

5th Semester	REI5D005	Virtual Instrumentation	L-T-P 3-0-0	3 CREDITS
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Virtual Instrumentation

Module I: **(14 Hours)**

(Basic Concepts for Intelligent Instrumentation)

Background of Instrumentation: Introduction, Classification of Classical Sensors and Transducers, Self-Generating Transducers, Variable Parameter Transducers, Radioactive Transducer, Semiconductor Sensors, Array-Based Sensors, Biosensors.

Intelligent Sensors: Introduction, Classification, Smart Sensors, Cogent Sensors, Soft or Virtual Sensors, Self-Adaptive Sensors, Self-Validating Sensors, VLSI Sensors, Temperature Compensating Intelligent Sensors.

Module II: **(14 Hours)**

Virtual Instrumentation

Introduction to Virtual Instrumentation, Computers in instrumentation, What is Virtual instrumentation (VI)& History about it, Conventional and graphical programming, Distributed systems.

Basics of LabVIEW: Components of LabVIEW, Owned and free labels, Tools and other palettes, Arranging objects, pop-up menu, Colour coding, Code debugging, Context sensitive help, Creating sub-Vis.

FOR and WHILE Loops: The FOR loop, The WHILE loop, Additional loop problem, Loop behaviour and interloop communication, Local variables, Global variables, Shift registers, Feedback, Auto indexing, Loop timing, Timed loop.

Other Structures: Sequence structures, Case structures, Formula node, and Event structures.

Arrays and Clusters: Arrays, Clusters, inter-conversion of arrays and clusters.

Graphs and Charts: Waveform chart, Resetting plots, Waveform graph, Use of cursors, X-Y graph.

File Input/Output: File formats, File I/O functions, Path functions, Sample VIs to demonstrate file WRITE and READ, Generation of file names automatically.

String Handling: String functions, LabVIEW string formats, Examples, Some more functions, Parsing of strings.

Module III: **(12 Hours)**

Data Acquisition and Interfacing in Virtual Instrumentation

Basics of Data Acquisition: Classification of signals, Read-world signals, Analog interfacing, Connecting the signal to the board, Guidelines, Practical versus ideal interfacing, Bridge signal sources.

Data Acquisition with LabVIEW DAQmx and DAQ Vis: Measurement and automation explorer, The waveform data type, Working in DAQmx, Working in NI-DAQ (Legacy DAQ), Use of simple VIs, Intermediate VIs.

Interfacing with Assistants: DAQ assistant, Analysis assistant, Instrument assistant.

Books:

- [1] M.Bhuyan, Intelligent Instrumentation Principles and Applications, CRC Press 2011, ISBN-13:978-1-4200-8954-7
- [2] Sanjay Gupta and Joseph John, Virtual Instrumentation Using LabVIEW, 2nd Edn., Tata McGraw-Hill, 2010, ISBN-10: 0-07-070028-1, ISBN-13: 978-0-07-070028-4.
- [3] Jerome Jovitha, Virtual Instrumentation Using Labview, PHI Learning,, 2010, ISBN-10: 8120340302, ISBN-13: 9788120340305, 978-8120340305.
- [4] .J.S.R. Jang, C.T. Sun, E. Mizutani, Neuro Fuzzy and Soft Computing, PHI.
- [5] V.keeman, Learning and Soft Computing, Pearson Education, New Delhi.
- [6] J. Travis and J. Kring, LabVIEW for Everyone, 3rd Edn., Prentice Hall, 2006.
- [7] Peter A. Blume, The LabVIEW Style Book, Prentice Hall, 2007.

Digital Learning Resources:

Course Name: Virtual Instrumentation using LABVIEW
Course Link: <https://youtu.be/gq-gE3F3ylI>
Course Instructor: [Afnan Pasha ASF Tutorials](#)