



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								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
DTEE402	DCC	AC Machines	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 following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

The objective of this course is -

1. To provide comprehensive knowledge of AC motors and their industrial applications.
2. To acquire hands on experience of conducting various tests on AC machines and obtaining their performance indices using standard analytical as well as graphical methods.

Course Outcomes (COs):

Upon completion of the course, the student shall be able:

1. To acquaint with AC machines fundamentals and the working of three phase induction motors.
2. To get the knowledge of single phase induction motor and its application for diverse approaches to sustainability.
3. To acquaint with the technical knowledge of alternator used in power plants.
4. To acquire hands on experience of conducting various tests on AC machines and obtaining their performance that can give lifelong learning.

Syllabus

UNIT I

9 Hrs.

Transformer: Principle, construction and classification. EMF equation turns ratio, name plate rating, phasor diagram, no load and on load equivalent circuit. Voltage regulation, polarity ratio, open and short circuit tests, losses and efficiency, condition of maximum efficiency. All day efficiency and its numerical.

Three phase transformer: Connections, groups, open delta connection. Comparison of three phase transformer with bank of three single phase transformers.

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UNIT II

9 Hrs.

Three-Phase Induction Motors: Classification of ac motors, Induction motor: general principal, construction, Phase-wound rotor, Relation between torque and rotor power factor, Condition for maximum starting torque, Rotor e.m.f and reactance under running conditions, Condition for maximum torque under running conditions, Relation between torque and slip, Starting torque and maximum torque, Torque/speed characteristic under load, Power stages in an induction motor.

UNIT III

8 Hrs.

Testing and Speed Control of Induction Motor: No-load test, Blocked rotor test, starting of Squirrel-cage motors, starting of slip-ring motors, crawling, cogging or magnetic locking, Double Squirrel-cage motor, Speed control of induction motor.

UNIT IV

9 Hrs.

Single Phase Induction Motors: Types of single-phase motors, Single-phase induction motor: construction, principle of operation Speed torque characteristics, Double-field revolving theory, Split phase induction motor: Principle, phasor diagram, speed-torque characteristic. Capacitor start Motor: Principle, phasor diagram, speed-torque characteristic, Capacitor start-and- run motor: construction, Application, Shaded-pole single-phase motor: construction, operation, Application, Repulsion motor.

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UNIT V

8 Hrs.

Alternators: Principle of working and construction.- Salient and Cylindrical rotor, Equivalent circuit and phasor diagram, Voltage regulation by synchronous impedance method, Open circuit and Short circuit characteristics, Parallel operation of an Alternator, Synchronization of alternator with bus bar.

Textbooks:

1. B. L. Thereja "A text book of Electrical Technology – Vol - II" – S. Chand Publications.

References:

1. J. B. Gupta – "Theory and Performance of Electrical Machines", S. K. Kataria and Sons.
2. S. J. Chapman - "Electric Machinery Fundamentals", Mcgraw Hill.
3. M. G. Say - "The performance and Design of Alternating Current Machines", CBS Publishers & Distributors.
4. D. P. Kothari & I. J. Nagrath - "Electrical Machines", TMH publication.
5. A. E. Fitzgerald, C. Kingsley, S. D. Umans - "Electric Machinery"- 6th Edition, TataMcgraw Hill.
6. Dr. P. S. Bimbhra – "Electrical Machinery", Khanna Publisher.
7. J. J. Winders, Jr. – "Power Transformers: Principles and Applications", CRC Press.

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List of Experiments:

Experiments can cover any of the above topics, following is a suggestive list:

1. Evaluation of turn's ratio and polarity test on 1-phase transformer.
2. Performance analysis of OC and SC tests on a 3-phase transformer and determine its equivalent circuit. Also find its efficiency and regulation at different load and power factor.
3. Performance analysis of No-load and block rotor test on a 3-phase IM and determine its equivalent circuit.
4. Perform load test on a 3-phase IM and plot its performance characteristics.
5. Study various types of starters used for 3-IMs.
6. Perform No-load and block rotor test on a 1-phase IM and determine its equivalent circuit.
7. Realization of Scott connection.
8. Draw & verify open circuit characteristics of 3- \emptyset synchronous generator.
9. Draw & verify short circuit characteristics of 3- \emptyset synchronous generator.
10. Draw & verify external load characteristics of 3- \emptyset synchronous generator.

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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*				
DTEE303N	DCC	Electrical and Electronics Measurement and Measuring Instruments	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):

To introduce the students with the

1. Different types of measuring instruments.
2. Fundamental concepts of electrical instrumentation.
3. Monitoring/measuring electrical parameters encountered in domestic and industrial applications.

Course Outcomes (COs):

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

1. Identify various types of instruments.
2. Understand the operating principles of Energy and power meters.
3. Measure low, medium & high Resistances using suitable bridges.
4. Select proper instrument for measurement various Electrical quantities.

Syllabus

UNIT I

9 Hrs.

Measuring Instruments:

Define Accuracy, precision, Errors, Resolutions Sensitivity and tolerance, Classification of measuring instruments. Explain Deflecting, controlling and damping arrangements in indicating type of instruments, Calibration of instruments.

UNIT II

8 Hrs.

ANALOG AMMETERS AND VOLTMETERS

Describe Construction, principle of operation, errors, ranges merits and demerits of: Moving iron type instruments, Permanent Magnet Moving coil type instruments, Dynamometer type instruments, Rectifier type instruments, Induction type instruments.

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DTEE303N	DCC	Electrical and Electronics Measurement and Measuring Instruments	60	20	20	30	20	3	0	2	4

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UNIT III

9 Hrs.

WATTMETERS AND MEASUREMENT OF POWER

Describe Construction, principle of working of Dynamometer type wattmeter, The Errors in Dynamometer type wattmeter and methods of their correction, Discuss Induction type watt meters.

UNIT IV

8 Hrs.

MEASUREMENT OF RESISTANCE, INDUCTANCE & CAPACITANCE

Classification of resistance: Measurement of low resistance by potentiometer method, Measurement of medium resistance by wheat Stone bridge method, Construction, principle of operations of Megger & Earth tester for insulation resistance and earth resistance measurement respectively, Construction and principles of Multimeter. (Analog and Digital).

UNIT V

7 Hrs.

ENERGY METERS AND MEASUREMENT OF ENERGY

Introduction, Single Phase Induction type Energy meters – construction, working principle, Testing of Energy Meters.

Textbooks:

1. Electrical and Electronic Measurements and Instrumentation by A. K. Sawhney, Dhanpat Rai & Co., 1 January 2015.
2. Electrical and Electronic Measurements & Instrumentation by J.B Gupta, S.K. Kataria & sons, Reprint 2024.
3. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, fifth Edition, Wheeler Publishing., 2011.

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DTEE303N	DCC	Electrical and Electronics Measurement and Measuring Instruments	60	20	20	30	20	3	0	2	4

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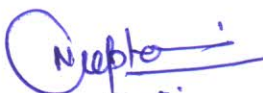
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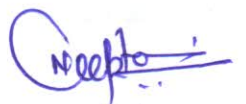
References:


1. Helfrick and Cooper, "Modern Electronic Instrumentation and Measurement Techniques", Prentice-Hall of India, Reprint 2005.
2. Jones, B.E., "Instrumentation Measurement and Feedback", Tata McGraw-Hill, 2004.

List of Experiments:

1. Study of various types of Indicating Instruments.
2. Measurement of low resistance by potentiometer method.
3. Measurement of medium resistance by Wheatstone bridge.
4. Measurement of insulation resistance by megger.
5. Measurement of inductance by Maxwell's bridge
6. Calibration of Voltmeter, Ammeter, Wattmeter, Energy meter.
7. Measurement of P.F. by ammeter, voltmeter and wattmeter method.
8. Measurement of 3-phase power by two wattmeter method.
9. Use of multi meter in a circuit for measurement of voltage, current and resistance.


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COURSE CODE	CATEGOR Y	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*				
DTEE403N	DCC	Utilization of Electrical Energy	60	20	20	0	0	3	0	0	3

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 will provide a comprehensive idea in utilization of electrical power such as drives, electric heating, electric welding and illumination, electric traction, electrolysis, refrigeration air-conditioning and automobile electric system.

Course Outcomes(COs):

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

1. Identify a heating/ welding scheme for a given application.
2. Explain various lamps and fittings in use.
3. Explain different schemes of traction schemes and its main components.
4. Identify the job/higher education / research opportunities in electric utilization industry.

Syllabus

UNIT I

8 Hrs.

Illumination Electromagnetic wave spectrum, solid and plane angle, definition of electrical terms in use, sensitivity of human eye. Luminous efficiency, horizontal and vertical laws of illumination, definition of terms used in lighting, lighting scheme, various types of lamps, their use.

UNIT II

9 Hrs.

Electric heating, Advantages and disadvantages of electric heating, methods of electric heating. Principle of electric heating. Resistance heating, heating elements and alloys. Causes of failures of heating elements. Arc furnaces, principle, construction, working and uses. Induction heating principle, Dielectric heating principles and uses.

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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*				
DTEE403N	DCC	Utilization of Electrical Energy	60	20	20	0	0	3	0	0	3

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.

UNIT III

8 Hrs.

Electric welding Definition, classification of electrical welding, principle of arc welding. Qualities of good welding. Welding defects. Resistance welding, advantages, classification, principle and working, comparison of resistance and arc welding process.

UNIT IV

9 Hrs.

Power factor improvement, causes of low P.F, effects of low P.F, methods of improvement of P.F. Electro-chemical processes and storage batteries, faraday's laws of electrolysis.

UNIT V

9 Hrs.

Electric drives, Merits and demerits of electric drives, factors governing selection of motors, drive requirements. Group and individual drive, Speed control of motors, load equalization, use of fly wheel.

Textbooks:

1. Gupta, J.B., Utilization of Elect. Energy, S.K. Kataria & Sons; 2012 Edition (2012)
2. Rajput R.K., Utilization of Electrical Power, Laxmi Publications, second Edition 2017

References:

1. H. Pratap, Art and Science of Utilization of Electrical Energy, Dhanpat Rai & co., 2014
2. Suryanarayan N.V., Utilization of Elect. Power: Electric Drives and Elect. Traction, New Age International, Second edition 2014.
3. Garg, G.C., Utilization of Elect. Power and Elect. Traction., Khanna publisher, New Delhi. 10th Edition. 2016

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Common to Diploma.(EE/Solar Engineering)
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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*				
DTEE304N	DCC	Electrical Engineering Drawing	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.

Course Educational Objectives (CEOs):

1. To draw assembled view of disassembled parts of electrical machines and transformers.
2. To develop the ability to identify different parts of electrical machines and prepare list of materials for various parts.
3. To draw circuit diagram for different AC motor starters.
4. To follow BIS and REC standard to supporting installation and SP and DP Structures and stay sets for line supports.
5. To use various symbols to draw the single line diagram of 33/11kV substations.

Course Outcomes (COs):

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

1. A technical person takes help of an engineering drawing to understand the constructional features of machines and accessories.
2. Electrical drawing is introduced for the Diploma students to be familiar with different assembled and disassembled views of electrical machine like: Three phase alternator, Induction motors, Transformers, Circuit diagrams of AC motors starters, Development of stator windings of single phase and three phase motors and alternators, with conventional symbols.
3. Sketching as to BIS and REC specification and symbol of electrical earthing installations, SP and DP structures and substations of 132/33 kV and 33/11 kV type.
4. This will enable them to follow engineering drawing in the working environment.

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Common to Diploma (EE/Solar Engineering)

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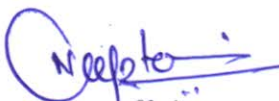
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DTEE304N	DCC	Electrical Engineering Drawing	0	0	0	30	20	0	0	4	2

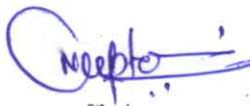
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List of Experiments:

1. Draw the winding diagram of a Single Layer Lap and Single Layer Wave connected D C Machine.
2. Draw the different Industrial Electrical symbols.
3. Draw the different types of poles and Towers with feeders and Distributors and Lightning Arrestors.
4. Draw the different types of earthing's.
5. Draw different core sections of a transformer.
6. Draw the Battery Charging Circuit with Battery.
7. Draw the Single, Double and Triple pole types, Main Switches, Energy meters.
8. Sketches of C.T., P.T. and other Relays with feeders and distributors.
9. Draw the single line diagram of 33/11 kV substation.
10. Stay Arrangement and guard wires arrangement for roads and rail lines crossing.


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ML307 ENVIRONMENTAL MANAGEMENT AND SUSTAINABILITY

SUBJECT CODE	CATEGORY	SUBJECT 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*					
ML-307	Compulsory	Environmental Management and Sustainability	60	20	20	0	0	4	0	0	4	

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

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

Course Objective

1. To create awareness towards various environmental problems.
2. To create awareness among students towards issues of sustainable development.
3. To expose students towards environment friendly practices of organizations.
4. To sensitize students to act responsibly towards environment.

Examination Scheme

The internal assessment of the students' performance will be done out of 40 Marks. The semester Examination will be worth 60 Marks. The question paper and semester exam will consist of two sections A and B. Section A will carry 36 Marks and consist of five questions, out of which student will be required to attempt any three questions. Section B will comprise of one or more cases / problems worth 24 marks.

Course Outcomes

1. The course will give students an overview of various environmental concerns and practical challenges in environmental management and sustainability.
2. Emphasis is given to make students practice environment friendly behavior in day-to-day activities.

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COURSE CONTENT

Unit I: Introduction to Environment Pollution and Control

1. Pollution and its types (Air, Water, and Soil): Causes, Effects and Control measures
2. Municipal Solid Waste: Definition, Composition, Effects
3. Electronic Waste: Definition, Composition, Effects
4. Plastic Pollution: Causes, Effects and Control Measures

Unit II: Climate Change and Environmental Challenges

1. Global Warming and Green House Effect
2. Depletion of the Ozone Layer
3. Acid Rain
4. Nuclear Hazards

Unit III: Environmental Management and Sustainable Development

1. Environmental Management and Sustainable Development: An overview
2. Sustainable Development Goals (17 SDGs)
3. Significance of Sustainable Development
4. Environment Friendly Practices At Workplace and Home (Three Rs' of Waste Management, Water Conservation, Energy Conservation)

Unit IV: Environmental Acts

1. The Water (Prevention and Control of Pollution) Act, 1974: Objectives, Definition of Pollution under this act, Powers and Functions of Boards
2. The Air (Prevention and Control of Pollution) Act, 1981: Objectives, Definition of Pollution under this act, Powers and Functions of Boards
3. The Environment (Protection) Act, 1986: Objectives, Definition of important terms used in this Act, Details about the act.
4. Environmental Impact Assessment: Concept and Benefits

Unit V: Role of Individuals, Corporate and Society

1. Environmental Values
2. Positive and Adverse Impact of Technological Developments on Society and Environment
3. Role of an individual/ Corporate/ Society in environmental conservation
4. Case Studies: The Bhopal Gas Tragedy, New Delhi's Air Pollution, Arsenic Pollution in Ground Water (West Bengal), Narmada Valley Project, Cauvery Water Dispute, Fukushima Daiichi Disaster (Japan), Ozone Hole over Antarctica, Ganga Pollution, Deterioration of Taj Mahal, Uttarakhand flash floods

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Suggested Readings:

1. Rogers, P.P., Jalal, K.F. , Boyd, J.A.(Latest Edition) . **An Introduction to Sustainable Development.** Earthscan
2. Kalam, A.P.J. (Latest Edition) .**Target 3 Billion: Innovative Solutions Towards Sustainable Development.** Penguin Books
3. Kaushik , A. and Kaushik (Latest Edition).**Perspectives in Environmental Studies.** New Delhi: New Age International Publishers.
4. Dhameja, S.K. (Latest Edition). **Environmental Studies.** S.K. Kataria and Sons.New Delhi
5. Bharucha,E. (Latest Edition). **Environmental Studies for Undergraduate Courses.** New Delhi: University Grants Commission.
6. Wright, R. T. (Latest Edition). **Environmental Science: towards a sustainable future** .New Delhi: PHL Learning Private Ltd.
7. Rajagopalan, R. (Latest Edition). **Environmental Studies.** New York: Oxford University Press.

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