

# **Kashi Institute of Technology, Varanasi**

**(An Autonomous Institute Approved by AICTE)**



## **Evaluation Scheme & Syllabus**

For

**Diploma 2<sup>nd</sup> Year**

**Electrical Engineering**

**(Effective from Session: 2025-26)**

Diploma in Electrical Engineering III Semester											
				Evaluation Scheme							
S.N.	Course Category	Course Code	Course Title	Type	Periods			FA	SA	Total	Credit
					L	T	P				
1	BS	DBS211	APPLIED MATHEMATICS-III	T	3	1	0	70	30	100	4
2	PC	DEEPC205	BASICS OF ELECTRICAL MACHINES -I	T	2	1	0	70	30	100	3
3	PC	DEEPC207	ELECTRICAL MEASUREMENTS AND INSTRUMENTATION	T	2	0	0	70	30	100	2
4	PC	DEEPC209	FUNCTIONAL MATERIALS IN ELECTRICAL AND ELECTRONICS ENGINEERING	T	3	0	0	70	30	100	3
5	PC	DEEPC211	FUNDAMENTAL OF DIGITAL ELECTRONICS	T	2	0	0	70	30	100	2
6	PC	DEEPC213	BASICS OF ELECTRICAL MACHINES -I LAB	P	0	0	2	70	30	100	1
7	PC	DEEPC215	ELECTRICAL MEASUREMENTS AND INSTRUMENTATIONLAB	P	0	0	2	70	30	100	1
8	PC	DEEPEC217	FUNDAMENTAL OF DIGITAL ELECTRONICS LAB	P	0	0	2	70	30	100	1
9	PC	DEEPC219	ELECTRICAL AUTO CAD	P	0	0	6	70	30	100	3
10	AU	DAU203	ENVIRONMENTAL SCIENCE	T	2	0	0	70	30	--	NC
11	CCA	DCCA203	CO-CORRICULAR ACTIVITIES	-	-	-	-	-	-	100	0.5
12	GP	DGP203	GENERAL PROFICIENCY	-	-	-	-	-	-	100	0.5
<b>Total</b>				-	<b>18</b>	<b>2</b>	<b>12</b>	<b>700</b>	<b>300</b>	<b>1200</b>	<b>21</b>

Diploma in Electrical Engineering IV Semester											
				Evaluation Scheme							
SN	Course Category	Course Code	Course Title	Type	Period			FA	SA	Total	Credit
					L	T	P				
1	HS	DHS202	COMMUNICATION SKILLS-II	T	2	0	0	70	30	100	2
2	PC	DEEPC206	INTRODUCTION TO INDUSTRIAL ELECTRONICS	T	2	1	0	70	30	100	3
3	PC	DEEPC208	DESIGN,DRAWING AND ESTIMATION COSTING OF ELECTRICAL EQUIPMENTS-I	T	3	1	0	70	30	100	4
4	PC	DEEPC210	INTRODUCTION TO POWER PLANT ENGINEERING	T	2	0	0	70	30	100	2
5	PC	DEEPC212	INTRODUCTION TO POWER SYSTEM	T	3	0	0	70	30	100	3
6	ES	DES220	CONSERVATION OF ENERGY	T	3	0	0	70	30	100	3
7	PC	DEEPC214	INTRODUCTION TO INDUSTRIAL ELECTRONICS LAB	P	0	0	2	70	30	100	1
8	PC	DEEPC216	DESIGN,DRAWING AND ESTIMATION COSTING OF ELECTRICAL EQUIPMENTS-I LAB	P	0	0	2	70	30	100	1
9	PC	DEEPC218	ELECTRICAL EQUIPMENT TESTING AND FALT ANALYSIS	P	0	0	2	70	30	100	1
10	AU	DAU204	UNIVERSAL HUMAN VALUES	P	0	0	2	70	30	--	NC
11	CCA	DCCA204	CO-CORRICULAR ACTIVITIES	-	-	-	-	-	-	100	0.5
12	GP	DGP204	GENERAL PROFICIENCY	-	-	-	-	-	-	100	0.5
<b>Total</b>				-	<b>17</b>	<b>0</b>	<b>8</b>	<b>700</b>	<b>300</b>	<b>1100</b>	<b>21</b>

**Note:** Industrial Training for 4 weeks after fourth semester during summer vacation.

FA: Formative Assessment, SA: Summative Assessment, L: Lecture, T- Tutorial, P: Practical

**Abbreviation Used:**

**PC:** Program Courses

**BS:** Basic Science

**ES:** Engineering Science

**HSMC:** Humanities, Social Science and Management Course

**CCA:** Co-Curricular Activities

**DETAILED SYLLABUS  
DIPLOMA 2<sup>nd</sup> Year**

- **Electrical Engineering 3<sup>rd</sup> Semester**

**(Effective from Session: 2025-26)**

<b>Diploma in Electrical Engineering</b>					
<b>Semester: III</b>		<b>Course Category Code :BS</b>			
<b>Course Code</b>	<b>Course</b>	<b>Period / Week</b>			<b>Credit</b>
		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>DBS211</b>	<b>APPLIED MATHEMATICS-III</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Prerequisite</b>	<i>At the end of this course, the students will be able to:</i>				<b>Bloom's Level</b>
<b>Course Outcome</b>	<b>CO1</b>	<i>Understand matrix operations and uses of matrix in different problems. Apply elementary row and column operations in finding inverse of a matrix. Find Eigen values, Eigen vectors of a matrix and their different properties</i>			<b>K<sub>1</sub>,K<sub>2</sub>,K<sub>3</sub></b>
	<b>CO2</b>	<i>Apply to mathematically formulate, and thus aid the solution of, physical and other problems involving functions of several variables.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>
	<b>CO3</b>	<i>Understand degree/order of differential equations and their solution techniques.</i>			<b>K<sub>1</sub>,K<sub>2</sub>,K<sub>3</sub></b>
	<b>CO4</b>	<i>Apply Laplace transform and their applications in solving engineering problems.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>
	<b>CO5</b>	<i>Understand concept of probability distribution and their applications.</i>			<b>K<sub>1</sub>,K<sub>2</sub>,K<sub>3</sub></b>
<b>UNIT – I</b>	<b>Matrices</b>				<b>Contact Hours : 12</b>
<p>1.1 Algebra of Matrices, Inverse Addition, Multiplication of matrices, Null matrix and a unit matrix, Square matrix, Symmetric, Skew symmetric, Hermitian, Skew hermitian, Orthogonal, Unitary, diagonal and Triangular matrix, Determinant of a matrix. Definition and Computation of inverse of a matrix.</p> <p>1.2 Elementary Row/Column Transformation .Meaning and use in computing inverse and rank of a matrix.</p> <p>1.3 Linear Dependence, Rank of a Matrix. Linear dependence/independence of vectors, Definition and computation of rank of matrix. Computing rank through determinants, Elementary row transformation and through the concept of a set of independent vectors.</p> <p>1.4 Eigen Pairs, Cayley-Hamilton Theorem. Definition and evaluation of eign values and eign vectors of a matrix of order two and three, Cayley-Hamilton theorem (without Proof)and its verification.</p>					<b>CO1</b>
<b>UNIT – II</b>	<b>Differential Calculus</b>				<b>Contact Hours : 12</b>
<p>2.1 Function of two variables, identification of surfaces in space, conicoids</p> <p>2.2 Partial Differentiation, Directional derivative, Gradient, Use of gradient f, Partial derivatives, Chainrule, Higher order derivatives, Euler's theorem for homogeneous functions, Jacobians.</p>					<b>CO 2</b>
<b>UNIT – III</b>	<b>Differential Equation</b>				<b>Contact Hours : 12</b>
<p>3.1 Formation, Order, Degree, Types, Solution. Formation of differential equations through physical, geometrical, mechanical and electrical considerations, Order, Degree of a differential equation, Linear, nonlinear equation.</p> <p>3.2 First Order Equations Variable Seperable, equations reducible to seperable forms, Homo generous equations, equations reducible to homogeneous forms, Linear and Bernoulli form exact equation and their solutions.</p> <p>3.3 Higher Order Linear Equation :Property of solution, Linear differential equation with constant coefficients(PI for <math>X= e^{ax}, \sin ax, \cos ax</math>)</p>					<b>CO 3</b>
<b>UNIT – IV</b>	<b>Integral Calculus-II</b>				<b>Contact Hours : 12</b>
<p>4.1 Beta and Gamma Functions, Definition, Use, Relation between the two, their use in evaluating integrals.</p> <p>4.2 Laplace Transform ---Definition, Basic theorem and properties, inverse laplace transform,</p>					<b>CO 4</b>
<b>UNIT – V</b>	<b>Probability and Statistics</b>				<b>Contact Hours : 12</b>

5.1 Probability: Introduction, Addition and Multiplication theorem and simple problem. 5.2 Distribution, Bionimal Distribution, Poisson distribution, Normal Distribution		<b>CO 5</b>
<b>Lecture Hours : 45</b>	<b>Tutorials Hours :15</b>	<b>Total :60</b>
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. <i>Applied Mathematics-III</i> by Ajay Kumar, Jai Prakash Nath Publication Meerut.</li> <li>2. <i>Applied Mathematics-III</i> by H.R. Luthera, Bharat Bharati Publication Meerut.</li> <li>3. <i>Applied Mathematics-III</i> by Kailash Sinha, BBP Publication Meerut.</li> </ol>		

<b>Diploma in Electrical Engineering</b>					
Semester: III			Course Category Code :PC		
Course Code	Course	Period / Week			Credit
		L	T	P	C
<b>DEEPC205</b>	<b>BASICS OF ELECTRICAL MACHINES-I</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>
<b>Prerequisite</b>	<i>At the end of this course, the students will be able to:</i>				<b>Bloom's Level</b>
<b>Course Outcome</b>	<b>CO1</b>	<i>Operate and maintain DC generators. Operate and service DC shunt, series, and compound motors.</i>			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>
	<b>CO2</b>	<i>Perform speed control operations on DC motors. Determine the appropriate type of DC motor for specific applications.</i>			K <sub>2</sub> ,K <sub>3</sub>
	<b>CO3</b>	<i>Connect and utilize single-phase transformers. Operate autotransformers efficiently. Conduct open-circuit and short-circuit tests on single-phase transformers.</i>			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>
	<b>CO4</b>	<i>Test winding polarity in three-phase transformers and configure windings in different arrangements. Operate and maintain three-phase transformers.</i>			K <sub>2</sub> ,K <sub>3</sub>
<b>UNIT – I</b>	<b>Basic Concepts</b>				<b>Contact Hours : 08</b>
<p>1.1 Definition and fundamental principles of motors and generators.</p> <p>1.2 Torque development through the alignment of two fields and the concept of the torque angle.</p> <p>1.3 Electromagnetic induction and the generation of EMF.</p> <p>1.4 Basic concepts of electrical machines.</p> <p>1.5 Comparative analysis of generators and motors.</p> <p>1.6 Overview of the generalized theory of electrical machines.</p>					<b>CO1</b>
<b>UNIT – II</b>	<b>DC MACHINES</b>				<b>Contact Hours : 08</b>
<p>2.1 <b>Construction of DC Machines:</b> Components, materials, and their functions, including armature windings.</p> <p>2.2 <b>DC Generator:</b> Working principle, armature reaction, commutation, inter-poles, compensating windings, classifications, and applications.</p> <p>2.3 <b>EMF Equation, Losses, and Efficiency:</b> Derivation, numerical problems related to EMF, losses, and efficiency of DC generators.</p> <p>2.4 <b>Magnetization and Internal Characteristics:</b> Characteristics of DC shunt generators under various operating conditions.</p> <p>2.5 <b>Load Characteristics:</b> Performance analysis of DC shunt generators under different loads.</p> <p>2.6 <b>DC Motor:</b> Working principle, classifications, applications, and detailed study of brushless DC motors, including construction and operation.</p> <p>2.7 <b>Principle of Operation:</b> Back EMF, its significance, torque equation, and classification of DC motors.</p> <p>2.8 <b>Brushless DC Motor:</b> Construction, working, and applications.</p> <p>2.9 <b>DC Motor Characteristics and Starting Methods:</b> Performance characteristics and various starting techniques.</p> <p>2.10 <b>Necessity of Starters:</b> Construction and operation of three-point and four-point starters.</p> <p>2.11 <b>Speed Control of DC Motors:</b> Methods for controlling the speed of DC shunt and series motors, including flux and armature control techniques.</p> <p>2.12 <b>Numerical Problems:</b> Calculations related to back EMF, torque, speed, losses, and efficiency.</p> <p>2.13 <b>Application of Speed Control Methods:</b> Implementation of field and armature control techniques for varying the speed of DC shunt motors.</p> <p>2.14 <b>Field and Armature Control Methods:</b> Techniques for controlling the speed of DC shunt and series motors.</p> <p>2.15 <b>Testing of DC Motors:</b> Swinburne's test on DC shunt motors and brake test on DC series motors.</p>					<b>CO2</b>

<b>UNIT – III</b>	<b>Transformers</b>	<b>Contact Hours : 08</b>
<p><b>3.1 Single-Phase Transformer:</b> Construction, working principle, EMF equation derivation, and classification.</p> <p><b>3.2 Transformer Construction:</b> Components, materials, and their functions. Principle of operation, EMF equation, and transformation ratio.</p> <p><b>3.3 Types of Transformers:</b> Shell-type and core-type, step-up and step-down, distribution, and power transformers.</p> <p><b>3.4 Equivalent Circuits and Phasor Diagrams:</b> Representation and analysis of transformer performance.</p> <p><b>3.5 Losses and Efficiency:</b> Types of losses, efficiency calculations, conditions for maximum efficiency, all-day efficiency, and voltage regulation. Numerical problems.</p> <p><b>3.6 Transformer Testing:</b> Polarity test on a single-phase transformer.</p> <p><b>3.7 Performance Analysis:</b> Conduct open-circuit and short-circuit tests to determine voltage regulation and efficiency.</p> <ul style="list-style-type: none"> <li>▪ <b>Auto Transformers:</b> Construction and working principles of single-phase and three-phase auto transformers.</li> </ul>	<b>CO3</b>	
<b>UNIT – IV</b>	<b>Three Phase Transformers</b>	<b>Contact Hours : 08</b>
<p><b>4.1 Requirement of Three Phase Transformer</b></p> <p><b>4.2 Types of Three Phase Transformers</b></p> <p><b>4.3 Advantages of Three Phase Transformers</b></p> <p><b>4.4 Three-Phase Transformer Configurations:</b> Bank of three single-phase transformers and single-unit three-phase transformers.</p> <p><b>4.5 Parallel Operation of Three-Phase Transformers:</b> Necessity, conditions, and operational requirements.</p> <p><b>4.6 Cooling Methods and Selection Criteria:</b> Cooling techniques and factors influencing the selection of distribution and power transformers.</p>	<b>CO4</b>	
<b>UNIT – V</b>	<b>Testing of Transformer</b>	<b>Contact Hours : 08</b>
Polarity Test, Open Circuit and Sort Circuit test, voltage regulation and efficiency, parallel operation of transformer, Auto-transformer working and comparison with two winding transformer.		<b>CO5</b>
<b>Lecture Hours : 30</b>	<b>Tutorials Hours :10</b>	<b>Total :40</b>
<b>Reference Books:</b>		
<ol style="list-style-type: none"> <li>1. Electrical Machines by JB Gupta, SK Kataria and Sons, New Delhi</li> <li>2. Electrical Machines by Nagrath and Kothari, Tata Mc Graw Hill, New Delhi</li> <li>3. Electrical Machines by Ashfaq Hussain, Bhanpat Rai and Co., New Delhi</li> </ol>		

<b>Diploma in Electrical Engineering</b>					
Semester: III			Course Category Code :PC		
Course Code	Course	Period / Week			Credit
		L	T	P	C
DEEPC207	<b>ELECTRICAL MEASUREMENTS AND INSTRUMENTATION</b>	2	0	0	2
Prerequisite	<i>At the end of this course, the students will be able to:</i>				<b>Bloom's Level</b>
<b>Course Outcome</b>	CO1	<i>Connect and repair various indicating and recording instruments in electrical circuits.</i>			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>
	CO2	<i>Measure key electrical parameters such as current, voltage, power, energy, power factor, and frequency.</i>			K <sub>2</sub> ,K <sub>3</sub>
	CO3	<i>Choose the appropriate type and range of instruments for specific tasks. Operate Current Transformers (CT) and Potential Transformers (PT) for accurate measurements.</i>			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>
	CO4	<i>Select and utilize appropriate sensors for measuring non-electrical quantities. Effectively use instruments for measuring electrical parameters.</i>			K <sub>2</sub> ,K <sub>3</sub>
	CO5	<i>Operate and manage smart metering systems in industrial settings.</i>			
<b>UNIT – I</b>	<b>Introduction to Electrical Measuring Instruments</b>				<b>Contact Hours :06</b>
1.1	Concept and importance of measurement and measuring instruments				<b>CO1</b>
1.2	Measurement of electrical quantities, types of instruments used, and sources of errors				
1.3	Classification of electrical measuring instruments: Indicating, Integrating, and Recording instruments				
1.4	Key components of indicating instruments: Deflecting, Controlling, and Damping torques				
<b>UNIT – II</b>	<b>Ammeters and Voltmeters (Moving Coil &amp; Moving Iron Type) and Wattmeters (Dynamometer Type)</b>				<b>Contact Hours :06</b>
2.1	Basic concepts of ammeters and voltmeters and their differences				<b>CO2</b>
2.2	Construction and working principles of moving iron and moving coil instruments				
2.3	Advantages, disadvantages, sources of errors, and applications of these instruments				
2.4	Construction and working principle of dynamometer-type wattmeters				
2.5	Advantages and disadvantages of dynamometer-type wattmeters				
2.6	Overview of digital wattmeters				
<b>UNIT – III</b>	<b>Energy Meters &amp; Miscellaneous Measuring Instruments</b>				<b>Contact Hours :06</b>
3.1	Induction-Type Energy Meters				<b>CO3</b>
3.2	Error Compensation				
3.3	Maximum Demand Indicators				
3.4	Digital Energy Meters				
3.5	Construction, working principle, and applications of:				
3.6	Megger				
3.7	Earth Tester (Analog and Digital)				
3.8	Multimeter				
3.9	Frequency Meter (Dynamometer Type)				
3.10	Single-Phase Power Factor Meter (Electrodynamometer Type)				
3.11	Synchroscope and Phase Sequence Indicator				
3.12	Tong Tester (Clamp-on Meter)				
3.13	Instrument Transformers				
<b>UNIT – IV</b>	<b>Electronic Instruments, LCR Meters and Transducers</b>				<b>Contact Hours :06</b>
4.1	Cathode Ray Oscilloscope (CRO)				<b>CO4</b>
4.2	Digital Multimeter				
4.3	Study of LCR meters and their applications				
4.4	Introduction and classification of transducers (Single-phase and Three-phase)				

4.5 Basic concepts of measuring pressure, flow, level, and displacement using transducers		
<b>UNIT –V</b>	<b>Power and Temperature Measurement</b>	<b>Contact Hours :06</b>
<b>5.1 Two-Wattmeter Method</b> <b>5.1.1</b> Measurement of power in balanced and unbalanced circuits with basic numerical problems <b>5.2 Three-Wattmeter Method</b> <b>5.2.1.</b> Concept and application <b>5.2.2.</b> Types of thermometers <b>5.2.3.</b> Working principles and construction of thermocouples and resistance temperature detectors (RTDs) <b>5.2.4.</b> Concept of Thermal Imager Cameras <b>5.3 Smart Metering Systems</b>		<b>CO5</b>
<b>Lecture Hours : 30</b>	<b>Tutorials Hours :00</b>	<b>Total : 30</b>
<b>Reference Books:</b>		
1. <i>A Course in Electrical Measurement and Measuring Instruments</i> by AK Sawhney and PL Bhatia; Dhanpat Rai and Sons, New Delhi 2. <i>Experiments in Basic Electrical Engineering</i> by SK Bhattacharya and KM Rastogi, New Age International (P) Ltd., Publishers, New Delhi 3. <i>Electrical Measurement and Measuring Instruments</i> by ML Anand, SK Kataria and Sons, New Delhi		

<b>Diploma in Electrical Engineering</b>						
Semester: III			Course Category Code :PC			
Course Code	Course		Period / Week			Credit
			L	T	P	C
<b>DEEPC209</b>	<b>FUNCTIONAL MATERIALS IN ELECTRICAL AND ELECTRONICS ENGINEERING</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Prerequisite</b>	<i>At the end of this course, the students will be able to:</i>				<b>Bloom's Level</b>	
<b>Course Outcome</b>	<b>CO1</b>	<i>Recognize materials and components used in electrical and electronics engineering.</i>			<b>K<sub>1</sub></b>	
	<b>CO2</b>	<i>Choose the appropriate conducting material for a specific application.</i>			<b>K<sub>3</sub></b>	
	<b>CO3</b>	<i>Determine the suitable insulating material for a given application.</i>			<b>K<sub>3</sub></b>	
	<b>CO4</b>	<i>Recommend alternative materials when the ideal option is unavailable. Acquire various electrical and electronics engineering materials available in the market.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>	
	<b>CO5</b>	<i>Identify the appropriate magnetic material for a specific application. Utilize engineering materials for the fabrication of specific electrical machines. Select the suitable gaseous material for a particular application.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>	
<b>UNIT – I</b>	<b>Types of Materials</b>				<b>Contact Hours : 08</b>	
<b>1.1</b> Classification of materials into conducting, semiconducting, and insulating materials. <b>1.2</b> Atomic structure and energy bands, along with factors influencing material properties.					<b>CO1</b>	
<b>UNIT – II</b>	Conducting Materials				<b>Contact Hours : 08</b>	
<b>2.1</b> Introduction <b>2.1.1</b> Understanding conductivity and factors affecting resistance, including alloying and temperature variations. <b>2.2</b> Classification of Conducting Materials <b>2.2.1</b> Conducting materials are categorized as low-resistivity and high-resistivity materials. <b>2.3</b> Low Resistance Materials <b>2.3.1</b> Copper: Properties as a conductor, including resistivity, temperature coefficient, density, mechanical properties (hard-drawn and annealed), corrosion resistance, and contact resistance. Applications in electrical engineering. <b>2.3.2</b> Aluminium: Conductivity properties, including resistivity, temperature coefficient, density, mechanical characteristics, solderability, and applications in electrical engineering. <b>2.3.3</b> Steel: Mechanical properties and its applications in electrical systems. <b>2.3.4</b> Bundle Conductors: Introduction and practical applications. <b>2.3.5</b> Low Resistivity Copper Alloys: Overview of brass and bronze (cadmium and beryllium), along with their practical applications. <b>2.3.6</b> Special Metals Applications: Uses of silver, gold, platinum, and other valuable metals in electrical applications. <b>2.4</b> High Resistivity Materials <b>2.4.1</b> Materials such as manganin, constantan, nichrome, mercury, platinum, carbon, and tungsten, along with their applications. <b>2.4.2</b> Superconductors: Concept and practical applications. <b>2.5</b> Semiconductor Materials <b>2.5.1</b> Properties and significance of semiconductors. <b>2.5.2</b> Materials used for electronic components such as resistors, capacitors, diodes, transistors, and inductors.					<b>CO2</b>	
<b>UNIT – III</b>	Insulating Materials				<b>Contact Hours : 08</b>	
<b>Properties of Insulating Materials</b>						
<b>4.1 Electrical Properties:</b> Volume resistivity, surface resistance, dielectric loss, dielectric strength, and dielectric constant.					<b>CO3</b>	
<b>4.2 Physical Properties:</b>						

<p>Hygroscopicity, tensile and compressive strength, abrasion resistance, and brittleness.</p> <p><b>4.3 Thermal Properties:</b> Heat resistance and classification based on permissible temperature rise. Effects of overloading on the lifespan of electrical appliances. Enhancement of rating using materials with higher thermal stability. Thermal conductivity and electro-thermal breakdown in solid dielectrics.</p> <p><b>4.4 Chemical Properties: <i>Solubility, chemical resistance, and weatherability.</i></b></p> <p><b>4.5 Mechanical Properties: <i>Mechanical structure, tensile strength, and other critical aspects affecting performance.</i></b></p> <p><b>4.6 Plastics</b> <b>Definition &amp; Classification</b> of insulating plastics. <b>Thermosetting Materials:</b> Properties and applications of Bakelite (Phenol-formaldehyde resins), Urea-formaldehyde, Melamine-formaldehyde, and epoxy resins. <b>Thermoplastics:</b> Properties and applications of PVC (Polyvinyl chloride), polyethylene, and silicones.</p> <p><b>4.7 Natural Insulating Materials</b> <b>Properties and applications of natural insulators, including:</b> Mica and mica products Asbestos and asbestos-based materials Ceramic materials (porcelain and steatite) Glass and glass-based products Cotton, silk, jute, and paper (dry and impregnated) Rubber, bitumen, mineral, and insulating oils used in transformers, switchgear, capacitors, and high-voltage insulated cables. Insulating varnishes for coating and impregnation. Enamels used in winding wires. Glass fibre sleeves.</p> <p><b>4.8 Gaseous Insulating Materials</b> Properties and applications of air, hydrogen, nitrogen, and SF<sub>6</sub> gas.</p>		
<b>UNIT – IV</b>	<b>Magnetic Materials</b>	<b>Contact Hours : 08</b>
<p><b>4.1 Introduction to Magnetic Materials</b></p> <p><b>4.1.1</b> Ferromagnetic materials and key concepts: permeability, B-H curve, magnetic saturation, hysteresis loop, coercive force, and residual magnetism.</p> <p><b>4.1.2</b> Understanding eddy current and hysteresis loss.</p> <p><b>4.1.3</b> Curie temperature and magnetostriction effect</p> <p><b>4.2 Soft Magnetic Materials</b></p> <p><b>4.2.1 Silicon Alloyed Steels:</b> High-silicon alloy steels for transformers, low-silicon alloy steels for rotating machines.</p> <p><b>4.2.2 Cold-Rolled Grain-Oriented Steels:</b> Their use in transformers.</p> <p><b>4.2.3 Non-Oriented Steels:</b> Used for rotating machines.</p> <p><b>4.2.4 Nickel-Iron Alloys &amp; Soft Ferrites:</b> Applications in electrical engineering.</p> <p><b>4.3 Hard Magnetic Materials</b></p> <p><b>4.3.1</b> Materials such as tungsten steel, chrome steel, hard ferrites, and cobalt steel, along with their applications.</p>		<b>CO4</b>
<b>UNIT –V</b>	<b>Special Materials</b>	<b>Contact Hours : 08</b>
<p><b>5.1 Thermocouples and Bimetals:</b> Their applications in electrical devices.</p> <p><b>5.2 Materials for Soldering &amp; Fuses:</b> Importance in electrical connections and safety.</p> <p><b>5.3 Thermistors, Sensistors, &amp; Varistors:</b> Their practical applications in electrical circuits.</p> <p><b>5.4 Materials for Electrical Machines</b> Overview of engineering materials essential for fabricating electrical machines such as motors, generators, and transformers.</p>		<b>CO5</b>
<b>Lecture Hours : 40</b>	<b>Tutorials Hours :00</b>	<b>Total :40</b>
<b>Reference Books:</b>		

1. *Electrical Engineering Materials by Sahdev, Uneek International Publications, Jalandhar*
2. *Electrical Engineering Materials by PL Kapoor, Khanna Publishers, New Delhi*
1. *Electrical Engineering Materials by Rakesh Dogra, SK Kataria and Sons, NEW Delhi*

<b>Diploma in Electrical Engineering</b>					
<b>Semester: III</b>		<b>Course Category Code :PEC</b>			
<b>Course Code</b>	<b>Course</b>	<b>Period / Week</b>			<b>Credit</b>
		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>DEEPC211</b>	<b>FUNDAMENTAL OF DIGITAL ELECTRONICS</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>
<b>Prerequisite</b>	<i>At the end of this course, the students will be able to:</i>				<b>Bloom's Level</b>
<b>Course Outcome</b>	<b>CO1</b>	<i>Perform addition, subtraction, and multiplication operations using binary and hexadecimal number systems, Apply 1's and 2's complement methods for binary addition and subtraction.</i>			<b>K<sub>3</sub></b>
	<b>CO2</b>	<i>Illustrate standard logic gates with their symbols and construct corresponding truth tables, Simplify logical expressions using Boolean algebra laws, Utilize De Morgan's Theorems for logic expression simplification.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>
	<b>CO3</b>	<i>Implement digital circuits using half adders, full adders, encoders, decoders, multiplexers, and de-multiplexers.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>
	<b>CO4</b>	<i>Integrate various types of flip-flops in digital circuit designs</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>
	<b>CO5</b>	<i>Use analog-to-digital (A/D) and digital-to-analog (D/A) converters for signal conversion.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>
<b>UNIT – I</b>	<b>Number Systems and Logic Gates</b>				<b>Contact Hours :06</b>
<b>1.1</b> Overview of Number Systems <b>1.2</b> Arithmetic Operations <b>1.3</b> Complement Methods <b>1.4</b> Definition, Symbol, and Truth Tables of Logic Gates: Inverter (NOT), OR, AND, NAND, NOR, XOR (Exclusive-OR), and XAND (Exclusive-AND)					<b>CO1</b>
<b>UNIT – II</b>	<b>Boolean Algebra and Combinational Circuits</b>				<b>Contact Hours :06</b>
<b>2.1</b> Boolean Expressions and Their Applications <b>2.2</b> De Morgan's Theorems and Their Use in Simplification <b>2.3</b> Karnaugh Map (K-Map) Techniques for up to Four Variables <b>2.4 Arithmetic Circuits:</b> Design and Function of Half Adder and Full Adder <b>2.5 Data Conversion Circuits:</b> Encoders and Decoders <b>2.6 Data Selection Circuits:</b> Multiplexers and Demultiplexers <b>2.7 Output Display Devices:</b> LED, LCD, and 7-Segment Displays					<b>CO2</b>
<b>UNIT – III</b>	<b>Flip-Flops</b>				<b>Contact Hours :06</b>
<b>3.1</b> J-K Flip-Flop <b>3.2</b> R-S Flip-Flop <b>3.3</b> D-Type Flip-Flop <b>3.4</b> T-Type Flip-Flop <b>3.5</b> Applications of Flip-Flops in Digital Circuits					<b>CO3</b>
<b>UNIT – IV</b>	<b>Sequential Devices, A/D and D/A Converters</b>				<b>Contact Hours :06</b>
<b>4.1</b> Introduction to Shift Registers and Counters <b>4.2</b> Analog-to-Digital (A/D) Converters: <b>4.2.1</b> Counter Ramp Method <b>4.2.2</b> Successive Approximation Method <b>4.3</b> Digital-to-Analog (D/A) Converters: <b>4.3.1</b> Binary Weighted Method <b>4.3.2</b> R-2-R Ladder Network					<b>CO4</b>
<b>UNIT – V</b>	<b>Semiconductor Memories</b>				<b>Contact Hours :06</b>
<b>5.1</b> Types of Semiconductor Memories: <ul style="list-style-type: none"> <li>• RAM, ROM, EPROM, EEPROM</li> </ul>					<b>CO5</b>

5.2	Static vs. Dynamic RAM:	
	<ul style="list-style-type: none"> <li>• Structure, Operation, and Differences</li> </ul>	
5.3	Advantages, Disadvantages, and Applications of Semiconductor Memories	
<b>Lecture Hours :30</b>	<b>Tutorials Hours :00</b>	<b>Total :30</b>
<b>Reference Books:</b>		
1. <i>Modern Digital Electronics</i> by RP Jain, Tata McGraw Hill, Education Pvt. Ltd. New Delhi		
2. <i>Digital Principles and Electronics</i> by Malvino and Leach, Tata McGraw Hill, New Delhi		
3. <i>Digital Electronics</i> by SN Ali		
4. <i>Digital Electronics</i> by Rajive Sapra, Eshan Publications, Ambala City		

## Diploma in Electrical Engineering

Semester: III		Course Category Code :PC			
Course Code	Course	Period / Week			Credit
		L	T	P	C
DEEPC213	BASICS OF ELECTRICAL MACHINES –I LAB	0	0	2	1
Prerequisite	<i>At the end of this course, the students will be able to:</i>				Bloom's Level
Course Outcome	CO1	Measurement of Rotor Angular Displacement			K3
	CO2	DC Motor Operation and control			K <sub>2</sub> ,K <sub>3</sub>
	CO3	Determination of Efficiency of Electrical Machines			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>
	CO4	Tests on Single Phase Transformers			K <sub>2</sub> ,K <sub>3</sub>
	CO5	Tests on Three Phase Transformers			K <sub>2</sub> ,K <sub>3</sub>
<b>List of experiment</b>					
<b>1. Measurement of Rotor Angular Displacement</b> Measure the angular displacement of the rotor in a slip-ring induction motor by sequentially applying DC to the stator windings and simultaneously to each phase of the rotor windings.					CO1
<b>2. Speed Control of DC Shunt Motor</b> Study the speed control of a DC shunt motor using: (i) the armature control method (ii) the field control method					CO2
<b>3. Observation of DC Series Motor Operation</b> Observe the operation of a DC series motor with a starter by running it on no load for a brief period.					
<b>4. Efficiency Determination Using Swinburne's Test</b> Determine the efficiency of a DC motor using Swinburne's Test at: (i) rated load (ii) half-load condition					CO3
<b>5. Open and Short Circuit Tests on Transformer</b> Perform open-circuit and short-circuit tests on a transformer to determine: (i) the equivalent circuit (ii) voltage regulation (iii) efficiency at full load					
<b>6. Efficiency and Regulation of Single-Phase Transformer</b> Determine the efficiency and voltage regulation of a single-phase transformer through actual loading.					CO4
<b>7. Polarity Test and Connection of Three-Phase Transformer Windings</b> Verify the polarity of the windings of a three-phase transformer and connect them in different configurations.					CO5
<b>8. Voltage and Current Relationships in Three-Phase Transformer</b> Determine the voltage and current relationships between the primary and secondary windings of a three-phase transformer under balanced load conditions for the following configurations: (a) Star-Star (b) Star-Delta (c) Delta-Star (d) Delta-Delta					

## Diploma in Electrical Engineering

Semester :III		Course Category Code :PC			
Course Code	Course	Period / Week			Credit
		L	T	P	C
<b>DEEPC215</b>	<b>ELECTRICAL MEASUREMENTS AND INSTRUMENTATIONLAB</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>1</b>
<b>Prerequisite</b>	<i>At the end of this course, the students will be able to:</i>				<b>Bloom's Level</b>
<b>Course Outcome</b>	<b>CO1</b>	<i>Measurement of Voltage, Current (A.C/D.C), Resistance and Pressure</i>			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>
	<b>CO2</b>	<i>Measurement of Earth Resistance, Power and Power Factor in a single phase</i>			K <sub>2</sub> ,K <sub>3</sub>
	<b>CO3</b>	<i>Measurement of Power and Power Factor of a Three-Phase and Operating CRO</i>			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>
	<b>CO4</b>	<i>Measurement of Power in a Three-Phase Circuit Using CT, PT, Inductance, Capacitance, and Resistance</i>			K <sub>2</sub> ,K <sub>3</sub>
	<b>CO5</b>	<i>Recording of All Electrical Quantities and Different Loads Using Single-Phase Digital Energy Meter</i>			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>
<b>LIST OF PRACTICALS</b>					
<ol style="list-style-type: none"> <li>1. Measurement of Voltage, Current (A.C/D.C), and Resistance Using Analog and Digital Multimeters.</li> <li>2. Measurement of Pressure Using LVDT</li> </ol>					<b>CO1</b>
<ol style="list-style-type: none"> <li>3. Measurement of Earth Resistance Using Earth Tester</li> <li>4. Measurement of Power and Power Factor in a Single-Phase Circuit Using Wattmeter and Power Factor Meter with Result Verification.</li> </ol>					<b>CO2</b>
<ol style="list-style-type: none"> <li>5. Measurement of Power and Power Factor of a Three-Phase Balanced Load Using Two Wattmeter Method.</li> <li>6. Measurement of Voltage and Frequency of a Sinusoidal Signal Using CRO and Plotting of Waveform.</li> </ol>					<b>CO3</b>
<ol style="list-style-type: none"> <li>7. Measurement of Power in a Three-Phase Circuit Using CT, PT, and Three-Phase Wattmeter.</li> <li>8. Measurement of Inductance, Capacitance, and Resistance Using LCR Meter.</li> </ol>					<b>CO4</b>
<ol style="list-style-type: none"> <li>9. Recording of All Electrical Quantities from Installed Meters in the Institution Premises.</li> <li>10. Measurement of Energy at Different Loads Using Single-Phase Digital Energy Meter.</li> </ol>					<b>CO5</b>

Diploma in Electrical Engineering						
Semester: III			Course Category Code :PEC			
Course Code	Course		Period / Week			Credit
			L	T	P	C
DEEPC217	FUNDAMENTAL OF DIGITAL ELECTRONICS LAB		0	0	2	1
Prerequisite	<i>At the end of this course, the students will be able to:</i>					Bloom's Level
Course Outcome	CO1	<i>Verification and Analysis of Logic Gates</i>				K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>
	CO2	<i>Design and Implementation of Half Adder</i>				K <sub>2</sub> ,K <sub>3</sub>
	CO3	<i>Design and Implementation of Full Adder</i>				K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>
	CO4	<i>Verification of JK Flip-Flop</i>				K <sub>2</sub> ,K <sub>3</sub>
	CO5	<i>Verification of an 8-bit Digital-to-Analog Converter (D/A Converter)</i>				K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>
<b>LIST OF PRACTICALS</b>						
1. Verify and interpret the truth tables for basic and universal gates: AND, OR, and NOT. 2. Verify and interpret the truth tables for basic and universal gates: NAND, NOR, and XOR.					CO1	
3. Design and Implementation of Half Adder. 4. Design and Implementation of Full Adder.					CO2	
5. Verification of JK Flip-Flop. 6. Verification of SR Flip-Flop.					CO3	
7. Verification of an 8-bit Digital-to-Analog Converter (D/A Converter). 8. Study of Analog and Digital Converter (ADC) and Digital to Analog Converter (DAC).					CO4	
9. Study and Construction of multiplexer (MUX) and De-multiplexer (DEMUX). 10. Construction and testing of Encoder and Decoder Circuit.					CO5	

<b>Diploma in Electrical Engineering</b>						
Semester: III			Course Category Code : OEC			
Course Code	Course		Period / Week			Credit
			L	T	P	C
<b>DEEOEC201</b>	<b>ELECTRICAL AUTO CAD</b>		<b>0</b>	<b>0</b>	<b>6</b>	<b>3</b>
<b>Prerequisite</b>	<i>At the end of this course, the students will be able to:</i>				<b>Bloom's Level</b>	
<b>Course Outcome</b>	<b>CO1</b>	<i>Know the advantages of using CAD in comparison with conventional method.</i>			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>	
	<b>CO2</b>	<i>Electrical Symbols and Drawing Standards</i>			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>	
	<b>CO3</b>	<i>Residential Electrical Wiring Drawing</i>			K <sub>2</sub> ,K <sub>3</sub>	
	<b>CO4</b>	<i>Industrial Wiring and Control Diagrams</i>			K <sub>2</sub> ,K <sub>3</sub>	
	<b>CO5</b>	<i>Control Panel and PLC Wiring</i>			K <sub>2</sub> ,K <sub>3</sub>	
<b>LIST OF PRACTICALS</b>						
<ol style="list-style-type: none"> <li>1. Introduction to CAD, its importance in electrical drawing</li> <li>2. AutoCAD workspace: menu bar, toolbars, command line, drawing area</li> <li>3. Basic commands: LINE, TRIM, EXTEND, CIRCLE, ARC, OFFSET, MOVE, COPY, MIRROR, etc.</li> <li>4. Grid settings, snap modes, drawing limits</li> </ol>					<b>CO1</b>	
<ol style="list-style-type: none"> <li>1. IS/IEC/NEMA standard symbols for electrical elements: switches, sockets, MCBs, lamps, fans, motors, Earthing, etc.</li> <li>2. Symbol insertion and block creation</li> <li>3. Wiring diagram conventions: schematic, wiring, and layout diagrams</li> <li>4. Use of layers, line types, colors, and text</li> </ol>					<b>CO2</b>	
<ol style="list-style-type: none"> <li>1. Drawing building layout for residential plan</li> <li>2. Placement of light, fan, switchboard, socket outlets</li> <li>3. Distribution board wiring (single line diagram)</li> <li>4. Load calculation and circuit division</li> <li>5. Earthing symbol and layout</li> </ol>					<b>CO3</b>	
<ol style="list-style-type: none"> <li>5.2.1. Workshop wiring layout (3-phase + single-phase)</li> <li>5.2.2. Cable routing, DB location, 3-phase socket placement</li> <li>5.2.3. Control circuits:               <ol style="list-style-type: none"> <li>3.1 Direct Online (DOL) starter</li> <li>3.2 Forward-Reverse starter</li> <li>3.3 Star-Delta starter schematic</li> </ol> </li> <li>5.2.4. Panel wiring with terminals and components</li> </ol>					<b>CO4</b>	
<ol style="list-style-type: none"> <li>1. Basic ladder diagram symbols and PLC I/O connection</li> <li>2. Drawing PLC wiring diagrams with annotations</li> <li>3. I/O table and tagging in AutoCAD</li> </ol>					<b>CO5</b>	

<b>Diploma in Electrical Engineering</b>						
<b>Semester: III</b>			Course Category Code :AU			
Course Code	Course		Period / Week			Credit
			L	T	P	C
<b>DAU203</b>	<b>ENVIRONMENTAL SCIENCE</b>		<b>2</b>	<b>0</b>	<b>0</b>	<b>NC</b>
<b>Prerequisite</b>	<i>At the end of this course, the students will be able to:</i>				<b>Bloom's Level</b>	
<b>Course Outcome</b>	<b>CO1</b>	<i>Understanding of ecology and ecosystem, sustainable development, renewable and nonrenewable resource.</i>			<b>K<sub>1</sub>,K<sub>2</sub></b>	
	<b>CO2</b>	<i>Understanding of Air pollution and water pollution.</i>			<b>K<sub>2</sub>,</b>	
	<b>CO3</b>	<i>Understanding of soil pollution and noise pollution.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>	
	<b>CO4</b>	<i>Understanding the environmental law</i>			<b>K<sub>1</sub>,K<sub>2</sub></b>	
	<b>CO5</b>	<i>Understanding the effect of pollution on environment.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>	
<b>UNIT – I</b>	<b>Introduction</b>				<b>Contact Hours: 06</b>	
Basics of ecology, ecosystem- concept, and sustainable development, Resources renewable and non-renewable					<b>CO1</b>	
<b>UNIT – II</b>	<b>Air Pollution and Water Pollution</b>				<b>Contact Hours: 06</b>	
Source of air pollution. Effect of air pollution on human health, economy, plant, animals. Air pollution control methods. Impurities in water Cause of water pollution, Source of water pollution. Effect of water pollution on human health, Concept of dissolved O <sub>2</sub> , BOD, COD. Prevention of water pollution- Water treatment processes, Sewage treatment. Water quality standard.					<b>CO2</b>	
<b>UNIT – III</b>	<b>Soil Pollution and Noise pollution</b>				<b>Contact Hours: 06</b>	
Sources of soil pollution. Types of Solid waste- House hold, Hospital, From Agriculture, Biomedical, Animal and human, excreta, sediments and E-waste . Effect of Solid waste. Disposal of Solid Waste- Solid Waste Management. Source of noise pollution, Unit of noise, Effect of noise pollution, Acceptable noise level, Different method of minimize noise pollution.					<b>CO3</b>	
<b>UNIT – IV</b>	<b>Environmental Legislation</b>				<b>Contact Hours: 06</b>	
Introduction to Water (Prevention and Control of Pollution) Act 1974, Introduction to Air (Prevention and Control of Pollution) Act 1981 and Environmental Protection Act 1986, Role and Function of State Pollution Control Board and National Green Tribunal (NGT), Environmental Impact Assessment (EIA).					<b>CO4</b>	
<b>UNIT – V</b>	<b>Impact of Energy Usage on Environment</b>				<b>Contact Hours: 06</b>	
Global Warming, Green House Effect, Depletion of Ozone Layer, Acid Rain. Eco-friendly Material, Recycling of Material.					<b>CO5</b>	
<b>Lecture Hours : 30</b>		<b>Tutorials Hours :00</b>		<b>Total : 30</b>		
<b>Reference Books:</b>						
<ol style="list-style-type: none"> <li>1. <i>Environmental Pollution by Dr. R. K Khitoliya; S Chand Publishing, New Delhi</i></li> <li>2. <i>Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.</i></li> <li>3. <i>Environmental Engineering and Management by Suresh K Dhamija; S K Katariaand Sons, New Delhi.</i></li> </ol>						

# **DETAILED SYLLABUS**

## **DIPLOMA 2<sup>nd</sup> Year**

- **Electrical Engineering 4<sup>th</sup> Semester**

**(Effective from Session: 2025-26)**

<b>Diploma in Electrical Engineering</b>						
<b>Semester: IV</b>				<b>Course Category Code: HS</b>		
<b>Course Code:</b>	<b>Course</b>		<b>Period/Week</b>			<b>Credit</b>
			<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>DHS202</b>	<b>COMMUNICATION SKILLS-II</b>		2	0	0	2
<b>Prerequisite</b>	<b>After completion of the course students are able to -</b>					<b>Bloom's Level</b>
<b>Course Outcome</b>	<b>CO1</b>	<i>Frame Correct sentences with language</i>				K1
	<b>CO2</b>	<i>Comprehend the language correctly</i>				K2
	<b>CO3</b>	<i>Mastering writing skills</i>				K3
	<b>CO4</b>	<i>Learning classified knowledge on speaking etiquettes</i>				K1,K3
	<b>CO5</b>	<i>Identifying and evaluating the entire concepts of Business writing and knowledge of literary elements</i>				K2,K3
<b>UNIT -I</b>	<b>DESCRIPTIVE GRAMMAR</b>					<b>Contact Hours: 06</b>
Tense, Preposition, Conjunction, Comparison of Adverbs, Simple, Compound & Complex Sentences Adverb						<b>CO1</b>
<b>UNIT - II</b>	<b>READING SKILLS</b>					<b>Contact Hours: 06</b>
Unseen Passages for comprehension, Vocabulary enhancement: -Prefix, Suffix, Synonyms, Antonyms						<b>CO2</b>
<b>UNIT - III</b>	<b>PROFESSIONAL WRITING SKILLS</b>					<b>Contact Hours: 06</b>
Professional Email, Resume & CV writing, Etiquettes to be followed in E-mail Writing						<b>CO3</b>
<b>UNIT - IV</b>	<b>EFFECTIVE LEARNING PATTERNS FOR INTERVIEW ROUNDS</b>					<b>Contact Hours: 06</b>
Professional Interview Practices, Types of Interview (Placement, Govt. job, academics, research, internships & training), Do's and don'ts of Interview session						<b>CO4</b>
<b>UNIT -V</b>	<b>Business Writing and Literary Work</b>					<b>Contact Hours: 06</b>
Business Letters & its types, Memorandum, Circulars, Office orders, Glossary of Literary term						<b>CO5</b>
<b>Lecture Hours : 30</b>		<b>Tutorials Hours : 00</b>			<b>Total :30</b>	
<b>Reference Books:-</b>						
<ol style="list-style-type: none"> <li>1. <i>Advance English Grammar</i> by D.S. Paul, Goodwill Publishing House, 2016.</li> <li>2. <i>How to Win Friends and Influence People</i> by Dale Carnegie ie Simon and Schuster, 1936.</li> <li>3. <i>Business Communication</i> by M. Raman, Oxford University Press, 2006.</li> <li>4. <i>Word Power Made by Easy</i> by Norman Lewis, Goyal Publishers &amp; Distributors Pvt. Ltd. 1949.</li> <li>5. <i>30 days to Better English</i> by Norman Lewis, Pocket Books, 1965.</li> <li>6. <i>Learn English Through Hindi</i>, V &amp; S Publisher, 2013.</li> </ol>						
<b>Text Books:-</b>						
<ol style="list-style-type: none"> <li>1. <i>Communication Skill-1</i> by Archana Sharma, Dr. Gyaneshwar Pratap Singh &amp; Dr. Ombir Singh, Asian Publishers, Muzaffarnagar, 2019.</li> <li>2. <i>Professional Communication</i> b. Malti Agarwal, Krishna Prakashan Media Pvt Ltd. Meruth, 1942.</li> <li>3. <i>Effective Technical Communication</i> by Dr. Bharti Kukreja &amp; Dr. Anupama Jain, S. K. Kataria &amp; Sons, New Delhi, 2019.</li> </ol>						

<b>Diploma in Electrical Engineering</b>						
<b>Semester: IV</b>			<b>Course Category Code: PC</b>			
<b>Course Code</b>	<b>Course</b>		<b>Period/Week</b>			<b>Credit</b>
			<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>DEEPC206</b>	<b>INTRODUCTION TO INDUSTRIAL ELECTRONICS</b>		<b>2</b>	<b>1</b>	<b>0</b>	<b>3</b>
<b>Prerequisite</b>	<i>At the end of this course, the students will be able to:</i>				<b>Bloom's Level</b>	
<b>Course Outcome</b>	<b>CO1</b>	Use Power diode with load R and R-L.			<b>K<sub>2</sub>,K<sub>4</sub></b>	
	<b>CO2</b>	Use SCR, TRIAC and Diac as per requirement of circuit			<b>K<sub>3</sub>,K<sub>6</sub></b>	
	<b>CO3</b>	Control fan speed using Triac and Quadriac. Control speed of D.C. shunt motor or universal motor			<b>K<sub>2</sub></b>	
	<b>CO4</b>	Demonstrate the output wave shape on CRO			<b>K<sub>4</sub></b>	
	<b>CO5</b>	Repair UPS and Inverter Maintain storage batteries Maintain panels used in the modern control process			<b>K<sub>3</sub>,K<sub>4</sub>,K<sub>6</sub></b>	
<b>UNIT-I</b>	<b>Introduction to SCR</b>				<b>Contact Hours: 08</b>	
Power diode characteristics, application of general purpose diode, fast recovery diode and Schottkey diode, use in R, RL series circuit. Construction and working principles of an SCR, two transistor analogy and characteristics of SCR, SCR specifications and rating , Construction, working principles and V-I characteristics of DIAC, TRIAC and Quadriac Basic idea about the selection of heat sinks for SCR and TRIACS, Methods of triggering a Thyristor. Study of triggering circuits UJT, its Construction, working principles and V-I characteristics, UJT relaxation oscillator, Commutation of Thyristors, Series and parallel operation of Thyristors, Applications of SCR, TRIACS and Quadriac such as light intensity control, speed control of DC and universal motor, fan regulator, battery charger etc, dv/dt and di/dt protection of SCR.					<b>CO1</b>	
<b>UNIT-II</b>	<b>Controlled Rectifiers</b>				<b>Contact Hours: 08</b>	
Single phase half wave controlled rectifier with resistive load and inductive load, Concept of freewheeling diode. Single phase half controlled full wave rectifier, Single phase fully controlled full wave rectifier, Single phase full wave centre tapped rectifier, Three phase full wave half controlled bridge rectifier, Three phase full wave fully controlled bridge rectifier.					<b>CO2</b>	
<b>UNIT-III</b>	<b>Inverters, Choppers, Dual Converters and Cyclo Convertors</b>				<b>Contact Hours: 08</b>	
Inverter-introduction, working principles, voltage and current driven series and parallel inverters and applications, Choppers-introduction, types of choppers and their working principles and applications, Dual converters-introduction, working principles and applications, Cyclo-converters- introduction, types, working principles and applications.					<b>CO3</b>	
<b>UNIT-IV</b>	<b>Thyristor Control of Electric Drives</b>				<b>Contact Hours: 08</b>	
DC drives control (Basic Concept), Half wave drives Full wave drives, Chopper drives, AC drives control, Phase control Variable frequency a.c. drives Constant V/F application, Voltage controlled inverter drives, Constant current inverter drives Cyclo- convertors controlled AC drives.					<b>CO4</b>	
<b>UNIT-V</b>	<b>Uninterrupted power supplies</b>				<b>Contact Hours: 08</b>	
UPS online, off line Storage devices (batteries) SMPS, CVT					<b>CO5</b>	
<b>Lecture Hours: 30</b>		<b>Tutorials Hours: 10</b>			<b>Total: 40</b>	

**Reference Books:**

1. *Fundamentals of Power Electronics* by S Rama Reddi, Narosa Publishing House Pvt. Ltd, New Delhi
2. *Power Electronics, Circuits Devices and Applications* by Mohammad H. Rashid
3. *Power Electronics* by Dr. PS Bhimbra, Khanna Publishers, New Delhi
4. *Industrial Electronics & Control* by SK Bhattacharya & S Chatterji, New Age international Publications(P) Ltd, New Delhi

**Text Book:**

1. *Power Electronics: Circuits, Devices and Applications"* by Muhammad H. Rashid
2. *Fundamentals of Power Electronics"* by Robert W. Erickson
3. *Power Electronics"* by Ned Mohan

<b>Diploma in Electrical Engineering</b>						
Semester: IV			Course Category Code :PC			
Course Code	Course		Period / Week			Credit
			L	T	P	C
<b>DEEPC208</b>	<b>DESIGN,DRAWING AND ESTIMATION COSTING OF ELECTRICAL EQUIPMENTS-I</b>		<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>
<b>Prerequisite</b>	<i>At the end of this course, the students will be able to:</i>				<b>Bloom's Level</b>	
<b>Course Outcome</b>	<b>CO1</b>	<i>Identify various electrical devices along with their standard symbols, electrical components mounted on panels/distribution boards and design appropriate panel layouts.</i>			<b>K<sub>1</sub>,K<sub>2</sub>,K<sub>3</sub></b>	
	<b>CO2</b>	<i>Understand and recognize the internal construction and components of different electrical machines and devices, Interpret schematic and wiring diagrams of electrical systems.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>	
	<b>CO3</b>	<i>Read and interpret electrical installation plans accurately, Communicate circuit concepts and device configurations effectively using sketches and technical drawings.</i>			<b>K<sub>1</sub>,K<sub>2</sub>,K<sub>3</sub></b>	
	<b>CO4</b>	<i>Identify different types of wiring systems and understand their specific applications, Perform and implement different types of electrical wiring practices.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>	
	<b>CO5</b>	<i>Assess and estimate the materials required for High Tension (HT) and Low Tension (LT) power lines, Prepare a comprehensive tender document for a specific electrical project, Estimate the materials and components required for pole-mounted substation installations.</i>			<b>K<sub>1</sub>,K<sub>2</sub>,K<sub>3</sub></b>	
<b>UNIT – I</b>	<b>Symbols and Sign Conventions and wiring Diagram</b>				<b>Contact Hours : 12</b>	
<b>1.1 Symbols and Sign Conventions</b> <b>1.1.1</b> Study and draw standard electrical symbols as per BIS Code. <b>1.1.2</b> Include symbols used in domestic and industrial installations and power systems (generation, transmission, distribution, and substations). <b>1.2 Prepare wiring diagrams for common electrical circuits such as:</b> <b>1.2.1</b> Light, fan, bell, and alarm circuits. <b>1.2.2</b> Staircase wiring <b>1.2.3</b> Godown wiring <b>1.2.4</b> Design a traffic light signal control circuit for crossroads.					<b>CO1</b>	
<b>UNIT – II</b>	<b>Panels and Distribution Boards and Orthographic Projections of Electrical</b>				<b>Contact Hours : 12</b>	
<b>3.1 Panels and Distribution Boards (6 Sheets)</b> <b>2.1.1</b> Design and draw panels/distribution boards incorporating MCBs, ELCBs, main switches, and changeover switches. <b>2.1.2</b> Cover domestic, industrial, and commercial installations. <b>3.2 Prepare detailed orthographic drawings of the following components:(8 Sheets)</b> <b>2.2.1</b> Bus bar post / Kit-Kat fuse <b>2.2.2</b> Pin-type and shackle-type insulators (11kV / 66kV) <b>2.2.3</b> Transformer or choke bobbins <b>2.2.4</b> Stay and suspension-type insulators <b>2.2.5</b> Rotor of a squirrel cage induction motor <b>2.2.6</b> Induction motor body (as per IS specifications) <b>2.2.7</b> Slip rings of a three-phase induction motor <b>2.2.8</b> Sectional view of a three-phase induction motor stator					<b>CO2</b>	
<b>UNIT – III</b>	<b>Introduction to Estimating &amp; Costing</b>				<b>Contact Hours : 12</b>	
<b>3.1</b> Understand the purpose of estimating and costing. <b>3.2</b> Learn about proformas, material schedules, price lists, tender preparation, market surveys, and cost calculations. <b>3.3</b> Study overheads, labor charges, profit margins, purchase procedures, and billing. <b>3.4</b> Explore various wiring systems: cleat, batten, casing-capping, and conduit. <b>3.5</b> Compare wiring types and learn to select and design appropriate systems for domestic and industrial settings.					<b>CO3</b>	

3.6	Learn selection criteria for wires, cables, accessories, and protective devices (MCB, ELCB).	
3.7	Use of wire gauge and reference tables.	
<b>UNIT – IV</b>	<b>Types of Wirings</b>	<b>Contact Hours : 12</b>
4.1	Explore various wiring systems: cleat, batten, casing-capping, and conduit.	<b>CO4</b>
4.2	Compare wiring types and learn to select and design appropriate systems for domestic and industrial settings.	
4.3	Learn selection criteria for wires, cables, accessories, and protective devices (MCB, ELCB).	
4.4	Use of wire gauge and reference tables.	
4.5	Apply standard practices as per IS and IE rules.	
4.6	Plan and design circuits, sub-circuits, and accessory placement.	
4.7	Prepare electrical layouts and cost estimates for single and multi-storey buildings.	
4.8	Estimate overhead and underground service line connections from pole to energy meter for both domestic and industrial applications.	
<b>UNIT – V</b>	<b>Tender Document Preparation</b>	<b>Contact Hours : 12</b>
5.1	Learn the components of a tender document.	<b>CO5</b>
5.2	Understand tender finalization procedures and prepare sample tenders.	
<b>Lecture Hours : 45</b>		<b>Tutorials Hours :15</b>
		<b>Total : 60</b>
<b>Reference Books:</b>		
1. <i>Electrical Engineering Design and Drawings</i> by Surjeet Singh, Dhanpat Rai and Co, New Delhi		
2. <i>Electrical Engineering Design and Drawings</i> by SK Bhattacharya, SK Kataria and Sons, New Delhi		
3. <i>Electrical Engineering Design and Drawings</i> by Ubhi& Marwaha, IPH, New Delhi		
4. <i>Electrical Design and Drawing</i> by SK Sahdev, Uneek Publications, Jalandhar		
5. <i>Electrical Engineering Drawing</i> by Surjit Singh, SK Kataria and Sons, New Delhi		
6. <i>Electrical Installation, Estimating and Costing</i> by JB Gupta, SK Kataria and Sons, New Delhi		

<b>Diploma in Electrical Engineering</b>						
<b>Semester: IV</b>			<b>Course Category Code: PC</b>			
<b>Course Code</b>	<b>Course</b>		<b>Period / Week</b>			<b>Credit</b>
			<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>DEEPC210</b>	<b>INTRODUCTION TO POWER PLANT ENGINEERING</b>		<b>2</b>	<b>0</b>	<b>0</b>	<b>2</b>
<b>Prerequisite</b>	<i>At the end of this course, the students will be able to:</i>				<b>Bloom's Level</b>	
<b>Course Outcome</b>	<b>CO1</b>	<i>Understanding of steam power generation system, their layout and working principle.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>	
	<b>CO2</b>	<i>Understanding of hydro power generation system, their layout and working principle.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>	
	<b>CO3</b>	<i>Understanding of nuclear and diesel power generation system, their layout and working principle.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>	
	<b>CO4</b>	<i>Understanding of gas turbine power generation system, their layout and working principle.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>	
	<b>CO5</b>	<i>Study of conventional and non-conventional energy sources.</i>			<b>K<sub>1</sub>,K<sub>2</sub></b>	
<b>UNIT – I</b>	<b>Steam Power Generation</b>				<b>Contact Hours :06</b>	
Main resources of energy, conventional and non-conventional Different types of power stations-thermal, hydro, gas, diesel and nuclear power stations, comparison of generating stations. Main parts and working of stations-thermodynamic cycles, fuel handling, combustion and combustion equipment, problem of ash disposal, circulating water schemes and supply of makeup water, choice of pressure of steam generation and steam temperature, selection of appropriate vacuum; economizer, air pre-heater feed water heaters and dust collection. Characteristics of turbo alternators, steam power plant heat balance and efficiency.						
<b>UNIT – II</b>	<b>Hydro- Power Generation</b>				<b>Contact Hours :06</b>	
Hydrology, stream flow, hydrograph, flow duration curves. Types of hydroelectric plants and their fields of use, capacity calculations for hydropower, Dams, head water control, penstocks, water turbines, specific speeds, turbine governors. Hydro plant auxiliaries, plant layout, automatic and remote control of hydro plants, pumped storage projects, cost of hydro-electric projects. Cooling of alternators.						
<b>UNIT – III</b>	<b>Nuclear and Diesel Power Generation</b>				<b>Contact Hours :06</b>	
Elements of nuclear power plant, nuclear reactor, fuels, moderators, coolants, control. Classification of nuclear power stations. Cost of nuclear power. Diesel engine performance and operation, Plant layout, Log sheets, applications, selection of engine size.						
<b>UNIT – IV</b>	<b>Gas Turbine Power Generation</b>				<b>Contact Hours :06</b>	
Plant layout, methods of improving output and performance. Fuels and fuel systems. Methods of testing. Open and closed cycle plants. Operating characteristics. Applications. Free piston engine plants, limitation and applications. Non-conventional energy sources.						
<b>UNIT – V</b>	<b>Conventional and Non-Conventional Source of Energy</b>				<b>Contact Hours :06</b>	
Main resources of energy, conventional and non-conventional Introduction, Concept of Solar Energy, Bio Mass Energy, Wind Energy, Tidal Energy, Geothermal Energy, Micro hydel Energy, Biodiesel Energy.						
<b>Lecture Hours :30</b>			<b>Tutorials Hours :00</b>		<b>Total :30</b>	
<b>Reference Books:</b>						
<ol style="list-style-type: none"> <li>1. <i>Electrical Power System by VK Mehta, S Chand and Co., New Delhi</i></li> <li>2. <i>Electrical Power System by JB Gupta, SK Kataria and Sons, New Delhi</i></li> <li>3. <i>Sub-Station Design by Satnam, Dhanpat Rai and Co., New Delhi</i></li> <li>4. <i>Electrical Power Distribution System by AS Pabla, Tata McGraw Hill, New Delhi</i></li> </ol>						

<b>Diploma in Electrical Engineering</b>						
Semester :IV			Course Category Code :PC			
Course Code	Course		Period / Week			Credit
			L	T	P	
DEEPC212	INTRODUCTION TO POWER SYSTEM		3	0	0	3
Prerequisite	<i>At the end of this course, the students will be able to:</i>				Bloom's Level	
Course Outcome	CO1	<i>Select appropriate supporting structures, insulators, conductors, and associated accessories</i>			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>	
	CO2	<i>Design and prepare layout plans, Prepare detailed estimates</i>			K <sub>2</sub> ,K <sub>3</sub>	
	CO3	<i>Operate and maintain both indoor and outdoor substations</i>			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>	
	CO4	<i>Implement various techniques to improve power factor</i>			K <sub>2</sub> ,K <sub>3</sub>	
	CO5	<i>Evaluate revenue and energy losses</i>			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>	
UNIT – I	<b>Transmission System</b>				Contact Hours :08	
1.1 Transmission System Layout and Voltage Selection 1.2 Comparison of AC and DC Transmission Systems 1.3 Constructional Aspects of Transmission Lines 1.4 Mechanical Considerations of Transmission Lines 1.5 Electrical Characteristics of Transmission Lines 1.6 Transmission Losses 1.7 Economic Principles of Transmission 1.8 Kelvin's law, limitation of Kelvin's law modification in Kelvin's law						
UNIT – II	<b>Distribution System</b>				Contact Hours :08	
2.1 Layout and Construction of Distribution Systems 2.2 Estimation for Distribution Line 2.3 Underground Cables: Design and Comparison 2.4 Distribution System Losses 2.5 Fault Detection in Underground Cables						
UNIT – III	<b>Substations</b>				Contact Hours :08	
3.1 Introduction to Substations 3.2 Substation Layout and Components						
UNIT – IV	<b>Power Factor</b>				Contact Hours :08	
4.1 Understanding Power Factor 4.2 Causes and Effects of Low Power Factor 4.3 Methods of Power Factor Improvement						
UNIT – V	<b>Revenue and Energy Loss</b>				Contact Hours :08	
5.1 Understand the concepts of technical losses and commercial losses in power distribution systems. 5.2 Learn methods for calculating input energy and energy sales. 5.3 Analyze key performance indicators such as: 5.3.1 Billing efficiency 5.3.2 Collection efficiency 5.3.3 Total energy billed (kWh) 5.4 Evaluate Aggregate Technical and Commercial (AT&C) losses and their percentage impact on the distribution network.						
Lecture Hours :40			Tutorials Hours :00		Total :40	

**Reference Books:**

1. *Electrical Power System and Analysis* by CL Wadhwa, 3rd edition, New Age International Publishers, New Delhi
2. *Substation Design and Equipment* by Satnam and PV Gupta, Dhanpat Rai & Sons, New Delhi
3. *Electrical Power - I* by SK Sahdev, Uneek Publications, Jalandhar
4. *Electrical Power System* by VK Mehta, S Chand and Co., New Delhi
5. *Electrical Power System* by JB Gupta, SK Kataria and Sons, New Delhi

<b>Diploma in Electrical Engineering</b>					
<b>Semester: IV</b>		<b>Course Category Code :ES</b>			
<b>Course Code</b>	<b>Course</b>	<b>Period / Week</b>			<b>Credit</b>
		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>DES220</b>	<b>CONSERVATIONOF ENERGY</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Prerequisite</b>	<i>At the end of this course, the students will be able to:</i>				<b>Bloom's Level</b>
<b>Course Outcome</b>	<b>CO1</b>	<i>Explain the principles and objectives of energy management and energy auditing.</i>			<b>K<sub>1</sub>,K<sub>2</sub>,K<sub>3</sub></b>
	<b>CO2</b>	<i>Comprehend the different forms and components of energy.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>
	<b>CO3</b>	<i>Recognize electrical and thermal utilities, understand their fundamental operating principles, and assess the performance of related equipment.</i>			<b>K<sub>1</sub>,K<sub>2</sub>,K<sub>3</sub></b>
	<b>CO4</b>	<i>Identify potential areas for energy conservation and implement appropriate methods across various systems.</i>			<b>K<sub>2</sub>,K<sub>3</sub></b>
	<b>CO5</b>	<i>Analyze the techno-economic viability of the adopted energy conservation techniques.</i>			<b>K<sub>1</sub>,K<sub>2</sub>,K<sub>3</sub></b>
<b>UNIT – I</b>	<b>Fundamentals of Energy</b>				<b>Contact Hours :08</b>
<b>1.1</b> Classification of Energy <b>1.2</b> Global Energy Resources and Fuel Reserves <b>1.3</b> Energy Scenario in India and Uttar Pradesh <b>1.4</b> Environmental Impact of Energy Use <b>1.5</b> Introduction to Energy Management, Conservation, and Efficiency <b>1.6</b> Overview of Energy Conservation Laws <b>1.7</b> Energy Standards and Labeling					<b>CO1</b>
<b>UNIT – II</b>	<b>Electrical Supply System and Electric Motors</b>				<b>Contact Hours :08</b>
<b>2.1</b> Overview of Electrical Supply Systems <b>2.2</b> Single Line Diagrams and Interpretation <b>2.3</b> Power Distribution Losses <b>2.4</b> Understanding Electricity Bills					<b>CO2</b>
<b>UNIT – III</b>	<b>Energy Conservation in Electric Machines</b>				<b>Contact Hours: 08</b>
<b>3.1 Transformers:</b> <b>3.1.1</b> Introduction, Types of Losses, Loading <b>3.1.2</b> Energy Saving Measures in Transformer Operation <b>3.2 Electric Motors:</b> <b>3.2.1</b> Types of Motors and Associated Losses <b>3.2.2</b> Characteristics of Energy Efficient Motors <b>3.2.3</b> Motor Loading Estimation and Impact on Efficiency and Power Factor <b>3.2.4</b> Energy Saving Tips for Motors					<b>CO3</b>
<b>UNIT - IV</b>	<b>Energy Conservation Building Code (ECBC)</b>				<b>Contact Hours: 08</b>
<b>4.1</b> Introduction to ECBC and Its Key Features <b>4.2</b> Energy Saving Practices in Buildings: <b>4.2.1</b> New Constructions and Existing Structures					<b>CO4</b>
<b>UNIT - V</b>	<b>General Energy Saving Tips and Energy Audit</b>				<b>Contact Hours: 08</b>
<b>5.1</b> Practical Tips for Energy Saving in: <b>5.1.1</b> Lighting <b>5.1.2</b> Room Air Conditioners <b>5.1.3</b> Refrigerators <b>5.1.4</b> Water Heaters <b>5.2</b> Types of Energy Audits and Methodologies <b>5.3</b> Instruments Used in Energy Auditing <b>5.4</b> Standard Format for Energy Audit Reports					<b>CO5</b>

Lecture Hours :40	Tutorials Hours :00	Total :40
<p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. <i>General Aspects of Energy Management and Energy Audit</i> by Bureau of Energy Efficiency, Government of India. Edition 2015</li> <li>2. <i>Energy Efficiency in Electrical Utilities</i>, by Bureau of Energy Efficiency, Government of India. Edition 2015</li> <li>3. <i>Energy Efficiency in Thermal Utilities</i>, by Bureau of Energy Efficiency, Government of India. Edition 2015</li> </ol>		
<p><b>Text Book:</b></p> <ol style="list-style-type: none"> <li>1. <i>Energy Audit &amp; Environmental Management</i> by Y P Abbi &amp; Shashank Jain published by TERI. Latest Edition</li> </ol>		

## Diploma in Electrical Engineering

Semester: IV		Course Category Code: PC			
Course Code	Course	Period/Week			Credit
		L	T	P	C
<b>DEEPC214</b>	<b>INTRODUCTION TO INDUSTRIAL ELECTRONICS LAB</b>	-	-	2	1
Prerequisite	<i>At the end of this course, the students will be able to:</i>				
<b>Course Outcome</b>	<b>CO1</b>	<i>Use Power diode with load R and R-L.</i>			
	<b>CO2</b>	<i>Use SCR, TRIAC and Diac as per requirement of circuit</i>			
	<b>CO3</b>	<i>Control fan speed using Triac and Quadriac. Control speed of D.C. shunt motor or universal motor</i>			
	<b>CO4</b>	<i>Demonstrate the output wave shape on CRO</i>			
	<b>CO5</b>	<i>Repair UPS and Inverter Maintain storage batteries Maintain panels used in the modern control process</i>			
<b>LIST OF PRACTICALS</b>					
<ol style="list-style-type: none"> <li>1. To draw V-I characteristics of an SCR</li> <li>2. To draw V-I characteristics of a TRIAC</li> <li>3. To draw V-I characteristics of a DIAC</li> </ol>					<b>CO1</b>
<ol style="list-style-type: none"> <li>4. To draw Uni-junction transistor characteristics</li> <li>5. Observe the output wave of an UJT relaxation oscillator</li> </ol>					<b>CO2</b>
<ol style="list-style-type: none"> <li>6. Observe the wave shape across SCR and load of an illumination control circuit</li> </ol>					<b>CO3</b>
<ol style="list-style-type: none"> <li>7. Fan speed regulator using TRIAC Quadriac (fabrication of this circuit)</li> </ol>					<b>CO4</b>
<ol style="list-style-type: none"> <li>8. Speed-control of a DC shunt motor or universal motor</li> <li>9. To observe the output wave shape on CRO of                             <ol style="list-style-type: none"> <li>(a) Single phase half controlled full wave rectifier</li> <li>(b) Single phase controlled rectifier</li> </ol> </li> </ol>					<b>CO5</b>

Diploma in Electrical Engineering						
Semester: IV			Course Category Code: PC			
Course Code	Course		Period / Week			Credit
			L	T	P	C
DEEPC216	DESIGN, DRAWING AND ESTIMATION COSTING OF ELECTRICAL EQUIPMENTS-I LAB		0	0	2	1
Prerequisite	<i>At the end of this course, the students will be able to:</i>					
Course Outcome	CO1	<i>Prepare and respond to tenders</i>				
	CO2	<i>Identify appropriate wiring systems</i>				
	CO3	<i>Develop a detailed cost estimate</i>				
	CO4	<i>Prepare an estimate for a service connection</i>				
	CO5	<i>Prepare an estimate single phase service connection</i>				
<b>LIST OF PRACTICALS</b>						
1. Prepare and respond to tenders for securing jobs or projects in the electrical domain. 2. Symbols and Standard used in Electrical Drawing as per IS specification.					CO1	
3. Identify appropriate wiring systems for various residential and commercial applications. 4. Design and drawing of Residential Electrical Wiring (Single line and Wiring Diagram).					CO2	
5. Develop a detailed cost estimate for electrical installation in a two-room residential building based on the provided layout plan. 6. Design and Drawing of industrial electrical wiring layout.					CO3	
7. Prepare an estimate for a service connection in a residential building, considering the specified connected electrical load. 8. Design and estimation of earthing system (plate and pipe earthing).					CO4	
9. Design and drawing of commercial electrical wiring layout. 10. Estimation and Costing of Single phase service connection.					CO5	

Diploma in Electrical Engineering					
Semester: IV			Course Category: PC		
Course Code	Course	Period / Week			Credit
		L	T	P	C
DEEPC218	ELECTRICAL EQUIPMENT TESTING AND FAULT ANALYSIS	0	0	2	2
Prerequisite	<i>At the end of this course, the students will be able to:</i>				Bloom's Level
Course Outcome	CO1	Understand the importance of electrical safety and apply standard testing procedures in lab and field environments.			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>
	CO2	Demonstrate the ability to conduct basic electrical tests on transformers, motors, and cables using standard instruments.			K <sub>1</sub> ,K <sub>2</sub> ,K <sub>3</sub>
	CO3	Identify and analyze common faults in electrical equipment such as open circuits, short circuits, insulation failure, and earthing issues.			K <sub>2</sub> ,K <sub>3</sub>
	CO4	Operate and test protective devices like fuses, MCBs, and relays and understand their function in preventing equipment damage.			K <sub>2</sub> ,K <sub>3</sub>
	CO5	Record observations, interpret test data, and prepare basic fault diagnosis reports.			K <sub>2</sub> ,K <sub>3</sub>
<b>LIST OF PRACTICALS</b>					
1. Measurement of insulation resistance of a transformer using a megger. 2. Polarity test of a single-phase transformer. 3. Open circuit and short circuit test on transformer.					CO1
1. Winding resistance test of transformer or motor using multimeter. 2. No-load test on a single-phase induction motor.					CO2
1. Continuity and insulation test of electric cable. 2. Fuse testing and replacement procedure. 3. Testing of MCB tripping mechanism.					CO3
1. Earth resistance measurement using earth tester. 2. Continuity test of earthing system.					CO4
1. Testing of relay coil (simple contact operation). 2. Visual inspection of common electrical faults in a circuit.					CO5

<b>Diploma in Electrical Engineering</b>						
<b>Semester: IV</b>			<b>Course Category Code: AU</b>			
<b>Course Code</b>	<b>Course</b>	<b>Period/Week</b>			<b>Credit</b>	
		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>DAU204</b>	<b>UNIVERSAL HUMAN VALUES</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>NC</b>	
<b>Prerequisite</b>	<i>At the end of this course, the students will be able to:</i>				<b>Bloom's Level</b>	
<b>Course Outcome</b>	<b>CO1</b>	<i>Value education is crucial for developing a holistic understanding of human needs and fostering a sense of purpose and harmony.</i>			K <sub>3</sub> ,K <sub>4</sub>	
	<b>CO2</b>	<i>Understanding Harmony in the Human Being - Harmony in Myself!</i>			K <sub>3</sub> ,K <sub>5</sub>	
	<b>CO3</b>	<i>Help students develop self-awareness, understand human relationships, and cultivate responsible, sustainable solutions to life's challenges.</i>			K <sub>3</sub>	
	<b>CO4</b>	<i>A holistic perception of the interconnectedness of all units within the universe.</i>			K <sub>4</sub>	
	<b>CO5</b>	<i>More fulfilling professional lives and contribute to a more harmonious society.</i>			K <sub>3</sub> ,K <sub>4</sub> ,K <sub>5</sub>	
<b>UNIT-I</b>	<b>Course Introduction - Need, Basic Guidelines, Content and Process for Value Education</b>				<b>Contact Hours: 06</b>	
	<ol style="list-style-type: none"> <li>Understanding the need, basic guidelines, content and process for Value Education.</li> <li>Self-Exploration-what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration.</li> <li>Continuous Happiness and Prosperity- A look at basic Human Aspirations.</li> <li>Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority.</li> <li>Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario.</li> <li>Method to fulfill the above human aspirations: understanding and living in harmony at various levels.</li> </ol>				<b>CO1</b>	
<b>UNIT-II</b>	<b>Understanding Harmony in the Human Being - Harmony in Myself!</b>				<b>Contact Hours: 06</b>	
	<ol style="list-style-type: none"> <li>Understanding human being as a co-existence of the sentient 'I' and the material the Body'.</li> <li>Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha.</li> <li>Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)</li> <li>Understanding the characteristics and activities of 'I' and harmony in 'I' .</li> <li>Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail.</li> <li>Programs to ensure Sanyam and Swasthya -Practice Exercises and Case Studies will be taken up in Practice Sessions.</li> </ol>				<b>CO2</b>	
<b>UNIT-III</b>	<b>Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship</b>				<b>Contact Hours: 06</b>	
	<ol style="list-style-type: none"> <li>Understanding human being as a co-existence of the sentient 'I' and the material the Body'</li> <li>Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha.</li> <li>Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)</li> <li>Understanding the characteristics and activities of 'I' and harmony in 'I'</li> <li>Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Swasthya -Practice Exercises and Case Studies will be taken up in Practice Sessions.</li> </ol>				<b>CO3</b>	
<b>UNIT-IV</b>	<b>Understanding Harmony in the Nature and Existence - Whole existence as Coexistence</b>				<b>Contact Hours: 06</b>	
	<ol style="list-style-type: none"> <li>Understanding the harmony in the Nature.</li> <li>Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self-regulation in nature.</li> <li>Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space.</li> <li>Holistic perception of harmony at all levels of existence -Practice Exercises and Case</li> </ol>				<b>CO4</b>	

Studies will be taken up in Practice Sessions		
<b>UNIT-V</b>	<b>Implications of the above Holistic Understanding of Harmony on Professional Ethics</b>	<b>Contact Hours: 06</b>
<ol style="list-style-type: none"> <li>1. Natural acceptance of human values.</li> <li>2. Definitiveness of Ethical Human Conduct.</li> <li>3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order.</li> <li>4. Competence in professional ethics: <ol style="list-style-type: none"> <li>4.1 Ability to utilize the professional competence for augmenting universal human order</li> <li>4.2 Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems.</li> <li>4.3 Ability to identify and develop appropriate technologies and management patterns for above production systems.</li> </ol> </li> <li>5. Case studies of typical holistic technologies, management models and production systems</li> </ol>		<b>CO5</b>
<b>Lecture Hours: 30</b>	<b>Tutorials Hours: 0</b>	<b>Total Hours: 30</b>
<p><b>Reference Books:</b>  In addition, the following reference books may be found useful for supplementary reading in connection with different parts of the course:</p> <ol style="list-style-type: none"> <li>1. B L Bajpai, 2004, <i>Indian Ethos and Modern Management</i>, New Royal Book Co., Lucknow. Reprinted 2008.</li> <li>2. PL Dhar, RR Gaur, 1990, <i>Science and Humanism</i>, Commonwealth Publishers.</li> <li>3. Sussan George, 1976, <i>How the Other Half Dies</i>, Penguin Press. Reprinted 1986, 1991</li> <li>4. Ivan Illich, 1974, <i>Energy &amp; Equity</i>, The Trinity Press, Worcester, and HarperCollins, USA</li> <li>5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III.</li> </ol>		
<p><b>Text Book:</b></p> <ol style="list-style-type: none"> <li>1. <i>The text book (Latest Edition) R.RGaur, R Asthana, G P Bagaria, A foundation course in Human Values and professional Ethics</i>, Excel books, New Delhi.</li> <li>2. <i>The teacher's manual (Latest Edition) R.R Gaur, R Asthana, G P Bagaria</i></li> </ol>		