

GOVERNMENT POLYTECHNIC MUMBAI
(Academically Autonomous Institute, Government of Maharashtra)
Teaching and Examination Scheme (P23)

With effect from AY 2023-24

Programme: Diploma in Electrical Engineering (Sandwich Pattern)

Term / Semester - I

Sr. No.	Course Title	Course Type	Course Code	Total IKS Hrs for Sem	Learning scheme					Credits	Paper Duration (Hrs)	Assessment Scheme													
					Actual Contact Hrs/Week			Self Learning Hr/Week	Notional Learning Hrs/Week			Theory						Based on LL & TL				Based on Self Learning		Total Marks	
																		Practical							
					CL	TL	LL					FA TH		SA TH		Total		FA-PR		SA-PR		SLA			
												T1	T2	Max	Min	Max	Min	Max	Min	Max		Min	Max		Min
								Max	Max			Max	Min							Max	Min			PR	
1	Basic Mathematics	AEC	SC23501	6	4	2	-	2	8	4	2.30	20	20	60	10	100	40	25	10	-	-	-	25	10	150
2	Basic Physics	DSC	SC23101	2	3	-	2	1	6	3	2.30	20	20	60	10		40	25	10	25#	-	10	25	10	175
3	Communication Skill	AEC	HU23501	0	3	-	2	1	6	3	2.30	20	20	60	10	100	40	25	10	-	-	-	25	10	150
4	Engineering Graphics	DSC	ME23102	2	2	-	2	-	4	2		-	-	-	-	-	-	50	20	50	-	20	-	-	100
5	Basic Electrical Engineering	DSC	EE23101	2	4	2	2	2	10	5	2.30	20	20	60	10	100	40	25	10	25#	-	10	25	10	175
6	Libre-Office Calc*(Spoken Tutorial)	SEC	SL 23601	0	-	-	-	4	4	2		-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Universal Human Values I	VEC	UV23301	4	1	-	-	1	2	1		-	-	-	-	-	-	-	-	-	-	-	50	20	50
	Total			16	17	4	8	11	40	20		80	80	240	40	400		150		100	-	-	150		800

Abbreviations : CL- Classroom Learning, TL- Tutorial Learning, LL-Laboratory Learning, FA - Formative Assessment, SA -Summative Assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends : @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

Note : 1. FA-TH represents two class tests of 20 marks each conducted during the semester.

2. 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.

3. 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.

4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs. * 16 Weeks

5. 1 credit is equivalent to 30 Notional hrs.

6. * Self learning hours shall not be reflected in the Time Table.

7. Students must secure a **minimum of 40 marks out of 100** for passing the course, It shall be **mandatory to obtain a minimum of 10 marks out of 60** in the End Term Theory Examination separately.

Course Category : Discipline Specific Course Core (DSC) : 2, Discipline Specific Elective (DSE) : 0, Value Education Course (VEC) : 1, Intern./Apprentice./Project./Community (INP) : 0, Ability Enhancement Course (AEC) : 2, Skill Enhancement Course (SEC) : 2, Generic Elective (GE) : 0

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CDC Co-ordinator

G. P. Mumbai

Department Coordinator,
Curriculum Development,
Dept. of Electrical Engineering

Head of Department,
Dept. of Electrical Engineering

In-Charge
Curriculum Development Cell

Principal,
Government Polytechnic, Mumbai

Programme : Diploma in EE / EC / IS / CE / ME / CO / IF/AI & ML / RT													
Course Code:SC23501						Course Title :BASIC MATHEMATICS							
Compulsory / Optional: Compulsory													
Teaching Scheme and Credits						Examination Scheme							
CL	TL	LL	SLH	NLH	Credits	FA-TH		SA-TH (2.30Hrs)	FA-PR	SA		SLA	Total
										PR	OR		
4	2	--	2	8	4	20	20	60	25	--	--	25	150

Total IKS Hrs. for course: 06 Hrs

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

Note:

1. FA-TH represents Total of two class tests of 20 marks each conducted during the term.
2. FA-PR represents Tutorial Term work of 25 Marks
3. SLA represents self learning Assessment of 25 Marks
4. SA-TH represents the end term examination of 60 Marks

I. Rationale

Basic Mathematics plays a crucial role in diploma programmes as it fosters the development of critical thinking skills, enhances quantitative literacy, prepares students for higher education, promotes problem-solving abilities, cultivates logical and abstract thinking and fosters mathematical literacy. By engaging with Mathematics, students acquire logical reasoning, problem-solving techniques and analytical thinking, which are valuable for lifelong learning and professional growth. Calculus is a branch of Mathematics that calculates how matter, particles and heavenly bodies actually move. Derivatives are useful to find maxima and minima of the function, velocity and acceleration are also useful for many engineering optimization problems. Statistics can be defined as a type of mathematical analysis which involves the method of collecting and analyzing data and then summing up the data into a numerical form for a given set of factual data or real-world observations. It equips individuals with the ability to interpret numerical information, make informed decisions and navigate real-world situations. Moreover, Mathematics provides a foundation for further studies in various disciplines and prepares students to tackle complex challenges. By exploring abstract concepts and logical structures, students develop their ability to reason, make connections, and approach problems with clarity and precision. Furthermore, studying Mathematics helps students appreciate the historical and cultural significance of Mathematics and its applications in diverse fields, thereby fostering mathematical literacy and a deeper understanding of the world. Hence the course provides the insight to analyze engineering problems scientifically using logarithms, matrices, trigonometry, straight line, differential calculus and statistics. By incorporating these topics, students comprehend to approach engineering problems from a mathematical perspective, enabling them to devise efficient and effective solutions and this leads to preparing Diploma graduates well-rounded, adaptable and capable of making significant contributions to the branch-specific problems.

Basic Mathematics(SC23501)

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II. Industry / Employer Expected Outcome

Apply the concept of Mathematics to solve industry-based technology problems.

III. Course Outcomes: Students will be able to achieve & demonstrate the following COs on completion of course based learning.

CO1	Apply the concepts of algebra to solve engineering (discipline) related problems.
CO2	Utilize trigonometry to solve branch specific engineering problems.
CO3	Solve area specific engineering problems under given conditions of straight lines.
CO4	Apply differential calculus to solve discipline specific problems.
CO5	Use techniques and methods of statistics to crack discipline specific problems.

Course Content Details:

Unit No.	Theory Learning Outcomes (TLO's) aligned to CO's.	Topics / Sub-topics
1	TLO 1.1 Solve the given simple problem based on laws of logarithm. TLO 1.2 Solve given system of linear equations using matrix inversion method. TLO 1.3 Obtain the proper and improper partial fraction for the given simple rational function. TLO 1.4 Solve simultaneous equations by using concept given in Ancient Indian Mathematics	Unit - I Algebra Logarithm: Concept and laws of logarithm. Matrices: Matrices, algebra of matrices, transpose, value of determinant of matrix of order 3×3 , adjoint and inverse of matrices. Matrices: Solution of simultaneous equations by matrix inversion method. Partial Fractions: Types of partial fraction based on nature of factors and related Problems. Algebra in Indian Knowledge System: Solution of simultaneous equations (Indian Mathematics)..
Course Outcome : CO1		Teaching Hours : 12 hrs
		Marks: 12
2	TLO 2.1 Apply the concept of Compound angle, allied angle and multiple angles to solve the given simple engineering problem(s). TLO 2.2 Apply the concept of Sub- multiple angle to solve the given simple engineering related problem(s). TLO 2.3 Apply concept of factorization and de-factorization formulae to solve the given simple engineering problem(s). TLO 2.4 Investigate given simple problems by utilizing inverse trigonometric ratios. TLO 2.5 Use concept given in Ancient Indian Mathematics for trigonometry to solve given problems.	Unit - II Trigonometry Trigonometric ratios of allied angles, compound angles, multiple angles ($2A, 3A$), submultiple angles (without proof). Factorization and De factorization formulae (without proof). Inverse Trigonometric Ratios and related problems. Principle values and relation between trigonometric and inverse trigonometric ratios. Trigonometry in Indian Knowledge System: The Evolution of Sine Function in India. Indian Trigonometry: Basic Indian Trigonometry-Introduction and Terminology (From Ancient Beginnings to Nilakantha). Trigonometry in Indian Knowledge System: Pythagorean triples in Sulbasutras.
Course Outcome : CO2		Teaching Hours : 16 hrs
		Marks: 12
3	TLO 3.1 Calculate angle between given two straight lines. TLO 3.2 Formulate equation of straight lines related to given engineering problems. TLO 3.3 Identify perpendicular distance from the given point to the line. TLO 3.4 Calculate perpendicular distance between the given two parallel lines. TLO 3.5 Use geometry given in Sulbasutras to	Unit - III Straight Line Straight line and slope of straight line: Angle between two lines, Condition of parallel and perpendicular lines. Various forms of straight lines: Slope point form, two-point form, Double intercept form, General form. Perpendicular distance from a point on the line. Perpendicular distance between two parallel lines. Geometry in Sulbasutras in Indian Knowledge System (construction of square, circling the square).

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(Indian Mathematics).

Course Outcome : CO3

Teaching Hours :6 hrs

Marks: 06

4

TLO 4.1 Solve the given simple problems based on functions.
TLO 4.2 Solve the given simple problems based on rules of differentiation.
TLO 4.3 Obtain the derivatives of composite, implicit, parametric, inverse, logarithmic, exponential functions.
TLO 4.4 Apply the concept of differentiation to find given equation of tangent and normal.
TLO 4.5 Apply the concept of differentiation to calculate maxima, minima and radius of curvature for given function.
TLO 4.6 Familiar with concept of calculus given in Indian Mathematics.

Unit - IV Differential Calculus

Functions and Limits: Concept of function and simple examples.
Functions and Limits: Concept of limits without examples.
Derivatives: Rules of derivatives such as sum, Product, Quotient of functions.
Derivatives: Derivative of composite functions(chain Rule), implicit and parametric functions.
Derivatives: Derivatives of inverse, logarithmic and exponential functions.
Applications of derivative: Second order derivative without examples, Equation of tangent and normal, Maxima and minima, Radius of curvature.
Calculus in Indian Knowledge System: The Discovery of Calculus by Indian Astronomers.(Indian Mathematics).

Course Outcome : CO4

Teaching Hours :16 hrs

Marks: 18

5

TLO 5.1 Obtain the range and coefficient of range of the given grouped and ungrouped data.
TLO 5.2 Calculate mean and standard deviation of ungrouped and grouped data related to the given simple engineering problem(s).
TLO 5.3 Determine the variance and coefficient of variance of given grouped and ungrouped data.
TLO 5.4 Justify the consistency of given simple sets of data.

Unit - V Statistics

Range, coefficient of range of discrete and grouped data.
Mean deviation and standard deviation from mean of grouped and ungrouped data.
Variance and coefficient of variance.
Comparison of two sets of observation.

Course Outcome : CO5

Teaching Hours :10 hrs

Marks: 12

IV. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Solve simple problems of Logarithms based on given applications.	1	Solve simple problems of Logarithms based on given applications.	2	CO1
LLO 2.1 Solve elementary problems on Algebra of matrices for branch specific engineering related applications.	2	Solve elementary problems on Algebra of matrices for branch specific engineering related applications.	2	CO1
LLO 3.1 Apply the concept of matrix to solve engineering problems.	3	Solve solution of Simultaneous Equation using inversion method.	2	CO1
LLO 4.1 Apply the concept of matrix to solve engineering problems.	4	Apply Matrix Inversion method to determine currents through various branches of given electrical networks.	2	CO1
LLO 5.1 Apply the concept of matrix to solve engineering problems.	5	Determine inverse of a non-singular matrix by using open source software.	2	CO1
LLO 6.1 Apply the concept of partial fraction to solve engineering problems.	6	Resolve into partial fraction using linear non-repeated, repeated, and irreducible quadratic factors.	2	CO1

LLO 7.1 Solve problems on Compound, Allied, multiple and sub multiple angles for related shapes.	7	Solve problems on Compound, Allied, multiple and submultiple angles for related shapes.	2	CO2
LLO 8.1 Utilize the concept of trigonometry to solve engineering problems.	8	Practice problems on factorization and de factorization.	2	CO2
LLO 9.1 Utilize the concept of trigonometry to solve engineering problems.	9	Solve problems on inverse trigonometric ratios based on applications.	2	CO2
LLO 10.1 Solve branch specific engineering problems under given conditions of straight lines.	10	Practice problems on equation of straight lines using different forms.	2	CO3
LLO 11.1 Solve branch specific engineering problems under given conditions of straight lines.	11	Solve problems on perpendicular distance, distance between two parallel lines and angle between two lines.	2	CO3
LLO 12.1 Solve branch specific engineering problems under given conditions of straight lines.	12	Use given form of straight line to calculate the speed, distance and time of moving object.	2	CO3
LLO 13.1 Apply the concept of derivative to solve engineering problems.	13	Solve problems to find derivatives of implicit function and parametric function.	2	CO4
LLO 14.1 Apply the concept of derivative to solve engineering problems.	14	Solve problems to find derivative of logarithmic and exponential functions for engineering applications.	2	CO4
LLO 15.1 Apply the concept of equation of tangent and normal to solve engineering problems.	15	Solve problems based on finding equation of tangent and normal for engineering applications.	2	CO4
LLO 16.1 Apply the concept of maxima, minima and radius of curvature to solve engineering problems.	16	Solve problems based on finding maxima, minima of function and radius of curvature at a given point for engineering applications.	2	CO4
LLO 17.1 Apply the concept of equation of tangent and normal to solve engineering problems.	17	Use the concept of tangent and normal to solve the given problem of Engineering Drawing.	2	CO4
LLO 18.1 Apply the concept of Maxima and Minima to solve engineering problems.	18	Use the concept of Maxima and Minima to obtain optimum value for given engineering problem.	2	CO4
LLO 19.1 Apply the concept of radius of curvature to solve engineering problems.	19	Use the concept of radius of curvature to solve given branch specific engineering problem.	2	CO4
LLO 20.1 Utilize the concept of derivative to solve engineering problems.	20	Use the concept of derivative to find the slope of a bending curve for given engineering problem.	2	CO4
LLO 21.1 Use concept of range and mean deviation to crack branch specific problems.	21	Solve problems on finding range, coefficient of range and mean deviation for given applications.	2	CO5
LLO 22.1 Use concept of standard deviation and coefficient of variance to crack branch specific problems.	22	Solve problems on standard deviation, coefficient of variation and comparison of two sets.	2	CO5
LLO 23.1 Use concept of standard deviation to crack branch specific problems.	23	Calculate the Standard Deviation for Concrete with the given data for given engineering applications.	2	CO5

Note: 1. Take any 10-12 tutorials out of 23 and ensure that all the units are covered. 2. Take tutorial in the batch size of 20 to 30 students. 3. Give students at least 10 problems to solve in each tutorial.

Suggested Micro Project / Assignment / Activities for Specific Learning / Skills Development (Self Learning):

Government Polytechnic, Mumbai

ALL Programme

- Collect examples based on real world applications of logarithm and prepare a pdf file.
- Solve the simultaneous system of equation in two variables by Matrix Inversion Method.
- Write down a Mathematical programming using any open source software to verify the result.
- Collect an examples on coding theory using applications of matrices and prepare a pdf file.
- Represent the Graph of Trigonometric function, Logarithmic function on Geogebra and interpret the nature of graph and Make a pdf file.
- Measure height of trees in surrounding locations using trigonometry and prepare presentation.
- Find the derivative of $y = x^{\sin x}$ and visualize the graph of the function and its derivative using any open source software geometrically.
- Find height of room or distance between two pillars by using concept of straight line.
- Collect at least 10 examples based on real world applications of standard deviation/variance.
- Collect at least 10 examples based on real world uses of applications of derivative.
- Attempt any 5-7 Assignment, out of the given list.

V. Specification Table:

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Algebra	2	4	6	12
2	Trigonometry	2	4	6	12
3	Straight Line	2	2	2	6
4	Differential Calculus	2	8	8	18
5	Statistics	2	4	6	12
Total		10	22	28	60

VI. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

- TH- Progressive /Periodic Test test each of 20 Marks
- TL - Continuous Assessment of Tutorials for 25 Marks
- SL - Continuous Assessment of Self Learning for 25 Marks

Summative Assessment (Assessment of Learning)

- TH - Term End examination of 60 Marks

Course	Programme Outcomes (POs)	Programme Specific Outcomes (PSOs)
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Outcomes (COs)	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	1	--	1	--	1	1			
CO2	3	1	--	--	1	1	1			
CO3	3	--	--	--	--	--	--			
CO4	3	1	1	1	--	1	--			
CO5	3	2	1	1	1	1	1			

Legends: - High:03, Medium:02, Low:01, No Mapping: --

VII. Suggested Learning Materials / Books

Sr.No	Author	Title	Publisher
1	Grewal B. S.	Higher Engineering Mathematics	Khanna publication New Delhi , 2013 ISBN:8174091955
2	Dutta. D	A text book of Engineering Mathematics	New age publication New Delhi, 2006 ISBN: 978-81-224-1689-3
3	Kreyszig, Ervin	Advance Engineering Mathematics	Wiley publication New Delhi 2016 ISBN: 978-81-265-5423-2
4	Das H.K.	Advance Engineering Mathematics	S Chand publication New Delhi 2008 ISBN:9788121903455
5	Marvin L. Bittinger David J. Ellenbogen Scott A. Sargent	Calculus and Its Applications	Addison-Wesley 10th Edition ISBN-13: 978-0-321-69433-1
6	C. S. Seshadri	Studies in the History of Indian Mathematics	Hindustan Book Agency, New Delhi 110016. ISBN978-93-80250-06-9
7	George Gheverghese Joseph	Indian Mathematics Engaging with the World from Ancient to Modern Times	World Scientific Publishing Europe Ltd. 57 ISBN978-17-86340-61-0
8	Deepak Singh	Mathematics-I	Khanna Book Publishing Co. (P) Ltd. ISBN: 978-93-91505-42-4
9	Garima Singh	Mathematics-II	Khanna Book Publishing Co. (P) Ltd. ISBN: 978-93-91505-52-3
10	Gareth James, Daniela Witten, Trevor Hastie Robert and Tibshirani	An Introduction to Statistical Learning with Applications in R	Springer New York Heidelberg Dordrecht London ISBN 978-1-4614-7137-0 ISBN 978-1-4614-7138-7 (eBook)
11	Gunakar Muley	Sansar Ke Mahan Ganitagya	First Edition, Rajkamal Prakashan, ISBN-10.8126703571, ISBN-13. 978-8126703579.
12	T.S. Bhanumurthy	A Modern introduction to Ancient Indian Mathematics	New Age International Private Limited, 1 January2008 ISBN- 10. 812242600X, ISBN-13. 978-8122426007
13	M.P. Trivedi and P.Y. Trivedi	Consider Dimension and Replace Pi	Notion Press; 1st edition (2018), ISBN-978-1644291795

Sr.No	Link /Portal	Description
1	http://nptel.ac.in/courses/106102064/1	Online Learning Initiatives by IITs and IISc
2	www.scilab.org/ -SCI Lab	Signal processing, statistical analysis, imageenhancement.
3	www.mathworks.com/product/matlab/ -MATLAB	Applications of concepts of Mathematics to coding.
4	Spreadsheet Applications	Use of Microsoft Excel, Apple Numbers, GoogleSheets.
5	https://ocw.mit.edu/	MIT Course ware
6	https://www.khanacademy.org/math?gclid=CNqHuabCys4CFdOJaddHoPig	Concept of Mathematics through video lectures and notes
7	http://ocw.abu.edu.ng/courses/mathematics/	List of Mathematical Courses.
8	https://libguides.furman.edu/oer/subject/mathematics	Open Education Resources (OER) in Mathematics.
9	https://phet.colorado.edu/en/simulations/filter?subjects=math&type=html,prototype	Phet Simulation for Mathematics.
10	https://libguides.cmich.edu/OER/mathematics	Mathematics with OER.

IX. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Mrs. Sanchita Datta	Lecturer in Mathematics (Selection Grade)	St. Xavier's Institute of Technology, Mahim
2	Mr. Abhijit Sadashiv Patil	Lecturer in Mathematics	Government Polytechnic, Mumbai
3	Mr. Vinod Shantaram Patil	Lecturer in Mathematics	Government Polytechnic, Mumbai

Coordinator,
Curriculum Development,
Department of Science Engineering
& Humanities

I/C, Curriculum Development Cell

Head of Department
Department of Science Engineering
& Humanities

Principal

Basic Mathematics (SC23501)

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Polytechnic, Mumbai														Science and Humanities Department			
Programme: Diploma in EE/IS/EC																	
Course Code: SC23101						Course Title: BASIC PHYSICS											
Compulsory / Optional: Compulsory																	
Teaching Scheme and Credits						Examination Scheme											
CL	TL	LL	SLH	NLH	Credits	FA-TH		SA-TH (2.30Hrs.)	FA-PR	SA		SLA	Total				
										PR	OR						
3	-	2	1	6	3	20	20	60	25	25#	-	25	175				

Total IKS Hrs. for course: 2hrs.

-Abbreviations: CL- Class Room Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

Note:

1. FA-TH represents an average of two class tests of 20 marks each conducted during the term.
2. SA-TH represents the end term examination.
3. FA-PR represents the term work.
4. SA-PR represents the end term practical examination.

I. Rationale:

The subject is included under the category of science. The special feature of the subject is to develop the laboratory skill using principles of scientific phenomenon. This course will serve to satisfy the need of the technical students for their development in technical field. The course is designed by selecting the topics which will develop intellectual skills of the students and will guide students to solve broad based engineering problems. Ultimately the focus of the course is to develop psychomotor skills in the students.

II. Industry / Employer Expected Outcome

Physics is a fundamental science that plays a crucial role in various industries and has numerous outcomes that benefit society: Apply principles of physics to solve broad based relevant engineering problems.

Basic Physics (SC23101)

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P-23 scheme

III. Course Outcomes: Students will be able to achieve & demonstrate the following COs on completion of course based learning

CO1	Classify the different physical quantities, identify the proper unit of it and to estimate error in the measurement of physical quantities.
CO2	Apply laws of motion in various engineering applications.
CO3	Understand photoelectricity, LASER, Semiconductor and gain its significance in modern science and technology.
CO4	Apply basic properties of light to solve engineering problems.
CO5	Identify properties such as elasticity and viscosity with their engineering applications

Course Content Details:

Unit No.	Theory Learning Outcomes (TLO's) aligned to CO's	Topics / Sub-topics
1	TLO 1a. Explain physical quantities and its types with examples. TLO 1b. Differentiate between scalar and vector quantities with examples. TLO 1c. Apply dimensional analysis to check correctness of equation and conversion of units in different systems. TLO 1d. Estimate the errors in the measurement for the give problem. TLO 1e. Explain the working of ancient astronomical instruments to measure distance, time and hour angle	Units and Measurements 1.1 Fundamental Physical quantities, examples, derived physical quantities, examples. 1.2 Scalar and Vector Physical Quantities. 1.3 Definition and requirements of unit System of units, C. G. S., M. K. S. and S. I. units., Dimensions, dimensional formula, Rules to write the unit and conventions of units and Significant figures, rules to writesignificant figures 1.4 Error – Definition, types of errors and estimation of errors. 1.5 Ancient astronomical instruments: Chakra, Dhanyata , Yasti and Phalak yantra, Numerical Course Outcome: CO1 Teaching Hours: 5hrs Marks: 8
2	TLO2a. Differentiate between velocity and speed. Identify changes in motion that produce acceleration. Able to calculate speed, velocity and acceleration of an object, analytically, Classify acceleration as positive, negative, and zero. TLO2b. Identify different periodic motion with examples such as oscillatory motion, Vibratory motion, circular motion. TLO2c. Explain angular motion with equation of angular motion, explain relation between linear velocity and angular Velocity, understand the concept	Motions 2.1 Linear motion –Definition – distance, displacement, velocity, acceleration, retardation, equation of motions, acceleration due to gravity and equation motion under gravity, numerical 2.2 Periodic motions: a) Oscillatory motion, b) Vibratory motion, c) S.H.M. d) Circular motion. (only definition and examples) , terms related to S.H.M. :Definition: Time period, frequency, amplitude, wavelength, and phase 2.3 Angular motion: a) Definition: angular motion, Uniform circular motion, Radius vector, linear velocity, Angular velocity, Angular acceleration, b) Relation between linear velocity and angular Velocity(derivation), Radial or centripetal acceleration, Three equations of motion (no derivations) , Centripetal and Centrifugal force, examples and

	of centripetal and centrifugal force TLO2d. Describe real-life situations that illustrate each of Newton's laws of motion. TLO2e. Explain the ancient theory of gravitation and laws of motion.	applications. 2.4. Laws of Motion and its applications. 2.5. Ancient theory of Gravitation and laws of motion. Numerical. Course Outcome: CO2 Teaching Hours :10hrs Marks: 16
3	TLO3a. Understand the concept of quantum theory of light, TLO3b. Describe a photoelectric-effect experiment. TLO 3c. Calculate KE of photoelectrons using Einstein's equation TLO3d. Explain characteristics of photoelectric effect TLO3e. Explain applications of photoelectric effect. TLO3f. Understand the fundamentals of lasers. TLO3g. Explain the properties and applications of LASER. TLO3h. Distinguish between conductors, semiconductors and insulators on the basis of energy bands. TLO3i. Explain the I-V characteristics and applications of p-n junction diode	Modern Physics 3.1 Photo Electricity 3.1.1 Concept of quantum theory of light, 3.1.2 photoelectric effect 3.1.3 Einstein's Photoelectric equation 3.1.4 Characteristics of photoelectric effect, 3.1.5 Application of photo electric effect, Numerical. 3.2 LASER 3.2.1 LASER introduction 3.2.2 Properties of laser, Applications of LASER 3.3 Semiconductor Physics 3.3.1 Conductors, Insulators and Semiconductors 3.3.2 Energy bands, intrinsic and extrinsic semiconductors 3.3.3 Minority and majority charge carriers 3.3.4 p-n junction diode, Depletion layer I-V characteristics of p-n junction, 3.3.5 static and dynamic resistance 3.3.6 Applications of p-n junction diode Course Outcome: CO3 Teaching Hours :11hrs Marks: 14
4	TLO4a. Explain refraction and reflection of light. TLO 4b. Estimate refractive index of material of prism. TLO4c. Explain the phenomenon of total internal reflection. TLO 4d. Describe the workings and uses of fibre optics.	4 Optics and Optical Fiber 4.1 Optics: 4.1.1 Revision of reflection and refraction of light. 4.1.2 Laws of refraction, Snell's law. 4.1.3 Determination of refractive index. 4.1.4 Dispersion, dispersive power, Prism formula (derivation) 4.1.5 Total internal reflection, Numerical 4.2 Optical Fiber: 4.2.1 Principle of propagation of light through optical fiber. 4.2.2 Structure of optical fiber. 4.2.3 Applications. 4.2.4 Difference between optical fiber cable and electric cable wire Course Outcome: CO4 Teaching Hours :8hrs Marks: 8

5	TLO 5a. Calculate elastic constants and state their significance TLO 5b. Distinguish between elasticity, viscosity TLO 5c. Determine viscosity of fluid Classify types of flow of fluid TLO 5d. Explain the significance of Reynold's number. TLO 5d. Identify applications of Elasticity and viscosity	General Properties of Matter 5.1 Elasticity: 5.1.1 Deformation, deforming force, internal restoring force, Elastic, plastic and rigid solids ^{solids} their examples. 5.1.2 Definition of elasticity, Plasticity, rigidity, stress, strain and its types. 5.1.3 Hooke's Law and elastic limit. 5.1.4 Stress versus Strain diagram, yield point, breaking point 5.1.5 Definition Young's Modulus, bulk modulus and modulus of rigidity relation among them. 5.1.6 Factor of safety, breaking stress, ultimate stress 5.1.7 Applications of elasticity. 5.1.8 Numerical 5.2 Viscosity: 5.2.1. Concept and Definition of viscosity, velocity gradient. 5.2.2 Newton's law of viscosity, Co-efficient of viscosity, unit of viscosity 5.2.3. Stoke's law, terminal velocity, derivation of Stoke's formula. 5.2.3 Streamline flow, turbulent flow, critical velocity, examples. 5.2.4 Reynold's number and its significance. 5.2.5 Applications of viscosity, Numerical Course Outcome: CO5 Teaching Hours :11hrs Marks: 14
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IV. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Sr No	Practical / Tutorial / Laboratory Learning Outcome (LLO)	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	LLO a. Use of measuring instruments LLO b. Find the least count and range of the instruments. LLO c. Interpretation of graph and use of scientific calculator.	To know your Physics laboratory and Use of Scientific Calculator	2	CO1
2	LLO a. Use Vernier caliper to Measure dimensions of given objects. Measure the dimensions of objects of known dimensions. LLO b. Estimate the errors in measurement.	To measure the dimensions of given objects and to determine their volume using Vernier caliper	2	CO1
3	LLO a. Identify types of motion LLO b. Determine the value of acceleration due to gravity.	To determine Acceleration due to gravity by simple pendulum	2	CO2
4	LLO a. Explain photoelectric effect LLO b. Demonstrate the IV characteristics of photoelectric effect.	To study IV characteristic of photoelectric cell.	2	CO3

5	LLO a. Explain refraction of light. LLO b. Determine refractive index of a given prism	To determine refractive index of a prism by pin method	2	CO4
6	LLO a. Explain Elastic moduli. LLO b. Understand the relation between Young's modulus, Bulk modulus and rigidity modulus of elasticity	To determine Elastic moduli of a given wire by using Searle's apparatus.	2	CO5
7	LLO a. Use Micrometer Screw gauge to: Measure dimensions of given objects. Measure the dimensions of objects of known dimensions. LLO b. Estimate the errors in measurement.	To measure the dimensions of given objects and to determine their volume using micrometer screw gauge.	2	CO1
8	LLO a. Identify type of motion LLO b. Calculate the stiffness constant	To determine stiffness constant by using helical spring	2	CO2
9	LLO a. Study the types of motion. LLO b. Use of projectile motion in sport.	To study projectile motion	2	CO2
10	LLO a. Use P-N junction diode to draw forward bias and reverse bias I-V characteristics LLO b. Find out static and dynamic resistance of given P-N junction diode	Determination of static and dynamic resistance of given P-N junction diode	2	CO3
11	LLO a. Study properties of liquid LLO b. Calculate coefficient of viscosity of liquid	To determine coefficient of viscosity of liquid by Stokes' method	2	CO5
12	LLO a. Study the properties of light TIR LLO b. Determine the critical angle	To study total internal reflection and to determine the critical angle.	2	CO4
13	LLO a. Demonstrate on spectrometer device	Demonstration on spectrometer	2	CO4
14	LLO a. Identify properties of LASER	Experiments on LASER	2	CO3
15	LLO a. Define unit and classify into different types of units	Showing Video on different applications related to units.	2	CO1

Note: 10 to 12 experiments should be performed in a term for completion of TW

V. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning): (Minimum 10 Assignments)

1. Convert the units of a given physical quantity from one system of units to another
2. Measure room temperature of hot baths / bodies by using mercury thermometer and convert it into different units.
3. Prepare a chart to summarize units and measurements.
4. Use a digital vernier calliper and micrometre screw gauge for measurements. (Lab- based).
5. Make a paper scale of least count e.g., 0.01 cm, 0.2cm, 0.5cm.
6. What is the difference between speed and velocity?
7. What is motion? Describe Straight line motion.
8. Explain Average speed and Average velocity.
9. Write in detail about your experience of various, types of motion while riding a bicycle on a road.
10. Identify the types of motion.

- Movement of the earth around the sun:
 - Movement of a ceiling fan:
 - A meteor falling from the sky:
 - A rocket launched from the ground:
 - A fish swimming in water:
 - The plucked string of a sitar:
- For the photoelectric effect, explain what happens (and why)
 - To the photocurrent as the light intensity increases.
 - To the photocurrent as the frequency of the light is increased.
 - To the speed of the photoelectrons as the radiation intensity increases.
 - Make a ppt on applications of LASER.
 - Applications of semiconductors in civil, mechanical, electrical engineering etc.
 - Applications of optical fibers in civil, mechanical, electrical engineering etc.
 - Prepare PPT on application of Nanotechnology in Electronics, Automobile, Medical, Textile, Cosmetics, Environmental, Space and Defense.
 - To demonstrate T.I.R and working of optical fiber (lab based)
 - Compare elastic body and plastic body (lab based).
 - Write the practical applications of Elasticity.
 - Write the practical applications of Viscosity.
 - Compare streamline and turbulent flow with examples.

VI. Specification Table:

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Units and Measurements	2	4	2	8
2	Motions	4	4	8	16
3	Modern physics	4	4	6	14
4	Optics and Optical fiber	2	4	2	8
5	General properties of matter	2	4	8	14
Total		14	20	26	60

VII. Assessment Methodologies/Tools**Formative assessment (Assessment for Learning)**

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- Rubrics for continuous assessment on process and product related performance indicators (25 marks)

Summative Assessment (Assessment of Learning)

- End term examination, Viva-voce, Workshop performance (25 marks)

VIII. Suggested COs - POs Matrix Form(Electrical Engineering)

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3			2			2	1	1	1
CO2	3						1			
CO3	3				1		1	1	1	1
CO4	3			2	1		2	1	1	1
CO5	3			2			2	1		1

Legends: - High:03, Medium:02, Low:01, No Mapping: --

VIII. Suggested COs - POs Matrix Form(Instrumentation Engineering)

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3			2			2	1	1	
CO2	3						1	1		
CO3	3				1		1	1	1	
CO4	3			2	1		2	1	1	
CO5	3			2			2	1	1	

Legends: - High:03, Medium:02, Low:01, No Mapping: --

VIII. Suggested COs - POs Matrix Form(Electronics Engineering)

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO - 1	PSO - 2	PSO - 3
CO1	3			2			2	2	1	1
CO2	3						1	1		1
CO3	3				1		1	1	1	1
CO4	3			2	1		2	2	1	1
CO5	3		2	2			2	1	1	2

Legends: - High:03, Medium:02, Low:01, No Mapping: --

IX. Suggested Learning Materials / Books

Sr. No	Author	Title	Publisher
1	R K Gaur & S L Gupta	Engineering Physics	Dhan pat Rai Pub.
2	Prof. Arthur Beiser	Applied Physics	Tata McGraw hill Pub.
3	D K Bhattacharya	Engineering Physics	Oxford University press
4	NCERT / MSBSHSE	Physics 1 & 2	NCERT/MSBSHSE
5	Halliday & Resnick Wiley	Physics Vol 1 & 2	Wiley India
6	Brijlal & Subrahmanyam	Principle of physics	S. CHAND & COMPANY
7	R K Gaur & S L Gupta.	Engineering Physics	Dhan pat Rai Pub.

X. Learning Websites & Portals

Sr. No	Link / Portal	Description
1	https://sunitathorat1310.wixsite.com/website-1	Unit and measurement, Motion, Modern physics, Optics and Optical fiber, Properties of materials viz Elasticity, Viscosity
2	www.physicsclassroom.com	Concept of basic physics
3	www.physics.org	Concept of basic physics
4	www.physics.brown.edu	Concept of basic physics
5	www.amazon.com/Basic-Physics	Concept of basic physics
6	http://scienceworld.wolfram.com/physics/	Concept of basic physics
7	http://en.wikipedia.org/wiki	Concept of basic physics
8	http://hyperphysics.phy-astr.gsu.edu/hbase	Concept of basic physics
9	www.msu.edu/~brechtjo/physics	Concept of basic physics
10	www.answers.com/topic/list-of-basic-physics-topics	Concept of basic physics
11	www.answers.com/topic	Unit and measurement, Motion, Modern physics, Optics and Optical fiber, Properties of materials viz Elasticity, Viscosity
12	www.vlab.amrita.edu	All Experiments video
13	www.olabs.edu.in	All Experiments video
14	https://praxilabs.com/en/	All Experiments video
15	www.phet.colorado.edu	Simulation of Topics

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Basic Physics (SC23101)

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Programme : Diploma in _ CE/ME/EE/EC/IS/CO/IF/AIML/LG/LT/RT														
Course Code:HU23501						Course Title :Communication Skills (CMS)								
Compulsory / Optional:														
Teaching Scheme and Credits						Examination Scheme								
CL	TL	LL	SLH	NLH	Credits	FA-TH		SA-TH (2.30Hrs)	FA-PR	SA		SLA	Total	
										PR	OR			
03	--	02	01	06	03	20	20	60	25	--	--	25	150	

Total IKS Hrs. for course:

Abbreviations: CL- Class Room Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

Note:

1. FA-TH represents two class tests of 20 marks each conducted during the term.
2. SA-TH represents the end term examination of 60 marks.
3. FA-PR represents practical term work of 25 marks.
4. SLA represents Self Learning Assignment of 25 marks.

Rationale - In this age of globalization, competition is tough. Hence effective communication skills are important. Communication skills play a vital and decisive role in career development.. It will guide and direct to develop a good personality and improve communication skills. Students will be able to utilize the skills necessary to be a competent communicator. This course will help the students to select and apply the appropriate methods of communication in various situations. Communication skills for professional purposes aim to equip the students with necessary language skills required for public speaking, presentation and negotiation. Communication skills for academic purposes will include academic writing skills and critical thinking considering the need of students to communicate in engineering domain.

II. Industry / Employer Expected Outcome

The aim of this course is to help the student to achieve the following industry identified outcome through various learning experiences: "Communicate in Verbal and Non verbal form of communication effectively at workplace".

Communication Skills(HU23501)

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III. Course Outcomes: Students will be able to achieve & demonstrate the following COs on completion of course based learning

CO1	Apply proper communication technique by avoiding barriers to cope up with the challenges of the modern world.
CO2	Compose paragraphs and dialogues on given situations.
CO3	Able to participate in Group Discussion and acquire the practical knowledge of an Interview.
CO4	Deliver effective presentations with apt body language by using audio visual aids.
CO5	Acquire professional writing skills for formal written business correspondence.

Course Content Details:

Unit No.	Topics / Sub-topics
1	Unit I Communication Theory and Practice TLO 1.1 Define communication. TLO 1.2 Describe the process of Communication. TLO 1.3 Differentiate between types of communication. TLO 1.4 Identify the type of Barriers and suggest Remedies. TLO 1.5 Describe and apply 7 C's of effective Communication. TLO 1.6 Describe the non-verbal communication. Introduction, meaning and definition and importance of communication. Elements/process of communication. Types of communication: formal , informal, verbal (oral and written), non-verbal (visual and auditory), vertical, horizontal and Diagonal communication. Barriers in Communication and ways to overcome a) Mechanical Barrier b) Physical Barrier c) Psychological Barrier d) Linguistic Barrier 7 C's of effective communication (Considerate, concrete, concise, clear, complete, correct, courteous) Introduction to Non-verbal communication (Aspects of Body Language & Graphic Communication) Course Outcome : CO1 Teaching Hours :10hrs
	Marks: 18

2	TLO 2.1 Formulate paragraphs with synchronized sentence structure on the given situation / topic TLO 2.2 Develop dialogues to practice language skill in a structured and meaningful way.	UNIT II Paragraph and Dialogue Writing Types of paragraphs: Technical ,Descriptive , Narrative Dialogue Writing: i. Greetings ii.Development iii. Closing Sentence. Course Outcome : CO2 Teaching Hours :06hrs Marks: 08
3	TLO 3.1 Express thoughts freely during group discussion. TLO 3.2 Participate in interview confidently . TLO 3.3 Prepare Group Discussion to practice language skills and leadership qualities in a structured and meaningful way. TLO 3.4 Understand Non Verbal Communication in interview.	UNIT III Group Discussion And Interview Skills Importance and Types of Group Discussion Parameters of Group Discussion Need and Types of Interview Preparing for an Interview Non Verbal communication during interview Course Outcome : CO3 Teaching Hours :10hrs Marks: 10
4	TLO 4.1 Prepare power point presentation TLO 4.2 Use appropriate body language for effective communication	Unit -IV Presentation Skills Power Point Presentation : i. Layout ii. Fontsize iii. Color combination. Kinesics : i. Facial expressions ii Eye contact iii Postures iv Gestures. Course Outcome : CO4 Teaching Hours :09hrs Marks: 08
5	TLO 5.1 Draft business letters in the given situation. TLO 5.2 Respond to given job advertisement by writing application letter with resume. TLO 5.3 Draft office correspondence in given format. TLO 5.4 Prepare reports of the given types of events.	UNIT V PROFESSIONAL WRITING Business Correspondence: Enquiry, order, Complaint. Job-Application with Resume Office Drafting- notices, circulars, memorandum etc. Report Writing: Accident and Fall in production Course Outcome : CO5 Teaching Hours :10hrs Marks: 16

IV. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Sr No		Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	LLO 1.1 Enhance the understanding of word formation LLO 1.2 Enrich word power LLO 1.3 Construct words with the specific meanings	Formulate 20 words using Prefix and Suffix	2	CO1
2	LLO 2.1 Promote the development of effective communication skills LLO 2.2 .Improve non -verbal communication Skills LLO 2.3 Enhance interpersonal skills LLO 2.4 Build confidence	Enact Role Plays as per situation and context	2	CO2
3	LLO 3.1 Participate and express their thoughts confidently in group discussion. LLO 3.2 Improve speaking & listening skills	Group Discussion	2	CO3
4	LLO 4.1 Draft job application.	Job application with Resume	2	CO5
5	LLO 5 .1 Draft different types of reports on the given situation.	Report Writing	2	CO5
6	LLO 6.1 Identify different types of barriers & suggest remedies to overcome them.	Present different Types of barriers using Examples with remedies to overcome.	2	CO1
7	LLO 7.1 Face interview confidently LLO 7.2 Use appropriate body Language during interview.	Mock Interview	2	CO3
8	LLO 8.1 Identify different aspects of body language. LLO 8.2 Use appropriate body language during communication.	Mention Examples of Body Language use at Workplace with suitable pictures and images.	2	CO4
9	LLO 9.1 Express information in coherent and engaging manner LLO 9.2 Build confidence	Introduce oneself and others	2	CO4
10	LO 10.1 Develop Listening Practice	Listening Practice	2	CO1
11	LLO 11.1 Develop Reading Practice	Reading Practice	2	CO4
12	LO 12.1 Develop Writing Practice	Writing Practice	2	CO5

Note: .Students should complete all assignments & activities of Basic & Level 1 of Online course – “Business Communication Excellence” on Infosys Springboard. At the end of term, it is mandatory to submit certificates of Basic and Level 1 of Online course –“Business Communication Excellence”, on Infosys Springboard. Only after that their Term Work will be granted.

Any 10 out of 12 practicals are compulsory

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V. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning):

1. Powerpoint preparation and presentations on given topic. (Mini Project)
2. Describe a given picture.
3. Impromptu Communication on given situation
4. Prepare an advertisement on any product.
5. Suggest proper dressing & grooming for the given occasion.

VI. Specification Table:

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Communication Theory and Practice	6	6	6	18
2	Paragraph and Dialogue Writing	2	2	4	08
3	Group Discussion and Mock-Interview	4	2	4	10
4	Presentation Skills	2	2	4	08
5	Professional writing	2	6	8	16
Total		16	18	26	60

VII. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

Rubrics for continuous assessment based on process and product related performance indicators(10marks)

Note : Rubric - Each Practical Carries.

- 1) 02 Marks for present, 00 Marks for Absent & 01 Marks for extra practical.
- 2) 04 Marks for Discipline & involvement in the practical.
- 3) 04 Marks for Accuracy for result & Neat clean presentation.

Summative Assessment (Assessment of Learning)

End term examination, Viva-voce, Workshop performance (70marks)

Course Outcomes (COs)	Programme Outcomes (POs) ELECTRICAL ENGINEERING							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	2	3	1		2	2	3	1	2	3
CO2					1	2	2	2		3
CO3	1	3			2	2	2	2		3
CO4					2	3	2	1		2
CO5	2				2	3	3			

Legends: - High:03, Medium:02, Low:01, No Mapping: --

Course Outcomes (COs)	Programme Outcomes (POs) ELECTRONICS ENGINEERING							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	2	3	1		2	2	3	2	2	
CO2					1	2	2	1	2	1
CO3	1	3			2	2	2	1	1	1
CO4					2	3	2	1		
CO5	2				2	3	3	1		

Legends: - High:03, Medium:02, Low:01, No Mapping: --

Course	Programme Outcomes (POs) CIVIL ENGINEERING	Programme Specific Outcomes
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Outcomes (COs)								(PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PS O-1	PS O-2	PS O-3
CO1	2	3	1		2	2	3	1	2	1
CO2					1	2	2	1	2	1
CO3	1	3			2	2	2	1	2	1
CO4					2	3	2	1	2	
CO5	2				2	3	3	1	2	

Legends: - High:03, Medium:02, Low:01, No Mapping: --

Course Outcomes (COs)	Programme Outcomes (POs) MECHANICAL ENGINEERING							PS O-1	PSO - 2
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning		
CO1	2	3	1		2	2	3		1
CO2					1	2	2		
CO3	1	3			2	2	2	2	
CO4					2	3	2	2	1
CO5	2				2	3	3	2	1

Course Outcomes (COs)	Programme Outcomes COMPUTER ENGINEERING							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PS O-1	PS O-2	PS O-3
CO1	2	3	1		2	2	3	1	2	1
CO2					1	2	2	1	2	1
CO3	1	3			2	2	2	1	2	1
CO4					2	3	2		2	
CO5	2				2	3	3		2	

Legends: - High:03, Medium:02, Low:01, No Mapping: --

Course Outcomes (COs)	Programme Outcomes (POs) INFORMATION TECHNOLOGY							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PS O-1	PS O-2	PS O-3
CO1	2	3	1		2	2	3	2	1	1
CO2					1	2	2	2	1	1
CO3	1	3			2	2	2	1		2
CO4					2	3	2	1		
CO5	2				2	3	3	1		

Legends: - High:03, Medium:02, Low:01, No Mapping: --

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Course Outcomes (COs)	Programme Outcomes (POs) INSTRUMENTATION ENGINEERING							Programme Specific Outcomes (PSOs)		
	2	3	1		2	2	3	PSO-1	PSO-2	PSO-3
CO1					1	2	2	2	1	2
CO2	1	3			2	2	2	2	1	2
CO3					2	3	2	2	1	2
CO4	2				2	3	3	2		2
CO5	3	3	3	3	3	3	3	2		

Legends: - High:03, Medium:02, Low:01, No Mapping: --

Course Outcomes (COs)	Programme Outcomes (POs) ARTIFICIAL INTELLIGENCE & MACHINE LEARNING							PSO - 1	PSO - 2
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning		
CO1	2	3	1		2	2	3	3	3
CO2					1	2	2		
CO3	1	3			2	2	2	2	2
CO4					2	3	2		2
CO5	2				2	3	3	2	2

Course Outcomes (COs)	Programme Outcomes (POs) RUBBER TECHNOLOGY							PSO - 1	PSO - 2
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning		

CO1	2	3	1		2	2	3	1	3
CO2					1	2	2	1	2
CO3	1	3			2	2	2	1	2
CO4					2	3	3		2
CO5	2				2	3	3		

Course Outcomes (COs)	Programme Outcomes (POs) LEATHER GOODS & FOOTWEAR TECHNOLOGY							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PS O-1	PS O-2	PS O-3
CO1	2	3	1		2	2	3	1		2
CO2					1	2	2	1		2
CO3	1	3			2	2	2	1	1	2
CO4					2	3	2	1		2
CO5	2				2	3	3	1		2

Legends: - High:03, Medium:02, Low:01, No Mapping: --

Course Outcomes (COs)	Programme Outcomes (POs) LEATHER TECHNOLOGY							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PS O-1	PS O-2	PS O-3
CO1	2	3	1		2	2	3			
CO2					1	2	2			
CO3	1	3			2	2	2			
CO4					2	3	2			
CO5	2				2	3	3			

Legends: - High:03, Medium:02, Low:01, No Mapping: --

IX. Suggested Learning Materials / Books

Sr.No	Author	Title	Publisher
1	Communication Skills	Sanjay Kumar, PushpaLata- Oxford University Press	Oxford University Press
2	Kumar, E. Suresh, Sreehari, P Savitri	Effective English with CD	Pearson Education
3	Gnanamurli	English Grammar at a Glance	S. Chand
4	CBSE	English Communicative (class X)	Golden
5	Dr. Anjana Tiwari	Communication Skills in English	Khanna Publishers, New Delhi

X. Learning Websites & Portals

Sr.No	Link / Portal	Description
1	https://www.britishcouncil.in/english/learn-online	Website link is given to refer Unit 1
2	Vocabulary.com	Refer this website for interactive vocabulary quizzes, word lists
3	International Phonetic Association (IPA) Website	It offers audio examples and charts to help understand and transcribe sounds
4	grammarly.com/blog	For constructing effective paragraphs and improving clarity
5	www.newagegolden.com	Refer this website for speech writing, diary entry and paragraph writing
6	https://infyspringboard.onwingspan.com/	Refer this website for Course Business Communication Excellenceto complete Basic level and Level I

XI. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Mrs. Sharmishta S. Kulkarni	Lecturer in English	Government Polytechnic Pune
2	Mr. B.M.Pande	Lecturer in English	Shri.Bhagubai Maftlal Polytechnic, Mumbai.
3	Mrs. K. S. Pawar	Lecturer in English	Government Polytechnic Mumbai
4	Ms. N. N. Dhake	Lecturer in English	Government Polytechnic Mumbai

Government Polytechnic, Mumbai

Coordinator,

Curriculum Development, *NN Dhabbe*

Department of Science Engineering
& Humanities

K. T. J.
I/C, Curriculum Development Cell

Althorab AH Programmes
C. S. A. Thorat
Head of Department
Department of Science Engineering
& Humanities

N. V.
Principal

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(Approved copy)

G. P. Mumbai

Communication Skills(HU23501)

P-23 scheme



Programme : Diploma in Electrical Engineering												
Course Code: ME23102						Course Title : Engineering Graphics						
Compulsory / Optional: Compulsory												
Teaching Scheme and Credits						Examination Scheme						
CL	TL	LL	SLH	NLH	Credits	FA-TH	SA-TH (2.30Hrs)	FA-PR	SA		SLA	Total
									PR	OR		
2	-	2	-	4	2	-	-	50	50	-	-	100

Total IKS Hrs. for course: 2

Abbreviations: CL- Class Room Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

Note:

1. FA-TH represents an average of two class tests of 30 marks each conducted during the term.
2. SA-TH represents the end term examination.

I. Rationale

Engineering drawing is the common graphical language of engineers, technicians and workers to express engineering ideas and concepts. Correct interpretation of engineering drawings is one of the basic duties of First Line Supervisors. This Engineering Graphics course induces the concepts of accuracy and exactness of information required to work as electrical technician. It also develops judgments about small distances and angles.

This course is useful in developing imagination, drafting and sketching skills of the students.

II. Industry / Employer Expected Outcome

To draw and interpret engineering drawing

III. Course Outcomes: Students will be able to achieve & demonstrate the following COs on completion of course based learning

ME23102.1	Draw geometric figures and engineering curves using drawing instruments.
ME23102.2	Apply principles of orthographic projections to draw orthographic views of given object
ME23102.3	Apply principles of isometric projection to draw isometric view from given orthographic views.
ME23102.4	Draw the free hand sketches of given engineering objects/elements

Unit No.	Theory Learning Outcomes (TLO's) aligned to CO	Topics / Sub-topics
1	Draw engineering figures using geometric constructions with the help of drawing instruments. Use IS SP-46 for dimensioning Use different types of lines.	Principles of Drawing Drawing instruments and their uses, Standard sizes of drawing sheets (ISO-A series), letters and Numbers (single stroke vertical), Conventions of lines and their applications, Methods of Dimensioning: Chain, parallel and coordinate dimensioning (Refer SP-46 Code) Simple Geometrical Constructions (Bisecting line and angle, Dividing line in given equal number of parts, Drawing of polygons, Redrawing of figures using geometrical constructions) Course Outcome : ME23102.1 Teaching Hours :5 hrs Marks: 08
2	2.1 Draw different engineering curves from given data.	Engineering Curves Drawing Scales (reduced, enlarge and full size), Method to draw Ellipse by Arcs of Circle Method and Concentric Circle Method. Method to draw Parabola and Hyperbola by Directrix and Focus Method. Course Outcome-ME23102.1 Teaching Hours:5 Marks – 08
3	Draw top, front and side views of given pictorial view. Draw the top, front and side sectional orthographic views from given pictorial view.	Orthographic projections Introduction to orthographic projections, Symbol of First Angle Projection, Conversion of pictorial view into orthographic views –Top, Front and End View of objects containing plain surfaces, slant surfaces, slots, ribs, cylindrical surfaces. (First Angle Projection Method Only) Sectional Orthographic Views and conversion of pictorial view into sectional orthographic views Course Outcome-ME23 102.2 Teaching Hours:8 Marks – 14
4	Draw isometric scale. Draw isometric views from given orthographic view using natural and isometric scale.	Isometric projections: Isometric scale: Natural Scale with Isometric Scale Conversion of Orthographic Views into Isometric View/Projection (Objects involving plain surfaces, slant surfaces, slots, ribs, cylindrical surfaces, holes etc) Course Outcome-ME23102.3 Teaching Hours:6 Marks – 12

5	1.1 Draw proportionate free-hand sketches of given elements.	Freehand sketches Drawing of proportional freehand sketches of – Different types of thread forms, nuts, bolts, screws, washers and foundation bolts (Rag and Lewis type) Electrical Components such as- Fuses: Rewireable, HRC Cartridge, MCB single pole, double pole, Insulator-Pin, Shackled, Disc (String), Isolator: Vertical, Horizontal, Pantograph, Transformer: Cut section, Core & amp; Shell (Teacher shall also explain use/ function of all the above elements)	Course Outcome-ME23102.4 Teaching Hours:6 Marks – 08
---	--	--	---

IV. Laboratory Learning Outcome and Aligned Practical / Tutorial Experiences.

Sr No	Laboratory Learning Outcome (LLO) aligned to CO's.	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	Prepare Lettering, Draw types of lines. Redraw the given figure. Apply IS code provisions for dimensioning.	Basics of Engineering Graphics Drawing sheet containing types of lines, Lettering, Redrawing given figure, dimensioning	4	ME23102.1
2	2.1 Draw Engineering curves using given data.	Engineering curves Geometrical constructions (minimum 2 problems)	6	ME23102.1
3	3.1 Apply method of projection for drawing orthographic views.	Orthographic projections Using first angle method of projections, draw two problems (one problem with sectional orthographic views)	6	ME23102.2
4	4.1 Draw isometric projections using natural and isometric scale.	Isometric Projection One problem using isometric scale and one with natural scale	6	ME23102.3
5	5.1 Draw standard discipline-oriented components using free hand	Freehand sketches: i) Drawing of proportional freehand sketches of – Different types of thread forms, nuts, bolts, screws, washers and foundation bolts (Rag and Lewis type) ii) Electrical Components such as- Fuses: Rewindable, HRC Cartridge, MCB single pole, double pole, MCCB, Insulator-Pin, Schackle, Disc (String), Isolator: Vertical, Horizontal, Pantograph, Transformer: Cut section, Core & amp; Shell	6	ME23102.4
6	6.1 Collect information of an ancient Indian culture related to engineering graphics	Assignment on correlation regarding Indian sculpture, Indian temples, ancient monuments etc with engineering drawing.	2	ME23102.1

V. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning):

Not Applicable

VI. Specification Table:

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Principles of Drawing	-	-	08	08
2	Engineering Curves	-	-	08	08
3	Orthographic projections	-	-	14	14
4	Isometric projections:	-	-	12	12
5	Freehand sketches	-	-	08	08
Total		-	-	50	50

VII. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

Each sheet to be assessed on following rubrics (10 marks)

Attendance & Regularity	Technical Understanding & Interpretation of given problem	Line work, Accuracy, Presentation	Total
02 Marks	04 Marks	04 Marks	10 Marks

Summative Assessment (Assessment of Learning)

- End term practical examination (50 marks)

Suggested COs - POs Matrix Form

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	2	-	-	2	-	-	1		3	
CO2	2	-	-	2	-	-	1	1	3	
CO3	2	-	-	2	-	-	1	1	3	
CO4	2	-	-	2	-	-	1	1	3	

Legends: - High:03, Medium:02, Low:01, No Mapping: --

VIII. Suggested Learning Materials / Books

Sr.No	Author	Title	Publisher
1	N.D. Bhatt	Engineering Drawing	Charotar Publishing House
2	P.J. Shah	Engineering Graphics	S. Chand, New Delhi
4	D.Jolhe	Engineering Drawing	Tata McGraw Hill Education
5	K.L.Narayan,P.Kannaiah	Textbook on Engineering Drawing	Scitech publications
6	BIS	IS Code SP-46, Engineering Drawing practice For school and colleges	BIS
7	S.K. Bhattacharya	Electrical Engineering Drawing	Wiley Eastern Limited

IX. Learning Websites & Portals

Sr.No	Link / Portal	Description
1	https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing_and_sketching/	MIT Open courseware describing basics of engineering drawing
2	https://archive.nptel.ac.in/courses/112/104/112104172/	Lectures on Technical Drawing
3	https://www.youtube.com/watch?v=3WXPanCq9LI	Projection of lines
4	https://www.youtube.com/watch?v=fvjk7PlxAuo	Introduction to Graphics (GTU)

Engineering Graphics (ME23102)

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CDC Co-ordinator
G. P. Mumbai

P-23 scheme

X. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Mr. K.B. Salunke	Lecturer in Mechanical Engineering	Government Polytechnic, Thane
2	Dr. V.P. Rathod	Lecturer in Mechanical Engineering	Government Polytechnic, Thane
3	Mr. I.N. Khuspe	Lecturer in Electrical Engineering	Government Polytechnic, Mumbai
4	Mr. S. B. Bidgar	Lecturer in Mechanical Engineering	Government Polytechnic, Mumbai
5	Mr. E.C. Dhembre	Lecturer in Mechanical Engineering	Government Polytechnic, Mumbai

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Curriculum Development,
Department of Mechanical Engineering

Head of Department
Department of Mechanical & Electrical Engineering

I/C, Curriculum Development Cell

Principal

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CDC Co-ordinator
G. P. Mumbai

Engineering Graphics (ME23102)

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P-23 scheme

Programme:ElectricalEngg.(SandwichPattern)

Semester-II

SL23601

LibreOffice

1. Introduction to Libre Office Calc (Foss:Libre Office Calcon BOSS Linux English)

Outline: Introduction to Libre Office Calc What is Calc, Who should use Calc, What can be done using Calc. About spread sheets, sheets and cells. Basic features-parts of main Ca..

2. Working with Cells Outline: Working with Cells How to enter numbers, text, numbers as text, date and time in Calc. How to Navigate between cells and in between sheets. How to select items in row. 3. Working with Sheets Outline: Working with Sheets Inserting and Deleting rows and columns Calc. Inserting and Deleting Sheets in Calc. Renaming Sheets

4. Formatting Data Outline: Formatting Data Borders, Color, Formatting Text, Increasing Cell Size Formatting multiple line softext, numbers, fonts, cell borders, cell background Automatic Wrappi..

5. Basic Data Manipulation Outline: Basic Data Manipulation Paste and paste special (values, transpose), pasting a spreadsheet into writer as a table Introduction to Formulas-Sum, Average, basic formula..

6. Working with Data Outline: Working with data Speed up using Fill tools and Selection lists. Sharing content between sheets Remove data, Replace data, Change part of a data.

7. Using Charts & Graphs Outline: Using Charts and graphs in Calc Creating, Editing and Formatting Charts Types of charts Resizing and moving of charts

8. Formulas & Functions Outline: Formulas and Functions Creating formulas, operator types and referencing Basic arithmetic and statistic functions- relative and fixed(\$) referencing in a function..

9. Linking Calc Data Outline: Linking Calc Data Referencing other sheets and documents Working with Hyperlinks

APPROVED CO-ORDINATOR

CDC Co-ordinator
G. P. Mumbai

Dr. B. Shirsat
Lecturer in Ele. Engg.

9/5/23
HOD
EE Dept.

Programme : Diploma in Electrical Engineering (Sandwich Pattern)

Course Code: EE23 101

Course Title : Basic Electrical Engineering

Compulsory / Optional: Compulsory

Teaching Scheme and Credits						Examination Scheme							
CL	TL	LL	SLH	NLH	Credits	FA-TH		SA-TH (2.30Hrs.)	FA-PR	SA		SLA	Total
						T1	T2			PR	OR		
4	2	2	2	10	5	20	20	60	25	25#	--	25	175

Total IKS Hrs. for course:

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @\$ Internal Online Examination

Note:

1. FA-TH represents an average of two class tests of 30 marks each conducted during the term.
2. SA-TH represents the end term examination.

I. Rationale : Knowledge of fundamentals of electrical is essential to apply on all type of electrical machines, instruments, devices and equipment's. The basic aim of this course is that, the student must learn facts, concepts, principles and procedures in electrical engineering. The knowledge of this course will be useful for understanding the higher-level knowledge in the field of electrical engineering

II. Industry / Employer Expected Outcome: The aim of this course is to help the student to attain the following industry identified outcome through various teaching learning experiences: 1)To know the basic elements of electrical engineering 2) Apply principles and basic laws of electrical engineering for solving electric and magnetic circuit.

III. Course Outcomes: Students will be able to achieve & demonstrate the following COs on completion of course based learning

CO1	Describe principles and basic laws of electrical engineering
CO2	Solve simple electrical circuit
CO3	Interpreting electrostatic study focusing on capacitor
CO4	Apply the rules & laws to solve magnetic circuit.
CO5	Calculate fundamental parameters of AC sinusoidal waveform

Basic Electrical Engineering (EE23 101)

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CDC Co-ordinator
G. P. Mumbai

Unit No.	Learning Outcome	Topics / Sub-topics
1	1.1 State and apply Basic concepts of electricity. 1.2 Define resistance and explain the factors affecting resistance 1.3 state and explain classification of Electric current. 1.4 State and apply Ohm's law 1.5 Solve DC resistive network using rules and laws 1.6 Identify duality between series and parallel circuit 1.7 Identify the effects of electric current in an appliances. 1.8 State concept of Electrical work, power and Energy 1.9 State types of Resistance. 1.10 Define and state causes of Electrical accident. 1.11 State factors on which severity of shock depend.	1: Basic Concept 1.1 Concept of Electric Current, Electric Potential, Potential Difference (P D) and Electromotive Force (EMF). 1.2 Concept of Resistance, Laws of Resistance, Concept of Resistivity, Conductance and Conductivity, Effect of Temperature on Resistance, Temp. co-efficient of Resistance (Simple numerical) 1.3 Classification of Electric Current: - Direct Current (DC), Alternating Current (AC), advantages of alternating current over direct current, application of Direct Current and Alternating current 1.4 Ohm's Law, Non ohmic conductors, Concept of Voltage drop and Terminal Voltage. 1.5 Resistance in Series, Voltage Division Formula, Resistance in Parallel, Current Division Formula. Calculations of Equivalent Resistance of simple Series, Parallel and Series-Parallel Circuits. (Simple numerical) 1.6 Duality Between Series and Parallel Circuits. 1.7 Effects of Electric Current - Heating Effect, Magnetic Effect, Chemical Effect with applications 1.8 Concept of Electrical Work, Power and Energy with S.I. unit. (Simple numerical) 1.9 Types of Resistors and their Applications. - Carbon Composition - Deposited Carbon - High Voltage Ink Film - Metal Film - Metal Glaze - Wire Wound 1.10 Meaning and causes of Electrical accident 1.11 Factors on which severity of shock depends Course Outcome : CO1, CO2 Teaching Hours : 14hrs Marks: 14
2	2.1 Define the term related to electric circuit. 2.2 Identify constant voltage/current and real voltage/current source. 2.3 State effect of open and short circuit. 2.4 Solve dc circuit using Kirchhoff's laws 2.5 Carry out star-delta transformations.	2:D. C. Circuits 2.1 Definitions of terms Related to Electric Circuits, Circuit Parameters, Linear Circuit, Non-linear Circuit, Bi-lateral Circuit, Uni-lateral Circuit, Electric Network, Passive Network, Active Network, Node, Branch, Loop, Mesh. 2.2 Voltage and Current Sources: 2.2.1 Constant Voltage Source and Real Voltage Source 2.2.2 Constant Current Source and Real Current Source 2.3 Concept of Open and Short circuit

		2.4 Kirchhoff's Laws - Kirchhoff's Current Law - Kirchhoff's Voltage Law (Simple Numerical with maximum two equations) 2.5 Delta-Star and Star-Delta Transformation (No Derivation and Simple Numerical) Course Outcome: CO1,CO2 Teaching Hours : 12 Marks : 12
3	3.1 Define terminology related to Electrostatics. 3.2 State and explain working of capacitor 3.3 Solve numerical on different dielectric medium of capacitor 3.4 solve capacitive circuit using rule and laws. 3.5 Find value of voltage and current during charging and discharging of capacitor. 3.6 State types of capacitor. 3.7 Describe ultra capacitor and super capacitor.	3: Capacitors 3.1 Electrostatics: Static Electricity, Electrostatic induction, Coulombs Laws of electrostatics, Electric Field, Electric Flux, Electric flux Density, Permittivity - Absolute permittivity, Permittivity of free space and Relative Permittivity, Electric potential, Electric Potential Difference, Potential Gradient, Breakdown voltage 3.2 Definition of Capacitor and Capacitance, Action of Capacitor 3.3 Parallel Plate Capacitor: - Uniform Di-electric Medium - Medium Partly Air. - Composite Medium. (Simple Numerical) 3.4 Capacitors in Series, Capacitors in Parallel (Simple Numerical) Energy Stored in Capacitor. (No Derivation and Simple Numerical) 3.5 Charging and Discharging of Capacitor (No Derivation and Simple Numerical) 3.6 Types of Capacitors and their Applications. Electrolytic, Non-Electrolytic (Paper, Mica, Plastic) 3.7 Introduction of ultra capacitor and super capacitor. Course Outcome: CO3 Teaching Hours : 12 Marks: 12
4	4.1 Define and explain various terms related to magnetism 4.2 Define and explain various terms related to magnetic circuit 4.3 Compare electric and Magnetic circuit. 4.4 State concept of leakage flux, useful flux and fringing. 4.5 Explain hysteresis loop. 4.6 State types of magnet with application. 4.7 Determine Polarity of a Electromagnet. 4.8 State Faradays law of Electromagnetic Induction 4.9 Compare and explain types of induced emf. 4.10 State and calculate the coefficient of self inductance and mutual inductance. 4.11 Explain inductances connected in series and parallel. 4.12 Describe how energy is stored in a magnetic field.	4: Magnetic Circuits & Electromagnetic Induction 4.1 Magnetism: Absolute and Relative Permeabilities of a Medium, Laws of Magnetic Force, Magnetic field strength, Flux & Flux Density. 4.2 Magnetic Circuit - Ohm's law of Magnetic Circuit, Definitions Concerning Magnetic Circuit. Magneto-Motive-Force (MMF), Ampere Turns (AT), Reluctance, Permeance, Reluctivity. (simple numerical) 4.3 Comparison Between Electric and Magnetic circuit. 4.4 Concept of Leakage Flux, Useful Flux & Fringing. 4.5 Magnetization Curve (B - H Curve), Magnetic Hysteresis, Hysteresis Loop. Hysteresis Loops for Hard & Soft Magnetic Materials. Area of Hysteresis Loop, Hysteresis Loss. (No Derivation and No Numerical) 4.6 Types of Magnets and their applications 4.7 Magnetic effect of electric current, Dot & cross conventions, Right hand thumb rule, Interaction between magnetic fields, force on current carrying conductors, Fleming's left hand rule

		4.8 Faraday's Laws of Electromagnetic Induction. Direction of induced EMF and current, Lenz's Law, Fleming's right hand rule, 4.9 Type of Induced EMF, Dynamically induced EMF, statically induced EMF, 4.10 self-Inductance (L), Mutual Inductance, co-efficient of coupling. (simple numerical) 4.11 Inductances in Series and parallel. (No Derivation and No Numerical) 4.12 Energy Stored in Magnetic Field (No Derivation and Simple Numerical) Course Outcome: CO4 Teaching Hours : 16 Marks: 14
5	5.1 Compare single phase and three phase ac supply. 5.2 Define terminology related ac waveform.	5: Introduction of AC Fundamental 5.1 Generation of single phase and three-phase ac supply, Fundamental Equation of A.C. Voltage and current. Difference between single phase and three phase supply 5.2 Important terms: instantaneous value, waveform, cycle, Periodic Time, frequency, amplitude, R.M.S value, Average value, Form factor, Peak factor, Phase, Phase difference (simple numerical) Course Outcome: CO5 Teaching Hours : 6 Marks: 8

IV. List of Laboratory Experiment.(Minimum 10)

Sr No	Laboratory outcomes	Laboratory Experiment	Number of hrs.	Relevant COs
1	Identify electrical measuring instruments/apparatus/equipments	Identify electrical measuring instruments, supply sources, ICDP/ITDP, switches, loads, wires and Prepare Charts of electrical safety	4	CO1
2	Identify types of fire Extinguisher.	Demonstrate the operation and types of fire extinguisher	2	CO1
3	Demonstrate methods of artificial respiration	First Aid Treatment: Precautions if person gets an electric shock. Methods of artificial respiration.	2	CO1
4	Measure AC/DC voltage, resistance, continuity	Use of Multimeter/Multirange meter for measurement of AC & DC voltage, resistance, continuity	2	CO1
5	Calculate temperature coefficient of resistance.	To verify the effect of temperature on resistance of copper conductor	2	CO2
6	Calculate total resistance for series /parallel circuit.	To determine the equivalent resistance (Req.) of Series and Parallel connected resistances	4	CO2
7	Calculate energy consumed in single phase circuit.	To measure current, voltage, power and energy in single phase circuit	2	CO2

9	Calculate branch current and voltage using Kirchhoff's law	Verify Kirchhoff's current and Voltage law	4	CO2
9	Draw voltage versus time curve for charging/discharging of capacitor	To plot the charging and discharging curves of a capacitor and determine the time constant.	2	CO3
10	Draw B-H curve.	To plot the B-H curve for magnetic material	2	CO4
11	Identify types of induced emf	To verify Faraday's First Law of electromagnetic Induction (For Dynamically & Statically Induced EMF)	2	CO4
12	Calculate rms voltage and average voltage for AC/DC waveform.	To observe AC & DC waveform & measure its voltage on CRO	2	CO5

I. List of Tutorial

Sr No	Tutorial Titles	Number of hrs.	Relevant COs
1	Numerical on Temp. co-efficient of Resistance	02	CO2
2	Solve Numerical on series circuit and parallel resistive circuit	04	CO2
3	Solve Numerical on work, power and energy	02	CO2
4	Solve Numerical on Kirchhoff's current and Voltage law	04	CO2
5	Solve Numerical on Delta-Star and Star-Delta Transformation	04	CO2
6	Solve Numerical on parallel plate a uniform dielectric, partly medium air, composite medium capacitor	02	CO3
7	Solve the Numerical on Capacitors connected in Series and parallel	04	CO3
8	Solve the Numerical on Charging and discharging of capacitor, energy stored in capacitor.	04	CO3
4.4	Solve the Numerical on simple magnetic circuit	02	CO4
10	Solve the simple Numerical on AC Fundamental	02	CO5

II. Suggested Micro Project / Assignment/ Activities for Specific Learning / Skills Development (Self Learning): (Minimum 5)

1. Collect information of any 10 Inventors/ scientist in Electrical Engineering
2. Prepare simple resistor using nichrom wire and measure its resistance.
3. Write general specifications of capacitor used in domestic application.

4. Enlist examples of apparatus/machine working on self and mutual Induction principle
5. Draw Electrical Symbol used in Practice
6. Design simulation of a simple resistance circuit

III. Specification Table:

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Basic Concept	4	4	6	14
2	DC Circuit	2	4	6	12
3	Capacitors	2	6	4	12
4	Magnetic Circuit & Electromagnetic Induction	4	6	4	14
5	AC Fundamental	2	2	4	8
Total		14	22	24	60

IV. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

- Rubrics for continuous assessment based on process and product related performance indicators(25 marks)

Summative Assessment (Assessment of Learning)

- End term examination, Viva-voce, Workshop performance (25 marks)

V. Suggested COs - POs Matrix Form

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	3	3	--	2	2	--	3	3	1	2
CO2	3	3	--	2	2	--	3	3	1	--
CO3	3	3	--	2	2	--	3	3	1	--
CO4	3	3	--	2	2	--	3	3	1	--
CO5	3	3	--	2	2	--	3	3	1	--

Legends: - High:03, Medium:02, Low:01, No Mapping: --

VI. Suggested Learning Materials / Books

Sr.No	Author	Title	Publisher
1	M.N. Mittal	Fundamentals of Electrical Engineering	Everest Publishing House
2	B. L. Theraja and A. K. Theraja	Electrical Technology (Volume I)	S. Chand and Co. Ltd.
3	V. K. Mehta and Rohit Mehta	Basic Electrical Engineering	S. Chand and Co. Ltd.
4	Edward Hughes	Electrical Technology	ELBS Publications

VII. Learning Websites & Portals

Sr.No	Link / Portal	Description
1	https://archive.nptel.ac.in/courses/108/105/108105112/	Videos on basic concept, DC circuit, Capacitor and ac fundamental
2	https://www.khanacademy.org	Videos on basic concept
3	https://www.elprocus.com/kirchhoffs-laws-working-formula/	Kirchoff's Laws and basic terminology of circuit.
4	https://www.electronics-tutorials.ws/electromagnetism/electromagnetic-induction.html	Laws of Electromagnetic Induction

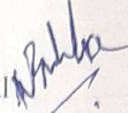
VIII. Academic Consultation Committee/Industry Consultation Committee:

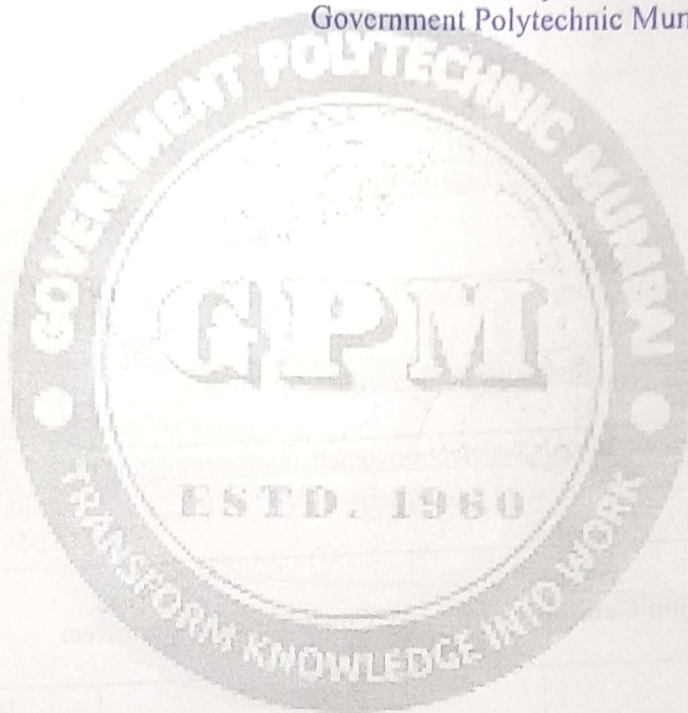
Sr. No	Name	Designation	Institute/Organization
1	Mr. Rahul H Shewale	Assistant Engineer	Mumbai Inspection Division Industry Energy and Labour Dept. Govt of Maharashtra Mumbai Central
2	Mrs.S.P.Phadnaik	Lecturer in Electrical Engineering	G.P.Pune
3	Miss A.V. Patil	Lecturer in Electrical Engineering	G.P.Mumbai
4	Mrs. D. R. Kirtane	Lecturer in Electrical Engineering	G.P.Mumbai


Coordinator,
Curriculum Development,
Department of Electrical Engineering

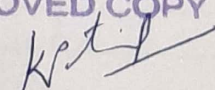
Head of Department
Department of Electrical Engineering


I/C, Curriculum Development Cell


Principal
Principal
Government Polytechnic Mumbai



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CDC Co-ordinator
G. P. Mumbai

Basic Electrical Engineering (EE23 101)

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P-23scheme

Programme : Diploma in ME/CE/EE/CO/IF/IS/EC/RT/LT/LG (Sandwich Pattern), AIML												
Course Code: UV23301						Course Title : Universal Human Values-I						
Compulsory / Optional: Compulsory												
Teaching Scheme and Credits						Examination Scheme						
CL	TL	LL	SLH	NLH	Credits	FA-TH	SA-TH	FA- PR	SA		SLA	Total
									PR	OR		
01	–	–	01	02	01	–	–	–	–	–	50	50

Total IKS Hrs. for course: 04

Abbreviations: CL- Classroom Learning, TL- Tutorial Learning, LL- Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA- Formative Assessment, SA -Summative assessment, SLA- Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# Online Examination, @\$ Internal Online Examination

Note:

1. FA-TH represents an average of two class tests of 30 marks each conducted during the term.
2. SA-TH represents the end term examination.

Rationale:

Human beings have materially developed to a great extent through technological development. Still the scarcity of happiness and satisfaction result in personal and social conflicts. The value system develops the frame of reference of the individual to benchmark his/ her behavioral pattern respecting the righteousness during life. The appreciation and inculcation of a value system can develop a person as a creative contributor for society, nation and by-large the world.

By inculcating universal values, not only can a person resolve the personal, social and professional situations positively but also can lead toward an enriched life. Once these values are inculcated in a student's personality, it will result in the sustainable development of a student. This course is designed to make the student think that by observing the universally accepted human values, it is easy to become a good human being, a good citizen and make their own life goal-oriented, cladded with happiness and satisfaction. The core universal values to be inculcated: personal values, social values and professional values. The aspirations and concerns to be explored at the level of individual, at the level of family, at the level of society and at the level of nature.

Industry / Employer Expected Outcome

To demonstrate value based behavior at the workplace.

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Course Outcomes:

On completion of this course, Students will be able to achieve & demonstrate the following COs on completion of course based learning

CO1	Appreciate universal human values to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.
CO2	Develop a holistic approach to environment, family and society.
CO3	Develop more confidence in self.
CO4	Derive joy of giving.
CO5	Improve understanding and perform acts of kindness.

Course Content Details:

Sr. No.	CO	Activity	Related Value/s	Methodology of Implementation	Student's Role	Mentor's role	Resources Required
01	CO1 CO3	Prepare a self-introduction sheet i) Name, School passed from, achievements up to 10th standard - What are your goals in your life? - What are your expectations from institute, Family, Society? - Information of family members - Most happy moments and difficult moments in your life, Special trips, Hobbies, Sports, Music, etc	Honesty, Self-exploration	Preparing a note and presenting in front of peers	Thoughtfully answer the questions in an honest manner.	Provide information about the institute and motivate students to honestly express themselves.	Official website of the institute

02	CO1 CO2	List behavioral characteristics and analyze self, friend, family members, Do you like these characters yes/no – why	Self-exploration , Honesty	Preparing a presentation	Honestly and sincerely analyse self and others	Create a stress-free environment and see that there will be no conflict of expression.	Provide a list of character traits by referring to various resources like internet, books, etc. For e.g. https://www.teachervision.com/writing/character-traits-list-examples
03	CO2 CO3	Identify your needs and desires	Honesty Self-exploration	Making a list of needs and desires	Reflect and identify needs and desires.	Stay wary of controversial subjects	list of historical personalities who set the example.
04	CO2 CO5	Singing a patriotic song in group Make group , select song, explain meaning, use music/karaoke and demonstrate to class	Patriotism	Forming group of interested students. Students will rehearse the activity and will perform in groups	Diligently practice and cooperate with others.	Manage the logistics of creating groups and assigning roles.	Music system, list of patriotic songs.

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05	CO1 CO3	Essay writing ● My dreams as an Engineer ● India a Super power in my views ● Society & I ● Indian culture and values ● My role models in life IKS hours- Religious and cultural history of India- Indus civilization	Self exploration Patriotism Accountability	Selecting a topic from the list and writing an essay on it	Thoughtfully write the essay on a selected topic.	Display the best essays on the notice board.	notice board, panel of judges
06	CO2 CO3	Play Music instruments/ Singing/ Drawing/Any stage performance/ photography/any creative art IKS hours - History of Indian classical music.	Derive the joy	Present to peers	Pursue your creative interest	Identify and categorize students. Create groups accordingly	logistical support
07	CO2 CO4 CO5	Visit a nature park, identify the flora & fauna, ecological factors & their role in our life. (e.g Maharashtra nature park society, Dharavi, Mumbai)	Environment Conservation	Students to arrange visit under supervision of mentor	Study various flora & fauna in a disciplined manner.	Assure safety of students and manage activities.	https://maharashtraturep.org/
08	CO2 CO4	Tree plantation and caring for it.	Environment Conservation	Students to arrange activity under supervision of mentor	Plant the appropriate saplings according to instructions.	Assure safety of students and provide adequate instructions.	saplings, soil, shovels, fertilizer

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09	CO3	List the distractors which are responsible to deviate you from integrity and find out the solution	Integrity, Righteousness	Observation and identification of common distractors.	Identify distractors like TV shows, movies and bad habits	Provide historical case studies of previous students.	Case studies
10	CO2 CO5	Prepare the chart DOs and DONTs for different situations like local trains, travel, public place, classroom, examination, etc.	Conscientiousness, honesty, social gratitude	Preparing the chart	Identify DOs and DONTs and prepare various charts	Create groups and assign topics.	Official websites of respective administrations like railways, Municipal corporation, etc.,
11	CO4	Beach cleaning, institute cleaning	Environment conservation, Health consciousness	Organizing a visit to clean the venue.	Clean the venue as per instructions.	Assure safety and aid in organization.	https://www.unitedwaymumbai.org/clean-shores



12	CO4 CO5	a) To prepare a first aid box to be kept at home b) Preparation of a report on industrial accident	Care for others, accountability	Collection of information from various available sources and use it for intended purpose.	a) Prepare a list of contents for a first aid box to be kept at home b) Prepare a first aid box as per prepared list c) Prepare a list of various accidental hazards at home. d) Prepare a display of safety precautions for use of gas stove. e) Collect information of one industrial accident, its effects, probable causes from various resources and prepare a report.	To explain and monitor the task	Medicine, Box, paper
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Methodology:

1. The course teacher will be the mentor.
2. In consultation and under supervision of a mentor, the student/ Group of students has to complete the activity.
3. The mentor will work as a facilitator/ advisor.
4. The strategies to learn the course is "Self- Exploratory" and "Experiential Learning"
5. The onus of responsibility for completing the activities is with students.
6. The student has to complete at least **five** no. of activities throughout the term. Each activity carries 10 marks.

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Assessment methodologies/Tools:

Formative Assessment (Assessment for Learning)

The student has to complete at least five no. of activities throughout the term. Each activity carries 10 marks

Criterion No.	Criterion	Max. Marks	Not Satisfactory	Satisfactory	Good	Excellent
1	Attendance	02	0	1	2	2
2	Knowledge	04	1	2	3	4
3	Presentation / Performance	04	1	2	3	4
	Total	10				

Suggested CO-PO Matrix form:

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	-	-	-	-	2	1	3			
CO2	-	1	1	-	1	1	2			
CO3		1	-	-	1	1	2			
CO4	-	-	-	-	1	-	2			
CO5	-	-	-	-	1	-	2			

Legends :- High:03, Medium:02, Low:01, No Mapping: -
 *CO PSOs mapping to be formulated at department level

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References/ Books:

Sr. No.	Title	Author, Publisher, Edition and Year Of publication	ISBN
1	A Foundation Course in Human Values and Professional Ethics	R.R. Gaur, R. Sangal, G.P. Bagaria, Excel Books, New Delhi, 2010	978-8-174-46781-2
2	Human Values	A.N. Tripathy, New Age International Publishers, 2003	978-8-122-42589-5
3	Teacher's Manual - A Foundation Course in Human Values and Professional Ethics	R.R. Gaur, R. Sangal, G.P. Bagaria, Excel Books, New Delhi, 2010	-
4	Science and Humanism, Towards a Unified World View	PL Dhar, RR Gaur, Commonwealth Publications, 1992	978-8-171-69222-4
5	Education for values in schools- a framework	NCERT	
6	Value oriented education	E N Gawande	

E-References:

- 1) https://youtu.be/kOJu1vj_BVk (The 10 Most Important Human Values)
- 2) Dr. Prakash Baba Amte- Movie
- 3) <https://youtu.be/QeogOlzG2ls> (Value of Education -short film)

E-References for mentors:

- 1) <https://www.edutopia.org/>
- 2) <https://sdgs.un.org/goals>

Consultation Committee:

Sr. No	Name	Designation	Institute/Organisation
1	Dr. L.A. Patil	Principal (Retired)	Pratap College, Amalner
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