

Nirma University
School of Technology, Institute of Technology
Instrumentation & Control Engineering

B. TECH. SEMESTER -III

L	T	P	C
3	1	0	4

Course Code **2IC301**

Course Title **Control Theory**

Course Learning Outcome:

At the end of the course, students will be able to -

- apply the basic concept of mathematical modeling for the control system
- analyze time and frequency response of control system
- evaluate the stability of linear control system

L	T	P	C
3	0	2	4

Course Code **2IC302**

Course Title **Microprocessors and Microcontrollers**

Course Learning Outcome:

At the end of the course, students will be able to -

- illustrate the architecture of microcontroller and microprocessor
- develop assembly and C language programs for various applications
- design microcontroller based embedded system

L	T	P	C
3	0	2	4

Course Code **2IC303**

Course Title **Basic Electronics**

Course Learning Outcome:

At the end of the course, students will be able to -

- analyze analog circuits
- design and analyze the sequential logic circuits
- evaluate the performance of various electronic circuits

L	T	P	C
3	0	2	4

Course Code **2IC304**

Course Title **Circuit Theory**

Course Learning Outcome:

At the end of the course, students will be able to -

- develop an understanding of the fundamental principles & theorems of electrical networks
- analyze the performance of two port networks
- synthesize electrical networks

B. TECH. SEMESTER -IV

L	T	P	C
3	0	0	3

Course Code **2IC401**

Course Title **Signals and Systems**

Course Learning Outcome:

At the end of the course, students will be able to -

- illustrate the representations and classifications of the discrete time signals and systems
- analyze the linear time invariant systems in time domain
- apply fourier transformation for discrete time signals and linear time invariant systems

L	T	P	C
3	0	2	4

Course Code **2IC402**

Course Title **Industrial Electronics**

Course Learning Outcome:

At the end of the course, students will be able to -

- explain various power electronic devices
- simulate, analyse and develop different application circuits based on thyristors
- illustrate the principle of operation and applications industrial heating and welding

L	T	P	C
3	0	2	4

Course Code **2IC403**

Course Title **Electrical and Electronics Measurement**

Course Learning Outcome:

At the end of the course, students will be able to -

- elaborate the concepts of different electrical and electronics measurements
- elaborate testing and measuring instruments for various applications
- analyze and develop various ac and dc bridge circuits

L	T	P	C
3	0	2	4

Course Code **2IC404**

Course Title **Control System Design**

Course Learning Outcome:

At the end of the course, students will be able to -

- Analyse the control system using state space modeling
- design state feedback based controller and observer
- design controller using conventional methods

L	T	P	C
3	0	2	4

Course Code 2IC405

Course Title **Linear Integrated Circuits**

Course Learning Outcome:

At the end of the course, students will be able to -

- utilize different signal conditioning ICs for various applications.
- analyze the signal conditioning IC based circuits
- design various signal conditioning circuits.

- apply the knowledge of different programming techniques for virtual instrumentation

IC506 Mini Project-I [0 0 2 1]

Course Learning Outcome:

After successful completion of the course, students will be able to

- practice acquired knowledge within the chosen area of technology for project development
- identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach
- reproduce, improve and refine technical aspects for engineering projects
- work as an individual or in a team in development of technical projects
- communicate and report effectively project related activities and findings

SS562 Law for Engineers [2 - - 2]

Course Learning Outcome

By the end of the course, students will be able to

- Understand the Indian Legal System and Basics of different laws.
- Understand explore, and acquire practical insight of legal system and its application in e engineering profession.

SP501 Fractional Course [1 0 0 0]

Course Learning Outcome:

After successful completion of the course, student will be able to

- know the recent technological developments in industries/ R & D organizations
- understand advanced topic related to concerned engineering discipline
- correlate the fundamentals with the contemporary application areas

IC511 Advanced Microcontrollers and its Applications [3 0 2 4]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand the architecture of PIC microcontroller
- program PIC microcontroller using various techniques
- design and develop PIC microcontroller based embedded circuits

IC521 Advanced Microprocessors and its Applications [3 0 2 4]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand the architecture of ARM microprocessor
- program ARM microprocessor using various programming techniques
- design ARM processor based embedded applications

IC531 Embedded Controller based Design

[3 0 2 4]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand the basic working of AVR microcontrollers
- program AVR controllers in C and assembly language
- interface and analyze the AVR based circuits
- design and develop embedded systems based on AVR microcontrollers

IC541 Electronic Communication

[3 0 2 4]

Course Learning Outcomes:

After successful completion of the course, students will be able to

- understand the fundamental principles of various modulation techniques
- analyze various electronics circuits for different communication systems
- compare various communication systems
- analyze various digital transmission techniques
- understand the fundamental principles of cellular and wireless communication

B. TECH. SEMESTER -VI

IC601 Industrial Electronics [4 0 2 5]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand the operation of various power electronic devices, optoelectronic devices and power supplies
- design and develop a power supply for low power applications
- simulate, analyse and develop different application circuits based on thyristors
- understand the principle of operation and applications of various techniques used for industrial heating and welding
- realize the role of power electronics in utility-related applications

IC602 Process Control [4 0 2 5]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand the need of process control
- develop mathematical model of the given process
- select the proper controller and apply the tuning rules to achieve optimum performance
- select advanced control strategy to enhance the performance

IC603 Virtual Instrumentation Applications [0 0 2 1]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand and apply the basics of state machine and file management
- understand and apply the concepts of different advanced toolbox for virtual instrumentation
- design applications for virtual instrumentation

IC604 Mini Project-II [0 0 2 1]

Course Learning Outcome:

After successful completion of the course, students will be able to

- practice acquired knowledge within the chosen area of technology for project development
- identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach
- reproduce, improve and refine technical aspects for engineering projects
- work as an individual or in a team in development of technical projects
- communicate and report effectively project related activities and findings

SP601 Capstone Course [1 0 0 0]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand and explain the fundamentals of instrumentation and control
- review the broader themes that link various subfields of instrumentation and control

- apply the subject knowledge in relevant applications

SS561 Creativity and Innovation

[2 0 0 2]

Course Learning Outcome:

By the end of this course students will be able to:

- Understand the importance of R directed thinking complementing L directed thinking
- Infer and discover processes and methods of creative problem solving
- Enhance and correlate their creative and innovative thinking skills
- Understand various disruptive innovations and techniques
- Analyze and apply various tools of creativity to some basic problems

SS701 Organizational Behaviour

[2 0 0 2]

Course Learning Outcomes (CLO):

After studying the course the students will be able to:

- Understand and apply principles of organizational dynamics relating to systems, culture, structure and change processes
- Develop critical analytical skills that will help them diagnose situations pertaining to human behaviour and generate effective solutions for the same.
- Understand performance behaviour at individual and group levels.
- Develop the ability to lead and motivate others to succeed.

IC612 Digital Design for Instrumentation

[3 02 4]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand architecture and working of different types of programmable logic devices
- develop VHDL code for different types of combinational and sequential circuits
- implement applications related to instrumentation on programmable logic devices

IC622 Biomedical Instrumentation

[3 0 2 4]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand medical terminology relevant to biomedical instrumentation
- understand different medical imaging systems for different pathological diagnoses
- analyze different diagnostic and therapeutic methods
- utilize biomedical instruments for diagnostic purpose

IC632 Mechatronics

[3 0 2 4]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand principles and working of devices and elements for mechatronics and robotics
- select and apply various sensors and actuators for mechatronic and robotic systems
- perform modeling, simulation, systems level analysis and design for mechatronics and robotics

- work as an individual or in a team in development of technical projects
- report project related activities effectively to peers and mentors

IC714 Power Plant Automation

[3 0 0 3]

Course Learning Outcome:

After successful completion of the course, student will be able to

- assess various operational aspects of power plant and compare thermal, nuclear and hydro power plants
- analyze various control systems of thermal power plant
- analyze various subsystems and health monitoring system of thermal power plant
- understand optimization strategies for thermal power plants

IC724 Advanced Power Electronics and Applications

[3 0 0 3]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand the characteristics of modern power electronic devices
- analyze various power electronics circuits
- understand the importance of protection circuitry for thyristors
- understand the concept of vector control and advanced vector control

IC734 Analog VLSI

[3 0 0 3]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand the structure, and characteristics of MOSFET
- analyze the performance of different types of single stage amplifiers
- understand the working of different types current mirror circuits
- Compute different parameters for frequency response of different amplifiers.

IC744 Cyber Physical Systems

[3 0 0 3]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand the cyber physical system
- model the cyber physical system
- understand multitasking, mapping and scheduling concept for CPS on embedded platform

IC754 Model Based Control

[3 0 0 3]

Course Learning Outcome:

After successful completion of the course, student will be able to

- understand the basics of model based control
- perform time and frequency based model identification
- design model based controller

IC764 Advanced Factory Automation**[3 0 0 3]****Course Learning Outcomes (CLO) :**

At the end of the course, students will be able to –

- ascertain need, benefits and applicability of motion controllers and drives
- select the right drive system including motor
- appreciate the different types of sensors used in machine control
- understand different types of motion profiles and coordinated motion

SP701 Practical Training**[0 0 0 0]****Course Learning Outcome:**

After successful completion of the course, student will be able to

- explore the preferred field of specialization and develop analytical / hardware / software / experimental / observation skills
- manage the technical content and work
- prepare and present technical report

B. TECH. SEMESTER -VIII**IC801 Major Project****[0 0 30 25]****Course Learning Outcome:**

After successful completion of the course, students will be able to

- use various tools and techniques to study existing systems
- critically analyse existing systems, thereby select and justify parameters to be improved
- start and manipulate proposed engineering solution as per industry / research / societal need
- achieve precision in uses of the tools related to their experiments/fabrication
- reorganize and refine various components of technology to optimize the resources at large
- appraise the potential of technology for scalability and wide spectrum of applications
- report project related activities effectively to peers, mentors and society
- follow and value health, safety and ethical practices during project