# 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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| DTEE502 | DCC | Industrial Electronics | 60 | 20 | 20 | 30 | 20 | 3 | 0 | 2 | 4 |

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**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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**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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| DTEE503 | DCC | Estimating and Costing | 60 | 20 | 20 | 0 | 0 | 3 | 0 | 0 | 3 |

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**Course Objective:**
The aim of this course is to enable the students to prepare the schedule of materials with specifications and estimates for different types of electrical installations.

**Course Outcomes:**
After the successful completion of this course students will be able to
1. Summarize the importance of estimation and specification.
2. Prepare the schedule of materials with specifications and estimates for service mains.
3. Draw the wiring plan for residential buildings, Prepare the schedule of materials with specifications and estimates for lighting Installations.
4. Prepare the schedule of materials with specifications for transmission lines, distribution line and substations.

**UNIT I** **9 Hrs.**

**Introduction**

Meaning of estimation and specification, its importance and purpose and the factors to be considered while preparing estimations and specifications. Meaning of standardization and its advantages. Meaning of overhead charges, stock incidental charges, contingencies, supervision charges, labour charges, Inspection charges, transportation charges and miscellaneous charges.

**UNIT II** **8 Hrs.**

**Service Mains**

Meaning of service mains, code of Practice for service mains, types of service mains- Over Head & UG Service Mains, materials and specifications, current ratings for Aluminium, copper conductors and selection of size of conduit pipe as per the size and number of wires. Load calculation, selection of size and type of conductor/UG cable, estimates for single phase OH service connection, three phase OH service connection.

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**UNIT III** **8 Hrs.**

**Lightning Installation**

Interior Wiring types and their applications, factors to be considered, materials required for Interior wiring and their specifications, calculating the quantity of wiring materials and accessories for the Interior Wiring, load calculations for residential buildings, size of conductors.

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

**Power Installation**

Code of Practice for Power Installations, materials required for power circuit wiring and their specifications, Prepare the layout diagram of machines showing clearances as per IS standards, load calculations, determine the size of conductors, main switch, Isolators, sub switches and protective devices,

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

**Distribution Line and transformer centre**

Code of practice for Distribution Lines and Transformer centre, types of transformer centres - Pole mounted, plinth mounted, indoor and outdoor types. Determining the rating of Distribution Transformer. Write Specifications of the Distribution Transformer. Code of practice for Transmission lines and substations, transmission line materials and their specifications, types of Towers, ACSR conductors and Number of Disc insulators in suspension string.

**References:**


1. KB Raina, SK Bhattacharya, "Electrical Design Estimating and Costing", New Age Publishers.
2. J.B.Gupta, "Electrical Installation Estimating and Costing", S.K.Kataria and Sons.
3. SL Uppal ,G.C.Garg, "Electrical Wiring Estimating and Costing", Khanna Publisher,
4. Surjit Singh, "Electrical Estimating and costing", Dhanpat Rai & Co.
5. Raghvendra Rao, "Electrical Design Estimating and Costing", published by sapna book house.


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# Diploma(Electrical Engineering)
# (2023-2026)

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| DTEE601N | DCC | Control System | 60 | 20 | 20 | 30 | 20 | 3 | 1 | 2 | 5 |

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**Course Objectives:**

1. To give the concept of control system & its applications in various fields.
2. To learn concept of modeling of various physical systems.
3. To learn about the performance characteristics and limitations associated with various devices.

**Course Outcomes:**

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

1. Demonstrate an understanding of the fundamentals of (feedback) control systems.
2. Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.
3. Apply root-locus technique to analyze and design control systems.
4. Determine the (absolute) stability of a closed-loop control system.

**Syllabus**

**UNIT-I** **8 Hrs.**

**Introduction:**Basic concept of open loop and closed loop control system and their comparison- Simple Mathematical model of physical systems-Analogy between different systems-Mechanical and Electrical.

**UNIT-II** **8 Hrs.**

**Control System Representation:** Transfer function, block diagram, reduction of block diagram,Mason's gain formula,Simple Mathematical problems on block diagram and signal flow graphs.

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|---|---|---|---|---|---|---|---|---|---|---|---|
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**UNIT-III** **9 Hrs.**

**Time Domain Analysis:** First and Second order control System (Without mathematical treatment)-Definition of different performance indices as delay time, rise time, peak time, percentage peak overshoot, Settling time, steady state error.-Type-0, Type -1, type-2, system definition-Concept of stability: absolute stability, relative stability-Routh and Hurwitz Criteria for stability.

**UNIT-IV** **8 Hrs.**

**Root Locus Techniques:** Introduction-Root Locus concept, Construction of Root Loci.

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

**Frequency Domain Analysis:** Introduction- Nyquist Stability Criteria and Bode plots of simple control system.

**References:**


1. I.J. Nagrath and M. Gopal, "Control system Engineering", New Age International.
2. Control Systems by Ashfaq Hussain, Haroon Ashfaq, Dhanpat Rai& Co.
3. Rudra Pratap, Getting Started with MATLAB, Oxford.
4. Modern Control Systems by Roy Chaudhary. PHI
5. Feedback Control Systems by Dr. S.D. Bhide, R.A. Barapate, S. Satyanarayan, Tech-Max Publication, Pune


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**List of Experiments:**

1. Determination of transfer function of A-C servomotor
2. Determination of transfer function of D-C motor.
3. Study of Block diagram reduction Method using MATLAB
4. To Plot Root Locus using MATLAB.
5. To Plot Nyquist plot using MATLAB
6. To Plot Bode plot using MATLAB
7. Effect of adding poles on root loci of type-1, type-2 systems through MATLAB.
8. Effect of adding zeros on root loci of type-1, type-2 systems through MATLAB.
9. Effect of adding poles on bode plots of type-1, type-2 systems through MATLAB.
10. Effect of adding zeros on bode plots of type-1, type-2 systems through MATLAB.

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| DTEE603 | DCC | Electric Traction | 60 | 20 | 20 | 0 | 0 | 3 | 0 | 0 | 3 |

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**Course Objectives:**

1. To provide the students the fundamental concepts of drives and types of drives used in traction.
2. To train the students with a good engineering breadth so as to analyzethe accessing techniques for braking system implementation in traction.

**Course Outcomes:**

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

1. Express working of Electric Drives.
2. Understand the function of the various traction system equipment.
3. Evaluate the Constituents of Supply systems in traction.
4. Select and understand the various train lighting systems.

**Syllabus**

**UNIT I** **6 Hrs.**

**Electric Traction System**

Electric Traction – Advantages and Disadvantages, Applications. Ideal traction system. Choice of traction system in India.

**UNIT II** **9 Hrs.**

**Track Electrification**

Description of various systems - D.C., 1-Phase low frequency A.C., 1-Phase high frequency, 3-Phase A.C. and Composite System, 25 K.V. A.C., 50 Hz System-Advantages and disadvantages, Problems associated with A.C traction system, current and voltage unbalance, production of harmonics and induction effects, comparison between A.C. and D.C. system

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**UNIT III** **9 Hrs.**

**Power Supply Arrangements**

High Voltage Supply, Constituents of supply system substation, feeding post, feeding and sectioning arrangements, sectioning post, elementary section, Miscellaneous equipment at control posts and switching station, Major equipment at substation, transformer, circuit breaker, interrupters, Protection system for A.C. Traction.

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

**A.C. Electric Locomotive**

Block diagram of A.C. electric locomotive, Overhead equipment (O.H.E.), Pentagonal O.H.E.-catenary construction, OHE Supporting structure, Current collection system, current collection gear for OHE, pole collection bow collection, pantograph collector, Air blast C.B, Tap Changer (on load), Transformer, Rectifier connection, Traction motor connection.

**UNIT V** **8 Hrs.**

**Rail Locomotive Signaling**

System of train lighting, special requirements of train lighting, methods of obtaining unidirectional polarity and constant output, Battery System, Failure of under frame generating equipment.

**References:**


1. S. K. Pillai, "A first course on Electric Drives", 3rd edition, New Age International Publishers.
2. M. V. Deshpande, "Electrical Motors applications and control", PHI.
3. S. L. Uppal, "Electrical power", Khanna Publishers.
4. J. B. Gupta, "Electrical Power", S.K Kataria & Sons, New Delhi.
5. H. Pratab, "Modern Electric Traction", Dhanpat Rai & Sons
6. J. Upadhyay, S. N. Mahendra , "Electric Traction", Allied Publishers Ltd.


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