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

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

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

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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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