

**CHOICE BASED CREDIT SYSTEM
EVALUATION SCHEME
AND
COURSE OF STUDY
IN
DIPLOMA (WORKING PROFESSIONAL)
ELECTRICAL ENGINEERING
SCHEME OF EXAMINATION & SYLLABUS**



**FACULTY OF ENGINEERING AND TECHNOLOGY
GURUKULA KANGRI (DEEMED TO BE UNIVERSITY), HARIDWAR
ACADEMIC SESSION 2026-27**

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma Regular /Working Professional in Electrical Engineering

SEMESTER-III

S.NO.	COURSE CODE	COURS E OPTED	SUBJECT	Period per week			EVALUATION SCHEME				Credit	Subject TOTAL
							SESSIONAL EXAM.			EXA M. ESE		
				L	T	P	CT	TA	TOTAL			
1	DEE- C 311/ DEW-C311	ESC	Electrical Circuits	3	0	0	20	10	30	70	3	100
2	DEE- C 312/ DEW- C 312	ESC	Electrical and Electronics Measurements	3	0	0	20	10	30	70	3	100
3	DEE- C 313/ DEW- C 313	ESC	Electrical and Electronic Engineering Materials	3	0	0	20	10	30	70	3	100
4	DEE- C 314/ DEW- C 314	ESC	Electrical Machine-I	3	0	0	20	10	30	70	3	100
5	DEE- C 315/ DEW- C 315	ESC	Principles of Electrical Wiring, Design and Drawing	3	0	0	20	10	30	70	3	100
PRACTICAL / TRAINING / PROJECT												
6	DEE C -351/ DEW C -351	ESC	Electrical Circuits Laboratory	0	0	2	20	10	30	70	1	100
7	DEE- C 352/ DEW- C 352	ESC	Electrical and Electronic Measurements Laboratory	0	0	2	20	10	30	70	1	100
8	DEE- C 353/ DEW- C 353	ESC	Electrical Machine-I Laboratory	0	0	2	20	10	30	70	1	100
TOTAL				15	0	6	160	80	240	560	18	800

(Effective from the session 2026-27)
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Diploma Regular /Working Professional in Electrical Engineering

SEMESTER-IV

S.NO.	COURSE CODE	COURSE OPTED	SUBJECT	Period per week			EVALUATION SCHEME				Credit	SUBJECT TOTAL
							SESSIONAL EXAM.			EXAM. ESE		
				L	T	P	CT	TA	TOTAL			
1	DEE- C 411/ DEW- C 411	ESC	Electric Power Transmission and Distribution	3	0	0	20	10	30	70	3	100
2	DEE- C 412/ DEW- C 412	ESC	Semiconductor Switches and Devices	3	0	0	20	10	30	70	3	100
3	DEE- C 413/ DEW- C 413	ESC	Estimating and Costing in Electrical Engineering	3	0	0	20	10	30	70	3	100
4	DEE- C 414/ DEW- C 414	ESC	Electrical Machine-II	3	0	0	20	10	30	70	3	100
5	DEE- P 4XX/ DEW- P 4XX	ESC	PEC-I	3	0	0	20	10	30	70	3	100
PRACTICAL / TRAINING / PROJECT												
6	DEE- C 451/ DEW- C 451	ESC	Electric Power Transmission and Distribution Laboratory	0	0	2	20	10	30	70	1	100
7	DEE- C 452/ DEW- C 452	ESC	Seminar	0	0	2	20	10	30	70	1	100
8	DEE- C 454/ DEW- C 454	ESC	Electrical Machine-II Laboratory	0	0	2	20	10	30	70	1	100
TOTAL				15	0	6	160	80	240	560	18	800
Program Elective-I												
1. DEE- P 415/DEW-P415 Power Plant Engineering												
2. DEE- P 417/DEW-P417 Installation and Maintenance of Electrical Equipment												

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Faculty of Engineering & Technology

Diploma Regular /Working Professional in Electrical Engineering

SEMESTER-V

S.NO.	COURSE CODE	COURSE OPTED	SUBJECT	Period per week			EVALUATION SCHEME				Credit	SUBJECT TOTAL
							SESSIONAL EXAM.			EXAM. ESE		
				L	T	P	CT	TA	TOTAL			
1	DEE- C 511/ DEW- C 511	ESC	Control Systems	3	0	0	20	10	30	70	3	100
2	DEE- C 512/ DEW- C 512	ESC	Industrial Power Electronics	3	0	0	20	10	30	70	3	100
3	DEE- A 001 DEW- A 001	ESC	Universal Human Values	3	0	0	20	10	30	70	3	100
4	DEE- C 514/ DEW- C 514	ESC	Substation Switchgear and Protection	3	0	0	20	10	30	70	3	100
5	DEE- C 515/ DEW- C 515	ESC	Renewable Energy	3	0	0	20	10	30	70	3	100
PRACTICAL / TRAINING / PROJECT												
6	DEE- C 551/ DEW- C 551	ESC	Control Systems Laboratory	0	0	2	20	10	30	70	1	100
7	DEE- C 552/ DEW- C 552	ESC	Industrial Power Electronics Laboratory	0	0	2	20	10	30	70	1	100
8	DEE- C 554/ DEW- C 554	ESC	Minor Project	0	0	4	20	10	30	70	2	100
9	DEE- C 555/ DEW- C 555	ESC	Summer Internship (4 Weeks)	To be pursued during summer vacation, submit a certificate of completion in the department, Working professional students will submit a report of their concerned department (in summer break after IV semester exam and will be assessed during V semester)							1	100
TOTAL				15	0	8	160	80	240	560	20	900

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Diploma Regular /Working Professional in Electrical Engineering

SEMESTER-VI

S.NO.	COURSE CODE	COURSE OPTED	SUBJECT	Period per week			EVALUATION SCHEME				Credit	Subject TOTAL
							SESSIONAL EXAM.			EXAM. ESE		
				L	T	P	CT	TA	TOTAL			
1	DEE- C 611/ DEW- C 611	ESC	Energy Management	3	0	0	20	10	30	70	3	100
2	DEE- C 612/ DEW- C 612	ESC	Energy Conservation and Auditing	3	0	0	20	10	30	70	3	100
3	DEE- C 613/ DEW- C 613	ESC	Utilization of Electrical Energy	3	0	0	20	10	30	70	3	100
4	DEE- P 6XX/ DEW- P 6XX	ESC	PEC-II	3	0	0	20	10	30	70	3	100
5	DEE- O 6XX/ DEW- O 6XX	ESC	OEC-I	3	0	0	20	10	30	70	3	100
PRACTICAL / TRAINING / PROJECT												
6.	DEE- C 661/ DEW- C 661	ESC	Major Project	0	0	16	0	100	100	300	8	400
			TOTAL	15	0	16	100	150	250	650	23	900
Program Elective-II												
1. DEE- P 614/DEW-P 614Industrial Automation and Control												
2. DEE-P 615/DEW-P615 Electric Vehicles												
Open Elective-I												
1. DEE- O 617/DEW-O617Entrepreneurship Development and Management												
2. DEE- O 618/DEW-O618 Illumination Practices												
3. DEE-O 619/DEW-O619 Digital Electronics and Microprocessor												

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Electrical Circuits
DEE-C311/DEW-C311

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. To maintain electrical systems by applying AC and DC circuit fundamentals.
2. To understand the concept of graphical solutions to electrical networks.
3. To understand frequency response in electrical circuits.
4. To learn powerful engineering circuit analysis techniques such as nodal analysis, mesh analysis, network theorems, source transformation, and other analytical methods.

UNIT I

Network Reduction and Principles of Circuit Analysis: Source transformation, Star-Delta and Delta-Star transformation, Mesh Analysis, Node Analysis.

UNIT II

Network Theorems: Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem.

UNIT III

Single-Phase AC Series Circuits: Generation of alternating voltage, phasor representation of sinusoidal quantities, R, L, and C circuit elements and their voltage and current responses, R-L, R-C, and R-L-C combinations of AC series circuits, impedance, reactance, impedance triangle, power factor, active power, reactive power, and apparent power.

UNIT IV

Single-Phase AC Parallel Circuits: R-L, R-C, and R-L-C parallel combinations of AC circuits, impedance, reactance, phasor diagram, impedance triangle, power factor, active power, apparent power, reactive power, and power triangle.

Diploma in Electrical Engineering

UNIT V

Three-Phase Circuits: Phasor and complex representation of three-phase supply, phase sequence and polarity, types of three-phase connections, phase and line quantities in three-phase star and delta systems.

Course Outcomes

After completing this course, the students shall be able to:

1. Troubleshoot problems related to single-phase AC series circuits.
2. Troubleshoot problems related to single-phase AC parallel circuits.
3. Troubleshoot problems related to three-phase circuits.
4. Apply principles of circuit analysis to troubleshoot electrical circuits.
5. Apply network theorems to troubleshoot electrical circuits.

Text Books

1. Ashfaq Husain, *Networks & Systems*, Khanna Book Publishing, New Delhi.
2. Gupta, B. R.; Singhal, Vandana, *Fundamentals of Electrical Network*, S. Chand & Co., New Delhi. ISBN: 978-81-219-2318-7.
3. Saxena, S. B.; Lal, Dasgupta, K., *Fundamentals of Electrical Engineering*, Cambridge University Press Pvt. Ltd., New Delhi. ISBN: 978-11-0746-435-3.
4. Theraja, B. L.; Theraja, A. K., *A Textbook of Electrical Technology*, Vol. I, S. Chand & Co., Ram Nagar, New Delhi. ISBN: 9788121924405.

Reference Books

1. Sudhakar, A.; Shyam Mohan, S. Palli, *Circuit and Network*, McGraw Hill Education, New Delhi. ISBN: 978-93-3921-960-4.
2. Bell, David A., *Electric Circuits*, Oxford University Press, New Delhi. ISBN: 978-01-954-2524-6.
3. Boylestad, R. L., *Introductory Circuit Analysis*, Wheeler, New Delhi. ISBN: 978-00-231-3161-5.
4. Mittle, V. N.; Mittle, Arvind, *Basic Electrical Engineering*, McGraw Hill Education, Noida. ISBN: 978-00-705-9357-2.
5. Sivanandam, S. N., *Electric Circuit Analysis*, Vikas Publishing House Pvt. Ltd., Noida. ISBN: 978-81259-1364-1.
6. Salivahanan, S.; Pravinkumar, S., *Circuit Theory*, Vikas Publishing House Pvt. Ltd., Noida. ISBN: 978-93259-7418-0.

Diploma in Electrical Engineering

Electrical and Electronics Measurement

DEE-C312 / DEW-C312

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. To provide basic knowledge of the different elements and concepts of electrical and electronics measurement.
2. To address the underlying concepts and methods behind electronics measurements.
3. To identify various types of electronic instruments suitable for specific measurements.

UNIT I

Fundamentals of Measurements: Significance, units, fundamental quantities and standards, classification of measuring instruments: indicating, recording, and integrating instruments.

UNIT II

Measurement of Voltage and Current: DC ammeter: basic, multi-range, universal shunt; DC voltmeter: basic, multi-range, concept of loading effect and sensitivity; AC voltmeter: rectifier type (half-wave and full-wave); CT and PT.

UNIT III

Measurement of Electric Power: Analog meters: Permanent Magnet Moving Coil (PMMC) and Permanent Magnet Moving Iron (PMMI) meters, their construction, working, salient features, merits and demerits. Dynamometer-type wattmeter. Measurement of power: one-, two-, and three-wattmeter methods.

UNIT IV

Measurement of Electric Energy: Single-phase and three-phase electronic energy meter: constructional features and working principle, measurement of frequency, errors and their compensation.

UNIT V

Circuit Parameter Measurement, CRO, and Other Meters: Megger, measurement of resistance by voltmeter and ammeter method, single-beam/single-trace CRO, Digital Storage Oscilloscope (DSO): basic block diagram, cathode ray tube, signal generator.

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Diploma in Electrical Engineering

Course Outcomes

After completing this course, the students shall be able to:

1. Check the working of electrical measuring instruments.
2. Use different types of measuring instruments for measuring voltage and current.
3. Use different types of measuring instruments for measuring electric power.
4. Use different types of measuring instruments for measuring electric energy.
5. Use different types of electrical instruments for measuring various ranges of electrical parameters.

Text Books

1. Mittle, V. N., *Basic Electrical Engineering*, McGraw-Hill, New Delhi. ISBN: 9780070085725.
2. Edward Hughes, *Electrical Technology*, Pearson Education, New Delhi. ISBN-13: 978-0582405196.

Reference Books

1. Rajput, R. K., *Electrical and Electronic Measurement and Instrumentation*, S. Chand & Co., New Delhi. ISBN: 9789385676017.
2. Sawhney, A. K., *Electrical and Electronics Measurements and Instrumentation*, Dhanpat Rai and Sons, New Delhi. ISBN: 9780000279744.
3. Suryanarayana, N. V., *Electrical Measurements and Measuring Instruments*, S. Chand & Co., New Delhi. ISBN: 8121920116.

Diploma in Electrical Engineering

Electrical and Electronics Engineering Materials
DEE-C313/DEW-C313

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. To understand classification of electrical and electronic materials.
2. To analyze electrical and magnetic behaviour of materials.
3. To study dielectric properties and polarization phenomena.
4. To explore superconductivity and piezoelectricity concepts.

UNIT I

Introduction to Electrical and Electronic Materials: Importance of materials, Classification of electrical and electronic materials, Requirement of Engineering materials, Classification of solids on the basis of energy gap, Products – working principle and materials.

UNIT II

Conductive Materials and Applications: Introduction, Semiconductor materials, Types of conducting materials, Low resistivity materials, High resistivity materials.

Dielectrics: Introduction to dielectric materials, classification of dielectric materials, Dielectric constant, Dielectric strength and Dielectric loss.

UNIT III

Magnetic Materials: Origin of permanent magnetic dipole, Magnetic terminology, Relation between relative permeability and magnetic susceptibility. Classification of magnetic materials, Diamagnetic, Paramagnetism, Ferromagnetism, Anti-ferromagnetism

UNIT IV

Superconductive Materials: Concept of superconductor, meaning of the phenomenon of superconductivity, properties of superconductors, types of superconductors, critical magnetic field and critical temperature, ideal and hard superconductors, mechanism of superconductivity.

Diploma in Electrical Engineering

UNIT V

Plastics: Introduction, thermoplastics, rubbers, thermosets, DC and AC properties, mechanical properties and processing of plastics, photoconductivity, photoconductive cell.

Course Outcomes

After completing this course, the students shall be able to:

1. To identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. To understand the relationship between structure, processing, and properties for the selection of existing materials and the development of new materials in the design of parts, structures, and devices.
3. To understand the microstructure characteristics, electronic properties, material formation, and manipulation of microstructure for applications in engineering design and materials processing.

Text Books

1. Advanced Electrical and Electronics Materials: Processes and Applications, K. M. Gupta and Nishu Gupta, Wiley, First Edition, 2015.
2. Materials Science and Engineering, V. Raghavan, Prentice Hall of India Pvt. Ltd., New Delhi.
3. Structure and Properties of Engineering Materials, Murthy & Jena, TMH, New Delhi.

Reference Books

1. Fundamentals of Electronic Devices and Circuits, Bell David, Oxford University Press.
2. Electronic Engineering Materials, R. K. Shukla and Archana Singh, McGraw Hill, 2012.
3. Electrical Properties of Materials, L. Solymar et al., Oxford University Press, 9th Edition, 2014.
4. Electrical Engineering Materials, A. J. Dekker, Pearson, 2016.
5. Principles of Electronic Materials and Devices, S. O. Kasap, McGraw Hill, 3rd Edition, 2010.

Diploma in Electrical Engineering

**Electrical Machine-I
DEE-C314/DEW-C314**

**MM: 100
Time: 3Hrs.
L T P
3 0 0**

**Sessional: 30
ESE: 70
Credit: 3**

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

To provide basic knowledge of generators and motors. The aim of this course is to help the students attain the following industry-identified competencies through various teaching-learning experiences:

1. To study the principles of electro-mechanical energy conversion.
2. To provide basic knowledge of generators and motors.

UNIT I

Principles of Electro-Mechanical Energy Conversion: Introduction, conservation of energy, energy stored in a magnetic field, singly excited systems, doubly excited systems, stored energy in the magnetic field.

UNIT II

Introduction to Electrical Machines: Definition of motor and generator, torque development due to the alignment of two fields and the concept of torque angle, electromagnetic induction and Faraday's law, comparison of generator and motor. Fleming's Left and Right Hand Rule.

UNIT III

DC Generator: Construction and principle of operation of DC generators and their functions, schematic diagrams, E.M.F. equation of DC generator, armature reaction, characteristics, commutation, and applications of DC generators.

UNIT IV

DC Motor: Principle of operation of DC motor, back E.M.F. and its significance, equivalent circuit diagram of DC motor, torque equation of DC motor, types of DC motors, losses, and efficiency. DC motor starters: necessity, two-point and three-point starters. Speed control of DC motors: flux control and armature control.

UNIT V

Transformers-I: Principle of Transformer operation, EMF equation of a transformer, Voltage ratio and Turns Ratio, Step-Up and Step-Down Transformer, Construction of Single phase transformer. Ideal Transformer, Transformer on No Load, Practical Transformer.

Course Outcomes

After completing this course, the students shall be able to:

1. Maintain different types of DC generators.
2. Maintain different types of DC motors.
3. Understand the principle of operation and the effect of pulsating and rotating magnetic fields.
4. Perform testing of DC machines.
5. Understand the starting methods and speed control methods of DC motors.

Text Books

1. G. C. Garg & P. S. Bimbhra, *Electrical Machines*, Vol. I & II, Khanna Book Publishing House, ISBN: 978-9386173-447, 978-93-86173-607, New Delhi.
2. Mittle, V. N. and Mittle, Arvind, *Basic Electrical Engineering*, McGraw Hill Education, New Delhi, ISBN: 9780070593572.
3. Kothari, D. P. and Nagrath, I. J., *Electrical Machines*, McGraw Hill Education, New Delhi, ISBN: 9780070699670.
4. Bhattacharya, S. K., *Electrical Machines*, McGraw Hill Education, New Delhi, ISBN: 9789332902855.

Reference Books

1. Mehta, V. K. and Mehta, Rohit, *Principles of Electrical Machines*, S. Chand & Co. Ltd., New Delhi, ISBN: 9788121930888.
2. Theraja, B. L., *Electrical Technology*, Vol. II (AC and DC Machines), S. Chand & Co. Ltd., New Delhi, ISBN: 9788121924375.
3. Bandyopadhyay, M. N., *Electrical Machines: Theory and Practice*, PHI Learning Pvt. Ltd., New Delhi, ISBN: 9788120329973.
4. Murugesh Kumar, K., *DC Machines and Transformers*, ISBN: 9788125916055.

Diploma in Electrical Engineering

Principles of Electrical Wiring, Design and Drawing
DEE-C315/DEW-C315

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. To learn about basic engineering instruments.
2. To have knowledge of sheet layout.
3. To learn dimensioning and reading of sketches.
4. To learn orthographic and isometric views of drawing.

UNIT I

Symbols: Various electrical symbols used in domestic and industrial installations and power systems (generation, transmission, and distribution, including substations).

UNIT II

Electrical Wiring: Wiring diagrams of light, fan, bell, and alarm circuits; staircase wiring; and go-down wiring.

UNIT III

House Wiring: Concept of standard house wiring procedures and best practices.

UNIT IV

Electrical Fixtures: Proper procedure for handling electrical fixtures; use of ladders, scaffolds, PPEs, and shock-resistant gloves while working or performing tests on live circuits; use of power drill machines and selection of drill bits for drilling work; use of different common electrical hand and power tools.

Diploma in Electrical Engineering

UNIT V

Draw single-line diagrams of substations: Single-line diagram of a 33/11 kV distribution substation., Single-line diagram of an 11/0.4 kV distribution substation., Earthing.

Course Outcomes

After completing this course, the students shall be able to:

1. Have knowledge of engineering instruments.
2. Learn lines and symbols used in drawing.
3. Learn freehand sketching.
4. Understand projections of drawing.

Text Books

1. Engineering Drawing by K. K. Dhiman, Ishan Publications, Ambala, Haryana.
2. Elementary Engineering Drawing (First Angle Projection) by N. D. Bhatt, Charotar Publishing House, Anand, Gujarat.

Reference Books

1. A Text Book of Engineering Drawing by Surjit Singh, Dhanpat Rai & Co., Delhi.
2. Engineering Drawing by P. S. Gill, S. K. Kataria & Sons, Delhi.
3. Engineering Drawing by R. B. Gupta, Satya Prakashan, New Delhi.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
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Diploma in Electrical Engineering

Electrical Circuits Laboratory
DEE-C351

MM: 100
Time: 2Hrs.
L T P
0 0 2

Sessional: 30
ESE: 70
Credit: 1

LIST OF EXPERIMENTS

1. Verification of the principle of **Thevenin's theorem** with A.C. source.
2. Verification of the principle of **Superposition theorem** with A.C. source.
3. Verification of the principle of **Norton's theorem** with A.C. source.
4. Verification of the principle of **Maximum Power Transfer theorem** with A.C. source.
5. Use a voltmeter and ammeter to determine the current through the given branch of an electric network by applying **mesh analysis** with A.C. source.
6. Use a voltmeter and ammeter to determine the current through the given branch of an electric network by applying **node analysis** with A.C. source.
7. Use a voltmeter, ammeter, and wattmeter to determine the active, reactive, and apparent power consumed in the given R-L series circuit. Draw the phasor diagram.
8. Use a voltmeter, ammeter, and wattmeter to determine the active, reactive, and apparent power consumed in the given R-C series circuit. Draw the phasor diagram.
9. Use a voltmeter, ammeter, and wattmeter to determine the active, reactive, and apparent power consumed in the given R-L-C series circuit. Draw the phasor diagram.
10. Use a variable frequency supply to create resonance in the given series R-L-C circuit or by using a variable inductor or variable capacitor.
11. Use a voltmeter, ammeter, and wattmeter to determine the current, power factor (p.f.), active, reactive, and apparent power in an R-C parallel A.C. circuit.
12. Use a voltmeter, ammeter, wattmeter, and p.f. meter to determine the current, power factor (p.f.), active, reactive, and apparent power for the given R-L-C parallel circuit with a series connection of resistor and inductor in parallel with a capacitor.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
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Diploma in Electrical Engineering

Electrical and Electronics Measurement Laboratory
DEE-C352

MM: 100
Time: 2Hrs.
L T P
0 0 2

Sessional: 30
ESE: 70
Credit: 1

LIST OF EXPERIMENTS

1. Identify measuring instruments on the basis of symbols on dial, type, accuracy, class, position, and scale.
2. To study the components of PMMC and MI instruments.
3. Verification of Kirchhoff's Law.
4. To study single-phase electronic energy meter.
5. Use digital multimeter for measurement of AC/DC current and AC/DC voltage.
6. Use voltmeter and ammeter method for measurement of medium resistance.
7. To connect resistance in series and parallel combination and verify the value.
8. Use earth tester for measurement of earth resistance.
9. Calibration of voltmeter and ammeter.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Electrical Machine-I Laboratory
DEE-C353

MM: 100
Time: 2Hrs.
L T P
0 0 2

Sessional: 30
ESE: 70
Credit: 1

LIST OF EXPERIMENTS

1. Perform brake test on DC shunt motor.
2. Control the speed of DC shunt motor by different methods.
3. Control the speed of DC series motor by different methods.
4. Perform the brake test on DC series motor.
5. Check the functioning of single-phase transformer.
6. Determine regulation and efficiency of single-phase transformer by direct loading.
7. Perform open-circuit and short-circuit tests on single-phase transformer to determine equivalent circuit, constants, voltage regulation, and efficiency.
8. Perform parallel operation of two single-phase transformers to determine the load current sharing.
9. Perform parallel operation of two single-phase transformers and determine the apparent and real power load sharing.
10. Perform polarity test on a single-phase transformer whose polarity markings are masked.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Seminar
DEE-C452

MM: 100
Time: 2Hrs.
L T P
0 0 2

Sessional: 70
ESE: 30
Credit: 1

Objectives: To increase the communication ability of students and to prepare them for presenting seminars on advanced topics of their branch.

The students will be required to deliver a seminar on a topic of general interest or any advanced technical topic related to the theory papers studied. The topic will be decided by mutual consent of the faculty In-Charge and the students.

Diploma in Electrical Engineering

Electric Power Transmission and Distribution
DEE-C411/DEW-C411

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. To understand the proper functioning of the electrical transmission and distribution systems.
2. To make students capable of analyzing the mechanical and electrical design aspects of transmission systems.
3. To learn the policies, Acts, and tariffs related to power transmission and distribution projects, which will be discussed and taught region-wise in India.

UNIT I

Basics of Transmission and Distribution: Single-line diagrams; different types of power switches with components of the electric supply transmission and distribution systems. Classification of transmission lines: primary and secondary transmission; standard voltage levels used in India.

UNIT II

Transmission Line Parameters and Performance: Line parameters: concepts of R, L, and C of transmission lines and types of transmission lines.

UNIT III

Performance of short transmission lines: efficiency, regulation and its derivation, effect of power factor.

Performance of medium transmission lines: representation, nominal 'T', nominal ' π ', and end-condenser methods. Skin effect and proximity effect.

Diploma in Electrical Engineering

UNIT IV

AC Distribution System: AC distribution—components, classification, requirements of an ideal distribution system, primary and secondary distribution systems. Feeders and distributors; factors to be considered in the design of feeders and distributors.

UNIT V

Components of Transmission and Distribution Lines: Overhead Conductors: Properties of materials, types of conductors with trade names, significance of sag, different types of cables, cable ratings, and derating factors.

Line Insulators: Properties of insulating materials, selection of materials, types of insulators, and their applications.

Course Outcomes

After completing this course, the students shall be able to:

1. Interpret the normal operation of electric transmission and distribution systems.
2. Maintain the functioning of medium- and high-voltage transmission systems.
3. Analyze the functioning of low-voltage AC distribution systems.
4. Understand the components of transmission and distribution lines.

Text Books

1. C. Garg, *Utilization of Electric Power & Electric Traction*, Khanna Book Publishing Co., New Delhi. **ISBN:** 978-93-86173-355.
2. Mehta, V. K., *Principles of Power System*, S. Chand and Co., New Delhi. **ISBN:** 9788121924962.
3. Soni, Gupta, and Bhatnagar, *A Course in Electrical Power*, Dhanpat Rai and Sons, New Delhi. **ISBN:** 9788177000207.
4. Gupta, J. B., *A Course in Power Systems*, S. K. Kataria and Sons, New Delhi. **ISBN:** 9788188458523.
5. Theraja, B. L., and Theraja, A. K., *A Textbook of Electrical Technology*, Vol. III, S. Chand and Co., New Delhi. **ISBN:** 9788121924900.

Reference Books

1. Uppal, S. L., *A Course in Electrical Power*, S. K. Khanna Publisher, New Delhi. **ISBN:** 9788174092380.
2. Sivanagaraju, S., and Satyanarayana, S., *Electrical Power Transmission and Distribution*, Pearson Education, New Delhi. **ISBN:** 9788131707913.
3. Ned Mohan, *Electrical Power System: A First Course*, Wiley India Pvt. Ltd., New Delhi. **ISBN:** 9788126541959.
4. Gupta, B. R., *Power System Analysis and Design*, S. Chand and Co., New Delhi. **ISBN:** 9788121922388.

Diploma in Electrical Engineering

Semiconductor Switches and Devices
DEE-C412 / DET-C412 / DEW-C412

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. To introduce basic semiconductor devices, their characteristics, and applications.
2. To understand the analysis and design of simple diode circuits.
3. To learn to analyze the PN junction behavior at the circuit level and its role in the operation of diodes and active devices.

UNIT I

Semiconductor and Diodes: Definition, Extrinsic/Intrinsic Semiconductor, N-type & P-type Semiconductor, PN Junction Diode – Forward and Reverse Bias Characteristics, Zener Diode – Principle, Characteristics, Construction, Working, Diode Rectifiers – Half-Wave and Full-Wave, Filters – C, LC and π (PI) Filters.

UNIT II

Bipolar Junction Transistor (BJT): NPN and PNP Transistors – Operation and Characteristics, Common Base Configuration – Characteristics and Working, Common Emitter Configuration – Characteristics.

UNIT III

Field Effect Transistors: FET – Working Principle, Classification, MOSFET Small Signal Model, N-Channel/P-Channel MOSFETs – Characteristics, Enhancement and Depletion Modes.

UNIT IV

SCR, DIAC & TRIAC: SCR – Construction, Operation, Working, Characteristics; DIAC – Construction, Operation, Working, Characteristics; TRIAC – Construction, Operation, Working, Characteristics of SCR.

UNIT V

Diploma in Electrical Engineering

Amplifiers and Oscillators: BJT Classification of Amplifiers, Feedback Amplifiers – Properties of Negative Feedback, Impact of Feedback on Different Parameters, Basic Feedback.

Course Outcomes

After completing this course, the students shall understand the following points:

1. Ability to analyze PN junctions in semiconductor devices under various conditions.
2. Ability to design and analyze simple rectifiers and voltage regulators using diodes.
3. Ability to describe the behavior of special-purpose diodes.
4. Ability to design and analyze simple BJT and MOSFET circuits.

Text Books

1. Electronic Devices and Circuits, McGraw Hill Education, Fourth Edition, S. Salivahanan and N. Suresh Kumar.
2. Electronic Devices and Circuits, Pearson Education India, First Edition, Boylestad and Nashelsky.
3. Electronic Devices and Circuits, McGraw Hill Education, Fourth Edition, Jacob Millman.

Reference Books

1. Adel S. Sedra, Kenneth C. Smith, and Arun N. Chandorkar, *Microelectronic Circuits – Theory and Applications*, Seventh Edition, Oxford University Press, 2017.
2. Robert L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuit Theory*, Eleventh Edition, Pearson India Education Services Pvt. Ltd., 2015.
3. Donald A. Neamen, *Electronic Circuits – Analysis and Design*, Third Edition, McGraw Hill Education, 2006.
4. Albert Malvino and David Bates, *Electronic Principles*, Eighth Edition, McGraw Hill Education, 2016.

Diploma in Electrical Engineering

Estimating and Costing in Electrical Engineering
DEE-C413 / DEW-C413

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. To design electrical installations with costing for tendering.
2. To make students capable of analyzing the mechanical and electrical design aspects of a system.
3. To learn the policies, Acts, and tariffs related to Power Transmission & Distribution projects, which will be discussed and taught region-wise in India.

UNIT I

Electric Installation and Safety: Scope and features of National Electrical Code 2011; types of electrical installations.

UNIT II

Fundamental Principles: Basics of electrical installation, permit to work, safety instructions and safety practices, purpose of estimating and costing.

UNIT III

Estimation and Costing: Meaning and purpose of rough estimate, detailed estimate, supplementary estimate, annual maintenance estimate, and revised estimate. Factors to be considered while preparing a detailed estimate and economical execution of work.

UNIT IV

Contracts: Concepts of contracts, types of contracts, contractor, role of contractor, tenders, and quotations.
Non-Industrial Installations-I: Types of non-industrial installations—office buildings, shopping, and commercial centres.

UNIT V

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Non-Industrial Installations-II: Residential installation, electric service and supply, design considerations of electrical installations in commercial buildings.

Course Outcomes

After completing this course, the students shall understand the following points:

1. Follow the National Electrical Code 2011 in electrical installations.
2. Estimate electrical installation works.
3. Estimate the work of non-industrial electrical installations.
4. Estimate the work of industrial electrical installations.
5. Prepare abstracts, tenders, and quotations for public lighting and other installations.
6. Prepare abstracts, tenders, and quotations for low-tension (LT) substations.

Text Books

1. Raina, K. B.; Dr. S. K. Bhattacharya, New Age International Publishers, First Reprint, 2010, *Electrical Design, Estimating and Costing*, ISBN: 978-81-224-0363-3.
2. Allagappan, N.; S. Ekambarram, Tata McGraw-Hill Publishing Co. Ltd., *Electrical Estimating and Costing*, ISBN-13: 9780074624784.
3. Singh, Surjit; Ravi Deep Singh, Dhanpat Rai and Sons, *Electrical Estimating and Costing*, ISBN-13: 1234567150995.

Reference Books

1. Gupta, J. B., S. K. Kataria and Sons, Reprint Edition, *A Course in Electrical Installation Estimating and Costing*, ISBN-10: 9350142791, ISBN-13: 978-9350142790.
2. Bureau of Indian Standards, IS: 732-1989, *Code of Practice for Electrical Wiring Installation*.
3. Bureau of Indian Standards, SP-30:2011, *National Electrical Code 2011*.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Electrical Machine-II
DEE-C414 / DEW-C414

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. To provide basic knowledge of Transformer.
2. To address the underlying AC Machines.
3. To study Transformer construction, operation, various tests, efficiency, and voltage regulation.

UNIT I

Transformer-II: Losses in Transformer, O/C & S/C Test. Efficiency of Transformer, All Day Efficiency, Voltage Regulation of Transformer, Back to Back Test, Applications of Transformers

UNIT II

Transformer-III: Auto Transformer, Volt Ampere Relation, Step-Up & Step-Down Auto Transformer, Efficiency of Auto Transformer, Advantages & Disadvantage of Auto Transformer, Applications of Auto Transformers.

UNIT III

3 Phase-Transformer: Three-Phase Transformer construction, advantages of Three-Phase Unit Transformer and bank of three Single-Phase Transformers. Star-Delta, Delta-Delta, Star-Star. Scott Connection of 3-phase & 2-phase connections, Applications of Scott Connection.

UNIT IV

Induction Motors: Basics of Induction Machine, Single-Phase Induction Motor, characteristics, construction of Three-Phase Induction Motor, comparison of Cage and Wound Rotors, principle of operation of a Three-Phase Induction Motor, speed and slip, frequency of rotor voltage and current, starting and speed control of Three-Phase Induction Motors, braking, relationship between rotor copper loss and rotor input, developed torque, and applications.

Diploma in Electrical Engineering

UNIT V

Synchronous Machines: Basic concept of synchronous machine, construction and working principle of synchronous machine, E.M.F. equation of an alternator, speed and frequency, synchronous speed, armature windings, coil-span factor or pitch factor, distribution factor or breadth factor, armature reaction, voltage regulation, parallel operation, synchronization, control of active and reactive power, starting methods, and applications.

Course Outcomes

After completing this course, the students shall understand the following points:

1. The principle of operation and the effect of pulsating and rotating magnetic fields on the working of AC machines.
2. The armature winding layouts and concept of armature reaction with phasor diagrams.
3. The starting methods, speed control methods, and equivalent circuit diagrams of polyphase and Single-Phase machines.
4. Maintain Single-Phase Transformers.
5. Maintain Three-Phase Transformers.

Text Books

1. D. P. Kothari & I. J. Nagrath, Electric Machines, Tata McGraw Hill.
2. P. S. Bimbhra, Generalized Theory of Electrical Machines, Khanna Publishers.
3. Fitzgerald, A. E., Kingsley, and S. D. Umans, Electric Machinery, McGraw Hill.

Reference Books

1. P. S. Bimbhra, Electrical Machines, Khanna Publishers.
2. M. G. Say, Alternating Current Machines, Pitman & Sons.
3. O. C. Taylor, The Performance & Design of A.C. Commutator Motors, A. H. Wheeler & Co. (P) Ltd.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

**Power Plant Engineering
DEE-P415 / DEW-C415**

MM: 100
Time: 3 Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. Understand the energy demand & supply conditions and appreciate the importance of non-conventional energy sources.
2. Understand solar energy, its features & its applications.
3. Understand wind energy, its mechanisms & applications.
4. Understand ocean thermal & tidal energy, their features, mechanisms & applications.
5. Understand geothermal & hydrothermal energy, its mechanism & applications.
6. Understand the concepts of Direct Energy Conversion Systems & their applications.
7. Understand the concepts of Energy Storage & applications.

UNIT I

Fundamentals of Energy Systems: Energy conservation principle – Energy scenario (World and India) – Solar radiation: Outside Earth's atmosphere.

UNIT II

Thermal Power Plant: Thermal power plant – General layout – Working – Site selection – Materials required for thermal power plants, coal handling and its methods, stages in coal storage, advantages and disadvantages, limitations of thermal power plant.

UNIT III

Hydro Power Plant: Hydroelectric power plant – Introduction, storage and poundage, selection of sites for hydroelectric power plant – General layout and essential elements of hydroelectric power plant and its working – Classification of the plant: base load plant, peak load plant, run-of-river plant, storage river plant, pumped storage plant, mini and micro hydel plants, advantages and disadvantages, limitations of hydroelectric power plant.

Diploma in Electrical Engineering

UNIT IV

Nuclear Power Plant & Gas Turbine Power Plants: Nuclear Power Plant: Introduction – Nuclear fuels, nuclear fission and fusion, working of a nuclear power plant, types of reactors, advantages, disadvantages, limitations.

Gas Turbine Power Plant: Schematic diagram & working of open and closed cycle gas turbine power plant, advantages, disadvantages, limitations.

UNIT V

Economics of Power Generation: Load curve, load duration curve, plant load factor, capacity factor, cost of generation: fixed and variable cost, economic load dispatch and unit commitment (introductory concepts).

Course Outcomes

After completing this course, the students shall understand the following points:

1. Understand the basic concepts and operation of renewable energy systems.
2. Remember the ideas and statistics of current RES availability and usage.
3. Analyze the working of hydro and tidal power systems installation in real time.
4. Analyze solar energy, its features & its applications.

Text Books

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis.
3. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford.

Reference Books

1. Handbook of Renewable Technology, Ahmed and Zobaa, Ramesh C. Bansal, World Scientific, Singapore.
2. Renewable Energy Technologies, Ramesh & Kumar, Narosa.
3. Renewable Energy Technologies – A Practical Guide for Beginners, Chetong Singh Solanki, PH.

Diploma in Electrical Engineering

Installation and Maintenance of Electrical Equipment
DEE-P417 / DEW-C417

MM: 100
Time: 3 Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. To study the tools and accessories used in the system.
2. To study the installation of lines, equipment, and testing.
3. To study the maintenance of lines and equipment.

UNIT I

Tools and Accessories: Tools, accessories, and instruments required for installation, maintenance, and repair work. Knowledge of Indian Electricity Rules, safety codes, causes and prevention of accidents, artificial respiration of an electrocuted person, and workmen's safety devices.

UNIT II

Installation of Line: Installation of transmission and distribution lines: Erection of steel structures, connecting jumpers, tee-off points, joints, and dead ends; crossing of roads, streets, power/telecommunication lines, and railway line crossings.

UNIT III

Installation of Equipment: Elementary idea regarding inspection and handling of transformers; pole-mounted substations, plinth-mounted substations, grid substations, busbars, isolators, voltage and current transformers, and lightning arrestors.

UNIT IV

Testing: Testing of various electrical equipment such as electrical motors, transformers, cables, generators, motor control centers, medium-voltage distribution panels, and power control centers.

Diploma in Electrical Engineering

UNIT V

Maintenance of Equipment: Maintenance of distribution transformers: Transformer maintenance and points to be attended to in respect of various items of equipment. Checking of insulation resistance, transformer oil level, and measurement of earth resistance.

Course Outcomes

After completing this course, the students shall understand the following points:

1. To know how to erect/install various electrical equipment as per IE Rules/Act by adopting all safety measures.
2. Prepare specifications for different items required for transmission lines.
3. To know the design and excavation of cable trenches.
4. Study the laying of underground cables.

Text Books

1. Praveen Kumar, Installation and Maintenance of Electrical Equipment, North Publication, Jalandhar.
2. Madhvi Gupta, Installation, Maintenance and Repair of Electrical Machines and Equipments, S.K. Kataria & Sons, 2014 edition.
3. S. K. Sharotri, Preventive Maintenance of Electrical Apparatus, Katson Publishing House, Ludhiana.

Reference Books

1. S. Rao, Testing, Commissioning, Operation and Maintenance of Electrical Equipment, Khanna Technical Publication, New Delhi.
2. Tarlok Singh, Installation, Commissioning & Maintenance of Electrical Equipments, S.K. Kataria & Sons, Reprint 2013 edition.
3. Gupta P. P., Installation, Commissioning and Maintenance of Electrical Equipment, Dhanpat Rai Publications (P) Ltd.

Electric Power Transmission and Distribution Laboratory
DEE-C451

MM: 100
Time: 2Hrs.
L T P
0 0 2

Sessional: 30
ESE: 70
Credit: 1

LIST OF EXPERIMENTS

1. To study the performance of a long transmission line under no-load and light-load conditions.
2. To study phase displacement between the current and voltage at the input of the line using a transmission line trainer kit.
3. Measurement of input impedance and attenuation of a transmission line using a transmission line trainer kit.
4. Measurement of characteristics of transmission using a transmission line trainer kit.
5. To find the resistivity of the earth using a hand-driven earth tester.
6. To study the performance characteristics of a typical D.C. distribution system (Radial Configuration).
7. To determine the ABCD parameters of a transmission line.
8. To determine the h-parameters and image parameters of a transmission line.
9. To study the voltage distribution across a string insulator and calculate string efficiency.
10. To test the breakdown voltage of transformer oil using a transformer oil testing set.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Electrical Machine-II Laboratory
DEE-C454

MM: 100
Time: 2Hrs.
L T P
0 0 2

Sessional: 30
ESE: 70
Credit: 1

LIST OF EXPERIMENTS

1. Load test on a single-phase transformer.
2. Short-circuit (SC) and open-circuit (OC) tests on a single-phase transformer.
3. Polarity and turns ratio test.
4. Banking of transformers.
5. Dismantling and assembling of DOL and star-delta starters.
6. To study the polarity and ratio test of a single-phase transformer.
7. To perform open-circuit and short-circuit tests on a single-phase transformer and determine the parameters of the equivalent circuit.
8. To perform open-circuit and short-circuit tests on a three-phase transformer and determine the parameters of the equivalent circuit.
9. To obtain three-phase to two-phase conversion using the Scott connection.
10. To determine the efficiency and voltage regulation of a single-phase transformer by load test.
11. To perform Sumpner's (back-to-back) test on single-phase transformers.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Seminar
DEE-C452

MM: 100
Time: 2Hrs.
L T P
0 0 2

Sessional: 70
ESE: 30
Credit: 1

Objectives: To increase the communication ability of students and to prepare them for presenting seminars on advanced topics of their branch.

The students will be required to deliver a seminar on a topic of general interest or any advanced technical topic related to the theory papers studied. The topic will be decided by mutual consent of the faculty In-Charge and the students.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

**Control Systems
DEE- C511/DEW-C511**

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

1. Maintain Industrial Automation Systems.
2. Learn the basics of automation how systems work and the importance of PLC, SCADA and robots in automation.
3. This course will provide an opportunity to learn industrial automation techniques.

UNIT I

Control System: Types of control system, open loop and close loop system, components and the circuit, brief description and application in industry, idea about automation

UNIT II

Block Diagram and Signal Flow Graphs: Transfer Functions, Block diagram algebra and signal flow graphs.

UNIT III

Time Response of Feedback Control Systems: Standard test signals, Unit step response of first and second order system, Time response specifications of second order systems, Steady state analysis.

UNIT IV

Transducers: Theory, types of transducers construction and use of various transducers like resistance, inductance, capacitance, electromagnetic, piezoelectric type

Diploma in Electrical Engineering

UNIT V

Measurements: Importance of measurement, Basic measuring systems, advantages and limitations of each measuring systems, generalized measurement system, process and process variables

Course Outcomes

After completing this course, the students shall be able to:

1. Explain automation components and systems application.
2. Interface I/O devices with the PLC modules.
3. Develop PLC ladder programs for various applications.
4. Select the suitable motor drives for different applications
5. Identify suitable industrial automation hardware for given application

Text Books

1. Industrial Instrumentation and Control By. S.K. Singh The McGraw Hill Companies.
2. Process Control Instrumentation Technology By. C.D. Johnson, PHI
3. Programmable logic controller, Dunning, Delmar

Reference Books

1. Stenerson Jon, Industrial automation and Process control, PHI Learning, New Delhi, 2003, ISBN :9780130618900
2. Mitra, Madhuchandra; Sengupta, Samarjit, Programmable Logic Controllers and Industrial Automation - An introduction, Penram International Publication, 2015, ISBN:9788187972174
3. Boyar, S. A., Supervisory Control and Data Acquisition, ISA Publication, USA, ISBN:978-1936007097
4. Bailey David ; Wright Edwin, Practical SCADA for industry, Newnes (an imprint of Elsevier), UK 2003, ISBN:0750658053

Diploma in Electrical Engineering

**Industrial Power Electronics
DEE-C 512/DEW-C512**

MM: 100
Time: 3 Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. Maintain the proper functioning of power electronic devices.
2. To learn a number of power electronics circuit analysis techniques in trending projects.

UNIT I

Power Electronic Devices: Power electronic devices Power Diode, Power transistor: construction, working principle, V-I characteristics and uses. IGBT: Construction, working principle, V-I characteristics and uses.

UNIT II

Thyristor Family Devices: Thyristor operation, V-I characteristic, two transistor analogy, methods of turn-on operation of GTO, MCT and TRIAC.

UNIT III

Power Semiconductor Devices: Protection of devices, series and parallel operation of thyristors. SCR Turn-On methods.

UNIT IV

Diode & Phase Controlled Rectifiers: Single phase diode rectifiers with (R & R-L Load), firing angle, conduction angle. Single phase half wave controlled, full controlled and midpoint controlled rectifier with R, RL load.

UNIT V

Introduction to other Semiconductor devices: Inverter, dc to dc converter (chopper), Step-up and Step-down Chopper and AC voltage controller.

Course Outcomes

After completing this course the students shall understand the following points:

1. Select power electronic devices for specific applications.
2. Maintain the performance of Thyristors.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

3. Troubleshoot turn-on and turn-off circuits of Thyristors.
4. Maintain phase controlled rectifiers.
5. Maintain industrial control circuits.

Text Books

1. Ramamoorthy M., An Introduction to Thyristors and their applications, East-West Press Pvt. Ltd., New Delhi, ISBN:8185336679.
2. Sugandhi, Rajendra Kumar and Sugandhi, Krishna Kumar, Thyristors: Theory and Applications, New Age International (P) ltd. Publishers, New Delhi, ISBN: 978-0-85226- 852-0.
3. Bhattacharya, S.K., Fundamentals of Power Electronics, Vikas Publishing House Pvt. Ltd. Noida. ISBN:978-8125918530.
4. Jain &Alok , Power Electronics and its Applications, Penram International Publishing (India) Pvt. Ltd, Mumbai, ISBN:978-8187972228.
5. Rashid , Muhammad, Power Electronics Circuits Devices and Applications, Pearson Education India, Noida, ISBN:978-0133125900.

Reference Books

1. Singh, M. D. and Khanchandani, K.B., Power Electronics, Tata McGraw Hill Publishing Co. Ltd, New Delhi, 2008 ISBN:9780070583894.
2. Zbar, Paul B., Industrial Electronics: A Text –Lab Manual, McGraw Hill Publishing Co. Ltd., New Delhi, ISBN:978-0070728226.
3. Grafham D.R., SCR Manual, General Electric Co., ISBN:978-0137967711.

Diploma in Electrical Engineering

Digital Electronics and Microprocessor
DEE-C 513 / DET-C 513/DEW-C513

MM: 100
Time: 3 Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. To acquire the basic knowledge of digital logic levels and application of knowledge
2. To understand digital electronics circuits.
3. To introduce students with the architecture and operation of typical microprocessors and microcontrollers.
4. To familiarize the students with the programming and interfacing of microprocessors and microcontrollers.
5. To provide strong foundation for designing real world applications using microprocessors and microcontrollers.

UNIT I

Introduction to different number systems: Number Systems & Boolean Algebra, Binary, Octal, Decimal, Hexadecimal Conversion from one number system to another, Addition, Subtraction, 1's 2's Complement, Boolean variables: Rules and laws of Boolean Algebra, De- Morgan's Theorem.

UNIT II

Logic Gates: AND, OR, NOT, NAND, NOR, XOR, XNOR: Symbolic representation and truth table Implementation of Boolean expressions and Logic Functions using gates Simplification of expressions.

UNIT III

Combinational Logic Circuits: Arithmetic Circuits –Half Adder, Full Adder, Half Subtractor, Full Subtractor, Parallel and Series Adders Encoder, Decoder, Multiplexer 2to1MUX, 4to1MUX, 8to1MUX. Applications de-multiplexer– 1to2 DEMUX, 1-4 DEMUX, 1-8DEMUX.

UNIT IV

Fundamentals of Microprocessors: Fundamentals of Microprocessor , Microprocessor 8085 architecture, Addressing modes, Instruction set, and programming techniques, stack and subroutine

UNIT V

Memory and I/O Interfacing: Timing diagram, time delay and counter, memory & input output Interfacing with 8085, ADC & DAC.

Diploma in Electrical Engineering

Course Outcomes

After completing this course the students shall understand the following points:

1. Apply knowledge and demonstrate programming proficiency using the various Addressing modes.
2. Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements.
3. Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller.
4. Employ the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.
5. Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.
6. Design different types of with and without memory element digital electronic circuits for particular operation, with in the real of economic, performance, efficiency, user friendly and environmental constraints.

Text Books

1. Microprocessor, architecture, programming and applications with 8085 R.SGaonkar
2. 8051 microcontroller architecture programming and applications-K. JAyala

Reference Books

1. Modern Digital Electronics, 2nd Edition, R.P. Jain. Tata McGraw Hill Company Limited.
2. Digital circuits and design, 4th edition, S. Salivahanan & S. Arivazhagan, Vikas Publising House Pvt. Ltd.
3. Digital Electronics and integrated circuits, 2nd edition, Soumitra Kr. Mandal, McGraw Hill Company.

Diploma in Electrical Engineering

Substation Switchgear and Protection
DEE- P 514/DEW-P514

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. Maintain switchgear and protection schemes used in electrical power systems.

UNIT I

Substation: Different Type of Sub-stations, Layout, single line diagram, busbar arrangement, equipment, their functions, accessories, study of protective schemes, batteries and their maintenance, operation of small sub-stations.

UNIT II

Faults: Types of faults, three phase symmetrical faults, effects of faults on system reliability and stability, abnormalities, short circuits and their effects, representation of fault conditions through single line diagrams.

UNIT III

Switchgear: Purpose of protective gear, characteristics of a protection system, Classification and selection of fuses with application and working, Isolators and switches functions, air break switches, breaking capacity of switches, Circuit breakers :- types of circuit-breakers, requirements of circuit breakers & relays

UNIT IV

Protective Schemes: Protection of alternators: stator faults, rotor faults, Protection of feeders and bus bars mechanical conditions, external faults - their reasons, effect and protections used.

Diploma in Electrical Engineering

UNIT V

Protection Against Over Voltages: Causes of over voltages, travelling waves earth wire, protective zone, lightening arrestors, space-gap and electrolytic arrestors, surge absorber, location and rating of lightening arrestors.

Course Outcomes

After completing this course the students shall understand the following points:

1. Identify various types of fault diagnosis
2. Select suitable switchgears for different applications.
3. Study and Know relay operation
4. Study about protection schemes
5. Know and study about different types of substations and read single line diagrams

Text Books

1. Mehta V. K ;Rohit Mehta, Principles of Power System, S .Chand and Co., New Delhi., ISBN:978-81-2192-496-2.
2. Rao.Sunil S., Switchgear and Protection, Khanna Publishers, New Delhi, ISBN: 978- 81-7409-232-3.
3. Singh, R. P., Switchgear and Power System Protection, PHI Learning, New Delhi, ISBN:978-81-203-3660-5.
4. Gupta. J. B.. Switchgear and Protection, S. K. Kataria and Sons, New Delhi, ISBN: 978-93-5014-372-8.

Reference Books

1. Veerapan, N.,Krishnamurty, S. R., Switchgear and Protection, S .Chand and Co., New Delhi. ISBN: 978-81-2193-212-7.
2. Ram, Badri; Vishwakarma D. N., Power System Protection and Switchgear, McGraw-Hill, New Delhi. ISBN :978-07-107774-X
3. Kathan Nagrath, Switchgear and Protection, TMH.
4. Soni Gupta & Bhatnagar, Switchgear and Protection, Dhanpat Rai & Sons.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Renewable Energy
DEE- C 515/DEW-C515

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:
2. Maintain the efficient operation of various types of renewable energy power plants.

UNIT I

Solar PV and Concentrated Solar Power Plants: Solar Map of India: Global solar power radiation, Solar PV Concentrated Solar Power (CSP) plants, construction and working of: Power Tower, Parabolic Trough, Parabolic Dish, Fresnel Reflectors Solar Photovoltaic (PV) power plant: components layout, construction, working. Rooftop solar PV power system

UNIT II

Wind Power Plants: Wind Map of India: Wind power density in watts per square meter Lift and drag principle; long path theory. Geared type wind power plants: components, layout and working.

UNIT III

Wind Turbines: Horizontal axis small wind turbine: direct drive type, components and working Horizontal axis small wind turbine: geared type, components and working

UNIT IV

Micro-hydro Power Plants: Energy conversion process of hydro power plant, Classification of hydropower plant: High, medium and low head. Layouts of micro-hydro power plants, Construction and working of hydro turbines used in different types of hydro power plant:

Diploma in Electrical Engineering

UNIT V

Biomass-based Power Plants: Properties of solid fuel for biomass power plants: biogases, wood chips, rice husk, municipal waste. Properties of liquid and gaseous fuel for biomass power plants.

Course Outcomes

After completing this course the students shall understand the following points:

1. Maintain the optimized working of solar PV and CS power plants.
2. Maintain the optimized working of large wind power plants
3. Maintain the optimized working of small wind turbines.
4. Maintain the optimized working of micro hydro power plants.
5. Maintain the optimized working of biomass-based power plants.

Text Books

1. Deambi, Suneel: From Sunlight to Electricity: a practical handbook on solar photovoltaic application; TERI, New Delhi ISBN:9788179935736
2. David M. Buchla, Thomas E. Kissell, Thomas L. Floyd - Renewable Energy Systems, Pearson Education New Delhi, ISBN:9789332586826,
3. Rachel, Sthuthi; Earnest, Joshua – Wind Power Technologies, PHI Learning, New Delhi, ISBN: 978-93-88028-49-3; E-book 978-93-88028-50-9
4. Khoiyangbam, RS Navindu; Gupta and Sushil Kumar; Biogas Technology: Towards Sustainable Development; TERI, New Delhi; ISBN:9788179934043
5. Gipe, Paul: Wind Energy Basics, Chelsea Green Publishing Co; ISBN: 978-1603580304

Reference Books

1. Gipe, Paul: Wind Energy Basics, Chelsea Green Publishing Co; ISBN:978-1603580304
2. Wizelius, Tore & Earnest, Joshua - PHI Learning, New Delhi, ISBN:978-8120351660
3. Kothari, D.P. et al: Renewable Energy Sources and Emerging Technologies, PHI Learning, New Delhi, ISBN:-978-81-203-4470-9
4. Bhadra, S.N., Kastha, D., Banerjee, S, Wind Electrical Systems installation; Oxford University Press, New Delhi, ISBN: 9780195670936.
5. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi (ISBN: 978-9386173-683)
6. Soni Gupta & Bhatnagar, Switchgear and Protection, Dhanpat Rai & Sons.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

**UNIVERSAL HUMAN VALUES
DEE- A 001/DEW-A001**

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each and student shall be required to attempt five questions Sec.-B shall contain eight descriptive type questions of ten marks each and students shall be required to attempt any four questions. Question shall be uniformly distributed from the entire syllabus. The previous year paper /model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence.
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

UNIT I

Course Introduction- Need, Basic Guidelines, Content and Process for Value Education. Purpose and motivation for the course, recapitulation from Universal Human Values-I Self-Exploration what is it?- Its- as the process for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations Priority Right understanding, Relationship and Physical Facility-

UNIT II

Understanding Harmony in the Human Being- Harmony in Myself ! Understanding human being as a co--happiness Un the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Health.

UNIT III

Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship.

Diploma in Electrical Engineering

UNIT IV

Understanding Harmony in the Nature and Existence- Whole existence as Coexistence. Understanding the harmony in the Nature, Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self-regulation in nature. Understanding Existence as Co-existence of mutually interacting units in all- pervasive space.

UNIT V

Implications of the above Holistic Understanding of Harmony on Professional Ethics
Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order.

Course Outcomes:

1. By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature).
2. They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
3. It is hoped that they would be able to apply what they have learnt to their own self in different day-to day settings in real life, at least a beginning would be made in this direction.
4. This is only an introductory foundational input. It would be desirable to follow it up by Faculty-student or mentor-mentee programs throughout their time with the institution.
5. Higher level courses on human values in every aspect of living. E.g. as a professional.

Text Book:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books

1. Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantan, 1999.
2. HumanValues, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. Rediscovering India- by Dharampal
4. Hind Swaraj or Indian Home Rule- by Mohandas K. Gandhi
5. India Wins Freedom- Maulana Abdul Kalam Azad

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Control System Laboratory
DEE- C 551

MM: 100
Time: 2 Hrs.
L T P
0 0 2

Sessional: 30
ESE: 70
Credit: 1

LIST OF EXPERIMENTS

1. To study the performance of Resistance Temperature Detector (RTD) & draw the following characteristics Time vs. Temperature (for heating)
2. To study the performance of Resistance Temperature Detector(RTD) & draw the following characteristics Time vs. Temperature (for cooling)
3. To study the performance of Resistance Temperature Detector (RTD) & draw the following characteristics Time vs. Temperature (for heating) Temperature vs. Resistance of RTD
4. To study the performance of various types of controllers (P, PI, PID).
5. Use PLC to test the START STOP logic using two inputs and one output.
6. Develop /test ladder program for tank water level control.
7. Develop /test ladder program for automated car parking system.
8. Develop ladder program for Traffic light control system.
9. To Study the SCADA architecture/block diagram with applications.
10. Develop / test ladder program for rotating stepper motor in forward and reverse direction at constant speed.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Industrial Power Electronics Laboratory
DEE- C 552

MM: 100
Time: 2 Hrs.
L T P
0 0 2

Sessional: 30
ESE: 70
Credit: 1

LIST OF EXPERIMENTS

1. To study proper functioning of power transistor.
2. To study proper functioning of IGBT.
3. To study the variation of R, Cin R and RC triggering circuits on firing angle of SCR.
4. To study CRO to observe the output waveform.
5. To study output waveform of Full wave controlled rectifier with Rload.
6. To study TRIAC phase controlled circuit.
7. To study the voltage commutated DC Chopper.
8. To study the current commutated DC Chopper.
9. To study the IGBT single-phase Inverter.
10. To study MOSFET single-phase Inverter

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Energy Management
DEE-C611/DEW-C611

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives: The course objective is to;

1. To provide students with a general awareness on the importance of energy and its conservation, its impact on society, various energy sources, energy conversion processes, energy management, energy audit and energy conservation measures.

UNIT I

Energy Management: Overview of energy management, need for energy conservation (Started with oil crisis). Environmental Aspects, Alternative sources of energy. Need for Energy conservation with brief description of oil and coal crisis. Environmental aspects.

Alternate sources of energy. Energy efficiency-its significance.

UNIT II

Energy Conservation Basics Energy Scenario: Primary and Secondary Energy, Energy demand and supply, National scenario. Energy conservation and Energy audit; concepts and difference Indian Electricity Act 2001; relevant clauses of energy conservation BEE and its Roles MEDA and its Roles Star Labeling; Need and its benefits.

UNIT III

Energy Efficient Devices: Need for energy efficient devices, Initial cost versus life cycle cost analysis on life cycle basis, Energy efficient motors as compared to standard motors, BIS specification for energy efficient motors, Salient design features

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology
Diploma in Electrical Engineering

UNIT IV

Energy Audit: Energy Audit Methodology, Efficiency of energy conversion processes, monitoring system, Specific energy consumption- Three pronged approach, Five tuning, Technical up, Gradation, Avoidable losses, Case studies of energy audit of distribution system, AC motors, Industries, Organization of energy audit activities.

UNIT V

Energy storage and Distribution: Electrical energy route, Load curves, Energy conversion plants for Base load, Intermediate load, Peak load and Energy displacement, Energy storage plants.

Course Outcomes: After completing this course the students shall understand the following points:

1. The students shall have an understanding of the impact of energy on society, the need for sustainable energy, global and Indian energy policies.
2. They would have gained knowledge on various techniques of energy management and conservation. They would so have gained the basic ideas of conducting an energy audit.

Text Books

1. Amlan Chakrabarti, Energy Engineering and Management, Prentice Hall India, 2011.
2. Eastop T. D. and D. R. Croft, Energy Efficiency for Engineers & Technologists, Longman, 1990.
3. Albert Thumann P. E. and W. J. Younger, Handbook of Energy Audits, Fairmont Press, 2008.

Reference Books

1. Doty S. and W. C. Turner, Energy Management Hand book, 7/e, Fairmont Press, 2009.
2. Rao S. and B. B. Parulekar, Energy Technology, Khanna Publishers, 2005.
3. Rai G. D., Non-conventional Energy Sources, Khanna Publishers, 2011.

Diploma in Electrical Engineering

**Energy Conservation and Auditing
DEE-C612/DEW-C612**

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

The aim of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

1. Undertake energy conservation and energy audit.

UNIT I

Energy Conservation Basics: Energy Scenario: Primary and Secondary Energy, Energy demand and supply, National scenario. Energy conservation and Energy audit; concepts and difference, Indian Electricity Act 2001; relevant clauses of energy conservation, BEE and its Roles, MEDA and its Roles Star Labeling: Need and its benefits.

UNIT II

Energy Conservation in Electrical Machines: Need for energy conservation in induction motor and transformer. Energy conservation techniques in induction motor by: Improving Power quality, Motor survey, Matching motor with loading, minimizing the idle and redundant running of motor.

UNIT III

Energy Audit of Electrical System: Energy audit (definition as per Energy Conservation Act), Energy audit instruments and their use, Questionnaire for energy audit projects,

UNIT IV

Energy flow diagram (Sankey diagram), Simple payback period, Energy Audit procedure (walk through audit and detailed audit), Energy Audit report format.

Diploma in Electrical Engineering

UNIT V

Energy conservation in Electrical Installation systems: Aggregated Technical and commercial losses (ATC); Power system at state, regional, national and global level.

Course Outcomes

After completing this course the students shall understand the following points:

1. Interpret energy conservation policies in India.
2. Implement energy conservation techniques in electrical machines.
3. Apply energy conservation techniques in electrical installations.
4. Use Co-generation and relevant tariff for reducing losses in facilities.
5. Undertake energy audit for electrical system.

Text Books

1. Turner, W. C., Energy Management Handbook, Fairmount Press, 2012, ISBN 9781304520708
2. Sharma, K. V., Venkataseshiaiah, P., Energy Management and Conservation, I K International Publishing House Pvt. Ltd; 2011 ISBN9789381141298
3. Singh, Sanjeev; Rathore, Umesh, Energy Management, S K Kataria&Sons, New Delhi ISBN-13:9789350141014.
4. Desai, B. G.; Rana, J. S.; A. Dinesh, V.; Paraman, R., Efficient Use and Management of Electricity in Industry, Devki Energy Consultancy Pvt.Ltd.

Reference Books

1. Mehta ,V. K., Principles of Power System, S. Chand & Co.New Delhi, 2016, ISBN 9788121905947
2. Chakrabarti Aman, Energy Engineering And Management, e-books Kindle Edition.
3. Guide Books No. 1 and 3 for National Certification Examination for Energy Managers and Energy Auditors, Bureau of Energy Efficiency (BEE), Bureau of Energy Efficiency.
4. O.P. Gupta, Energy Technology, Khanna Publishing House, New Delhi
5. Henderson, P. D., India - The Energy Sector, University Press, Delhi, 2016. ISBN: 978-0195606539

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Utilization of Electrical Energy
DEE-C613/DEW-C613

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. Able to get a comprehensive idea in utilization of electrical power such as drives, electric heating.
2. Learn about electric welding and illumination, electric traction, electrolysis, refrigeration air-conditioning and automobile electric system.

UNIT I

Electric Drives: Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization.

UNIT II

Electric Heating: Advantages and methods of electric heating, methods of heat transfer, Stefan's law, resistance heating, design of heating elements, losses and efficiency, construction and working principle of induction furnaces, arc furnaces and dielectric heating and control equipment.

UNIT III

Electric Welding: Type of welding, resistance and arc welding, electric welding equipment, comparison between A.C and D.C Welding.

UNIT IV

Illumination: Introduction, Terms used in illumination, laws of illumination, sources of light. Incandescent lamps, Discharge lamps, MV and SV lamps, fluorescent lamps- effect of voltage variation on lamp efficiency - Type of lighting schemes, factory lighting, flood lighting and street lighting.

Diploma in Electrical Engineering

UNIT V

Electric Traction: System of electric traction and traction electrification, Diesel electric traction systems in India, Special features of traction motors, overhead electrical equipment – collectors – modern electric locomotive – methods of track electrification.

Course Outcomes

After completing this course the students shall understand the following points:

1. To understand the operating principles and characteristics of traction motors with respect to speed, temperature, loading condition.
2. To acquaint with the different types of heating and welding techniques.
3. To understand the basic principle of electric traction including speed–time curves of different traction services.
4. To understand the method of calculation of various traction system for braking, acceleration and other related parameters, including demand side management.

Text Books

1. Art & Science of Utilization of Electrical Energy - by Partab, Dhanpat Rai & Sons
2. Utilization of Electrical Power including Electric drives and Electric traction by J.B.Gupta, S.K. Kataria & Sons.
3. Automobile Engineering by Dr Kirpal Singh , Standard Publishers and Distributors

Reference Books

1. Generation, Distribution and Utilization of Electrical Energy – by C.L.Wadhwa
New Age international (P)Limited,Publishers,1997
2. Utilization of Electrical Power including Electric drives and Electric traction –by N.V. Suryanarayana, New Age International (P) Limited, Publishers, 1996.
3. Henderson, P. D., India - The Energy Sector, University Press, Delhi, 2016. ISBN: 978-0195606539

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

**Industrial Automation and Control
DEE-P614/DEW-P614**

MM: 100
Time: 3 Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. To understand the generic architecture and constituent components of a Programmable Logic Controller.
2. To develop a software program using modern engineering tools and technique for PLC and SCADA.
3. To apply knowledge gained about PLCs and SCADA systems to real-life industrial applications.

UNIT I

Introduction to Industrial Automation: Need and benefits. Types of automation system: Fixed, Programmable, Flexible Different systems used for Industrial automation:, HMI, SCADA, DCS, Drives. Evolution of PLC.

UNIT II

PLC Fundamentals: Building blocks of PLC: CPU, Memory organization, Input- output modules (discrete and analog), Specialty I/O Modules, Power supply, Fixed and Modular PLC and their types, Redundancy in PLC module I/O module selection criteria.

UNIT III

PLC Programming and Applications: PLC I/O addressing PLC programming Instructions: Relay type instructions, Timer instructions: On delay, off delay, retentive, Counter instructions: Up, Down, High speed, Logical Instructions, Data handling Instructions, Arithmetic instructions.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology
Diploma in Electrical Engineering

UNIT IV

Electric Drives and Special machines: Electric drives: Types, functions, classification of electric drives, four quadrant operation, fundamental of electric drives equivalent values of drive parameter.

UNIT V

Supervisory Control and Data Acquisition System (SCADA): Introduction to SCADA: Typical SCADA architecture/block diagram, Benefits of SCADA, Various editors of SCADA.

Course Outcomes

After completing this course, the students shall be able to:

1. Identify different types of automation systems.
2. Interface I/O devices with the PLC modules.
3. Develop PLC ladder programs for various applications.
4. Select the suitable motor drives for different applications
5. Prepare simple SCAD Applications.

Text Books

1. Dunning, G., Introduction to Programmable Logic Controllers, Thomson /Delmar learning, New Delhi, 2005,ISBN 13 : 9781401884260
2. Jadhav, V. R., Programmable Logic Controller, Khanna publishers, New Delhi, 2017, ISBN :9788174092281
3. Petruzella, F.D., Programmable Logic Controllers, McGraw Hill India, New Delhi, 2010, ISBN:9780071067386
4. Hackworth, John; Hackworth, Federic, Programmable Logic Controllers, PHI Learning, New Delhi, 2003, ISBN :9780130607188

Reference Books

1. Stenerson Jon, Industrial automation and Process control, PHI Learning, New Delhi, 2003, ISBN :9780130618900
2. Mitra, Madhuchandra; Sengupta, Samarjit, Programmable Logic Controllers and Industrial Automation - An introduction, Penram International Publication, 2015,ISBN:9788187972174
3. Boyar, S. A., Supervisory Control and Data Acquisition, ISA Publication, USA, ISBN:978-1936007097
4. Bailey David ; Wright Edwin, Practical SCADA for industry, Newnes (an imprint of Elsevier), UK 2003,ISBN:0750658053

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

**Electric Vehicles
DEE-P 615/DEW-P615**

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives:

1. Design illumination schemes and associated electrification of buildings.
2. To understand the importance of illumination engineering in energy conservation.
3. To guide students towards acquiring the knowledge regarding the fundamentals and elementary design aspects of artificial lighting.

UNIT I

Introduction to Hybrid Electric Vehicles: Evolution of Electric Vehicles Advanced Electric drive vehicle technology Vehicles-Electric vehicles (EV), Hybrid Electric drive (HEV), Plug in Electric vehicle (PIEV).

UNIT II

Components used Hybrid Electric Vehicle Economic and environmental impacts of Electric hybrid vehicle Parameters affecting Environmental and economic analysis Comparative study of vehicles for economic, environmental aspects

UNIT III

Dynamics of hybrid and Electric vehicles-I : General description of vehicle movement Factors affecting vehicle motion- Vehicle resistance, tyre ground adhesion, rolling resistance, aerodynamic drag, equation of grading resistance, dynamic equation Drive train configuration.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology
Diploma in Electrical Engineering

UNIT IV

Dynamics of hybrid and Electric vehicles-II: classification of vehicle power plant Performance characteristics of IC engine, electric motor, need of gear box Classification of motors used in Electric vehicles

UNIT V

DC-DC Converters for EV and HEV Applications: EV and HEV configuration based on power converters Classification of converters –unidirectional and bidirectional Principle of step down operation Boost and Buck- Boost Converters

Text Books

1. A.K. Babu, Electric & Hybrid Vehicles, Khanna Publishing House, New Delhi (Ed.2018)
2. Fuhs, A. E. Hybrid Vehicles and the Future of Personal Transportation, CRC Press,
3. Gianfranco, Electric and Hybrid Vehicles: Power Sources, Models, Sustainability, Infrastructure And The Market, Pistoia Consultant, Rome, Italy.
4. Ehsani, M. Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press
5. Husain, I. Electric and Hybrid Electric Vehicles, CRC Press

Reference Books

1. Lechner G. and H. Naunheimer, Automotive Transmissions: Fundamentals, Selection, Design and Application, Springer.
2. Rashid, M. H. Power Electronics: Circuits, Devices and Applications, 3rd edition, Pearson,
3. Moorthi, V. R. Power Electronics: Devices, Circuits and Industrial Applications, Oxford University Press
4. Krishnan, R. Electric motor drives: modelling, analysis, and control, Prentice Hall
5. Krause, O. P. ; C. Wasynczuk, S. D. Sudhoff, Analysis of electric machinery, IEEE Press

Diploma in Electrical Engineering

Entrepreneurship Development and Management
DEE- O 617/DEW-O617

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

1. Provide a precise understanding into the nature of entrepreneurship, its dimensions and certain innovative entrepreneurial process.
2. Give experiential learning so that it would prepares students to run and manage business/as and eventually start their own business/as, or takeover or run existing
3. Business/as with an eye toward expansion and growth.

UNIT I

Entrepreneurship: Introduction, Objective and Concept of Entrepreneurship, Meaning, Definitions, Characteristics and functions of Entrepreneurship, Understanding the terms Entrepreneur, Entrepreneurship and Entrepreneurship Development.

UNIT II

Theories & Fundamental outlook of Entrepreneurship: Historical perspective, Perspectives on the emergence of Entrepreneurship, Theories of Eminent Thinkers, Women Entrepreneurship, Rural Entrepreneurship, Tourism Entrepreneurship.

UNIT III

Organization, Traits& Financial statements: Different forms of Business Organizations, Practicalities relating to forms of Business Organizations, Parameters determining competitive advantages.

Diploma in Electrical Engineering

UNIT IV

Startup & Agencies: Definition & Types of Startup, Economic Contribution of Startups, National and International Scenario, Vision, mission and values, Success & Failure stories of Startups,

UNIT V

Project & Project Management: Meaning and Concept of Project, Introduction to Project Management, Project Budgeting/Capital Founding Team and Early Recruits in Projects.

Course Outcomes

After completing this course the students shall understand the following points:

1. To apply the concepts and skills necessary to become a successful Entrepreneur.
2. To become a proactive individual who is driven to act on opportunities by employing innovative processes in the face of limited resources.
3. To become a person with ability to foster social consensus while upholding mutual understanding and trust.
4. To establish teamwork to achieve set goals.
5. To demonstrate ability to perform innovative business activities and write bankable business proposals.

Text Books

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development published by Tata McGraw Hill Publishing Company Ltd., New Delhi
3. Entrepreneurship Development in India by CB Gupta and P Srinivasan; Sultan Chand and Sons, New Delhi

Reference Books

1. Entrepreneurship Development - Small Business Enterprises by Poornima M Charantimath; Pearson Education, New Delhi
2. Entrepreneurship : New Venture Creation by David H Holt; Prentice Hall of India Pvt. Ltd., New Delhi
3. Handbook of Small Scale Industry by PM Bhandari
4. Principles and Practice of Management by L M Prasad; Sultan Chand & Sons, New Delhi.

(Effective from the session 2026-27)
Gurukula Kangri (Deemed to be University), Haridwar
Faculty of Engineering & Technology

Diploma in Electrical Engineering

Illumination Practices
DEE-O 618/DEW-O618

MM: 100
Time: 3Hrs.
L T P
3 0 0

Sessional: 30
ESE: 70
Credit: 3

Note: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain ten questions of six marks each, and students shall be required to attempt any five questions. Sec.-B shall contain eight descriptive-type questions of ten marks each, and students shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year's question paper/model paper may be used as a guideline, and the following syllabus should be strictly followed while setting the question paper.

Course Objectives

To provide basic knowledge of generators and motors. The aim of this course is to help the students attain the following industry-identified competencies through various teaching-learning experiences:

1. Design illumination schemes and associated electrification of buildings.
2. To understand the importance of illumination engineering in energy conservation.
3. To guide students towards acquiring the knowledge regarding the fundamentals and elementary design aspects of artificial lighting.

UNIT I

Fundamentals of illumination: Basic illumination, Terminology, Laws of illumination, Polar curves, polar curve: its meaning and applications for designing the lamp. Concept of Photometry, Measurement of illumination, Lighting calculation methods, Watt /m² method, Lumens or light flux method.

UNIT II

Types of Lamps: Incandescent lamp, ARC lamps – AC and DC arc lamps, fluorescent lamp, Types of other lamps: Mercury vapour lamp, HPMV lamp, Mercury iodide lamp, Sodium va- pour lamp, Halogen Lamps, Ultraviolet Lamps, Neon Lamps. Neon Sign Tubes. Metal halides, HID and Arc lamps, LED lamps, CFL, Lasers Selection Criteria for lamps.

UNIT III

Illumination Control and Control Circuits: Purpose of lighting control, and Dimmer, Resistance type Salt water Dimmer Working principle and operation of Dimmer, Transformer and their types,

Diploma in Electrical Engineering

UNIT IV

Illumination for Interior Applications-I: Standard for various locations of Interior Illumination, Design considerations for Interior location of residences (1/2/3/4 BHK),

UNIT V

Illumination for Interior Applications-II: Factory Lighting, Street Lighting (Latest Technology), Flood Lighting Railway Lighting, Lighting for advertisement /Hoardings/sports lighting, Agriculture and Horticulture lighting, Health Care Centre's / Hospitals, Decorating Purposes, Stage Lighting, Aquariums and Ship- yards.

Course Outcomes

After completing this course the students shall understand the following points:

1. Select relevant lamps for various applications considering illumination levels
2. Select the lighting accessories required for selected wiring scheme.
3. Design relevant illumination schemes for interior applications.
4. Design Illumination schemes for various applications
5. Design Illumination schemes for various outdoor applications.

Text Books

1. Lindsey, Jack L., Applied Illumination Engineering, The Fairmont Press Inc.
2. Simons, R. H., Bean, Robert; Lighting Engineering: Applied Calculations, Architectural Press. ISBN: 0750650516.
3. Casimer M Decusatis, Handbook of Applied Photometry, Springer, ISBN 1563964163.

Reference Books

1. Butter worths, Lyons Stanley, Handbook of Industrial Lighting, Butterworths
2. Simpson Robert S, Lighting Control Technology and Applications, Focal Press
3. Kao Chen, Energy Management in Illuminating Systems, CRC Press