COURSE CODE: **1153EE105**	COURSE TITLE: **VIRTUAL INSTRUMENTATION**	L	T	P	C
		3	**0**	**0**	**3**

COURSE CATEGORY:

Allied Elective

PREAMBLE :

To study the concept of virtual instrumentation using software language

PREREQUISITE COURSES:

- Measurement & Instrumentation

RELATED COURSES:

- Communication Engineering

COURSE EDUCATIONAL OBJECTIVES:

The objectives of the course are to make the students,

- To study the principles and techniques of windows programming using MFC, procedures, resources, controls and database programming through the visual languages, Visual C++ and Visual Basic.

COURSE OUTCOMES :

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Comprehend the concept of analog signals in digital domain.	K2
CO2	Apply Calibration and Resolution for analog inputs and outputs using DAQ.	K3
CO3	Interface the external instruments to PC by selecting the appropriate on communication bus.	K3
CO4	Gain a vast knowledge of graphical programming techniques.	K2
CO5	Develop program for simple applications using VI	K5

CORRELATION OF COs AND POs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2	M	H	H		H							
CO3	M	H	H		H							
CO4	M	L			H							
CO5	M	H	H		H							

COURSE CONTENT:

UNIT I	REVIEW OF DIGITAL INSTRUMENTATION	9

Representation of analog signals in the digital domain – Review of quantization in amplitude and time – Sample and hold –Sampling theorem – ADC and DAC

UNIT II	FUNDAMENTALS OF VIRTUAL INSTRUMENTATION	9
Concept of virtual instrumentation – PC based data acquisition – Typical on board DAQ card – Resolution and sampling frequency – Multiplexing of analog inputs – Single-ended and differential inputs – Different strategies for sampling of multi-channel analog inputs – Concept of universal DAQ card – Use of timer-counter and analog outputs on the universal DAQ card		
UNIT III	**CLUSTER OF INSTRUMENTS IN VI SYSTEM**	**9**
Interfacing of external instruments to a PC – RS232 – RS 422 – RS 485 – USB standards – IEEE 488 standard – ISO-OSI model for serial bus – Introduction to bus protocols of MOD bus and CAN bus		
UNIT IV	**GRAPHICAL PROGRAMMING ENVIRONMENT IN VI**	**9**
Concepts of graphical programming – Lab-view software – Concept of VIs and sub VI – Display types – Digital – Analog – Chart – Oscilloscopic types – Loops – Case and sequence structures – Types of data – Arrays – Formulae nodes – Local and global variables – String and file I/O		
UNIT V	**ANALYSIS TOOLS AND SIMPLE APPLICATIONS IN VI**	**9**
Fourier transform – Power spectrum – Correlation – Windowing and filtering tools – Simple temperature indicator – ON/OFF controller – PID controller – CRO emulation – Simulation of a simple second order system – Generation of HTML page		
		TOTAL: 45 PERIODS

TEXT BOOKS:

1. Gupta, S. and Gupta, J.P., “PC Interfacing for Data Acquisition and Process Control”, Instrument society of America, 1994.
2. Peter W. Gofton, “Understanding Serial Communications”, Sybex International, 1994.
3. Robert H. Bishop, “Learning with Lab-view”, Prentice Hall of India, 2003.

REFERENCE BOOKS:

1. Kevin James, “PC Interfacing and Data Acquisition: Techniques for Measurement, Instrumentation and Control”, Newnes, 2000.
2. Gary W. Johnson, Richard Jennings, “Lab-view Graphical Programming”, McGraw-Hill Professional Publishing, 2001.
3. Virtual Instrumentation Using Labview, JOVITHA JEROME, PHI Learning, 2010