PEI6J001 INTELLIGENT & VIRTUAL INSTRUMENTATION

University level: 80%

MODULE: I (Basic Concepts for Intelligent Instrumentation) 12 hours

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 (Virtual Instrumentation) 10 hours

Introduction to Virtual Instrumentation: Computers in instrumentation, What is Virtual instrumentation (VI), History of VI, LabVIEW and VI, 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, Autoindexing, Loop timong, Timed loop.
Other Structures: Sequence structures, Case structures, Formula node, Event structure.
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, Generatinf file names automatically.
String Handling: String functions, LabVIEW string formats, Examples, Some more functions, Parsing of strings.

MODULE: III (Data Acquisition and Interfacing in Virtual Instrumentation) 10 hours

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.

Textbooks:

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:*** *0-07-07002****8-1****,* ***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.*

Recommended Reading:

1. *J.S.R. Jang, C.T. Sun, E. Mizutani, Neuro Fuzzy and Soft Computing, PHI.*
2. *Ham & I. Kostanic, Principles of Neuro Computing for Science & Engineering, TMH.*
3. *V.keeman, Learning and Soft Computing, Pearson Education, New Delhi.*
4. *Gary W. Johnson & Richard Jeninngs, LabVIEW Graphical Programming, 4th Edn., TMH.*
5. *J. Travis and J. Kring, LabVIEW for Everyone, 3rd Edn., Prentice Hall, 2006.*
6. *Peter A. Blume, The LabVIEW Style Book, Prentice Hall, 2007.*