



Shri Vaishnav Institute of Technology and Science
Choice Based Credit System (CBCS) in the Light of NEP-2020
Diploma in Electronics and Instrumentation Engineering
w.e.f. 2023

COURSE CODE	CATEG ORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTEI504		Analytical Instrumentation	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit.

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

The course is designed to aid students understand the fundamentals of Analytical Instrumentation and applying the principles of Analytical Instrumentation to carry out the analysis of different samples present in species.

Course Outcomes (COs):

After completing the course the students should be able to:

1. Understand the building blocks of analytical Instrumentation.
2. Use of various spectroscopy techniques and principles of measurement of constituent species in a sample to carry out qualitative and quantitative analysis.
3. Determine various parameters used in analytical Instrumentation.
4. Describe air pollution and water pollution monitoring methods.

Syllabus

UNIT I

7 Hrs.

Block diagram of Analytical Instrumentation, Electromagnetic Spectrum in Analytical Instrumentation, Chemical analysis, Introduction to Spectroscopy, and fundamental laws of photometry.

Separation techniques: Chromatography, principle, Classification, Various types of Chromatographic techniques, Gas Chromatography.

UNIT II

6 Hrs.

Spectrophotometer, types, working principle, UV-VIS Spectrophotometer, Colorimeters, IR spectrophotometer, Interferogram.

UNIT III

6 Hrs.

Mass spectrometer system, working principle, types, Introduction to X-ray spectrometry, Instrumentation for X-ray spectrometry.



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* Guided Student Activity: P – Practical; C - Credit.

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7 Hrs.

UNIT IV
pH measurement, pH meter, measurement of viscosity, DO meter, turbidity, and conductivity measurements.

6 Hrs.

UNIT V
Introduction to Flame photometry, Working principle, and constructional details. Air pollution and water pollution monitoring instruments.

Textbook:

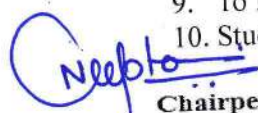
1. Gurdeep R. Chatwal, Sham K. Anand, "Instrumental methods of Chemical Analysis", Himalaya Publishing House, 5th edition, 2017.
2. Gillian McMahon, Analytical Instrumentation: "A Guide to Laboratory, Portable and Miniaturized Instruments", John Wiley and Sons, 1st and only edition, 2007.
3. Douglas A. Skoog, F. James Holler, Stanley R. Crouch, "Principles of Instrumental Analysis", Cengage Learning, 7th edition, 2018.

Reference Book:

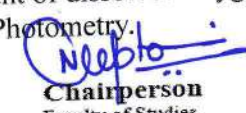
1. R. S. Khandpur, "Handbook of Analytical Instruments", Tata McGraw-Hill Publications, 3rd edition, 2017.

List of Experiments:

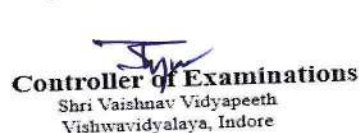
1. To determine the percentage transmittance and percentage absorbance of a given sample using a colorimeter.
2. To determine the % transmittance and absorbance by using a UV-VIS Spectrophotometer.
3. Study of Mass Spectrometer.
4. Study of X-ray Spectrometer.
5. Study of the basic principle of Gas Chromatography and its various parts.
6. To find the turbidity of a given solution using a turbidity meter.
7. To determine the pH and ionic concentration of a given sample using pH meter.
8. To determine the conductivity of an unknown liquid using a conductivity meter.
9. To find the amount of dissolved oxygen in a given solution using a DO meter.
10. Study of Flame Photometry.

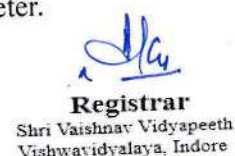

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Common to EE/EX/EI/MTX w.e.f. 2024

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DTEE601N		Control Systems	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C – Credit.

***Teacher Assessment** shall be based on the following components: Quiz/Assignment/Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

The course will provide understanding of control system and mathematical modeling of the system.

Course Outcomes (COs):

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

1. Demonstrate the understanding of basic elements and modeling of the control system.
2. Analyze the stability in time domain and frequency domain
3. Design the controller and compensators for the system

Syllabus

UNIT I

8Hrs.

Introduction: Basic Elements of Control System, Open and closed loop control system and their merits and demerits, Block representation of simple systems, Block diagram reduction technique, Signal flow graph of control systems, Mason's gain formula, Transfer function of electrical, Mechanical and electromechanical system.

UNIT II

8 Hrs.

Time Domain Analysis: Time domain analysis, Type and order of a control system, typical test signals for time response analysis of a control system, Time response of first and second order control systems, Basic ideas of proportional, derivative and integral controllers and PID controllers.

UNIT III

7 Hrs.

Stability Analysis and Root locus: Concept of stability, Routh Hurwitz criterion- different cases and conditions, Root locus technique, basic theory and properties of root loci, procedure for construction of root loci.

UNIT IV

6 Hrs.

Frequency domain Analysis: Frequency domain analysis, frequency response, frequency domain specifications, Bode plot, Nyquist stability criterion, relative stability, gain margin, phase margin,

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UNIT V

6 Hrs.

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model, derivation of state models from block diagrams, Solution of state equation: Concepts of Controllability and Observability.

Textbooks:

1. Richard C Dorf; Robert H Bishop, "Modern control system", Pearson Education, 14th Edition, 2022
2. I. J. Nagrath and M. Gopal, "Control System Engineering", Age International Publishers, 7th Edition, 2021.

References:

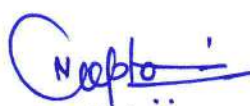
1. M. F. Golnaraghi and Benjamin C Kuo, "Automatic control systems", New York McGraw-Hill Education, 9th Edition, 2017.
2. M. Gopal, "Digital Control and State Variable Methods", Tata McGraw Hill, 4th Edition, 2014.
3. Joseph J DiStefano, Allen R Stubberud and Ivan J Williams, Schaum's Outline Series, "Feedback and Control Systems", Tata McGraw- Hill, 2nd Edition 2014.
4. John J. D'azzo & Constantine H. Houpis, "Linear control system analysis and design", Tata McGraw-Hill, 5th Edition 2003.

List of Experiments:

1. To study the torque-speed characteristics and determine the transfer function of a d.c. motor.
2. To study the characteristics of a small a.c. servomotor and determine its transfer function.
3. To study the performance of various types of controllers used to control the temperature of an oven.
4. Perform impulse response of a transfer function.
5. Perform ramp response of a transfer function.
6. Draw Nyquist plot from a transfer function.
7. Draw root locus from a transfer function.
8. Draw bode plot from a transfer function.



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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTET502	DC	Embedded Systems	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit.

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Course Educational Objectives (CEOs):

1. To introduce students to smart devices and how they work in everyday life (like washing machines, mobile phones, and cars).
2. To teach programming of small computers (microcontrollers) that control real-world devices.
3. To develop skills in connecting sensors, displays, and motors to create intelligent systems.
4. To build practical projects that solve real problems using embedded technology.

Course Outcomes (COs):

After completing this course, students will be able to:

1. Understand embedded systems, working smart devices around us work and their applications.
2. Write simple microcontroller programs to control LEDs, motors, and sensors.
3. Interface hardware and connect different components like displays, keyboards, and sensors to microcontrollers.
4. Design practical projects like digital clocks, temperature controllers, and security systems.

Syllabus

UNIT I

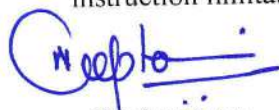
7 Hrs.

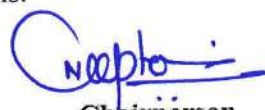
Introduction to Embedded system. Characteristics: Real-time operation, low power, small size, reliability Types of embedded systems, Applications in daily life, Basic architecture: Processor, Memory, Input/Output, Software. Difference between general-purpose computers and embedded systems

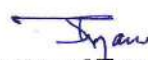
UNIT II

8 Hrs.

Introduction to 8051 Microcontroller: Why 8051 is popular for learning Pin diagram and basic architecture CPU, Memory (RAM, ROM), Timers, Interrupts Memory organization: Program memory vs Data memory Special function registers (SFRs) Input/Output ports: Port 0, 1, 2, 3 functions Reading switches and controlling LEDs Addressing modes: Immediate, Direct, Indirect addressing (with simple examples) Basic instruction set: Data transfer, arithmetic, logical, branch instruction limitations.


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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTET502	DC	Embedded Systems	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C – Credit.

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UNIT III

8 Hrs.

Programming in C: Basic C programs for 8051, Variables, loops, functions for embedded systems, Basic interfacing.

UNIT IV

8 Hrs.

Communication basics: Serial communication (UART), I2C protocol SPI protocol, Analog to Digital Converter, Digital to Analog Converter, Interrupts, Timer and counters.

UNIT V

10 Hrs.

Real-time concepts: What is real-time? Hard vs Soft real-time systems Task scheduling basics Power management: Sleep modes and power saving.

Text Books:

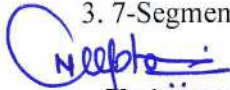
1. Mazidi M. A., "The 8051 Microcontroller and Embedded Systems", Pearson Education, 2nd Edition, 2013.
2. Rajkamal, "Embedded Systems: Architecture, Programming and Design", TMH, 3rd Edition, 2014.

Reference Books:

1. Shibu K. V., "Introduction to Embedded Systems", TMH, 1st Edition, 2009.
2. Lyla B. Das, "Embedded Systems: An Integrated Approach", Pearson Education, 1st Edition, 2013.
3. Frank Vahid, "Embedded System Design: A Unified Hardware/Software Introduction", Wiley, 2nd Edition, 2002.

List of Experiments:

1. Basic LED Control - Blinking LED, LED patterns, traffic light simulation.
2. Switch Interfacing - Reading push buttons, toggle switches.
3. 7-Segment Display - Single digit display, counter, digital clock.


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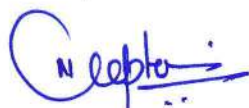
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Diploma EI/EA W.e.f. 2024											
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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTET502	DC	Embedded Systems	60	20	20	30	20	3	0	2	4

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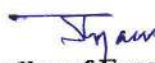
4. LCD Interfacing - Text display, scrolling messages, menu system.
5. Keypad Interfacing - 4x4 keypad, password entry system.
6. Temperature Monitoring - LM35 sensor, digital thermometer with alarm.
7. Motor Control - DC motor speed control, stepper motor control.
8. Serial Communication - Data transfer between microcontroller and PC.
9. ADC Application - Light intensity measurement, voltage monitoring.
10. Mini Project - Complete system (Security alarm, Automatic water level controller, Digital clock with alarm).



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Diploma (All Branches) w.e.f. 2023

COURSE CODE	CATEG ORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
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DTET504		PLC Lab	0	0	0	30	20	0	0	4	2

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Course Educational Objectives (CEOs):

To understand the concept of:

1. Fundamentals of Programmable Logic Controllers and their industrial applications.
2. PLC programming using Ladder Logic and basic programming languages.
3. Interfacing input/output devices with PLC systems.

Course Outcomes (COs):

After completing the course students will be able to:

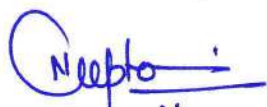
1. Explain the architecture and working principles of PLC systems.
2. Develop ladder logic programs for basic industrial automation applications.
3. Interface sensors, actuators, and control devices with PLC.
4. Troubleshoot and commission simple PLC-based control systems.

List of Experiments:

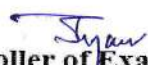
1. Study of PLC hardware architecture and I/O modules.
2. Introduction to PLC programming software and ladder logic basics.
3. Programming exercises on basic logic gates (AND, OR, NOT, NAND, NOR) using PLC.
4. Programming for motor control applications:
 - o Single motor start/stop control
 - o Forward-reverse motor control
5. Programming for timers and counters:
 - o ON-delay timer application
 - o OFF-delay timer application
 - o Up counter and down counter applications
6. Design and implementation of sequential control circuits using PLC.
7. Traffic light control system simulation using PLC.
8. Automatic star-delta starter control using PLC.
9. Conveyor belt control system using PLC.
10. Temperature monitoring and control using PLC with analog inputs.



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DTET504		PLC Lab	0	0	0	30	20	0	0	4	2

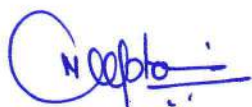
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Text Books:

1. Frank D. Petruzella, "Programmable Logic Controllers", 6th Edition, McGraw-Hill Education, 2022.
2. M. T. White, "PLCs for Beginners: An Introductory Guide to Building Robust PLC Programs with Structured Text", Packt Publishing, 2024.

Reference Books:

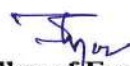
1. Gary A. Dunning, "Introduction to Programmable Logic Controllers", 3rd Edition, Delmar Cengage Learning, 2006.
2. Ashraf Said AlMadhoun, "PLC SCADA for Beginners: Understanding and Implementing Industrial Automation Systems", Springer, 2023.
3. Himanshu Kumar, "Advanced Industrial Automation: PLC Programming in Simplest Way with 110 Solved Examples", Notion Press, 2020.
4. R. G. Jamkar, "Industrial Automation Using PLC SCADA & DCS", Dreamtech Press, 2019.



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