

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Electronics and Instrumentation)			
Subject Code & Name	Instructions Hours per Week			Credits			
EIR7C3 Intelligent Instrumentation System	L	T	P	L	T	P	Total
	3	1	2	3	1	1	5
Duration of Theory Paper: 3 Hours							

Learning Objectives:

To get students familiar with interfacing of computer systems with the control theory thus making it an automatic system and to learn the Lab View programming and its application in different process industries.

Prerequisites (if any):

Control System, Transducers & Applications, Computer networking, Communication Systems

COURSE CONTENTS

UNIT-I

Introduction: Introduction to intelligent instrumentation, Historical perspectives, Current status, Software based instruments. Virtual Instrumentation: Introduction to graphical programming, data flow and graphical programming techniques.

UNIT-II

Instrumentation Standard Protocol: HART protocol, Field Bus H1, GPIB, CAN, Industrial Ethernet: introduction, frame structure, programming, implementation, benefits, advantages and limitation.

UNIT-III

Introduction To SCADA: SCADA system, evolution, objectives, benefits and function of SCADA system. SCADA in process control, application, SCADA function, SCADA hardware: RTU, Single board RTU, Basic Operation, Features of SCADA, SCADA software: ISO model, DNP3 protocol, IEC60870 protocol, MODBUS protocol. Power System Automation: benefits, architecture classification, implementation, SCADA applications.

UNIT-IV

Distributed Control System: Introduction and overview, history, system architecture, system element. Difference between Centralized and Distributed Control System, Overall tasks of DCS. Displays: Group display, Overview display, Detail display.

Local Control Units, mean time between failures, Data Highways, Fieldbuses, Multiplexers and remote sensing terminal units, I/O hardware, Set-point stations

UNIT-V

PC Hardware review and Instrumentation buses: structure, timing, interrupts, DMA, operation systems, ISA, PCI, USB, PCMCIA buses. IEEE488.1 and IEEE488.2 serials, SCXI and PXI.

Learning Outcomes:

Upon Completing the Course, Student will able to:

1. Understand the concept of Intelligent instrumentation
2. Identify the optimized protocol selection according to the application area
3. Design complete automatic process control system
4. Analyze the DCS and SCADA systems In industry

BOOKS RECOMMENDED:

1. Liptak B.G, *Instrument Engineers Handbook*, Clinton Book Company, (1982)
2. D.Patranabis, *Principles of Industrial Instrumentation*, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1999.
3. SteveMackey, Edwin Wright, *Practical Industrial Data Network I/e*, Elsevier Publications, 2004
4. David Bailey, Edwin Wright, *Practical SCADA for Industry*, I/e, Elsevier Publications, 2003
5. Poppovik Bhatkar, *Distributed Computer Control for Industrial Automation*, Dekkar Publications.

List of Practical Assignments:

To perform the following operations using LabView.

1. Basic arithmetic operations
2. Boolean operations
3. Sum of 'n' numbers using 'for' loop
4. Factorial of a give number using for loop
5. Sum of 'n' natural numbers using while loop
6. Factorial of a give number using while loop
7. Sorting even numbers using while loop in an array
8. Array maximum and minimum
9. Bundle and unbundle cluster
10. Flat and stacked sequence
11. Application using formula node
12. Median filter
13. Discrete cosine transform
14. Convolution of two signals
15. Windowing technique
16. Instrumentation of an amplifier to acquire an ECG signal
17. Acquire, analyse and present an eeg using virtual Instrumentation