# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
# Shri Vaishnav Institute of Technology and Science
# Choice Based Credit System (CBCS) in the Light of NEP-2020
# Diploma
# Common to EE/EX/EI/MTX w.e.f. 2024

| COURSE CODE | CATE GORY | COURSE NAME | TEACHING & EVALUATION SCHEME | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | THEORY | | | PRACTICAL | | L | T | P | CREDEITS |
| | | | END SEM University Exam | Two Term Exam | Teachers Assessment* | END SEM University Exam | Teachers Assessment* | | | | |
| 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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| DTEE601N | | Control Systems | 60 | 20 | 20 | 30 | 20 | 3 | 1 | 2 | 5 |

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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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## Choice Based Credit System (CBCS) in the Light of NEP-2020
## Diploma EI/EX w.e.f. 2024

| COURSE CODE | CATE-GORY | COURSE NAME | TEACHING &EVALUATION SCHEME | | | | | | | | |
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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.
***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):**

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 |
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| DTET502 | DC | Embedded Systems | 60 | 20 | 20 | 30 | 20 | 3 | 0 | 2 | 4 |

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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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| COURSE CODE | CATE-GORY | COURSE NAME | TEACHING &EVALUATION SCHEME | | | | | | | | |
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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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# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
## Shri Vaishnav Institute of Technology and Science
## Choice Based Credit System (CBCS) in the Light of NEP-2020
## Diploma (Electrical Engineering)
## (2021-2024)

| COURSE CODE | CATEGORY | COURSE NAME | TEACHING & EVALUATION SCHEME | | | | | | | | |
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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* | | | | |
| DTEE502 | DCC | Industrial Electronics | 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 Objectives:**

1. Understand the principles, merits and de-merits of Induction/ Di-electric heating
2. Draw and design regulated / controlled power supply , SMPS and UPS

**Course Outcomes:**

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

1. Understand solid state devices as logic switches, power controller switches.
2. Understand heating and its properties.
3. List general and industrial applications of converters, invertors, choppers, and regulator.
4. Select proper device for a given application

**Syllabus**

**UNIT I**

**Inverter Application** **6 Hrs.**

SMPS Types, Block diagram of SMPS, Various schemes of SMPS, advantages and disadvantages. UPS-Type (ON Line, OFF Line) and its comparison. Battery banks.

**UNIT II**

**Electric Welding** **9 Hrs.**

Electric welding, resistance and arc welding, control devices and welding equipment. A.C. / D.C. timers using solid state devices, Synchronous and non synchronous timers, Sequence timer, Duty cycle of welding process, Electronic welding controls, SCR as electronic contactor in welding.

**UNIT III**

**High frequency heating** **9 Hrs.**

Induction Heating: Basic Principle ,Factors Governing the process, Applications, merits &demerits over other systems , Di-electric heating: Basic Principle ,Factors governing the process, applications, merits & demerits over other systems.

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## Choice Based Credit System (CBCS) in the Light of NEP-2020
## Diploma (Electrical Engineering)
## (2021-2024)

| COURSE CODE | CATEGORY | COURSE NAME | TEACHING & EVALUATION SCHEME | | | | | | | | |
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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* | | | | |
| DTEE502 | DCC | Industrial Electronics | 60 | 20 | 20 | 30 | 20 | 3 | 0 | 2 | 4 |

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**UNIT IV** **9 Hrs.**

**General Applications**

Static Switches, AC switches, DC Switches, Solid State Relays, DC Solid State Relays, AC Solid State Relays. Static Circuit Breakers, Static AC Circuit Breakers, Static DC Circuit Breakers, Battery Charger, Sawtooth generators, Flasher Circuits

**UNIT V** **9 Hrs.**

**Industrial Applications**

HVDC Transmission, Types of HVDC link, Bipolar HVDC System, Temperature control, Liquid level controllers, Alarm actuator, High frequency welding, Ultrasonic Applications, Emergency Lighting System.

**References:**


1. Power Electronics by M. H. Rashid - PHI Publication-3 rd Edition.
2. Industrial Electronics and control by Biswanath Paul, PHI publications2nd Edition.
3. Programmable Logic Controllers - "Frank D.Petruzela "PHI publications
4. Power Electronics by Dr.P. S. Bimbhra, Khanna publishers -2 nd Edition.
5. Industrial & Power Electronics By Harish C.Rai, Umesh Publication, 5 th Edition.
6. Programmable Logic Controller –Pradeep Kumar& Srivashtava- BPB Publications


**List of Practical**

1. Demonstration of SMPS.
2. Demonstration of UPS
3. Demonstration of High frequency heating
4. Demonstration of induction heating.
5. Demonstration of Sawtooth generators.
6. Study of circuit breaker.

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

| COURSE CODE | CATEGORY | COURSE NAME | TEACHING &EVALUATION SCHEME | | | | | | | | |
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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* | | | | |
| DTET504 | | PLC Lab | 0 | 0 | 0 | 30 | 20 | 0 | 0 | 4 | 2 |

**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):**
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:
   - Single motor start/stop control
   - Forward-reverse motor control
5. Programming for timers and counters:
   - ON-delay timer application
   - OFF-delay timer application
   - 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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***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

**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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