

# Department of Electrical Engineering



**SEMESTER-I**

**SCHEME -2023**

Shri Vile Parle Kelavani Mandal's  
**SHRI BHAGUBHAI MAFATLAL POLYTECHNIC**

**Learning and Assessment Scheme for Post S.S.C Diploma Programs**

Program Name : Diploma In Electrical Engineering  
 Programme Code : EE With Effect From Academic Year : 2023-24  
 Duration Of Programme : 6 Semester Duration : 16 WEEKS  
 Semester : I Scheme : 2023

Sr No	Course Title & Code	Course Category	IKS (Hrs)	Learning Scheme					Credits	Paper Duration (Hrs.)	Assessment Scheme							Total Marks
				Actual Contact Hrs./Week			Self-Learning (SL) (Term Work + Assignment) (Hrs)	Notional Learning Hrs/Week			Theory (Marks)			Based on LL & TL			Based on Self Learning	
				CL	TL	LL					FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR		
																	Practical (Marks)	
1	Basic Mathematics (BMT230001)	AEC	6	3	2	-	3	8	4	3	30	70	100	25	-	-	25	150
2	Applied Physics (APH230007)	DSC	2	4	-	2	2	8	4	1.5	30	70@	100	25	50	-	25	200
3	Environmental Studies (EVS230003)	VEC	2	2	-	-	2	4	2	-	-	-	-	25	-	-	25	50
4	Universal Human Values (UHV230004)	VEC	1	2	1	-	1	4	2	-	-	-	-	25	-	-	25	50
5	Engineering Drawing (EDG230301)	DSC	2	2	-	4	-	6	3	-	-	-	-	50	25	-	-	75
6	DC Circuit Fundamentals (DCF230302)	DSC	2	3	-	2	1	6	3	3	30	70	100	25	25	-	25	175
7	Electrical Materials & Appliances (EMA230303)	DSC	3	3	-	2	1	6	3	3	30	70	100	25	-	25	25	175
<b>Total</b>			<b>18</b>	<b>19</b>	<b>3</b>	<b>10</b>	<b>10</b>	<b>42</b>	<b>21</b>	No. of paper = 4	<b>120</b>	<b>280</b>	<b>400</b>	<b>200</b>	<b>100</b>	<b>25</b>	<b>150</b>	<b>875</b>

**Abbreviations :** IKS - Indian Knowledge System, CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment, SA -Summative Assessment, SLA - Self Learning Assessment, TH-Theory, PR- Practical, OR-Oral **Legends :** @ Online Examination-

**Note :**

- FA-TH represents average of two class tests of 30 marks each conducted during the semester.
  - If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
  - If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
  - Notional Learning hours for the semester are (CL+TL+LL+SL)Hrs. x 15 Weeks
  - 1 credit is equivalent to 30 Notional Hrs.
  - \* Self learning hours shall not be reflected in the Time Table.
  - SA-PR,SA-OR. Assessed by Internal and External Examiners Jointly FA-PR, SLA: Assessed by Internal Examiner Only
- Course Category :** Discipline Specific Course Core (DSC) : 4, Discipline Specific Elective (DSE) : 0, Value Education Course (VEC) : 2, Intern./Apprenti./Project/Community (INP) : 0, Ability Enhancement Course (AEC) : 1, Skill Enhancement Course (SEC) : 0, Generic Elective (GE) : 0

Head of Department

Controller of Examination

Secretary CDC



Principal

## 1. COURSE DETAILS

<b>Programme: CE/ME/EE/PE/CH/EXTC</b>	<b>Semester: I</b>
<b>Course: Basic Mathematics</b>	<b>Course Category: AEC</b>
<b>Course Code: BMT230001</b>	<b>Duration:16 Weeks</b>

## 2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Paper Duration (Hrs.)	Assessment Scheme							Total Marks
Actual Contact Hrs./Week			Self-Learning (SL <sup>^</sup> ) (Term Work + Assignment) (Hrs)			Theory (Marks)			Based on LL & TL			Based on Self Learning	
CL	TL	LL				FA-TH	SA-TH	Total	Practical (Marks)				
									FA-PR	SA-PR	SA-OR	SLA (Marks)	
3	2	-	3	4	3	30	70	100	25	-	-	25	150

**Total IKS Hrs for the course :06**

## 3. COURSE OBJECTIVE

This Course is being introduced to provide mathematical background needed for any Diploma engineer. It intends to enable the students to apply basic facts, concepts and principles of algebra, trigonometry, Determinants, Matrices, functions and Limits as a tool to analyse engineering problems.

## 4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- **Solve broad-based Engineering problems using the Basic Knowledge of mathematics**

**5. COURSE OUTCOMES (COs):** At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Apply the concepts of algebra to solve engineering related problems.
CO2	Utilize basic concepts of trigonometry to solve elementary engineering problems.
CO3	Solve problems based on Determinants and Matrices.
CO4	Understand the concept of function and limits and apply them into engineering



## 6. CO-PO, CO- PSO MAPPING TABLE- CIVIL ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Basic Mathematics (BMT230001)	CO1	3	1	1	-	1	-	2	2	1
	CO2	3	2	2	2	1	2	2	2	2
	CO3	2	1	1	-	1	-	1	1	1
	CO4	2	1	-	-	1	-	2	1	1
	CO Avg.	2.5	1.25	1.33	2	1	2	1.75	1.5	1.25

## CO-PO, CO- PSO MAPPING TABLE- MECHANICAL ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Basic Mathematics (BMT230001)	CO1	3	1	1	-	1	-	2	-	1
	CO2	3	2	2	2	1	2	2	1	1
	CO3	2	1	1	-	1	-	1	1	1
	CO4	2	1	-	-	1	2	2	-	1
	CO Avg.	2.5	1.25	1.33	2	1	2	1.75	1	1



**CO-PO, CO- PSO MAPPING TABLE- ELECTRICAL ENGINEERING**

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Basic Mathematics (BMT230001)	CO1	3	1	1	-	1	-	2	-	1
	CO2	3	2	2	2	1	2	2	1	1
	CO3	2	1	1	-	1	-	1	1	1
	CO4	2	1	-	-	1	-	2	-	1
	CO Avg.	2.5	1.25	1.33	2	1	2	1.75	1	1

**CO-PO, CO- PSO MAPPING TABLE- PLASTICS ENGINEERING**

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
Basic Mathematics (BMT230001)	CO1	3	1	1	-	1	-	2	-	-	-
	CO2	3	2	2	2	1	2	2	1	1	-
	CO3	2	1	1	-	1	-	1	-	-	-
	CO4	2	1	-	-	1	2	2	1	1	-
	CO Avg.	2.5	1.25	1.33	2	1	2	1.75	1	1	-



**CO-PO, CO- PSO MAPPING TABLE- CHEMICAL ENGINEERING**

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Basic Mathematics (BMT230001)	CO1	3	1	1	-	1	-	2	-	-
	CO2	3	2	2	2	1	2	2	1	1
	CO3	2	1	1	-	1	-	1	-	-
	CO4	2	1	-	-	1	2	2	3	1
	CO Avg.	2.5	1.25	1.33	2	1	2	1.75	2	1

**CO-PO, CO- PSO MAPPING TABLE- ELECTRONICS AND TELECOMMUNICATIONS ENGINEERING**

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Basic Mathematics (BMT230001)	CO1	3	1	1	-	1	-	2	1	1
	CO2	3	2	2	2	1	2	2	2	2
	CO3	2	1	1	-	1	-	1	1	1
	CO4	2	1	-	-	1	-	2	1	1
	CO Avg.	2.5	1.25	1.33	2	1	2	1.75	1.25	1.25



## 7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic
I	<b>Logarithm</b> 1.1 Concept 1.2 Basic Laws of logarithm (without proof) 1.3 Numerical on Change of Base (without proof) 1.4 Calculation in Indian Knowledge System (Vedic Mathematics)
II	<b>Partial Fraction</b> 2.1 Introduction: Proper and improper fractions 2.2 Type 1: Non-repeated linear factor 2.3 Type 2: Repeated linear factor 2.4 Type 3: Irreducible quadratic form 2.5 Examples using Substitution 2.6 The knowledge of fraction in Indian Knowledge System (The fractions one-half (ardha) and three-fourths (tri-pada))
III	<b>Straight Lines</b> 3.1 Revision: Slope of straight lines 3.2 Revision: Various form of Straight lines 3.3 General equation of line and its relation to standard form 3.4 Angle between two lines 3.5 Condition of parallel and perpendicular lines 3.6 Perpendicular distance from a point on the line 3.7 Perpendicular distance between two parallel lines 3.8 Geometry in Sulabasutras in Indian Knowledge System (construction of square, circling the square). (Indian Mathematics).
IV	<b>Trigonometry</b> 4.1 Revision of Trigonometry Formulas 4.2 Trigonometric ratios of Compound, allied, multiple and sub-multiple angles (without proofs) 4.3 Factorization and de-factorization formulae (without proofs) 4.4 Inverse Trigonometric function 4.5 Principle values and Relation between Trigonometric and Inverse Trigonometric function 4.6 Trigonometry in Indian Knowledge System: Pythagorean triples in Sulabasutras



<b>V</b>	<p><b>Determinants &amp; Matrices</b></p> <p>5.1 Revision: Determinants of 2 x 2 order  5.2 Value of Determinants of 3 x 3 order  5.3 Cramer's rule to solve three unknowns  5.4 Introduction to Matrices  5.5 Algebra of Matrices  5.6 Transpose, Adjoint and Inverse of Matrices  5.7 Solution of simultaneous equation by Matrix inversion method. (2 and 3 Unknowns  5.8 Algebra in Indian Knowledge System: Solution of simultaneous equations (Indian Mathematics)</p>
<b>VI</b>	<p><b>Function and Limits</b></p> <p>6.1 Introduction and Definition  6.2 Simple Numerical based on concept of function  6.3 Odd and Even Functions  6.4 Introduction and Definition  6.5 Concepts of limits  6.6 Limits of algebraic, trigonometric, exponential and logarithmic Functions  6.7 Calculus in Indian Knowledge System: The discovery of Calculus by Indian Astronomers</p>

## 8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of –10 Tutorials..

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	CO
1	Tutorials on Logarithms based on laws and change of base.	2	CO1
2	Tutorials on partial fraction (Non-repeated and repeated linear factor)	2	CO1
3	Tutorials on partial fraction (Irreducible quadratic form and using Substitution)	1	CO1
4	Tutorials on straight lines. (General equation of line and Angle between two lines)	2	CO1
5	Tutorials on straight lines. (Condition of parallel and perpendicular lines Perpendicular distance from a point on the line	2	CO1
6	Tutorials on trigonometric. (Trigonometric ratios of Compound, allied, multiple and sub-multiple angles.	3	CO2
7	Tutorials on factorization and de-factorization formulae	3	CO2
8	Tutorials on trigonometric. (Inverse Trigonometric function)	3	CO2





9	Tutorials on Determinates. (Basic solving and Cramer's rule)	2	CO3
10	Tutorials on matrices. (Algebra of Matrices ,Transpose, Adjoint and Inverse of Matrices)	1	CO3
11	Practicing matrices and on Sci-Lab.	4	CO3
12	Tutorials on function. (Types of functions)	2	CO4
13	Tutorials on Limits. (Limits of algebraic, trigonometric, exponential and logarithmic functions)	3	CO4
<b>TOTAL</b>		30	

### 9. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITES FOR SPECIFIC LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

- Assignment
  - Collect example based on real world application of logarithm & prepare pdf file
  - Represent the graph of Trigonometric function, Logarithmic function on Geogebra & make a pdf file
- Mathematical programming using Sci-Lab (Addition, subtraction, multiplication, algebra of matrices etc.)

### 10. IMPLEMENTATION STRATEGY (PLANNING)

- Teaching Plan
- Minimum no of practical/assignments.
- Guest/Expert Lectures
- Self-learning Online Resources.

### 11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Calculus for Polytechnics	Shri. S.P.Deshpande	Pune Vidyarthi Graha Prakashan Pune-30
2	Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna Publishers 2/B, Delhi-6
3	Dutta. D	A text book of Engineering Mathematics	New age publication New Delhi
4	Basic Mathematics	G.V.Kumbhojkar	P.Jamnadas LLP

### 12 LEARNING WEBSITE & PORTALS (minimum 5)

- [www.mic-mathematics.com](http://www.mic-mathematics.com)
- [www.math.com](http://www.math.com)
- [www.lernerstv.com](http://www.lernerstv.com)
- [www.onlinetutorials.com](http://www.onlinetutorials.com)
- [www.mathplanet.com](http://www.mathplanet.com)



### 13. ASSESSMENT METHODOLOGIES/TOOLS

#### Formative Assessment (Assessment for Learning)

1. Test
2. Rubrics for Cos Assignment
3. Self-learning
4. Term work

#### Summative Assessment (Assessment of Learning)

1. End Term Exam
2. Tutorials Performance

### 14. SUGGESTED WEIGHTAGE FOR LEARNING EFFORTS & ASSESMENT PURPOSE (Specification Table)

Unit No.	Unit Title	Aligned COs	Learning Hours	Distribution of Theory Marks			
				R Level	U Level	A Level	Total Marks
I	Logarithm	CO1	3	2	2	-	4
II	Partial Fraction	CO1	4	4	4	-	8
III	Straight Lines	CO1	5	2	2	4	8
IV	Trigonometry	CO2	12	2	8	6	16
V	Determinants & Matrices	CO3	12	6	8	4	18
VI	Function & Limits	CO4	9	2	8	6	16
GRAND TOTAL			45	18	32	20	70

#### R Remember, U Understand, A Apply and above, (Bloom's revised taxonomy levels)

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

### 15. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Dr. Kavita Dange
2	Internal	Mr. Akhileshwar Singh
3	External	Prof. Taqdis Pawale
		Organization: Mithibai Degree College, Vile Parle, Mumbai



## 1. COURSE DETAILS

<b>Programme: CE/ME/EE/PE/CH/EXTC</b>	<b>Semester: I / II</b>
<b>Course: APPLIED PHYSICS</b>	<b>Course Category: DSC</b>
<b>Course Code:APH230007</b>	<b>Duration:16 Weeks</b>

## 2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme								
Actual Contact Hrs./Week			Self-Learning (SL <sup>^</sup> ) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
CL	TL	LL				FA-TH	SA-TH	Total	Practical (Marks)				
									FA-PR	SA-PR	SA-OR		
4	-	2	2	4	1.5	30	70 @	100	25	50	-	25	

**Total IKS Hrs for the course :02**

## 3. COURSE OBJECTIVE

Diploma engineers have to deal with various materials, instruments and machines. This course is designed with some fundamental information to help the diploma engineers apply the basic concepts and principles of physics to solve broad based engineering problems. The study of basic principles of physics and the concepts related to properties of materials, heat, acoustics, electricity, magnetism, optics, semiconductors help in understanding the engineering courses where emphasis is on the applications of these in engineering.

## 4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- Solve broad-based engineering problems applying basic concepts and principles of physics.

**5. COURSE OUTCOMES (COs):** At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Estimate errors in measurement of physical quantities.
CO2	List the use of physical properties of different materials.
CO3	Use the basic principles of elasticity, surface tension, viscosity, heat and optics in related engineering applications.
CO4	Apply the principles and concepts of electricity, magnetism, sound to solve engineering problems.



## 6. CO-PO, CO- PSO MAPPING TABLE

### Civil Engineering:

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
<b>APPLIED PHYSICS (APH230007)</b>	CO1	3	2	-	3	-	-	-	1	-
	CO2	3	2	1	1	-	-	-	1	-
	CO3	3	2	-	2	-	-	-	1	-
	CO4	3	2	1	3	-	-	-	1	-
	<b>CO Avg.</b>	<b>3.00</b>	<b>2.00</b>	<b>1.00</b>	<b>2.25</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1.00</b>	<b>-</b>

### Mechanical Engineering:

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
<b>APPLIED PHYSICS (APH230007)</b>	CO1	3	2	-	3	-	-	-	1	1
	CO2	3	2	1	1	-	-	-	1	1
	CO3	3	2	-	2	-	-	-	1	1
	CO4	3	2	1	3	-	-	-	1	1
	<b>CO Avg.</b>	<b>3.00</b>	<b>2.00</b>	<b>1.00</b>	<b>2.25</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1.00</b>	<b>1.00</b>

### Electrical Engineering:

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
<b>APPLIED PHYSICS (APH230007)</b>	CO1	3	2	-	3	-	-	-	1	-
	CO2	3	2	1	1	-	-	-	1	-
	CO3	3	2	-	2	-	-	-	1	-
	CO4	3	2	1	3	-	-	-	1	-
	<b>CO Avg.</b>	<b>3.00</b>	<b>2.00</b>	<b>1.00</b>	<b>2.25</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1.00</b>	<b>-</b>



**Plastics Engineering:**

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
<b>APPLIED PHYSICS (APH230007)</b>	CO1	3	2	-	3	-	-	-	1	-	1
	CO2	3	2	1	1	-	-	-	1	-	1
	CO3	3	2	-	2	-	-	-	1	-	1
	CO4	3	2	1	3	-	-	-	1	-	1
	<b>CO Avg.</b>	<b>3.00</b>	<b>2.00</b>	<b>1.00</b>	<b>2.25</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1.00</b>	<b>-</b>	<b>1.00</b>

**Chemical Engineering:**

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
<b>APPLIED PHYSICS (APH230007)</b>	CO1	3	2	-	3	-	-	-	1	-
	CO2	3	2	1	1	-	-	-	1	-
	CO3	3	2	-	2	-	-	-	1	-
	CO4	3	2	1	3	-	-	-	1	-
	<b>CO Avg.</b>	<b>3.00</b>	<b>2.00</b>	<b>1.00</b>	<b>2.25</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1.00</b>	<b>-</b>

**Electronics and Telecommunications Engg:**

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
<b>APPLIED PHYSICS (APH230007)</b>	CO1	3	2	-	3	-	-	-	1	1
	CO2	3	2	1	1	-	-	-	1	1
	CO3	3	2	-	2	-	-	-	1	1
	CO4	3	2	1	3	-	-	-	1	1
	<b>CO Avg.</b>	<b>3.00</b>	<b>2.00</b>	<b>1.00</b>	<b>2.25</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>1.00</b>	<b>1.00</b>



## 7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic
I	<p><b>1. Measurement and errors</b></p> <p>1.1 Fundamental, Derived, Supplementary SI units.</p> <p>1.2 Accuracy and Precision in Measurement.</p> <p>1.3 Significant figures in measured quantities.</p> <p>1.4 Dimensions, dimensional formula.</p> <p>1.5 Errors, types of errors, instrumental, systematic and random error, estimation of errors: absolute, relative and percentage error.</p>
II	<p><b>2. Properties of matter : Elasticity , Surface Tension and Viscosity</b></p> <p><b>2.1 Elasticity:</b></p> <p>2.1.1 Deforming force, restoring force, elastic and plastic body.</p> <p>2.1.2 Stress and strain with their types.</p> <p>2.1.3 Elastic limit, Hooke's law.</p> <p>2.1.4 Moduli of elasticity, Constants of elasticity by Searle's method.</p> <p>2.1.5 Stress-strain diagram, behavior of wire under continuously increasing load.</p> <p>2.1.6 Definition of yield point, ultimate stress, factor of safety.</p> <p>2.1.7 Numerical on stress, strain and Young's modulus.</p> <p><b>2.2 Surface Tension :</b></p> <p>2.2.1 Molecular force, cohesive and adhesive force, molecular range, sphere of influence.</p> <p>2.2.2 Definition of surface tension and its S.I. unit, angle of contact.</p> <p>2.2.3 Capillary action with examples, shape of meniscus for water and mercury.</p> <p>2.2.4 Relation between surface tension, capillary rise and radius of capillary (no derivation).</p> <p>2.2.5 Effect of impurity and temperature on surface tension,</p> <p>2.2.6 Numerical on relation between surface tension, capillary rise and radius.</p> <p><b>2.3 Viscosity :</b></p> <p>2.3.1 Fluid friction, viscous force.</p> <p>2.3.2 Definition of viscosity, velocity gradient.</p> <p>2.3.3 Newton's law of viscosity, Definition coefficient of viscosity and its S.I. unit.</p> <p>2.3.4 Streamline and turbulent flow with examples, critical velocity.</p> <p>2.3.5 Variation of viscosity with temperature.</p> <p>2.3.6 Reynolds number and its significance.</p>
III	<p><b>3. Heat and Temperature, Sound , ultrasonic and acoustics</b></p> <p><b>3.1 Heat :</b></p> <p>3.1.1 Conduction, convection and radiation, good and bad conductor of heat with examples.</p> <p>3.1.2 Law of thermal conductivity, coefficient of thermal conductivity and its S.I. unit.</p> <p><b>3.2 Temperature :</b></p> <p>3.2.1 Boyle's law, Charle's law, Gay Lussac's law.</p> <p>3.2.2 Absolute zero temperature, Kelvin scale of temperature, general gas equation (statement only).</p> <p>3.2.3 Temperature measurement: Optical pyrometer, Thermoelectric thermometer.</p> <p><b>3.3 Simple Harmonic Motion :</b></p> <p>3.3.1 circular motion motion, periodic, Vibrational motion ( definition with examples ),</p> <p>3.3.2 Simple Harmonic Motion (S.H.M.) (Definition), Characteristics of S.H.M., Amplitude, Frequency, Period of S.H.M.</p> <p>3.3.3 General equations of (S.H.M.) ( no derivation), Graphical representation of S.H.M. (only diagram), Phase of S.H.M., Epoch or phase constant of S.H.M. (definition), Numerical on amplitude, frequency and period of S.H.M.</p>



	<p><b>3.4 Wave Motion:</b></p> <p>3.4.1 Definition of Wave motion, amplitude, period, frequency and wavelength, Relation between velocity, frequency, and wavelength, Equation of progressive wave (no derivation).</p> <p>3.4.2 Longitudinal and transverse wave, Definition and formation of stationary wave, Definition of Node, Antinode, Free vibration, Forced vibration and Resonance</p> <p>3.4.3 Velocity of sound by resonance tube, Frequency of A.C. Supply by Sonometer, Numerical on relation <math>v = n\lambda</math> and resonance.</p> <p><b>3.5 Acoustics and Reverberation:</b></p> <p>3.5.1 Definition of Echo, Reverberation, Reverberation time, Sabine's formula (no derivation), Definition of Absorption coefficient, Open window unit (OWU), Absorption coefficient.</p> <p>3.5.2 Essential features for good acoustics or acoustical planning, ULTRASONIC- Production and uses, Sonic, Subsonic, Supersonic, Numerical problems.</p> <p>3.5.3 <b>IKS: Scientific constructions in India:</b> Ancient classification of towns in India: 8 types</p> <ul style="list-style-type: none"> <li>• Dandaka</li> <li>• Sarvatobhadra</li> <li>• Nandyavarta</li> <li>• Padmaka</li> <li>• Swastika</li> <li>• Prasatara</li> <li>• Chaturmukha</li> <li>• Karmula.</li> </ul>
<p><b>IV</b></p>	<p><b>4.OPTICS</b></p> <p><b>4.1 Photoelectric effect :</b></p> <p>4.1.1 Statement of photoelectric effect, Planck's hypotheses,</p> <p>4.1.2 Einstein's equation, Definition: Threshold wavelength, Threshold frequency, Work function.</p> <p>4.1.3 Study of experimental set up for study of photoelectric effect, Study of factors on which photoelectric effect depend on. Definition: Stopping potential, Characteristics of photoelectric effect.</p> <p>4.1.4 Photocells: Photo emissive, photoconductive, photovoltaic.</p> <p>4.1.5 Engineering applications.</p> <p>4.1.6 Numerical on energy of photon, work function, Einstein's equation.</p> <p><b>4.2 Interference :</b></p> <p>4.2.1 Interference of light, Interference pattern. Constructive interference, Destructive interference. Steady interference of light.</p> <p>4.2.2 Conditions for steady interference pattern</p> <p>4.2.3 Newton's rings, Newton's rings setup, Wavelength of source of light (No derivation)</p> <p>4.2.4 Optical flatness,</p> <p>4.2.5 Engineering Applications.</p> <p><b>4.3 Diffraction :</b></p> <p>4.3.1 Diffraction of light, Diffraction at a slit,</p> <p>4.3.2 Diffraction Grating, Characteristics of grating spectra.</p> <p><b>4.4 Polarization :</b></p> <p>4.4.1 Polarization of light, Definition : Plane of polarization, plane of vibration, Explanation of polarization of light,</p> <p>4.4.2 Nicol prism.</p>



<b>V</b>	<p><b>5.0 ELECTRICITY AND MAGNETISM</b></p> <p><b>5.1 Coulomb's law , Intensity and Potential :</b> Coulomb's inverse square law for electric charges, Electric fields, Intensity of electric field, Electric line of forces, Properties of electric line of forces, Electric flux, Electric flux density, Relation between flux density and Intensity of electric field, Electric potential, Absolute electric potential, Numerical problems.</p> <p><b>5.2 Capacitor:</b> 5.2.1 Capacity of conductor, Definition: Capacitance, Farad, 5.2.2 Capacitance of Spherical conductor, Principle of capacitor (condenser), Capacitors in series and parallel, Expression for the energy stored, Numerical on capacitor.</p> <p><b>5.3 Current electricity:</b> Ohm's law, Resistance, Specific resistance, Combination of resistances, e.m.f. and p.d., Temperature coefficient of resistance, Potentiometer, Applications, Numerical problems on specific resistances.</p> <p><b>5.4 Magnetic materials:</b> Modern concepts of magnetism, Dia, Para, Ferromagnetism, Testing of magnetic materials.</p>
<b>VI</b>	<p><b>6. MODERN PHYSICS</b></p> <p><b>6.1 Crystal Structure: Space</b> lattice, Unit cell, Cubic Crystal Structures- Simple cubic.(S.C.), Body centered cubic(B.C.C.), Face centered cubic(F.C.C.), Number of atoms per unit cell, Atomic radius, Co-ordination number, Packing density, Atomic planes and spacing, Miller indices.</p> <p><b>6.2 Lasers: Elementary</b> idea, Spontaneous and Stimulated emissions, population inversion, pumping methods, Helium-neon laser construction and working.</p> <p><b>6.3 Bhor's theory of hydrogen atom:</b> Structure of atom, Bohr's postulates and Atom model, Hydrogen spectrum and Rydberg constant.</p> <p><b>6.4 Fiber optics:</b> Total internal reflection, optical fiber-step index and graded index, Applications.</p> <p><b>6.5 SUPERCONDUCTIVITY AND NANOTECHNOLOGY</b></p> <p><b>6.5.1 Super conductivity :</b> Principle of superconductivity, zero ohm resistance, Meissner effect, Properties and Applications.</p> <p><b>6.5.2 Nanotechnology:</b> Nano – Technology, Nano – science, Nano – materials, Nano – machines, Instruments being used in Nano – technology, Five generation of Nano – technology, Carbon allotropes, Applications.</p>

## 8. LIST OF PRACTICALS:

Term Work consists of Journal containing minimum no of 10 experiments and 03 Demonstrations.

Sr. No.	Title of Experiment/Demonstrations	Approx.Hrs required	COs
1.	Use of Measuring Instruments – Vernier Callipers, Micrometer Screw Gauge , Spherometer.	2	CO1
2.	Determine the Elastic constant by Searle's metod.	2	CO2
3.	Determine the Surface tension by Capillary rise method.	2	CO2
4.	Determine the Viscosity by Poiseuille's method.	2	CO2
5.	Determine the Thermal conductivity of a good conductor by Searle's Apparatus.	2	CO2
6.	Determine the Velocity of sound by Resonance.	2	CO2
7.	Determination Frequency of A.C. Supply by Sonometer .	2	CO4
8.	Determine the Wavelength of Light by Diffraction Grating.	2	CO3





9.	Determine the Wavelength of Laser Beam (He – Ne) by Diffraction Grating.	2	CO4
10.	Verify the packing density of SC,BCC and FCC.	2	CO4
11.	Use of Potentiometer (Principle and operation)	1	CO2
12.	Calibrate voltmeter by using potentiometer.	2	CO4
13.	Determine the Refractive Index of a given material by Spectrometer.	2	CO4
	<b>Demonstrations</b>		
(i)	Optical Pyrometer	1	CO2
(ii)	Spectra of Ionized Gases.	1	CO3
(iii)	Study of Photocell.	1	CO3
(iv)	Study of Newton's Rings.	1	CO3
(v)	Study of Para and Diamagnetism by Electromagnet.	1	CO4
	<b>TOTAL</b>	<b>30</b>	

### 9. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITES FOR SPECIFIC LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

Assessment to be based on one of the following tools and rubrics for evaluation of SLA to be well defined by course teacher.

1. Micro-Project
3. Model/Chart making
4. Quiz
5. Assignment

#### List of Assignment/Mini Projects (any 5)

1. Convert units of a given physical quantity from one system to another
2. Prepare a chart to summaries the units and dimensions
3. Prepare chart of Different materials with property of elasticity, surface tension and viscosity respectively
4. Prepare model of different thermocouples
5. Prepare model for model for combination of series and parallel resistances.
6. Develop potentiometer model
7. Prepare model of SC, BCC and FCC respectively

### 10. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments.
3. Guest/Expert lectures
4. Demonstrations
5. Slides
6. Self-Learning Online Resources

### 11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Engineering Physics	R.K. Gaur and S.L. Gupta	Dhanpat Rai Publishing Co. New Delhi
2	Physics for Engineers	M.R.Shrinivasan	New Age International , New Delhi
3	A Text Book of Engineering Physics	P.G.Kshirsagar and M.N.Avandhunulu	S. CNHAND & CO. LTD.



## 12 LEARNING WEBSITE & PORTALS

1. <https://www.physicsclassroom.com>
2. <https://www.khanacademy.org>
3. <https://www.howstuffworks.com>
4. <https://www.libretexts.org>
5. <https://www.idc-online.com>

## 13. ASSESMENT METHODOLOGIES/TOOLS

### Formative Assessment (Assessment for Learning)

1. Test
2. Rubrics for COs Assignment
3. Self-Learning
4. Term Work
5. Seminar/Presentation

### Summative Assessment (Assessment of Learning)

1. End Term Exam
2. Micro-project
3. Tutorial Performance

## 14. SUGGESTED WEIGHTAGE FOR LEARNING EFFORTS & ASSESMENT PURPOSE (Specification Table)

Unit No.	Unit Title	Aligned COs	Learning Hours	Distribution of Theory Marks			
				R Level	U Level	A Level	Total Marks
I	Measurement and errors	CO1	04	01	01	02	04
II	Properties of matter : elasticity , surface tension and viscosity	CO2 CO3	12	03	05	05	13
III	Heat and temperature, sound , ultrasonic and acoustics	CO2,CO3	14	06	06	06	18
IV	Optics	CO2,CO3	10	03	04	04	11
V	Electricity and magnetism	CO2,CO4	10	02	04	04	10
VI	Modern physics	CO2, CO3 CO4	10	04	04	06	14
<b>GRAND TOTAL</b>			60	19	24	27	70

### R Remember, U Understand, A Apply and above, (Bloom's revised taxonomy levels)

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 15. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mr. Suresh Sukhadeo Salve
2	Internal	Mr. Ajinkya Jogle
3	External	Mrs. Sunita Thorat
		Organization: Government Polytechnic , Mumbai



## 1. COURSE DETAILS

<b>Programme: CE/ME/EE//PE/CH/EXTC</b>	<b>Semester: I</b>
<b>Course: Environmental Studies</b>	<b>Course Category: VEC</b>
<b>Course Code: EVS230003</b>	<b>Duration:16 Weeks</b>

## 2.. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Paper Duration (Hrs.)	Assessment Scheme							Total Marks
Actual Contact Hrs./Week			Self-Learning (SL <sup>^</sup> ) (Term Work + Assignment) (Hrs)			Theory (Marks)			Based on LL & TL			Based on Self Learning	
CL	TL	LL				FA-TH	SA-TH	Total	Practical (Marks)			SLA (Marks)	
									FA-PR	SA-PR	SA-OR		
2	-	-	2	2	-	-	-	25	-	-	25	50	

**Total IKS Hrs. for the course :02**

## 3. COURSE OBJECTIVE

Environmental Sciences is a multidisciplinary course aimed to impart knowledge about the current situation and future prospects of nature and natural resources. It is designed to create awareness of ecosystems of the world, earth's resources –renewable and non-renewable, health benefits of nature and adverse effects with depletion of environment. Such a knowledge can encourage today's generation to switch to safer and better choices.

Environmental education makes people understand the importance of renewable energy. Nonrenewable sources of energy like petrol, diesel etc. are the major sources of the world's pollution. Using renewable sources like solar energy, wind energy etc. is encouraged by Environment Education, and is imperative in our fight against global warming

## 4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- Sense of social responsibility.
- Communication and analytical skills.
- Ability to apply knowledge and skills in real-world settings.
- Competence in developing arguments from scientific, ethical and philosophical perspective.



**5. COURSE OUTCOMES (COs):** At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Identify and classify different natural resources and use them prudently.
CO2	Recognize, categorize the different ecosystems and understand the importance of a balanced ecosystem.
CO3	Estimate the importance of biodiversity and its conservation.
CO4	Judge the type of pollution, identify the pollutants, causes, effects and develop methods to reduce the same.
CO5	Use the information regarding environmental legislation to improve upon their surroundings for the betterment of the community.

**6. CO-PO, CO- PSO MAPPING TABLE**

**A. CIVIL ENGINEERING**

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Environmental Studies (EVS230003)	CO1	2		1		3		1	1	
	CO2					2				
	CO3			3		2		1	1	
	CO4	2		2		2	1	1	1	1
	CO5		1	2		2	1			1
	CO Avg.	2	1	2		2.2	1	1	1	1

**B. MECHANICAL ENGINEERING**

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Environmental Studies (EVS230003)	CO1	2		1		3			1	
	CO2					2				
	CO3			3		2			1	
	CO4		1	2		2	1		1	
	CO5	2		2		2	1	1		
	CO Avg.	2	1	2		2	1	1	1	



### C. ELECTRICAL ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Environmental Studies (EVS230003)	CO1	2		1		3		1		1
	CO2					2				
	CO3			3		2		1		
	CO4	2		2		2	1	1		1
	CO 5		1	2		2	1			1
	CO Avg.	2	1	2		2.2	1	1		1

### D. PLASTICS ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
- Environmental Studies (EVS230003)	CO1	2		1		3			1		
	CO2					2					
	CO3			3		2			1		1
	CO4		1	2		2	1		1		1
	CO5	2		2		2	1	1			1
	CO Avg.	2	1	2		2.2	1	1	1		1

### E. CHEMICAL ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
- Environmental Studies (EVS230003)	CO1	3				2		1	1	
	CO2	3				2		1		
	CO3	.3		1	1	2		1	1	
	CO4	.3		1	1	2	1	1	1	
	CO 5	3		1		2	1	1	1	
	CO Avg.	3		1	1	2	1	1	1	



## F. ELECTRONICS AND TELECOMMUNICATIONS ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Environmental Studies (EVS230003)	CO1	2		1		3		1		1
	CO2					2				
	CO3			3		2		1		
	CO4	2		2		2	1	1		1
	CO5		1	2		2	1			1
	<b>CO Avg.</b>	<b>2</b>	<b>1</b>	<b>2</b>		<b>2.2</b>	<b>1</b>	<b>1</b>		<b>1</b>

## 7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	CO	Hours
I	<p><b>1. The Multidisciplinary nature of environmental studies:</b></p> <p>1.1 Definition, scope and importance Need for public awareness</p> <p><b>1.2 Natural Resources: Renewable and non-renewable resources:</b> Natural resources and associated problems</p> <p><b>1.2.1 Forest resources:</b> Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forest and tribal people.</p> <p><b>1.2.2 Water resources:</b> Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams' benefits and problems.</p> <p><b>1.2.3 Mineral resources:</b> Use and exploitation, environmental effects of extracting and using mineral resources.</p> <p><b>1.2.4 Food resources:</b> World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.</p> <p><b>1.2.5 Land resources:</b> Land as a resource, land degradation, man induced landslides, soil erosion and desertification.</p> <p><b>1.3 Energy resources:</b></p> <p><b>1.3.1 Renewable Energy Resources</b> – Biogas, Solar energy, Wind energy, Energy from falling water, Energy from wastes and tidal energy.</p> <p><b>1.3.2 Non-Renewable Energy Resources</b> – Coal, Oil, Natural gas Issue of economic viability and ability to meet demands. Inequitable use of energy in urban and rural areas</p>	CO 1	6
II	<p><b>2. Eco Systems:</b></p> <p>2.1 Concept of ecosystem</p> <p>2.2 Major ecosystems in the world.</p> <p><b>2.3 IKS-Traditional Knowledge Systems, Culture and Environmental Sustainability: Concepts of India.</b></p>	CO 2	4



<b>III</b>	<b>3. Biodiversity and Its Conservation</b> 3.1 Concepts 3.2 Threats to biodiversity 3.3 Value and conservation of biodiversity  3.4 Indian agricultural tradition living in harmony with nature its flora	CO 3	4
<b>IV</b>	<b>4. Environmental Pollution</b> 4.1 Definition Causes, effects and control measures of 4.2 Air pollution 4.3 Water pollution 4.4 Soil pollution 4.5 Noise pollution	CO 4	6
<b>V</b>	<b>5. Social issues and the Environment</b> 5.1 Types of wastes – generation, characteristics, treatment and disposal of: 5.2 Solid waste 5.3 e- waste 5.4 Biomedical waste 5.5 From Unsustainable to Sustainable development 5.6 Water conservation, rain water harvesting, watershed management 5.7 Environmental ethics: Issues and possible solutions like Carbon Credit. 5.8 Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. 5.9 <b>IKS</b> -Ancient Indian civilization- use of natural material and its easy disposal.	CO 4	6
<b>VI</b>	<b>6. Environmental Protection</b> 6.1 Environment legislations- 6.2 Legal aspects related to environment 6.3 Brief description of various acts involving air, water and forests. 6.4 ISO-14000 6.5 Issues involved in enforcement of environmental legislation	CO 5	4
	<b>Total Hours</b>		30

## 8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of 05 Assignments

Sr. No.	Title of Assignment	Approx. Hrs required	CO
1	Write a note on different renewable sources of energy.	-	CO1
2	List any two man-made disasters. Analyze its causes and effects on environment.	-	CO2, CO4
3	Enlist the different causes and effects of global warming and ozone depletion.	-	CO2, CO4
4	Explain in detail about biomedical waste its sources, storage and disposal.	-	CO4, CO5
5	List any five Environmental Protection Acts.	-	CO 5
6	Suggest the different ways in which a citizen can contribute in maintaining ecological balance.	-	CO1, CO3



## 9. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITES FOR SPECIFIC LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

Assessment to be based on one of the following tools and rubrics for evaluation of SLA to be well defined by course teacher.

6. Micro-Project and Presentation
  - a) Identify any one environmental problem and suggest probable solution for it.
  - b) Select any one endangered species and discuss the threats and measures adopted for its conservation.
  - c) Suggest any four methods to create awareness in public regarding conservation environment.
  - d) Find out at least two new ecofriendly technologies from the newspapers and magazines that have been introduced recently.
7. Model/Chart making
  - a) Prepare a chart on different ecosystems.
  - b) Prepare a chart on the causes effects and preventive measures for  
Air Pollution  
Water Pollution  
Soil Pollution  
Noise Pollution
  - c) Prepare a chart on E-waste its sources, characteristics, effects and management.
8. Surveys
  - a) Analyze the problem of water scarcity and water management in India. Suggest a suitable solution for the same.
  - b) Collect data regarding quality of air in different parts of the city. Analyze and draw conclusion about air pollution in the city.

## 10. IMPLEMENTATION STRATEGY (PLANNING)

- 7 Teaching Plan
- 8 Minimum no of assignments.
- 9 Slides
- 10 Self-Learning Online Resources

## 11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1.	Text book of Environmental studies	Erach Bharucha	UGC Press
2.	Environmental studies	Rajagopalan	Oxford University Press
3.	Environmental studies	Anandita Basak	Driling Kindersley (India) Pvt. Ltd Pearson
4	Fundamental concepts in Environmental studies	D.D. Mishra	S. Chand & Co. Ltd.
5	Role of Tech. in Environment and Health	Jain and Jain	Dhanpat Rai Publishing Co. New Delhi

## 12. LEARNING WEBSITE & PORTALS

1. <https://study.com/academy/.../what-are-natural-resources-definition-lesson->
2. [www.yourarticlelibrary.com/biodiversity/biodiversity...ecological-diversity/4474](http://www.yourarticlelibrary.com/biodiversity/biodiversity...ecological-diversity/4474)
3. <https://www.britannica.com/science/pollution-environment>
4. <https://businessworld.in/article/Major-Environmental-Laws-Of-India/09-09-2017-125737>
5. <https://sdgs.un.org/events/launch-e-learning-course-harnessing-climate-and-sdgs-synergies-33337>





### 13. ASSESMENT METHODOLOGIES/TOOLS

#### Formative Assessment (Assessment for Learning)

1. Seminar and Presentation (Self-Learning)
2. Term Work

#### Summative Assessment (Assessment of Learning)

1. Micro-project (Self learning)

### 14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mrs. Keerti Bhave
2	Internal	Mrs. Sneha Suvarna
3	External	Mr. Pravin Meshram
		Government Polytechnic, Mumbai



## 1. COURSE DETAILS

<b>Programme: CE/ME/EE/PE/CH/EXTC</b>	<b>Semester: I</b>
<b>Course: Universal Human Values</b>	<b>Course Category: VEC</b>
<b>Course Code: UHV230004</b>	<b>Duration:16 Weeks</b>

## 2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credi ts	Assessment Scheme								
Actual Contact Hrs./Week			Self-Learning (SL <sup>^</sup> ) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
CL	TL	LL				FA-TH	SA-TH	Total	Practical (Marks)				
									FA-PR	SA-PR	SA-OR	SLA (Marks)	
2	1	-	1	2	---	-	-	-	25	-	-	25	50

**Indian Knowledge System(IKS) Hrs. for the course: 01**

## 3. COURSE OBJECTIVE

Human values guide us to take into account the human element when we interact with other human beings, for example respect, acceptance, and love towards other human beings. Universal Human Values are needed for well-being of an individual, society and humanity at large. Our value system helps us to create the future we want to experience and the decisions we make, are the reflection of our values and beliefs, so therefore, it is necessary to nurture universal human values among the youngsters to equip them for better future.

## 4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- **Discipline**
- **Self –exploration**
- **Critical ability**
- **Universalism**
- **Honesty**
- **Adherence to law**
- **Time Management**
- **Decision Making**
- **Respect for constitutional order**
- **Patriotism**
- **Professional ethics**



**5. COURSE OUTCOMES (COs) at the end of the semester student will be able to**

CO No.	COURSE OUTCOME
CO1	Apply universal human values, its importance for individual, Society and nature /existence in personal and professional life.
CO 2	Take part as youth force for sustainable development of society, environment and nation.
CO 3	Utilize different life skills in a harmonious order for lifelong learning.
CO 4	Make use of the constitutional order of the country for sustainable social development.

**6. CO-PO, CO- PSO MAPPING TABLE**

**A. Civil Engineering**

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Universal Human Values (UHV230004)	CO 1	2	-	-	-	2	-	3	1	1
	CO 2	-	3	-	-	2	2	3		
	CO 3	-	-	-	-	2	-	3	1	1
	CO 4	-	1	-	-	-	1	3		
	CO Average	2.00	2.00	-	-	2	1.5	3	1	1

**B. Mechanical Engineering**

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Universal Human Values (UHV230004)	CO 1	2	-	-	-	2	-	3	1	1
	CO 2	-	3	-	-	2	2	3		
	CO 3	-	-	-	-	2	-	3	1	1
	CO 4	-	1	-	-	-	1	3		
	CO Average	2.00	2.00	-	-	2	1.5	3	1	1



### C. Electrical Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Universal Human Values (UHV230004)	CO 1	2	-	-	-	2	-	3	1	1
	CO 2	-	3	-	-	2	2	3		
	CO 3	-	-	-	-	2	-	3	1	1
	CO 4	-	1	-	-	-	1	3		
	CO Average	2.00	2.00	-	-	2	1.5	3	1	1

### D. Plastics Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3
Universal Human Values (UHV230004)	CO 1	2	-	-	-	2	-	3	1		1
	CO 2	-	3	-	-	2	2	3			
	CO 3	-	-	-	-	2	-	3	1		1
	CO 4	-	1	-	-	-	1	3			
	CO Average	2.00	2.00	-	-	2	1.5	3	1		1

### E. Chemical Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Universal Human Values (UHV230004)	CO 1	2	-	-	-	2	-	3	1	1
	CO 2	-	3	-	-	2	2	3		
	CO 3	-	-	-	-	2	-	3	1	1
	CO 4	-	1	-	-	-	1	3		
	CO Average	2.00	2.00	-	-	2	1.5	3	1	1



## F. Electronics & Telecommunication Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2
Universal Human Values (UHV230004)	CO 1	2	-	-	-	2	-	3	1	1
	CO 2	-	3	-	-	2	2	3		
	CO 3	-	-	-	-	2	-	3	1	1
	CO 4	-	1	-	-	-	1	3		
	CO Average	2.00	2.00	-	-	2	1.5	3	1	1

## 7. COURSE CONTENTS

UNIT No.	TOPIC/Sub-topic	CO	Hrs.
I	<b>Introduction to Universal Human values</b> 1.1 Universal Human Values, Definition, concept and need 1.2 Understanding Self exploration: content & process 1.3 Happiness and Prosperity as a part of universal values	CO 1	04
II	<b>Understanding Harmony in Human Being, Family, Society and Nature</b> 2.1 Human being more than just the body 2.2 Harmony of Self (I) with Body 2.3 Understanding the needs of Self and the Body 2.4 Understanding the activities of Self and Body 2.5 Family as source of human values, respect, affection, love 2.6 Values in Social life: Reverence, Glory, Kindness, Honesty, Gratitude 2.7 Harmony in Nature; The four orders in nature, harmony in Existence	CO1	06
III	<b>Yoga &amp; Meditation</b> 3.1 Yoga and its History 3.2 Surya Namaskar & Basic Asanas 3.4 Basic Pranayama: Bhastrika, Anulom Vilom, Pranayam Kriya, Kapalbhathi Pranayam Kriya, Bhramary Pranayam., Dhyan Mudra and Meditation	CO3	02
IV	<b>Professional Ethics</b> 4.1 Concepts of Professional ethics 4.2 Issues in Professional ethics 4.3 understanding importance of professional ethics 4.4 Competence, Honesty, Equality, discipline, trustworthiness, Team work	CO2	06



<b>V</b>	<b>Importance of Life skills</b> 5.1 Concept & meaning of life skills 5.2 Essential life skills: 5.2.1 Time Management, 5.2.2 Stress Management 5.2.3 Decision making, 5.2.4 SWOT Analysis, 5.2.5 Leadership 5.2.6 Application of life skills in personal and professional life	CO3	08
<b>VI</b>	<b>Indian Constitution</b> 6.1 Preamble of Indian Constitution 6.2 Historical Making of constitution 6.3 Fundamental Rights and Duties 6.4 Union, State and Local Administration 6.5 Election Commission of India	CO4	4
<b>TOTAL</b>			30

**8. LIST OF ASSIGNMENTS:** Term Work (**25 Marks**) consists of MCQ & subjective Assignments, Classroom Activities, Home Assignments

**A. MCQ Assignments (20 Marks) (5 hrs.)**

1	Introduction to Universal Human values	CO1	1 hr.
2	Understanding Harmony in Human Being , Harmony in Family , Society and Nature	CO1	1 hr.
3	Yoga , Meditation & Importance of Life skills	CO3	1 hr.
4	Indian constitution & Professional Ethics	CO 4 ,CO2	2 hr.

**B. Classroom activities (Group discussion, Role Play, Case Studies, Worksheets (05 Marks) (10 hrs.)**

1	<b>Self-Exploration:</b> Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong?	CO1	2 hrs.
2	<b>Understanding Happiness and prosperity:</b> What are the 3 key problems you see around yourself at each of the 4 levels – individual, family, society and nature/existence?	CO1	2 hrs.
3	<b>Understanding the needs of Self ('I') and 'Body':</b> Discuss and Write down five needs of yourself and five needs of your body. Discuss and Write down Five activities of yourself, five activities of your body and five activities of your body + self.	CO1	2 hrs.
4	<b>Yoga &amp; Meditation</b> Perform all the postures of Surya Namaskar one by one in a very slow pace, after warm up. Perform sitting in Dhyan Mudra and meditating, Kapalbhathi Pranayam Kriya	CO3	2 hrs.



<b>5</b>	<b>Professional Ethics &amp; Importance of Life skills:</b> Case studies and Worksheets are used to assess the different life skills.	CO2 CO3	1 hrs.
<b>6</b>	<b>Indian constitution:</b> Discuss your fundamental Rights & duties. Discuss major Constitutional Amendments. <u><a href="https://www.constitutionofindia.net/blogs/the_indian_constitution_in_the_classroom_law_history_and_politics">https://www.constitutionofindia.net/blogs/the_indian_constitution_in_the_classroom_law_history_and_politics</a></u>	CO4	1 hrs.

*# Note: Teacher will do necessary changes in home assignments as and when required*

## 9. ACTIVITIES FOR SPECIFIC LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

**Reel making /Video making / Questionnaire/ Seminar/ Presentation/ Skit:**

Each student will be assigned one of the above activities in group on following the topic

(25 Marks) CO 3

1. Importance Human values in Life
2. Role of Human Values in Family & society
3. Harmony in Human being. Society & nature
4. Leadership skills
- 5 Time management & Task management
6. Conflict management
7. SWOT Analysis & Decision making
8. Indian Constitution
9. Fundamental Rights & duties
10. Yoga & Stress management
11. Team Building
12. Creativity & Innovation
13. Any other subject related topic

## 10. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of assignments.
3. Guest/Expert lectures
4. Slides
5. Self-Learning Online Resources



## 11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Human Values and Professional Ethics	R, R Gaur, R Sangal, G. P. Bagaria	Excel Books New Delhi
2	Human Values	A.N. Tripathi	New Age Intl. Publishers , New Delhi
3	Human values and Ethics	Samarpan Chakraborty	New Delhi Publishers
4	Human Values : Prerequisite for happiness	Serena Mathumal	XLIBRIS US,2021

## 12. LEARNING WEBSITE & PORTALS:

1. <https://www.uhv.org.in/>
2. <https://www.youtube.com/watch?v=9-8gdnBJK1w>
3. <https://www.youtube.com/watch?v=9Q2lrBvstyc>
4. <https://fdp-si.aicte-india.org/verifiedProgramDetailsList.php>
5. [https://www.youtube.com/watch?v=nrDIAC8zu\\_c](https://www.youtube.com/watch?v=nrDIAC8zu_c)
6. <https://www.youtube.com/watch?v=Ng-50qEf0gE>

## 13. ASSESMENT METHODOLOGIES/TOOLS

### Formative Assessment (Assessment for Learning)

1. Self-Learning
2. Term Work
3. Seminar/Presentation
4. Class Room Activities
5. Group Discussion
6. Role Play
7. Case studies
8. Brain storming
9. Video Show

### Summative Assessment (Assessment of Learning)

1. Tutorial Performance (Final Submission)

## 14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME OF EXPERT
1	Internal	Mr. Balaji M Pande, Senior Lecturer in English
2	Internal	Mr. Vinod Vanvari , HOD , Civil Engineering
3	Internal	Mrs. Prachi Arora , Senior Lecturer , Computer Engineering
4	External	Mrs. Shiny Nair, SVKM's Soft Skills Trainer





## 1. COURSE DETAILS

<b>Programme: Electrical Engineering</b>	<b>Semester: I</b>
<b>Course: Engineering Drawing</b>	<b>Course Category: DSC</b>
<b>Course Code: EDG230301</b>	<b>Duration:16 Weeks</b>

## 2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Paper Duration (Hrs.)	Assessment Scheme							Total Marks
Actual Contact Hrs./Week			Self-Learning (SL <sup>^</sup> ) (Term Work + Assignment) (Hrs)			Theory (Marks)			Based on LL & TL			Based on Self Learning	
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR		
												02	

**Total IKS Hrs for the course: 02 Hrs**

## 3. COURSE OBJECTIVE

Engineering drawing helps in understanding design of parts, assembly, structure etc. used in engineering field. It supports technology and technical subjects. By achieving visualization and drawing skills, the student will successfully discharge his role on shop floor, design department and inspection department etc.

## 4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

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

- **Prepare engineering drawings manually using prevailing drawing instruments.**
- **Prepare engineering drawings using AutoCAD software.**

## 5. COURSE OUTCOMES (COs) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Draw geometric figures and engineering curves.
CO2	Draw two-dimensional sectional and non-sectional views of given object using principles of orthographic projections.
CO3	Draw isometric views of given component from orthographic projections.
CO4	Prepare free hand sketches of thread profiles and thread fasteners.
CO5	Apply AutoCAD commands for drafting engineering drawings.



## 6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Engineering Drawing (EDG230301)	CO1	2	1	2	1	-	-	1	1	2
	CO2	2	1	2	1	-	-	1	1	2
	CO3	2	1	2	1	-	-	1	1	2
	CO4	2	1	2	1	-	-	1	1	2
	CO5	2	1	2	1			1	1	2
	CO Avg.	2.00	1.00	2.00	1.00	-	-	1.00	1.00	2.00

## 7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	CO	Hrs
I	<b>1.0 Drawing Instruments &amp; Geometrical Constructions</b> 1.1. Introduction: Importance of Engineering Drawing 1.2. Study the use of Drawing instruments, types of lines and Dimensioning techniques used in Engineering Drawings. 1.3. Study the use of different Scales in Engineering Drawings: Reduce Scale, Enlarge Scale and Full Size Scale 1.4. Geometrical constructions: To draw a perpendicular bisector of a given line. To divide the line into number of equal parts To draw line parallel to one another To Divide the given circle into number of equal parts To draw regular polygon of given side	CO1	04
II	<b>2.0 Engineering Curves</b> Conic Sections: 2.1 Ellipse: Introduction and Methods to draw an ellipse by oblong, arcs of circle and concentric circle methods. 2.2 Parabola: Introduction and Methods to draw parabola by Directrix-Focus and rectangular methods. 2.3 Hyperbola: Introduction and Methods to draw hyperbola by Directrix-Focus and rectangular methods	CO1	04



III	<p><b>3.0 Orthographic Projections</b></p> <p>3.1 Introduction to orthographic and isometric projections, concepts and applications.</p> <p>3.2 Orthographic projection by First angle and Third angle method, and their symbols.</p> <p>3.3 Conversion of Pictorial view into Orthographic Views – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces.</p> <p>3.4 Introduction to Cutting plane line, Hatching Line and Sectioning Conventions.</p> <p>3.5 Types of sectional views: Half, Full and Off-set sectional Views</p> <p>3.6 Conversion of pictorial views into sectional orthographic views</p>	CO2	06
IV	<p><b>4.0 Isometric View and Projection</b></p> <p>4.1 Introduction to Isometric view and isometric projection.</p> <p>4.2 Introduction to Isometric scale and Natural Scale.</p> <p>4.3 Illustrative problems related to objects having plain, slanting, cylindrical Surfaces and slots on slanting surfaces.</p> <p>4.4 Conversion of orthographic views into isometric View/projection. (Isometric of sphere and composite solids not to be included).</p> <p><b>4.5 IKS:</b> Information on the use of drawing concepts used in ancient Indian culture for the engineering design of structures like Indian temples, monuments, etc.</p>	CO3	06
V	<p><b>5.0 Free hand sketches</b> <b>Thread Profiles and Screw Fasteners.</b></p> <p>5.1 Different thread profiles</p> <p>5.2 Conventional representations of left hand – right hand threads, single and multistart square threads, external and internal threads.</p> <p>5.3 Nuts and Bolts: Types of nuts and bolts. Locking of nuts (Castle, slotted nut, simond’s nut etc.), Plane and Spring washers,</p>	CO4	04
VI	<p><b>6.0 Computer Aided Drawing</b></p> <p>6.1 Computer Aided Drafting: concept.</p> <p>6.2 Hardware and various CAD software available.</p> <p>6.3 System requirement and Understanding the interface.</p> <p>6.4 Components of AutoCAD software window: Title bar, standard tool bar, menu bar, object properties tool bar, draw tool bar, modify toolbar, cursor cross hair Command window, status bar, drawing area, UCS icon.</p> <p>6.5 File features: New file, Saving the file, opening an existing drawing . file, Creating Templates, Quit</p> <p>6.6 Setting up new drawing: Units. Limits, Grid, Snap</p> <p>6.7 Undoing and Redoing action</p> <p>6.8 Draw basic entities like Line, Circle, Arc, Polygon. Ellipse. Rectangle, Multiline, Poly Line.</p> <p>6.9 Methods of Specifying points: Absolute coordinates. Relative Cartesian and Polar coordinates</p> <p>6.10 Modify and edit commands like trim, delete, copy. offset. array, block, layers, mirror, rotate, scale, lengthen, stretch, measure, break, divide, explode, align.</p>	CO5	06



	6.11 Dimensioning: Linear, Horizontal, Vertical. Aligned, Rotated, Baseline, Continuous, Diameter, Radius, Angular, Dimensions, 6.12 Dim scale variable. 6.13 Editing dimensions 6.14 Text: Single line Text, Multiline text. 6.15 Layer, Layer Properties and applications. 6.16 Standard sizes of sheet: Selecting Various plotting parameters such as Paper size, paper units, drawing orientation, plot scale, plot offset, plot area, print preview.		
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## 8. LIST OF PRACTICALS/ASSIGNMENTS/DRAWINGS

Term Work consists of Journal containing following drawing sheets and CAD drawings.

Sr. No.	Title of Drawing sheets/ AutoCAD drawings	Approximate Hrs. required	CO
01	Drawing sheet on lettering, lines, dimensioning techniques and geometrical constructions.	02	CO1
02	Drawing sheet with problems on ellipse, parabola and hyperbola.	04	CO1
03	Drawing sheet with four problems on non-sectional orthographic views for the objects with curvilinear features	08	CO2
04	Drawing sheet with four problems on Sectional orthographic projections with full and half section.	10	CO2
05	Drawing sheet with four problems on Isometric views and projections.	04	CO3
06	Drawing sheet on free hand sketches of Thread Profiles and Screw Fasteners	04	CO4
07	Practice on AutoCAD 2D commands.	08	CO5
08	Four problems on non-sectional orthographic views for the objects with curvilinear features by using CAG 2D commands.	10	CO5
09	Four problems on sectional orthographic views for the objects with curvilinear features by using CAG 2D commands.	10	CO5
	<b>Total</b>	<b>60</b>	



## 9. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Classroom Teaching
3. AutoCAD software
4. Self-Learning online resources

## 10. SUGGESTED LEARNING RESOURCES

Sr. No	Title Of Book	Author	Publication
1.	Engineering drawing	R.K. Dhawan	S.Chand & Co.Ltd., Ram Nagar New Delhi-110 055. ISBN-13: 9788121914314 ISBN-10: 8121914310
2.	Engineering drawing	N.H. Dubey	Nandu Prakashan
3.	Engineering Drawing Practice for Schools and Colleges IS: SP-46	Bureau of Indian Standards.	BIS, Government of India, Third Reprint, October 1998; ISBN: 81-7061-091-2
4.	Engineering Drawing	Bhatt, N.D.	Charotar Publishing House, Anand, Gujarat 2010; ISBN: 978-93-80358-17-8
5.	Machine Drawing	Bhatt, N.D.; Panchal, V. M	Charotar Publishing House, Anand, Gujarat 2010; ISBN: 978-93-80358-
6	Engineering Drawing	Shah, P. J.	S. Chand and Company, New Delhi, 2008, ISBN: 81-219-2964-4
7	Essentials of Engineering Drawing and Graphics using AutoCAD	Jevapoovan T.	Vikas Publishing House Pvt. Ltd, Noida 2011, ISBN: 978-8125953005
8	AutoCAD User guide	Autodesk	Autodesk Press, USA, 2015
9	AutoCAD 2016 for Engineers and Designers	Sham, Tickoo	Dreamtech Press; Galgotia Publication New Delhi, 2015, ISBN: 978-9351199113

## 11. LEARNING WEBSITE & PORTALS

1. <http://pstulpule.com/>
2. <http://www.me.umn.edu/courses/me2011/handouts/engg%20graphics.pdf>
3. <https://www.machinedesignonline.com>
4. <http://www.mycadsite.com/tutorials/>
5. <http://tutorial145.com/learn-autocad-basics-in-21-days/>
6. <https://www.lynda.com/AutoCAD-training-tutorials/160-0.html>
7. <http://www.investintech.com/resources/blog/archives/5947-free-online-autocadtutorials-courses.html>
8. <http://www.cad-training-course.com/>
9. <http://au.autodesk.com/au-online/overview>



## 12. ASSESMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

1. Rubrics for COs Assignment for Term work
2. Term Work based as per List of Practicals

Summative Assessment (Assessment of Learning)

1. End Semester Practical Exam based on both Manual Drawing and AutoCAD drawing.

## 13. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mr. N. D. Adate
2	Internal	Mr. Pratik Sawant
3	External	Mr. Mahendra Bhor Organisation : Assistant Engineer, MCGM, Mumbai



## 1. COURSE DETAILS

<b>Programme: Electrical Engineering</b>	<b>Semester: I</b>
<b>Course: DC Circuit Fundamentals</b>	<b>Course Category: DSC</b>
<b>Course Code: DCF230302</b>	<b>Duration: 16 Weeks</b>

## 2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme								
Actual Contact Hrs./Week			Self-Learning (SL <sup>^</sup> ) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
CL	TL	LL				FA-TH	SA-TH	Total	FA-PR	SA-PR	SA-OR		
03	-	02	01	03	03	30	70	100	25	25	-	25	175

Total IKS Hrs for the course: 02 Hrs

## 3. COURSE OBJECTIVE

Technologists in electrical engineering are expected to handle electrical machines, instruments, devices and equipment's. Besides this, operation about power system, protection scheme and controls must be studied and developed by the students. This Course deals with the basic concepts, rules and laws of electric and magnetic circuits and practical's thereof. The basic concepts of electrical engineering in this course will be very useful for understanding of other higher level courses in further study.

## 4. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- Use basic Concepts and Principles of electrical engineering in different applications.

## 5. COURSE OUTCOMES (COs): At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Determine various parameters used in electric circuit
CO2	Use basic principles, laws and rules of electrical engineering
CO3	Use principles of Magnetism
CO4	Use principles of Electromagnetism
CO5	Select appropriate capacitors for various electrical applications
CO6	Choose appropriate battery for relevant applications



## 6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
DC Circuit Fundamentals (DCF230302)	CO1	3	2	1	-	-	-	1	-	2
	CO2	3	2	1	-	-	-	1	-	2
	CO3	3	2	1	-	-	-	-	-	2
	CO4	3	2	1	-	-	-	-	-	2
	CO5	-	2	1	3	-	-	-	-	2
	CO6	-	2	1	3	-	-	-	-	2
	CO Avg.	3.00	2.00	1.00	3.00	-	-	1.00	-	2.00

## 7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic
I	<p><b>1.0 Basic Electrical Parameters</b></p> <p>1.1 Concepts of free electrons, Charge, electric current, Potential difference, Electromotive force (EMF)</p> <p>1.2 Direct Current (DC) and Alternating current (AC)</p> <p>1.2.1 Voltage source: Ideal and Practical voltage source</p> <p>1.2.2 Current source: Ideal and Practical current source</p> <p>1.3 Electric work, power and Energy (Simple numericals)</p> <p><b>IKS: Detailed history of electricity evolution</b> Agastya's method of generating electricity.</p>
II	<p><b>2.0 D.C Circuits</b></p> <p>2.1 Ohm's Law, Resistance, factors affecting resistance, related numericals</p> <p>2.2 Temperature co-efficient of resistance, Definition of positive temperature coefficient of resistance and negative temperature coefficient of resistance.</p> <p>2.3 Series and parallel connection of resistances, expression for total resistance in series connection and parallel connection of resistances, related numericals</p> <p>2.4 Kirchhoff's Laws: Kirchhoff's current law and Kirchhoff's voltage law (No numericals)</p> <p>2.5 Division of voltage in series circuit and division of current in parallel circuit with derivation and formulae's.</p> <p>2.6 Types of resistors and their applications</p>





<p style="text-align: center;"><b>III</b></p>	<p><b>3.0 Magnetic Circuits</b></p> <p>3.1 Electromagnetism, Laws of Magnetism, magnetic lines of force, properties of lines of Force, Magnetic flux, Magnetic flux density, Magnetic flux intensity</p> <p>3.2 Permeability: Permeability of free space, Absolute permeability and Relative permeability</p> <p>3.3 Flux around a current carrying conductor, Cork's screw rule, Right hand Thumb rule</p> <p>3.4 Force developed on current carrying conductor, Fleming's left hand rule</p> <p>3.5 Magnetic field strength of a Solenoid</p> <p>3.6 Magnetic circuit, Magneto-motive force (MMF), Ampere turns, Reluctance, Permeance, reluctivity, comparison between magnetic and electric circuit.</p> <p>3.7 Magnetization curve or B-H curve of the magnetic material</p> <p>3.8 Calculation of ampere turn for series magnetic circuit. (Only Simple Numerical)</p>
<p style="text-align: center;"><b>IV</b></p>	<p><b>4.0 Electromagnetic Induction</b></p> <p>4.1 Faraday's laws of electromagnetic induction</p> <p>4.2 Dynamically and Statically induced emf, Lenz's law, Fleming's right hand rule</p> <p>4.3 Self-inductance or Inductance(L), Mutual inductance (M), coefficient of mutual inductance</p> <p>4.4 Self-induced emf and mutually induced emf, Coefficient of coupling. (Related numericals based on the above Topics)</p> <p>4.5 Types of inductor and their applications</p>
<p style="text-align: center;"><b>V</b></p>	<p><b>5.0 Electrostatics and Capacitors</b></p> <p>5.1 Electrostatics, Laws of electrostatics, Electric charge, electric field, electric lines of force, properties of electric lines of force, flux density, electric field strength, permittivity of medium, Dielectric strength and Breakdown voltage</p> <p>5.2 Construction and action of capacitor</p> <p>5.3 Capacitance of a parallel plate capacitor</p> <p>5.4. Expression for capacitance of a composite dielectric capacitor.</p> <p>5.5 Capacitance in series and parallel. (Related numericals based on the above Topics)</p> <p>5.6 Types of capacitor and application</p>
<p style="text-align: center;"><b>VI</b></p>	<p><b>6.0 Storage Batteries</b></p> <p>6.1 Types of secondary batteries</p> <p>6.2 Construction and working of lead acid battery and applications</p> <p>6.3 Construction and working of Nickel Cadmium battery and applications</p> <p>6.4 Construction and working of Lithium-Ion battery and applications</p> <p>6.5 Back emf, Internal resistance of a cell</p> <p>6.6 Rating of a battery, Ampere hour efficiency, Watt hour efficiency (Simple Numericals) <b>IKS: Detailed history of storage batteries</b> Electrical Batteries in Ancient India</p>



## 8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of 8–10 Experiments/assignments/drawings.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	CO
1	Measurement of Current, Voltage and Resistance using Digital Multimeter	2	CO1
2	To verify Ohm's Law	2	CO2
3	To Determine equivalent resistance of series connected resistors	2	CO2
4	To Determine equivalent resistance of parallel connected resistors	2	CO2
5	To verify Kirchhoff's current law	4	CO2
6	To verify Kirchhoff's voltage law	4	CO2
7	To plot B-H curve for the magnetic material	2	CO3
8	Assignment on Electromagnetic induction	2	CO4
9	To determine equivalent capacitance of series connected capacitors	2	CO5
10	To determine equivalent capacitance of parallel connected capacitors	2	CO5
11	Construction, working and applications of Nickel Cadmium battery	2	CO6
12	Construction, working and applications of Lithium-Ion battery	2	CO6
13	Construction, working and applications of Lead acid battery	2	CO6
<b>TOTAL</b>		<b>30</b>	

## 9. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITIES FOR SPECIFIC LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

Assessment to be based on one of the following tools and rubrics for evaluation of SLA to be well defined by course teacher.

1. Micro-Project
2. Seminar/ Presentation
3. Model/Chart making
4. Surveys
5. Case Study
6. Quiz
7. Assignment

### SUGGESTED STUDENT ACTIVITIES

#### Micro Project

- a) Illustrate situations wherein electrical energy is required.
- b) Prepare a chart for showing the units and Symbols of various electrical parameters.
- c) Prepare power point presentation related to basics of electrical engineering.
- d) Prepare a chart of electric circuit elements and relevant industrial application.
- e) Prepare models for combination of series and parallel connection of resistances
- f) Prepare a chart for showing the different types of resistors, their symbol and applications.



- g) Prepare models to demonstrate properties of magnetic lines of force
- h) Prepare model to demonstrate Faradays Laws of electromagnetic induction
- i) Collect the samples of different Inductors and list their uses.
- j) Prepare a chart for showing the different types of Capacitors, their symbol and applications.
- k) Collect the samples of different Capacitors and list their uses.
- l) Prepare a chart for showing the different types of Storage batteries and their applications.

### Assignments

- a) Differentiate between 1) A.C and D.C 2) Ideal and Practical voltage source 3) Ideal and Practical current source
- b) Solve numerical based on temperature coefficient of resistance
- c) Enlist various types of Resistors with their applications
- d) Compare between electric circuit and magnetic circuit
- e) Solve numerical based on Faraday's first and second law of electromagnetic induction.
- f) Enlist various types of Resistors with their applications

## 10. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments.
3. Industry visit
4. Guest/Expert lectures
5. Demonstrations
6. Slides
7. Self-Learning Online Resources

## 11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	A Text Book of Electrical Technology Volume - 1	Theraja B.L. Theraja A.K.	S.Chand and Co. New Delhi ISBN:9788:21924405
2	Electrical Technology	Hughes Edward	Pearson Education. New Delhi. ISBN-13:978-0582405196
3	Basic Electrical Engineering	Mittal V.N.	Tata McGraw-Hill. New Delhi. ISBN:978-0-07-0088572-5
4	Fundamentals of Electrical Engineering	Saxena S.B. Lal	Cambridge University Press, New Delhi. ISBN:9781107464353

## 12 LEARNING WEBSITE & PORTALS

1. [https://www.electronics-tutorials.ws/dccircuits/dcp\\_1.html](https://www.electronics-tutorials.ws/dccircuits/dcp_1.html)
2. [www.nptel.ac.in](http://www.nptel.ac.in)
3. [www.electricaltechnology.org](http://www.electricaltechnology.org)
4. [www.electrical4u.com](http://www.electrical4u.com)
5. <https://myelectrical.com/notes>
6. [www.howstuffworks.com](http://www.howstuffworks.com)



### 13. ASSESSMENT METHODOLOGIES/TOOLS

Formative Assessment (Assessment for Learning)

1. Test
2. Rubrics for COs Assignment
3. Self-Learning
4. Term Work
5. Seminar/Presentation

Summative Assessment (Assessment of Learning)

1. End Term Exam
2. Micro-project

### 14. SUGGESTED WEIGHTAGE FOR LEARNING EFFORTS & ASSESMENT PURPOSE (Specification Table)

Unit No.	Unit Title	Aligned COs	Learning Hours	Distribution of Theory Marks			
				R Level	U Level	A Level	Total Marks
I	Basic Electrical Parameters	CO1	04	2	2	2	06
II	DC Circuits	CO2	10	4	6	4	14
III	Magnetic Circuits	CO3	10	4	6	4	14
IV	Electromagnetic Induction	CO4	08	4	6	4	14
V	Electrostatics and Capacitors	CO5	08	2	6	4	12
VI	Storage batteries	CO6	05	2	4	4	10
<b>GRAND TOTAL</b>			<b>45</b>	<b>18</b>	<b>30</b>	<b>22</b>	<b>70</b>

**R Remember, U Understand, A Apply and above, (Bloom's revised taxonomy levels)**

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

### 15. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mr. Dinesh G.Rajmandai
2	Internal	Mr. N.D.Adate
3	External	Mrs.Bhagyashree Firke
		Organization:Somaiya Polytechnic, Vidyavihar, Mumbai



## 1. COURSE DETAILS

<b>Programme: Electrical Engineering</b>	<b>Semester: I</b>
<b>Course: Electrical Materials &amp; Appliances</b>	<b>Course Category: DSC</b>
<b>Course Code: EMA230303</b>	<b>Duration:16 Weeks</b>

## 2. LEARNING AND ASSESSMENT SCHEME

Learning Scheme				Credits	Assessment Scheme								
Actual Contact Hrs./Week			Self-Learning (SL <sup>^</sup> ) (Term Work + Assignment) (Hrs)		Paper Duration (Hrs.)	Theory (Marks)			Based on LL & TL			Based on Self Learning	Total Marks
CL	TL	LL				FA-TH	SA-TH	Total	Practical (Marks)				
									FA-PR	SA-PR	SA-OR	SLA (Marks)	
3	-	2	1	3	3	30	70	100	25	-	25	25	

**Total IKS Hrs for the course :03**

## 3. COURSE OBJECTIVE

The objective of the subject is to provide information and knowledge of various material used in Electrical Engineering and commonly used domestic appliances. A diploma holder in Electrical Engineering is involved in manufacturing, installation, maintenance, repairing and troubleshooting of electrical equipment and systems. He/she may also have to decide for an alternative when a particular material is either not readily available in the market or its cost becomes prohibitive.

## 3. SKILL COMPETENCY/INDUSTRY/EMPLOYER EXPECTED OUTCOME

- **Identify the properties of material used in industries related to electrical engineering.**
- **Test and troubleshoot the domestic appliances.**

**5. COURSE OUTCOMES (COs):** At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME
CO1	Choose appropriate conducting material for the given application.
CO2	Select appropriate conducting and magnetic material for the given application.
CO3	Identify insulating, dielectric and plastic material suitable for specific application.
CO4	Test and troubleshoot the common faults in simple domestic appliances.



## 6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
<b>Electrical Materials &amp; Appliances (EMA220303)</b>	CO1	3	1	1	-	-	-	1	2	3
	CO2	3	1	1	-	-	-	1	2	3
	CO3	3	1	1	-	1	-	1	2	3
	CO4	3	2	1	1	-	-	1	3	3
	<b>CO Avg.</b>	<b>3</b>	<b>1.25</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>-</b>	<b>1</b>	<b>2.25</b>	<b>3</b>

## 7.COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic
<b>I</b>	<p><b>Introduction:</b> Atomic structure and Types of Electrical Engineering Material</p> <p><b>Conducting Material</b></p> <ol style="list-style-type: none"> <li>1.1. Properties of conducting materials.</li> <li>1.2. Classification of conducting materials based on resistivity/conductivity, area of application</li> <li>1.3. Properties and applications of different metals and their alloys (Silver, Copper, Gold, Aluminium, Tungsten, Zinc, Iron, Manganin, Constantan, Steel, Nichrome</li> </ol> <p><b>IKS: Atomic structure: Maharshi Kanad</b></p>
<b>II</b>	<p><b>Magnetic Materials</b></p> <ol style="list-style-type: none"> <li>2.1. Magnetic Dipole moment, Permeability</li> <li>2.2. Classification of materials based on relative permeability</li> <li>2.3. Magnetization curve, Hysteresis loop, Losses in magnetic material</li> <li>2.4. Classification of magnetic materials</li> <li>2.5. Properties of magnetic materials: Magnetostriction, Curie temperature</li> <li>2.6. Properties and applications of magnetic materials: iron, cast iron, steel alloys, Nickel-iron alloy, permalloy, alnico</li> <li>2.7. Cold rolled grain-oriented steels</li> </ol>
<b>III</b>	<p><b>Insulating Materials</b></p> <ol style="list-style-type: none"> <li>3.1. Electrical, mechanical, thermal, physical and chemical properties of insulating materials;</li> <li>3.2. Classifications or classes of insulating material;</li> <li>3.3. Properties and uses of: <ol style="list-style-type: none"> <li>3.3.1. Inorganic insulating materials, such as mica, asbestos, glass, porcelain, marble, slate</li> <li>3.3.2. Organic insulating materials such as cotton, paper, cardboards</li> </ol> </li> <li>3.4. Transformer oil, its contamination, effect and purification</li> <li>3.5. Gaseous insulator: Sulphur hexafluoride SF<sub>6</sub>, only concept of mixture of CO<sub>2</sub> and fluorinated gases</li> </ol>



<b>IV</b>	<p><b>Dielectric Materials</b></p> <p>4.1. Polarization,  4.2. Polar and non-polar material,  4.3. Capacitance, characteristics of capacitance loss angle.  4.4. Construction and applications of paper, mica, ceramic capacitors  4.5. Polarized and non-polarized capacitors  4.6. Super capacitor (concept only)</p>
<b>V</b>	<p><b>Plastics Materials</b></p> <p>5.1. Definition: Monomer, polymer  5.2. Classification of plastic: Thermoplastics, Thermosets  5.3. Properties &amp; Applications of following in electrical engineering:  5.3.1 Thermoplastics: Polyethylene, Polystyrene, Polytetra Fluoroethylene, Nylon, PVC, Polymethyl methacrylate  5.3.2 Thermosets: Urea formaldehyde, Melamine Formaldehyde, Phenol Formaldehyde, Epoxy resin</p>
<b>VI</b>	<p><b>Domestic Appliances</b></p> <p>6.1. Working principle, construction and troubleshooting of heating appliances: Automatic electric iron, toaster, Electric kettle, Water heater, geyser, LED lamp/tube,  6.2. Working principle, construction and troubleshooting of motorised appliances: Electric mixer, fan, Hair dryer  6.3. Concept of: Vacuum cleaner, Hand drilling machine, Washing machine and Domestic water pump  <b>IKS: Domestic appliances in ancient India:</b>  <b>Stone mortar, Sil Batta, Humam Dasta/Khal batta, Ghotni/Phirni, Pankha, Bumb</b></p>

## 8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of 10 Experiments/assignments/drawings.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	CO
1	Testing and troubleshooting of Electric kettle	2	CO4
2	Testing and troubleshooting of Resistance oven/ Toaster	2	CO4
3	Testing and troubleshooting of Automatic electric iron	2	CO4
4	Testing and troubleshooting of Water heater/ Geyser	2	CO4
5	Testing and troubleshooting of LED lamp	4	CO4
6	Testing and Troubleshooting of Table/ ceiling fan	4	CO4
7	Testing and Troubleshooting of Grinder/ Mixer	4	CO4
8	Identification of various conducting materials in domestic appliances	4	CO1
9	Identification of various magnetic materials in domestic appliances	4	CO2
10	Identification of various insulating, dielectric and plastic materials in domestic appliances	4	CO3
	<b>TOTAL</b>	30	



## 9. SUGGESTED MICRO PROJECT/ASSIGNMENT/ACTIVITES FOR SPECIFIC LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

Assessment to be based on one of the following tools and rubrics for evaluation of SLA to be well defined by course teacher.

### 1. Chart making

Charts of conducting, magnetic, insulating, dielectric and plastics material

### 2. Survey

Survey of any 5 domestic appliances available in market which includes brand name, product name and comparison on the basis of following:

- a. Capacity
- b. Power rating
- c. Warranty
- d. Price
- e. Star rating
- f. Output in terms of Speed (if motorized), luminous output (if lamp), temperature (if heating appliance)
- g. Special features
- h. Protections
- i. Important or essential component if any
- j. Any other remark

## 10. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments.
3. Industry visit
4. Guest/Expert lectures
5. Slides
6. Self-Learning Online Resources

## 11. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Electrical Engineering Materials and Electronics components	M. L. Gupta	Dhanpat Rai Publishing Co. Pvt. Ltd.
2	Electrical Engineering Materials	Dr. C.S. Indulkar Dr. S Thiruvengadam	S. Chand Publications 4 <sup>th</sup> edition
3	Electrical Machines and Appliances	Dr. J. Kanakaraj Ms. A. Sumathi, Mr.R. Krishnakumar, Mr P. Balasubramanian, Mr. K. S. Sampath Nagarajan	Tamilnadu Textbook corporation
4	Study of Electrical Appliances and Devices	K. B. Bhatia	<b>Khanna Publishers; 1988</b>

## 12 LEARNING WEBSITE & PORTALS (minimum 5)

1. <https://www.youtube.com/watch?v=vfKF6DEhcos>,
2. <https://home.howstuffworks.com/vacuum-cleaner.html>
3. <https://www.explainthatstuff.com/vacuumcleaner.html>,
4. <https://www.butterflyfields.com/>
5. <https://etechnophiles.com/>





### 13. ASSESSMENT METHODOLOGIES/TOOLS

#### Formative Assessment (Assessment for Learning)

1. Test
2. Rubrics for COs Assignment
3. Self-Learning
4. Term Work

#### Summative Assessment (Assessment of Learning)

1. End Term Exam

### 14. SUGGESTED WEIGHTAGE FOR LEARNING EFFORTS & ASSESMENT PURPOSE (Specification Table)

Unit No.	Unit Title	Aligned COs	Learning Hours	Distribution of Theory Marks			
				R Level	U Level	A Level	Total Marks
I	Conducting Materials	CO1	9	4	4	6	14
II	Magnetic Materials	CO2	9	2	8	4	14
III	Insulating Materials	CO3	8	2	6	2	10
IV	Dielectric Materials	CO3	4	2	2	2	06
V	Plastics Materials	CO3	6	2	6	2	10
VI	Domestic Appliances	CO4	9	2	6	8	16
GRAND TOTAL			45	14	32	24	70

#### R Remember, U Understand, A Apply and above, (Bloom's revised taxonomy levels)

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

### 15. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Ms. Urvi Sawant
2	Internal	Mr. D G Rajmandai
3	External	Mr. Vivek Dhadam
		Organization: Maha Mumbai Metro Operation Corporation Limited, Mumbai

