generator, Motion Control, Image acquisition & processing  
12 Periods

#### **UNIT 1**

Chapter 1 - John Essick, Hands on Introduction to LabVIEW for Scientists and Engineers, 1st Edition

Chapter 1, 2 - S. Gupta, J.P. Gupta, PC Interfacing for Data Acquisition and Process Control, ISA, 1994, 2<sup>nd</sup> Edition

#### **UNIT 2**

Chapter 1, 2, 3, 5, 7, 8 - John Essick, Hands on Introduction to LabVIEW for Scientists and Engineers, 1st Edition

Chapter 3, 4, 5, 6, 8, 9 - S. Gupta, J.P. Gupta, PC Interfacing for Data Acquisition and Process Control, ISA, 1994, 2nd Edition

#### **UNIT 3**

Chapter 4, 5, 11, 13- John Essick, Hands on Introduction to LabVIEW for Scientists and Engineers, 1st Edition

Chapter 10, 11, 12, 13, - S. Gupta, J.P. Gupta, PC Interfacing for Data Acquisition and Process Control, ISA, 1994, 2nd Edition

#### **UNIT 4**

Chapter 9, 10, 12 - John Essick, Hands on Introduction to LabVIEW for Scientists and Engineers, 1st Edition

Chapter 14, 15 - S. Gupta, J.P. Gupta, PC Interfacing for Data Acquisition and Process Control, ISA, 1994 2nd Edition

**Essential Books:**

1. John Essick, Hands on Introduction to LabVIEW for Scientists and Engineers, 1st Edition
2. S. Gupta, J.P. Gupta, PC Interfacing for Data Acquisition and Process Control, ISA, 1994, 2nd Edition
3. Gary Johnson, LABVIEW Graphical Programming, McGraw Hill, 1997, 2nd Edition.

**Suggested Books:**

1. Lisa K. Wells and Jeffrey Travis, LABVIEW for Everyone, PHI, 1997
2. Skolkoff, Basic concepts of LABVIEW 4, PHI, 1998.
3. James K "PC interfacing and data acquisition", 2002.
4. Technical Manuals for DAS Modules of Advantech and National Instruments. L.T. Amy, Automation System for Control and Data Acquisition, ISA, 1992

**Practicals:**

1. Simple programming structures and Timing Issues, Basic operations, controls and indicators.
2. Debugging a VI, Sub-VI's
3. Use of Loops & charts
4. Use of arrays
5. Use of clusters and graphs
6. Use of Case & sequence structures
7. Use of Formula modes
8. Use of String & file input and output
9. Developing applications on LabVIEW e.g process control, waveform generator, motion control, image acquisition, processing Programming Structure, Sub-VIs, Clusters
10. Digital-to-Analog acquisition interfacing - Analog I/O
11. Importing pictures, Global/ local variables.