INSTRUMENTATION LABORATORY

VI Semester: ECE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEC109	Core	-	-	3	2	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

I. COURSE OVERVIEW:

The Laboratory Virtual Instrument Engineering Workbench (Lab VIEW) is a development environment designed by National Instruments that creates graphic-based programs called virtual instruments (VIs) that simulate actual laboratory instruments. The course imparts the basic knowledge about the software based tools for the development of virtual instruments in real world data acquisition and measurement systems. The course seeks to provide a hands-on environment and uses a number of VI-programming.

II. OBJECTIVES:

The course should enable the students to:

- **I** The concept of virtual instrumentation and to develop basic VI programs usingloops, case structures etc. including its applications in image, signal processing andmotion control.
- **II** Lab VIEW tool to design basic operations and data acquisition using my DAQ and my RIO cards.
- **III** Prototype model for distribute stand-alone applications using Lab VIEW.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Build** the arithmetic and logical operations based applicationsusing the Lab VIEW graphical programming environment.	Apply
CO 2	**Apply** single and multiple-loop design patterns for applicationfunctionality.	Apply
CO 3	**Analyze** data log waveform graphs for system monitoring, processing and controlling.	Analyze
CO 4	**Demonstrate** the formula node in Lab VIEW for signal processing, image processing etc.	Apply
CO 5	**Design** data acquisition systems using my DAQ and my RIO datacards.	Understand
CO 6	**Illustrate** the data acquisition and interfacing concepts using a state-of-the-art software platform such as National Instrument's LabVIEW.	Understand

IV. SYLLABUS:

LIST OF EXPERIMENTS

WEEK - l	**OPEN AND RUN A VIRTUAL INSTRUMENT**
Open the front panel and block diagram in Lab VIEW software	
WEEK-2	**BASIC ARITHMETIC OPERATIONS &BOOLEAN OPERATIONS**
Designing a program to perform Addition, Subtraction , Multiplication and Division operations, and Developing a program to perform AND, OR, NOT, NAND, NOR,XOR and XNOR operations using Lab VIEW	
WEEK-3	**SUM OF 'n' NUMBERS USING 'FOR' LOOP & FACTORIAL OF A GIVE NUMBER USING FOR LOOP**
Designing a program to find the sum of 'n' numbers using FOR loop and Designing a program to perform the factorial of a given number using FOR loop.	

WEEK-4	**SUM OF 'n' NATURAL NUMBERS USING WHILE LOOP & FACTORIAL OF A GIVE NUMBER USING WHILE LOOP**
Designing a program to find the sum of 'n' natural numbers using WHILE loop and Designing a program to perform the factorial of a given number using WHILE loop.	
WEEK-5	**CONVERT °C TO °F, CREATE A SUBVI**
Designing the program to convert °C to °F and Create a SubVI	
WEEK-6	**ARRAY MAXIMUM AND MINIMUM**
Designing a program to find the maximum and minimum variable from an array.	
WEEK-7	**ANALYZING AND LOGGING DATA BY USING WAVE FORM GRAPHS**
Designing a program to analyze and logging the data.	
WEEK -8	**BUNDLE AND UNBUNDLE CLUSTER**
Designing a program to bundle and unbundle a cluster.	
WEEK-9	**APPLICATION USING FORMULA NODE & DISCRETE COSINE TRANSFORM**
Designing a program to create a sine wave using formula node and to perform discrete cosine transform on the given signal.	
WEEK-l0	**FLAT AND STACKED SEQUENCE**
Designing a program to perform functions using flat and stacked sequence.	
WEEK-l1	**DATA ACQUISITION THROUGH VIRTUAL INSTRUMENTATION**
Acquire the data from the sensors by using MY DAQ and MY RIO	
WEEK-l2	**DEVELOPING VOLTMETER USING DAQ CARDS**
Designing a program to Develop voltmeter by using DAQ CARDS .	
WEEK-l3	**DEVELOPING SIGNAL GENERATOR USING DAQ CARDS**
Designing a program to develop signal generator by using DAQ cards	
WEEK-l4	**REAL TIME TEMPERATURE CONTROL USING VIRTUAL INSTRUMENTATION.**
Designing a program for real time temperature control by using virtual instrumentation	

Reference Books:

1. Jim Kring, Jeffrey Travis , "LabVIEW for Everyone: Graphical Programming Made Easy and Fun" Prentice Hall, 3rd Edition, 2006.
2. Richard Jennings Gary W.Johnson, "Labview Graphical Programming", McGraw-Hill Education, 4th Edition, 2011.
3. Rick Bitter, Taqi Mohiuddin,, Matt Nawrocki, "LabView: Advanced Programming Techniques", CRC Press, 2nd Edition, 2006.
4. Sanjay Gupta, "Virtual Instrumentation using LABVIEW", McGraw-Hill Education, 2nd edition, 2010.

Web References:

1. http://www.ni.com/pdf/manuals/373427j.pdf
2. http://home.hit.no/~hansha/documents/labview/Introduction%20to%20LabVIEW.htm

3. http://k12lab-support-pages.s3.amazonaws.com/lvbasichome1.html
4. https://www.pearsonhighered.com/samplechapter/0130153621.pdf

Course Home Page:

SOFTWARE AND HARDWARE REQUIRED FOR A BATCH OF 36 STUDENTS

HARDWARE: Desktop Computer Systems 36 nos

SOFTWARES: NI LabVIEW (2015 LV- 64bitWin Eng)

LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 36 STUDENTS

S. No	Name of the Equipment	Range
1	NI myDAQ with required accessories and mini systems	Analog input..... ±10 V, ±2 V, DC-coupled Audio input..... ±2 V, AC-coupled
2	NI myRIO	Analog Input…….±5V
3	Qube inverted pendulum addon for myRIO	--
4	Connectors and cables	--
5	NI USRB 2901 bundle with required accessories and cables	--