



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

## COURSE CONTENT

VIRTUAL INSTRUMENTATION LABORATORY								
V Semester: ECE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AECD29	Core	L	T	P	C	CIA	SEE	Total
		-	-	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45			Total Classes: 45			
Prerequisite: Electronic Devices and Circuits.								

### I. COURSE OVERVIEW:

The Laboratory Virtual Instrument Engineering Workbench (LabVIEW) is a development environment designed by National Instruments that creates graphic-based programs called virtual instruments (VIs) that simulate actual laboratory instruments. The experimental objective of this lab is to use LabVIEW to design basic operations and data acquisition using myDAQ and myRIO cards. Building these systems will demonstrate the potential for using simulated instruments in a laboratory. These programs will also obtain data from outside the computer and incorporate it into a program design.

### II. COURSES OBJECTIVES:

**The students will try to learn**

- The concept of virtual instrumentation used to develop basic VI programs using loops, case structures for image, signal processing and motion control applications.
- LabVIEW tool to design basic operations and data acquisition using myDAQ and myRIO's
- Prototype model for distribute stand-alone applications using LabVIEW.

### III. COURSE OUTCOMES:

**At the end of the course students should be able to:**

- CO1 Demonstrate the LabVIEW graphical programming environment for virtual instrumentation applications
- CO2 Make use of single and nested -loop design patterns for implementing iterative operations in LabVIEW.
- CO3 Apply cluster and frame based techniques on data for collective and distributive data application.
- CO4 Demonstrate the mathematical operations on waveforms using LabVIEW for signal processing and communication applications
- CO5 Demonstrate the mathematical operations on waveforms using LabVIEW for signal processing and communication applications.
- CO6 Test, control performance parameters of Electrical motors using My DAQ and My RIO..

### IV. COURSE CONTENT:

#### WEEK-1: GETTING STARTED EXERCISES

Build VI to implement arithmetic operations, Boolean operations, area and perimeter of the rectangle, and the area and circumference of the circle using graphical environment.

#### WEEK-2: SUM AND FACTORIAL OF A GIVEN NUMBERS USING FOR & WHILE LOOP

Build VI to implement sum and factorial of a given number by using for and while loop.

#### WEEK-3: MODULATION AND DEMODULATION

Build VI to implement different types of modulation and demodulations techniques.

**WEEK-4: SIGNAL GENERATORS**

Build VI to implement different types of signal generators

**WEEK-5: FILTERS TO FILTER UNWANTED FREQUENCIES**

Build VI to implement different types of filters to filter unwanted signals

**WEEK -6: MEASUREMENT AND DATA ACQUISITION USING MYDAQ**

Build VI to implement data acquisition using my DAQ

**WEEK -7: GENERATING SIGNALS USING MYDAQ**

Build VI to implement generating signals using my DAQ

**WEEK -8: MEASUREMENT AND DATA ACQUISITION USING MYRIO**

Build VI to implement data acquisition using my RIO

**WEEK -9: GENERATING SIGNALS USING MYRIO**

Build VI to implement generating signals using my RIO

**WEEK -10: MYRIO EXPERIMENTS**

Build VI to implement different experiments on my RIO

**WEEK -11: FPGA PROGRAMMING**

Build VI to implement experiments on FPGA programming.

**WEEK -12: PULSE AMPLITUDE MODULATION AND POWER SPECTRAL DENSITY  
CALCULATION USING USRP**

Build VI to implement experiments using USRP

**WEEK -13: CREATE A SYSTEM TO MEASURE WEATHER PARAMETERS AND DISPLAYS  
THEM TO THE USER USING MYDAQ, MYRIO**

Build VI to implement experiments using MYDAQ, MYRIO

**WEEK -14: HOME AUTOMATION USING MYDAQ AND MYRIO**

Build VI to implement HOME AUTOMATION using MYDAQ, MYRIO

**V. TEXT BOOKS:**

1. Jim Kring, Jeffrey Travis , “LabVIEW for Everyone: Graphical Programming Made Easy and Fun”, Prentice Hall, 3<sup>rd</sup> Edition, 2006.
2. Richard Jennings Gary W.Johnson, “Labview Graphical Programming”, McGraw-Hill Education, 4<sup>th</sup> Edition, 2011.
3. Rick Bitter, Taqi Mohiuddin,, Matt Nawrocki, “LabView: Advanced Programming Techniques”, CRC Press, 2<sup>nd</sup> Edition, 2006.

**VI. REFERENCE BOOKS:**

1. Sanjay Gupta, “Virtual Instrumentation using LABVIEW”, McGraw-Hill Education, 2<sup>nd</sup> Edition, 2010.

**VII. ELECTRONICS RESOURCES:**

1. <http://www.ni.com/pdf/manuals/373427j.pdf>
2. <http://home.hit.no/~hansha/documents/labview/Introduction%20to%20LabVIEW.htm>
3. <https://www.pearsonhighered.com/samplechapter/0130153621.pdf>
4. <http://k12lab-support-pages.amazonaws.com/lvbasichome1.html>

**VIII.MATERIALS ONLINE**

1. Course template
2. Lab Manual