Government Polytechnic, Mumbai

Department of Civil Engineering

P-23 Curriculum

(Sandwich Pattern)

Semester-I

(Course Contents)

Government Polytechnic, Mumbai
(Academically Autonoums Institute, Government of Maharashtra)

Name of the Programme: Diploma In Civil Engineering (Sandwitch Pattern)

Teaching and examination Scheme (P23) | With Effect From Academic Year : 2023-24

Duration Of Programme : 6 Semester | Duration : 16 WEEKS

Semester : First | Scheme : (P23)

Sr No	Course Title	Course Type	Course Code	Total IKS Hrs for Sem.	Learning Scheme					Credits	Assessment Scheme														
					Actual Contact Hrs. / Week			Self-Learning Hrs/ Week	Notional Learning Hrs/Week		Paper Duration (hrs.)	Theory					Based on LL & TL Practical					Based on Self Learning		Total Marks
												FA-TH		SA-TH	Total		FA-PR		SA-PR			SLA		
					CL	TL	LL					T1 Max	T2 Max	Max	Max	Min	Max	Min	Max PR	Max OR	Min	Max	Min	
1	BASIC MATHEMATICS	AEC	SC 23501	6	4	2	-	2	8	4	2 Hrs. 30 min	20	20	60	100	40	25	10	-	-	-	25	10	150
2	ENGINEERING CHEMISTRY	DSC	SC 23105	4	3	-	2	1	6	3	2 Hrs. 30 min	20	20	60	100	40	25	10	25#	-	10	25	10	175
3	COMMUNICATION SKILLS	AEC	HU 23501	0	3	-	2	1	6	3	2 Hrs. 30 min	20	20	60	100	40	25	10	-	-	-	25	10	150
4	ENVIROMENTAL STUDIES	VEC	CE 23301	2	-	-	2	2	4	2	-	-	-	-	-	-	25	10	-	25@	10	25	10	75
5	BUILDING CONSTRUCTION	DSC	CE23101	2	3	-	2	1	6	3	2 Hrs. 30 min	20	20	60	100	40	25	10	-	25@	10	25	10	175
6	CONSTRUCTION MATERIALS	DSC	CE23102	2	-	1	2	1	4	2	-	-	-	-	-	-	25	10	50@$	-	20	25	10	100
7	LIBRE OFFICE CALC (SPOKEN TUTORIALS) Self-Learning	SEC	SL 23601	0	-	-	-	4	4	2	-	-	-	-	-	-	-	-	-		-	-	-	-
8	UNIVERSAL HUMAN VALUES - I	VEC	UV 23301	4	1	-	-	1	2	1	-	-	-	-	-	-	-	-	-		-	50	20	50
	Total			20	14	4	9	13	40	20	12	80	80	240	400	160	150	60	75	50	50	200	80	**875**

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, IKS- Indian Knowledge System.

Legends :@ InternalAssessment, # ExternalAssessment, *# 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 SLAof 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.*15Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. *Self learning hours shall not be reflected in the Time Table.

Course Category: 1:Discipline Specific Course Core (DSC), 2:Discipline Specific Elective (DSE), 3:ValueEducation Course(VEC), 4: Intern./Apprenti./Project./Community(INP), 5:AbilityEnhancementCourse (AEC), 6: Skill Enhancement Course (SEC), 7: Generic Elective (GE)

Department Coordinator, Curriculum Development, Dept. of Civil Engineering

Head of Department, Dept. of Civil 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 (3Hrs.)**	**FA-PR**	**SA**		**SLA**	**Total**
						T1	**T2**			**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.

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** 1.1 Logarithm: Concept and laws of logarithm. 1.2 Matrices: Matrices, algebra of matrices, transpose,value of determinant of matrix of order 3x3, adjoint and inverse of matrices. 1.3 Matrices: Solution of simultaneous equations by matrix inversion method. 1.4 Partial Fractions: Types of partial fraction based onnature of factors and related Problems. 1.5 Algebra in Indian Knowledge System: Solution ofsimultaneous 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** 2.1 Trigonometric ratios of allied angles, compound angles, multiple angles (2A, 3A), submultiples angles.(without proof) 2.2 Factorization and De factorization formulae.(without proof). 2.3 Inverse Trigonometric Ratios and relatedproblems. 2.4 Principle values and relation between trigonometric and inverse trigonometric ratios. 2.5 Trigonometry in Indian Knowledge System: TheEvolution of Sine Function in India. 2.6 Indian Trigonometry: Basic Indian Trigonometry-Introduction and Terminology (From Ancient Beginnings to Nilakantha). 2.7 Trigonometry in Indian Knowledge System:Pythagorean triples in Sulabasutras.
	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 Sulabasutras to	**Unit - III Straight Line** 3.1 Straight line and slope of straight line: Angle between two lines, Condition of parallel and perpendicular lines. 3.2 Various forms of straight lines: Slope point form, two-point form, Double intercept form, General form. 3.3 Perpendicular distance from a point on the line. 3.4 Perpendicular distance between two parallel lines. 3.5 Geometry in Sulabasutras in Indian Knowledge System (construction of square, circling the square).

	solve the given problems.	(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 givenin Indian Mathematics.	**Unit - IV Differential Calculus** 4.1 Functions and Limits: Concept of function andsimple examples. 4.2 Functions and Limits: Concept of limits withoutexamples. 4.3 Derivatives: Rules of derivatives such as sum,Product, Quotient of functions. 4.4 Derivatives: Derivative of composite functions(chain Rule), implicit and parametric functions. 4.5 Derivatives: Derivatives of inverse, logarithmicand exponential functions. 4.6 Applications of derivative: Second order derivativewithout examples, Equation of tangent and normal, Maxima and minima, Radius of curvature. 4.7 Calculus in Indian Knowledge System: The Discovery of Calculus by Indian Astronomers.(IndianMathematics).
	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** 5.1 Range, coefficient of range of discrete and grouped data. 5.2 Mean deviation and standard deviation from meanof grouped and ungrouped data. 5.3Variance and coefficient of variance. 5.4 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 Logarithmsbased on given applications.	1	Solve simple problems of Logarithms based on givenapplications.	2	CO1
LLO 2.1 Solve elementary problems on Algebraof matrices for branch specific engineering related applications.	2	Solve elementary problems on Algebra of matrices forbranch specific engineering related applications.	2	CO1
LLO 3.1 Apply the concept of matrix to solveengineering problems.	3	Solve solution of Simultaneous Equation usinginversion method.	2	CO1
LLO 4.1 Apply the concept of matrix to solveengineering 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 solveengineering problems.	5	Determine inverse of a non-singular matrix by usingopen source software.	2	CO1
LLO 6.1 Apply the concept of partial fraction tosolve 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 tosolve engineering problems.	8	Practice problems on factorization and de factorization.	2	CO2
LLO 9.1 Utilize the concept of trigonometry tosolve engineering problems.	9	Solve problems on inverse trigonometric ratios basedon applications.	2	CO2

LLO 10.1 Solve branch specific engineeringproblems under given conditions of straight lines.	10	Practice problems on equation of straight lines usingdifferent 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 engineeringproblems 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 tosolve engineering problems.	13	Solve problems to find derivatives of implicit functionand parametric function.	2	CO4
LLO 14.1 Apply the concept of derivative tosolve engineering problems.	14	Solve problems to find derivative of logarithmic andexponential functions for engineering applications.	2	CO4
LLO 15.1 Apply the concept of equation oftangent and normal to solve engineering problems.	15	Solve problems based on finding equation of tangentand 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 offunction and radius of curvature at a given point for engineering applications.	2	CO4
LLO 17.1 Apply the concept of equation oftangent and normal to solve engineering problems.	17	Use the concept of tangent and normal to solve thegiven problem of Engineering Drawing.	2	CO4
LLO 18.1 Apply the concept of Maxima andMinima to solve engineering problems.	18	Use the concept of Maxima and Minima to obtainoptimum value for given engineering problem.	2	CO4
LLO 19.1 Apply the concept of radius ofcurvature to solve engineering problems.	19	Use the concept of radius of curvature to solve givenbranch specific engineering problem.	2	CO4
LLO 20.1 Utilize the concept of derivative tosolve engineering problems.	20	Use the concept of derivative to find the slope of abending 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 rangeand mean deviation for given applications.	2	CO5
LLO 22.1 Use concept of standard deviation andcoefficient of variance to crack branch specific problems.	22	Solve problems on standard deviation, coefficient ofvariation and comparison of two sets.	2	CO5
LLO 23.1 Use concept of standard deviation tocrack branch specific problems.	23	Calculate the Standard Deviation for Concrete with thegiven data for given engineering applications.	2	CO5

Note: 1. Take any 10-12 tutorials out of 23 and ensured 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):

- 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 programmingusing 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 pdffile.
- Measure height of trees in surrounding locations using trigonometry and prepare presentation.
- Find the derivative of y= x^sinx 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 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	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	Kreysizg, 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. Surgent	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

VIII. Learning Websites & Portals

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 tocoding.
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 lecturesand 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) inMathematics.
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 _____ Engineering

Head of Department
Department of _____ Engineering

I/C, Curriculum Development Cell

Principal

Programme: Diploma in ME/CE/RT													
Course Code: SC23105					**Course Title: Engineering Chemistry**								
Compulsory / Optional: Compulsory													
Teaching Scheme and Credits						**Examination Scheme**							
CL	**TL**	**LL**	**SLH**	**NLH**	**Credits**	**FA-TH**		**SA-TH (3 Hrs.)**	**FA-PR**	**SA**		**SLA**	**Total**
						TS1	**TS2**			**PR**	**OR**		
3	-	2	1	6	3	20	20	60	25	25#	-	25	175

Total IKS Hrs. for course: 4 Hrs.

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 class tests marks each conducted during the term.
2. SA-TH represents the end term examination.

I. Rationale

Diploma engineers have to deal with various materials and machines. This course is designed with fundamental information to help the diploma engineering students to apply the basic concepts and principles of chemistry to solve broad- based engineering problems. The basic concepts and principles of science related to engineering materials will help in understanding the technology courses where emphasis is on the applications of these in various technology domain applications.

II. Industry / Employer Expected Outcome

This course is to be taught and implemented with the aim to develop in the student, the course outcomes (COs) leading to the attainment of following industry identified outcome expected from this course:

Apply principles of chemistry to solve broad based relevant engineering problems.

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

CO1	Explain the structure, properties and behavior of molecules and compounds based on the types of chemical compound.
CO2	Apply the concepts of electrochemistry in engineering field and corrosion preventive measures in industry.
CO3	Select relevant metallurgical process related to industrial application.
CO4	Apply relevant water treatment process to solve industrial problem.
CO5	Use relevant fuel in relevant application

Course Content Details:

Unit No.	Theory Learning Outcomes (TLO)	Topics / Sub-topics
1	**TLO 1.1** Explain the Indian chemistry **TLO 1.2** Explain the properties of given material based on the bond formation. **TLO 1.3** Describe the molecular structure of given solid, liquid and gases. **TLO 1.4** Describe the crystal structure of the given solids and Explain Properties of metallic solid.	**Unit-I Atomic Structure and Chemical bonding** 1.1 Indian Chemistry: -Philosophy of atom by Acharya Kanad. 1.2 Introduction of atom, Molecules, Fundamental Particles, Proton, Neutron, Electron. Their mass, charge, location. And symbol Bohr's theory, Postulates, Structure of modern atom. Atomic number and atomic mass number. Atomic weight Numerical based on atomic number & atomic mass number. Electronic configuration of element up to 30 elements 1.3 Electronic theory of valency: Assumptions, Chemical bonds: Types and characteristics of electrovalent bond, covalent bond, coordinate bond, hydrogen bond, and metallic bond. 1.4 Molecular arrangement in solid, liquid and gases. Structure of solids: crystalline and amorphous solids Properties of metallic solid, Unit cell: simple cubic, body center cubic (BCC), face center cubic (FCC), hexagonal close pack crystals. **Course Outcome: CO1 Teaching Hours: 7hrs. Marks: 10**
2	**TLO 2.1** Describe mechanism of electrolysis of CuSO4 solution by using cu and pt rods **TLO 2.2** Solve numerical based on Faraday's first and second law of electrolysis. **TLO 2.3** Distinguish between primary and secondary cell. **TLO 2 4** Describe the phenomenon of the given type of corrosion and its prevention. **TLO 2.5** Identify the different factors affecting rate of corrosion for the given type of material and Select the	**Unit –II Electro chemistry and Metal Corrosion and its prevention** 2.1 Electrolyte- Types of electrolytes, ionization and dissociation, Cathode, Anode, Electrode potential: oxidation and reduction, Mechanism of electrolysis: Electrolysis, Electrochemical series for cations and anions. Mechanism of electrolysis of CuSO4 solution 2.2 Faraday's laws of electrolysis: Faraday's first and second law, relation between electrochemical equivalent and chemical equivalent, Numerical. Applications of electrolysis: Electro-refining of copper and Electroplating 2.3 Difference between primary and secondary cell. 2.4 Corrosion: Definition and Types of corrosion Dry corrosion: Mechanism, Types of oxide film, Wet corrosion

	protective measures to prevent the corrosion in the given corrosive medium.	: Mechanism hydrogen evolution in acidic medium, oxygen absorption in neutral or alkaline medium, Galvanic cell action by Daniel cell. 2.5 Factors affecting the rate of corrosion. Corrosion control: Modification of environment, Use of protective coatings, coating of less active metal like Tin (Tinning), coating of more active metal like Zinc (Galvanizing), Anodic and cathodic protection, Choice of material-using pure metal and using metal alloy **Course Outcome: CO2 Teaching Hours :9 hrs. Marks: 12**
3	**TLO 3.1** Explain the terminologies related to hard water **TLO 3.2** Explain the effects of hard water in industrial application **TLO 3.3** Describe the given process for softening of the given water sample. **TLO 3.4** Describe purification of potable water. **TLO3.5** Describe waste water treatment process.	**Unit–III: Water** 3.1 Water: Soft water, hard water, Hardness; Classification 3.2 Hard water in boilers and prevention: Boiler corrosion, caustic embrittlement, priming and foaming, scales and sludges 3.3 Water softening: lime soda process (hot lime soda and cold lime soda process), zeolite process, ion exchange process (cation exchange and anion exchange). 3.4 Potable water treatment: Sedimentation, coagulation, filtration and sterilization. 3.5 Waste water treatment: sewage treatment, BOD and COD of sewage water; Reverse Osmosis, recycling of waste water. **Course Outcome: CO3 Teaching Hours :9 hrs. Marks: 12**
4	**TLO 4.1** Explain the terminologies involved in metallurgy and working of the given type of furnace. **TLO 4.2** Describe the extraction process of the given ore with chemical reaction. **TLO 4.3** Explain purposes and preparation methods of making the given alloy. **TLO 4.4** Select the relevant alloy for the given application stating the properties with justification. **TLO 4.5** Describe the constituents, hardening and setting process of the given type of cement. **TLO 4.6** Describe the constituents, hardening and setting process of the given type lime.	**Unit–IV: Metals, alloys and Cement,** 4.1 Metallurgy: Mineral, ore, gangue, flux, slag. Types of furnaces: Muffle furnace, Blast furnace. 4.2 Extraction processes of Hematite, copper pyrite ores: Crushing, concentration, reduction, refining. Properties of iron and copper: Hardness, tensile strength, toughness, malleability, ductility, refractoriness, fatigue resistance. specific gravity, specific heat, brazing, castability, stiffness. 4.3 Preparation of alloys (Fusion and compression method). 4.4 Ferrous alloys: Low carbon, medium carbon, high carbon steels. Non-ferrous alloy: Brass, Bronze, Duralumin, Tinman Solder, Woods metal. 4.5 Cement: Types; Bio cement and Port land cement; constituents, setting and hardening, applications 4.6 Lime: classification, constituents, Setting and hardening, applications. **Course Outcome: CO4 Teaching Hours :12 hrs. Marks: 16**

5	**TLO 5.1** Describe salient properties of the given type of fuel. **TLO 5.2** Explain the given type of analysis of the given type of coal. **TLO 5.3** Calculate the calorific value of the given solid fuel using Bomb calorimeter. **TLO 5.4** Describe composition, properties of given gaseous fuel with their applications. **TLO 5.5** Calculate the mass and volume of air required for complete combustion of the given fuel.	**Unit–V: Fuel** 5.1 Fuel: Calorific value and Ignition temperature, classification. 5.2 Solid fuels: Coal, Classification and composition, proximate analysis, Ultimate analysis, 5.3 Bomb calorimeter. Carbonization of coke by Otto Hofmann's oven. 5.4 Liquid fuels: Fractional distillation of crude petroleum, boiling range, composition, properties. Knocking, cracking, octane number and cetane number. 5.5 Gaseous fuels: Biogas, LPG, and CNG. Combustion equation of gaseous fuels, mass and volume of air required for Complete combustion **Course Outcome: CO5** **Teaching Hours :8 hrs.** **Marks: 10**

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

Sr No	Laboratory Learning Outcomes	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	**LLO 1.1** Follow safety rules in chemistry laboratory.	Introduction to chemistry laboratory instruments and glassware	2	CO1
2	**LLO 2.1** Identify cation and anion in given ionic solutions by performing selective test	Identification of cation in given ionic solutions. ($Cu^{++,}$ Fe^{++}, $Fe^{+++,}$ Cr^{+++}, Mn^{++}, Ni^{++}, $Zn^{++,}$ $Ca^{++,}$ $Ba^{++,}$ Mg^{++} $NH4^{+)}$	2	CO1
3	**LLO 3.1** Identify cation and anion in given ionic solutions by performing selective test	Identification of anion in given ionic solutions. Cl^-, Br^-, I^-, CO_3, SO_4, NO_3	2	CO1
4	**LLO 4.1.** Prepare Electrolyte Solution And Setup Daniel Cell. **LLO 4.2.** Determine the voltage generated from chemical reaction of Daniel cell	Determination of the voltage generated from chemical reaction using Daniel Cell.	2	CO2
5	**LLO 5.1.** Determine the extent of corrosion of iron or aluminum rod in acidic and basic media **LLO 5.2.** Compare the corrosion behavior of Aluminum / Iron in acidic and basic media	Preparation of corrosive medium for Aluminium at different temperature. Determination of rate of corrosion at different temperatures for Aluminium iron rod in acidic and Basic medium and plot a graph of rate of	2	CO2

		corrosion.		
6	**LLO 6.1.** Explain acidic and Basic solution. **LLO 6.2.** Determine pH of given sample solution.	To find out pH of different solutions using Lovibond comparator, pH paper, pH meter.	2	CO2
7	**LLO 7.1.** Prepare required chemical of definite concentration. **LLO 7.3.** Determine total hardness, of given water sample.	Determine total hardness, temporary hardness and permanent hardness of water sample by EDTA method.	2	CO3
8	**LLO 8.1.** Prepare required chemical of definite concentration. **LLO 8.2.** Determine alkalinity of given water sample.	Determine the alkalinity of given water sample.	2	CO3
9	**LLO 9.1.** Prepare required chemical of definite concentration. **LLO 9.2.** Determine chloride content in given water sample.	Determine the chloride content of given water sample.	2	CO3
10	**LLO 10.1.** Explain Redox reaction.. **LLO 10.1.** Determine the percentage of Iron from Hematite ore by Redox titration.	Standardization of $KMnO_4$ solution using standard oxalic acid and Determine the percentage of iron present in given Hematite ore by $KMnO_4$ solution	2	CO4
11	**LLO 11.1.** Explain complexometric titration. **LLO 11.1.** Determine the percentage of Copper from copper ore.	Determine the percentage of copper in given copper ore.	2	CO4
12	**LLO 12.1.** Explain Role of Calcium in Cement. **LLO 12.2.** Determine the percentage of calcium in given cement sample.	Determine the percentage of calcium in given cement sample.	2	CO4
13	**LLO 13.1.** Describe proximate analysis of coal sample. **LLO 13.2.** Explain working of Oven. **LLO 13.3.** Determine ash content in coal sample.	Determine the moisture and ash content in given coal sample using proximate analysis.	2	CO5
14	**LLO 14.1.** Describe Ostwald's Viscometer. **LLO 14.2.** Determine the coefficient of viscosity of lubricant.	Determination of coefficient of viscosity of given oil (Glycerin) by using Ostwald's Viscometer.	2	CO5
15	**LLO 15.1.** Determine Acid value of given lubricant.	To find out acid value of given lubricant.	2	CO5

Note: if any

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

Assignment

1. Describe modern atomic structure.
2. Named four quantum numbers and their functions.
3. Write any four postulates of Bohrs atomic theory.
4. Explain covalent bond, ionic bond, coordinate bond, hydrogen bond.
5. Explain Corrosion with suitable example.
6. Demonstrate Mechanism of wet corrosion by waterline corrosion
7. Named the various factors affecting rate of corrosion.
8. Explain galvanizing and tinning.
9. Describe Hardness of water and their Types.
10. Enlist various chemicals responsible for hardness of water.
11. Explain Soda lime and zeolite process of softening of water.
12. Describe various steps involved in potable water treatment process.
13. Demonstrate waste water treatment.
14. Define mineral, ore, gangue, flux and slag.
15. Describe extraction of Iron Metal from hematite ore.
16. Explain various alloys and their application.
17. Describe Portland cement and their chemical constituent.
18. list various Types of Lime and their application.
19. Define calorific value, ignition temperature, octane number, cetane number, flash point and pour point.
20. Describe fractional distillation of crude oil.
21. Explain gaseous fuel with their chemical composition.
22. Explain carbonization of coke.

VI. Specification Table:

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	**Atomic Structure and Chemical bonding**	2	4	4	**10**
2	**Metal Corrosion and its prevention**	2	4	6	**12**
3	**Water**	2	4	6	**12**
4	**Metals, alloys and cement**	4	6	6	**16**
5	**Fuel**	2	4	4	**10**
	Total	**12**	**22**	**26**	**60**

VII. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

Rubrics for continuous assessment based on process and product related performance indicators **(TH 40 marks + 25 PR)**

Two-unit tests of 20 marks and total of two-unit tests.

- For laboratory learning 25 marks.

Summative Assessment (Assessment of Learning)

End term examination, Viva-voce, Workshop performance **(60 TH + 25 PR marks)**

- End semester assessment of 25 marks for laboratory learning marks).
- End semester assessment of 60 marks through end semester examination.

VIII. 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	1			2		2			
CO2	2	2		1	2		2			
CO3	3	2			2	1	2			
CO4	3	2	1	1	2		2			
CO5	3	2		1	2	1	2			
Legends: - High:03, Medium:02, Low:01, No Mapping: --										

IX. Suggested Learning Materials / Books

Sr.No	Author	Title	Publisher
1	NCERT	NCERT XI and XII text book	NCERT ISBN 81-7450-648-9 (Part I) 81-7450-716-7 (Part II)
2	Jain and Jain	Engineering Chemistry	Dhanpat rai Publishing ISBN New Delhi, 2010, ISBN: 8174505083
3	Dr.S.S. Dara, Dr. S.S. Umare	Engineering Chemistry	S. Chand publication 1986, ISBN: 978-81-219-0359-2
4	Anju Rawley, Devdatta V.Saraf	Applied Chemistry with Lab Manual	Khanna Book Publishing Co. (P) Ltd. NewDelhi, 2021, ISBN- 978-93-91505-44-8
5	V.P. Mehta,	Polytechnic Chemistry	Jain Brothers, Delhi ISBN: 978-81-8360-093-X

X. Learning Websites & Portals

Sr. No	Link / Portal	Description
1	www.chem1.com	Chemistry instruction and education
2	www.onlinelibrary.wiley.com	Materials and corrosion
3	www.chemtube3d.com	Atomic structure and engineering material
4	www.ferrofchemistry.com	Metals
5	www.chemistryclassroom.com	Chemical boding
6	www.sciencejoywagon.com/	Electrochemistry
7	www.chem1.com	Chemistry instruction and education
8	www. chemistry.org	Virtual Labs, simulation
9	www.swayam.gov.in	Chemistry for engineer

XI.Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Mrs. Leena Khadke	Lecturer In Chemistry	Govt. Polytechnic Thane
2	Mrs. Sneha Suvarna	Lecturer In Chemistry	SBM Polytechnic Mumbai
3	Mr. Santosh Mulye	Lecturer In Chemistry	VES Polytechnic Mumbai
4	Mr. Pravin Meshram	Lecturer In Chemistry	Govt. Polytechnic Mumbai

Coordinator,
Curriculum Development,
Department of _____ Engineering

Head of Department
Department of _____ Engineering

I/C, Curriculum Development Cell

Principal

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 (3Hrs.)**	**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.

I. 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".

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	**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.**	**Unit I** **Communication Theory and Practice** **1.1 Introduction, meaning and definition and importance of communication.** **1.2 Elements/process of communication.** **1.3 Types of communication: formal , informal, verbal (oral and written), non-verbal (visual and auditory), vertical, horizontal and Diagonal communication.** **1.4 Barriers in Communication and ways to overcome** **a) Mechanical Barrier** **b) Physical Barrier** **c) Psychological Barrier** **d) Linguistic Barrier** **1.5 7 C's of effective communication (Considerate, concrete, concise, clear, complete, correct, courteous)** **1.6 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** **2.1 Types of paragraphs: Technical ,Descriptive , Narrative** **2.2 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** **3.1 Importance and Types of Group Discussion** **3.2 Parameters of Group Discussion** **3.3 Need and Types of Interview** **3.4 Preparing for an Interview** **3.5 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** **4.1 Power Point Presentation : i. Layout ii. Font size iii. Color combination.** **4.2 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** **5.1 Business Correspondence: Enquiry, order, Complaint.** **5.2 Job-Application with Resume** **5.3 Office Drafting- notices, circulars, memorandum etc.** **5.4 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 tough ts 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 Leasing 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

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)

◆

VIII. Suggested COs - POs Matrix Form

Course Outcomes (COs)	Programme Outcomes (POs) ELECTRICALENGINEERING							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 Outcomes (COs)	**Programme Outcomes (POs) CIVIL 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**	**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**								
	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**
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**	**PSO-1**	**PSO-2**	**PSO-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**	**PSO-1**	**PSO-2**	**PSO-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: --										

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

Course Outcomes (COs)	**Programme Outcomes (POs)** **ARTIFICIAL INTELLIGENCE & MACHINE LEARNING**								
	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**
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**								
	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**
CO1	2	3	1		**2**	2	**3**	**1**	**3**

CO2					1	2	**2**		
CO3	1	3			**2**	2	**2**	**1**	**2**
CO4					**2**	3	**2**	**1**	**2**
CO5	2				**2**	3	3		**2**

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**	**PSO-1**	**PSO-2**	**PSO-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**	**PSO-1**	**PSO-2**	**PSO-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 Level1

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.BhagubaiMaftlalPolytechnic,Mumbai.

3	Mrs. K. S. Pawar	Lecturer in English	Government Polytechnic Mumbai
4	Ms. N. N. Dhake	Lecturer in English	Government Polytechnic Mumbai

Coordinator,
Curriculum Development,
Department of _____ Engineering

Head of Department
Department of _____ Engineering

I/C, Curriculum Development Cell

Principal

Programme : Diploma in CE/CO/EC/EE/IT/IS/LG/LT/ME/RT	
Course Code: CE 23301	**Course Title ENVIROMENTAL STUDIES**
Compulsory / Optional: Compulsory	

Teaching Scheme and Credits						**Examination Scheme**						
CL	**TL**	**LL**	**SLH**	**NLH**	**Credits**	**FA-TH**	**SA-TH (3Hrs.)**	**FA-PR**	**SA**		**SLA**	**Total**
									PR	**OR**		
-	**-**	**2**	**2**	**4**	**2**	**-**	**-**	**25**	**-**	**@25**	**25**	**75**

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

Environmental studies is the interdisciplinary academic field which systematically studies human interaction with the environment in the interests of solving complex problems. It is a broad field of study that includes also the natural environment, built environment, and the sets of relationships between them. The turn of the twentieth century saw the gradual onset of its degradation through depletion of resources such as air, water and soil; the destruction of ecosystems and the extinction of wildlife by our callous deeds without any concern for the well-being of our surrounding. We are today facing a grave environmental crisis. It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could possibly be the remedies or precautions which need to be taken to protect the environment.

II. Industry / Employer Expected Outcome

Select an industry which is potential pollution causing but following all the norms of CPCB/MPCB and study its pollution mitigation methods

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

CO1	Identify various terms related with environment and importance of the course.
CO2	Identify and distinguish Ecosystems and Biodiversity.

CO3	Identify various types of Environmental Pollutions and specify solutions to environmental problems
CO4	Analyze various Environmental Issues and suggest sustainable development.
CO5	Identify measures taken by the GOIto protect environment.

Course Content Details:

Unit No.	Theory Learning Outcomes (TLO)	Topics / Sub-topics
1	**TLO1.1** Explain the Scope and Importance of the environmental studies **TLO1.2** Explain the importance/significance of the environmental studies **TLO 1.3** Describe the need for creating public awareness **TLO 1.4** Describe the of ways creating public awareness	**Introduction to Environmental Studies** 1.1 Definition, Scope and Importance of the environmental studies 1.2 Importance/significance of the environmental studies irrespective of course 1.3 Need for creating public awareness about environmental issues 1.4 Ways/means/methods of creating public awareness 1.5 Some important terms related with Environmental Studies **Course Outcome : CO1 Teaching Hours :4 hrs**
2	**TLO2.1** Explain the concept of Ecosystem **TLO2.2** Explain the classification of Ecosystem **TLO2.3** Explain the basic structure and functions of ecosystem **TLO2.4** Describe energy flow in ecosystem **TLO2.5** State the definition of Biodiversity **TLO2.6** Explain the levels of biodiversity **TLO2.7** Explain the Threats to biodiversity **TLO2.8** Explain the Conservation of biodiversity	**Ecosystems and Biodiversity** 2.1 Concept of Ecosystem 2.2 Classification 2.3 Structure and functions of ecosystem: Basics 2.4 Energy flow in ecosystem:Gross primary product and Net primary product, Autotrophic levels and Bioaccumulation 2.5 Definition of Biodiversity 2.6 Levels of biodiversity: Genetic, Species, Community & Ecosystem 2.7 Threats to biodiversity:Habitat destruction, Invasive species, Genetic pollution, Overexploitation, Hybridization, Climate change & Overpopulation 2.8 Conservation of biodiversity: In-situ & Ex-situ **Course Outcome: CO2Teaching Hours :8 hrs**
3	**TLO3.1** Explain the definition of environmental pollution **TLO3.2** Explain the Air pollution **TLO3.3** Explain the Water Pollution **TLO3.4** Explain the Soil Pollution **TLO3.5** Explain the Noise Pollution	**Environmental Pollution** 3.1 Definition of environmental pollution 3.2 Air pollution: Definition, sources, effects, prevention 3.3 Water Pollution: Definition, sources, effects, prevention 3.4 Soil Pollution: Definition, sources, effects, prevention 3.5 Noise Pollution: Definition, sources, effects, prevention **Course Outcome:CO3Teaching Hours :6 hrs**

4	**TLO4.1** Explain the development Goals **TLO4.2** Explain the Water conservation with method **TLO4.3** Explain the Rain water harvesting **TLO4.4** Explain the Climate Change: **TLO4.5** Explain the Climate Change: **TLO4.6** Explain the Nuclear Accidents and Holocaust **TLO4.7** Explain the Concept of Carbon Credits and its advantages	**Environmental Issues and Sustainable Development** 4.1 Concept of development and Seventeen Sustainable development Goals 4.2 Water conservation and its method 4.3 Rain water harvesting 4.4 Climate Change: Causes 4.5 Global warming, Acid rain, Ozone Layer Depletion, 4.6 Nuclear Accidents and Holocaust 4.7 Concept of Carbon Credits and its advantages **Course Outcome:CO4Teaching Hours :8 hrs**
5	**TLO5.1** Explain the Brief description of various Environmental Acts **TLO5.2** Explain the EIA Clearance procedure **TLO5.3** Explain the Montreal protocol and ozone cell, Wetlands **TLO5.4** Explain the Green Building and rating systems	**Environmental Protection** 5.1 Brief description of the following acts and their provisions: • Environmental Protection Act, 1986 • Air (Prevention and Control of Pollution) Act, 1981 • Water (Prevention and Control of Pollution) Act, 1974 • Wildlife Protection Act 1972 • Forest Conservation Act, 1980 &1988 5.2 EIA Clearance procedure 5.3 Montreal protocol and ozone cell, Wetlands, CDM approval, PARIVESH, Genetic Engineering Appraisal Committee (GEAC) Clearances, Hazardous Waste Import and Export Clearances 5.4 Introduction to Green Building and rating systems **Course Outcome:CO5Teaching Hours :4 hrs**

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

Sr No	Laboratory Learning Outcomes (LLO)	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	**LLO 1.1** Follow safety rules in environmental studies laboratory.	a) Definition, Scope and Importance of the environmental studies&Some important terms related with Environmental Studies b) Importance/significance of the environmental studies irrespective of course	2	CO1
2	**LLO2.1** Identify the need for creating public awareness about environmental issues and to find Ways/means/ methods of creating	a) Need for creating public awareness about environmental issues b) Ways/means/methods of creating public awareness	2	CO1

	public awareness			
3	**LLO 3.1** Determine the Concept of Ecosystem, Classification, Structure and functions of Ecosystem **LLO 3.2** Identify the Energy flow in ecosystem	a) Concept of Ecosystem, Classification, Structure and functions of ecosystem: Basics, b) Energy flow in ecosystem: Gross primary product and Net primary product, Autotrophic levels and Bioaccumulation	4	CO2
4	**LLO 4.1** Explain the Definition of Biodiversity and to study Levels of biodiversity, Threats to biodiversity **LLO 4.2** Explain the	a) Definition of Biodiversity, Levels of biodiversity: Genetic, Species, Community & Ecosystem, Threats to biodiversity: Habitat destruction, Invasive species, Genetic pollution, Overexploitation, b) Hybridization, Climate change & Overpopulation, Conservation of biodiversity: In-situ & Ex-situ	4	CO2
5	**LLO 5.1** Explain the Definition of environmental pollution **LLO 5.2** Explain the types of environmental pollution	a) Definition of environmental pollution, Air pollution: Definition, sources, effects, prevention b) Water Pollution: Definition, sources, effects, prevention	4	CO3
6	**LLO 6.1** Explain the Soil Pollution **LLO 6.2** Explain the Noise Pollution	a) Soil Pollution: Definition, sources, effects, prevention b) Noise Pollution: Definition, sources, effects, prevention	2	CO3
7	**LLO 7.1** Explain the Sustainable development Goals **LLO 7.2** Explain the Rain water harvesting	a) Concept of development and Seventeen Sustainable development Goals, Water conservation and its method b) Rain water harvesting, Climate Change: Causes	4	CO4
8	**LLO 8.1** Describe the concept of Global warming, Acid rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust **LLO 8.2** Describe the concept of Carbon Credits and its advantages	a) Global warming, Acid rain, Ozone Layer Depletion,Nuclear Accidents and Holocaust b) Concept of Carbon Credits and its advantages	4	CO4

9	**LLO 9.1** Describe briefly various Environmental Acts **LLO 9.2** Describe Environmental Acts	a) Brief description of the following acts and their provisions, Environmental Protection Act, 1986, Air (Prevention and Control of Pollution) Act, 1981 b) Water (Prevention and Control of Pollution) Act, 1974, Wildlife Protection Act 1972, Forest Conservation Act, 1980 &1988	2	CO5
10	**LLO 10.1** Explain the EIA Clearance procedure **LLO 10.2** Explain the Montreal protocol and ozone cell, Wetlands, CDM approval, PARIVESH, Genetic Engineering Appraisal Committee (GEAC) Clearances, Hazardous Waste Import and Export Clearances	a) EIA Clearance procedure b) Montreal protocol and ozone cell, Wetlands, CDM approval, PARIVESH, Genetic Engineering Appraisal Committee (GEAC) Clearances, Hazardous Waste Import and Export Clearances	2	CO5

Note: if any

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

1. One write-up on each unit (altogether five in number) that summarizes the whole chapter and presents all the important points/material on it.
2. 10 MCQs (twenty questions each) at the start of each tutorial based on the topic of previous tutorial unit

3. project report on any one project of the following:

a) Visit to a local area to document environmental assets suchas river/ forest/ grassland / hill / mountain

b) Visit to a local polluted site: Urban/Rural/Industrial/Agricultural

c) Study of common plants, insects, birds

d) Study of simple ecosystems of ponds, river, hill slopes etc

Formative assessment (Assessment for Learning) for PR and SLA

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

Summative Assessment (Assessment of Learning)

End term examination, Viva-voce, Workshop performance (__marks)

-

e) 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	--	1	3	1	2	1	3	2
CO2	3	3	--	1	3	1	2	1	3	2
CO3	3	2	--	1	3	1	2	1	3	2
CO4	3	2	--	1	3	1	2	1	3	2
CO5	3	3	--	1	3	1	2	1	3	2
Legends: - High:03, Medium:02, Low:01, No Mapping: --										

f) Suggested Learning Materials / Books

Sr.No	Author	Title	Publisher
01	AninditaBasak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. JagdishKrishnaswamy	Environmental Studies	Wiley India

g) Learning Websites & Portals

Sr.No	Link / Portal	Description
1	https://www.engineeringcivil.com	Civil Engg. Portal
2	https://moef.gov.in/	For environmental Info
3	www.youtube.com/	For Various subjects
4	http://civildigital.com	
5	http://www.quora.com	
6	http://www.nationallibrary.gov.in	

h) Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Shri. S D Borkar	Deputy Engineer	PWD
2	Shri. Sudhir Nimbalkar	Assistant Engineer	BMC
3	Mr. K.V. Kelgandre	Sr. Lecturer in Civil Engg.	K.J. Somaiya Polytechnic
4	Dr D K Gupta	HOD in Civil Engg.	Govt. Polytechnic Mumbai

Coordinator,
Curriculum Development,
Department of _____ Engineering

Head of Department
Department of _____ Engineering

I/C, Curriculum Development Cell

Principal

Programme : Diploma in Civil Engineering												
Course Code:CE23101					**Course Title :BUILDING CONSTRUCTION**							
Compulsory / Optional: Compulsory												
Teaching Scheme and Credits						**Examination Scheme**						
CL	**TL**	**LL**	**SLH**	**NLH**	**Credits**	**FA-TH**	**SA-TH (3 Hrs.)**	**FA-PR**	**SA**		**SLA**	**Total**
									PR	**OR**		
3	---	2	1	6	3	30	70	25	---	@25	25	175

Total IKS Hrs. for course: 2 hrs /sem

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: Building construction is a core course in civil engineering. This course is intended for gaining useful knowledge with respect to facts, concepts, principles and procedures related to building construction system so that student can effectively plan, execute quality building construction work.
The course helps to learn building materials required for construction. It provides necessary knowledge about properties, uses of building materials.

II. Industry / Employer Expected Outcome

This course is to be taught and implemented with the aim to develop in the student, the course outcomes (COs) leading to the attainment of following industry identified outcome expected from this course and they can execute quality construction work of buildings .

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

CO1	Identify components of building structures.	
CO2	Propose suitable type of foundation for building structures	

CO3	Select suitable type of masonry for building structures.	
CO4	Propose relevant means of communications for different types of buildings.	
CO5	Select relevant material for finishing works.	

Course Content Details:

Unit No.	Topics / Sub-topics
1	**Introduction :** 1.1 Classification of Buildings as per National Building Code Group A to I, As per Types of Constructions- Load Bearing Structure, Framed Structure, Composite Structure. 1.2 Building Components - Functions of Building Components, Substructure – Foundation, Plinth. 1.3 Superstructure – Walls, Partition wall, Cavity wall, Sill, Lintel, Doors and Windows, Floor, Mezzanine floor, Roof, Columns, Beams, Parapet **Course Outcome : CO1 Teaching Hours :4hrs Marks: 08**
	Construction of Substructure : 2.1 Job Layout: Site Clearance, Layout for Load Bearing Structure and Framed Structure by Center Line and Face Line Method, Precautions. 2.2 Earthwork: Excavation for Foundation, Timbering and Strutting, Material for plinth Filling, Tools and plants used for earthwork. 2.3 Foundation: Functions of foundation, Types of foundation – Shallow Foundation, Stepped Footing, Wall Footing, Column Footing, Isolated and Combined Column Footing, Raft Foundation, Grillage Foundation. Deep Foundation - Pile Foundation, Well foundation and Caissons, Cofferdams (Introduction only) **Course Outcome: CO2 Teaching Hours : 8 hrs Marks:14 (R-4 , U- 4 , A- 4)**
	Construction of Superstructure : 3.1 Stone Masonry: Terms used in stone masonry- facing, backing, hearting, Through stone, corner stone, cornice. Types of stone masonry. 3.2 Brick masonry: Terms used in brick masonry- header, stretcher, closer, quoins, course, face, back, hearting, bat bond, joints, lap, frog line, level and plumb. Types of Bonds in brick masonry ,Requirements of good brick masonry 3.3 Precautions to be observed in Brick Masonry Construction. 3.4 Comparison between stone and Brick Masonry. Tools and plants required for construction of stone and brick masonry. Hollow concrete block masonry and composite masonry. **Course Outcome:CO3 Teaching Hours :12 hrs Marks:16 (R- 4 , U- 6 , A- 4)**
	Building Communication and Ventilation : 4.1 Horizontal Communication: Doors Components of Doors, Types of Doors,Sizes of Door recommended by BIS. 4.2 Windows: Component of windows, Types of Windows, Sizes of Windows recommended by BIS. Ventilators. 4.3 Fixtures and fastenings for doors and windows- Material used and functions of Window 4.4 Sill and Lintels, Shed / Chajja. 4.5 Vertical Communication: Means of Vertical Communication- Stair Case, Ramps, Lift, Elevators and Escalators. 4.6Terms used in staircase, Types of staircase : On the basis of shape, On the basis of Material

	Course Outcome:CO4 Teaching Hours :12 hrs Marks:16 (R- 4 , U- 4, A-4)
	Building Finishes and Wall Finishes : 5.1 Floors: Types of Floor Finishes and its suitability, Skirting and Dado. 5.2 Roofs: Various roofing materials. Types of Roof: Flat roof, Pitched Roof-King Post truss, Queen Post Truss, terms used in roofs. 5.3. Plastering: Necessity of Plastering, Procedure of Plastering, Single Coat Plaster, Double Coat Plaster, Precautions to be taken in plastering, defects in plastering. 5.4 Pointing: Necessity, Types of pointing and procedure of Pointing. 5.5 Painting –Necessity, Surface Preparation for painting, Methods of Application 5.6 Formwork: Definition of Formwork, Requirements of Formwork, Materials used in Formwork, Types of Formwork, Removal of formwork. 5.7 Scaffolding: Purpose, Types of Scaffolding, Process of Erection and Dismantling. 5.8 Shoring: Purpose and Types of Shoring, Underpinning. . **Course Outcome:CO5 Teaching Hours : 12 hrs Marks: 16 (R- 4, U- 4, A- 4)**

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

Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	To visit the institute building to study different components of building, types of Structures, etc.	02	1
2	Observing the models, specimen of different types of foundations	02	1
3	To set out Foundation Plan on ground for load bearing structure.	02	2
4	To set out foundation plan on ground for framed structure.	02	2
5	To visit building construction site to understand construction of substructure.	06	2
6	To visit building construction site to understand construction of super structure, plastering and painting work.	06	4,5
7	To draw different components of building observed in site visit (as built drawing)	02	2,3,4,5
8	Sketches to be drawn on drawing sketch book(any TWO) A. Brick masonry - Plans & elevation of English bond and Flemish bond for one, one & half, two brick thick wall. B. Doors - Plan, elevation & section of fully panelled, glazed, flush, collapsible, revolving doors, rolling shutters C. Window - elevation and section of a louvered window-centrally hung ventilator, glazed window and window with aluminum frame and sliding glass shutter D. Stairs (Plans only) : straight, quarter turn, half turn, open well, doglegged, spiral, bifurcated, circular.	04	3,4,5
9	Group activity of model making like scaffolding, formwork, centering. (Any one)	04	5

	Total	30	

Note: if any

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

1. Collect the relevant information of recent technologies in building construction and prepare a report on it.
2. Identify the different types of cracks and remedial measures and submit a report on case study.
3. Collect the relevant information of different techniques of demolition of existing structure and submit a report on it.
4. Carry out a market survey for various water proofing materials and write a report on it.
5. Prepare a summary report with reference to content in any one part of National building Code.

IV. Specification Table:

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Introduction	4	4	--	8
2	Construction of Substructure	6	4	4	14
3	Construction of Superstructure	6	6	4	16
4	Building Communication and Ventilation	8	4	4	16
5	Building Finishes Floors and Roofs	6	6	4	16
	Total				**70**

V. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

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

- (TH 30 marks + 25PR)

Two-unit tests of 30 marks and average of two-unit tests.

For Practical learning 25 marks**.**

Summative Assessment (Assessment of Learning)

End term examination, Viva-voce, Workshop performance (70 TH + 25 OR marks)

End semester assessment of 25 marks for OR (Based on Practical learning)

End semester assessment of 70 marks through end semester examination.

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	3	3	3	2	3	2	2	3	1
CO2	2	3	3	3	2	3	2	1	3	1
CO3	2	3	3	3	2	3	2	1	3	1
CO4	2	3	3	3	2	3	2	1	3	1
CO5	2	3	3	3	2	3	2	1	3	1
Legends: - High:03, Medium:02, Low:01, No Mapping: --										

VI. Suggested Learning Materials / Books

Sr.No	Author	Title	Publisher
1	Building Construction	S. P. Arora and Bindra., N. N. Basak, Dhanpat Rai Publication, Delhi Edition 2013	ISBN: 9788189928803
2	Building Construction	Sushil Kumar. Standard Publication.edition 2006	ISBN: 8186308024

VII. Learning Websites & Portals

Sr.No	Link / Portal	Description
1	http://www.learningconstruction.com/	
2	http://www.understandconstruction.com/	
3	http://www.constructionknowledge.net/	

VIII. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Mr. Rohan Deokar	Deputy Engineer	MMRDA
2	Mr. K.V. Kelgandre	Sr. Lecturer in Civil Engg.	K.J. Somaiya Polytechnic
3	Smt.Meera.S Deshmukh	Sr. Lecturer in Civil Engg.	Govt. Polytechnic Mumbai

Coordinator,
Curriculum Development,
Department of _____ Engineering

Head of Department
Department of _____ Engineering

I/C, Curriculum Development Cell

Principal

Programme : Diploma in Civil Engineering (Sandwich Pattern)												
Course Code: CE23102					**Course Title : CONSTRUCTION MATERIALS**							
Compulsory / Optional: Compulsory												
Teaching Scheme and Credits						**Examination Scheme**						
CL	**TL**	**LL**	**SLH**	**NLH**	**Credits**	**FA-TH**	**SA-TH (3 Hrs.)**	**FA-PR**	**SA**		**SLA**	**Total**
									PR	**OR**		
-	**2**	**1**	**1**	**4**	**2**	**-**	**-**	**25**	**@$50**	**-**	**25**	**100**

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

I. Rationale

Construction material is the key element in the construction project. A diploma engineer has to constantly deal with selection of materials for various engineering projects of constructions such as residential or commercial buildings, roads, metro, railways, bridges, dams, tunnels and fly-over. The development of advance technology generates the necessity of new engineering materials. It is a challenging job for the civil engineer to select the relevant material which is durable, economical and eco-friendly. Modern techniques are developed to handle and use materials for economic and safer designs of engineering structures. At diploma level, students are expected to study about these aspects so as to develop their understanding, performance oriented abilities in order to apply their knowledge in construction industry.

II. Industry / Employer Expected Outcome

Select relevant building material to fulfill construction requirements.

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

CO1	Identify relevant construction materials.
CO2	Identify relevant natural construction materials.
CO3	Select relevant artificial construction materials.

CO4	Select relevant special type construction materials.
CO5	Select relevant finishing materials for construction.
CO6	Identify relevant processed construction materials.

Course Content Details:

Unit No.	Topics / Sub-topics
1	**Introduction:** 1.1 Scope of construction materials in Construction Technology, Transportation Engineering, Environmental Engineering, Irrigation Engineering. (Applications only) 1.2 Selection of materials for different civil engineering structures on the basis of strength, durability, ecofriendly and economy. 1.3 Broad classification of materials – Sources, Natural, Artificial – special, finishing and recycled. **Course Outcome : CO1 Teaching Hours :2hrs**
2	**Natural Construction Materials**: 2.1 Stone: Requirements of good building stone, characteristics, tools for stone 2.2 Timber: Structure, properties, seasoning, preservation, defects in timber and uses. 2.3 Asphalt, bitumen and tar: properties and their uses 2.4 Lime: types, uses 2.5 Soil: types, suitability in construction 2.6 Sand: properties, uses 2.7 Course aggregate: classification according to size, uses **Course Outcome: CO2 Teaching Hours :5hrs**
3	**Artificial Construction Materials:** 3.1Brick: Conventional/Traditional bricks, modular and standard bricks, characteristics, classification, field tests on bricks. 3.2 Flooring tiles: types, uses 3.3 Cement: types, uses 3.4 Pavement blocks, pre-cast concrete block 3.5 Glass: soda lime glass, lead glass and borosilicate glass and their uses 3.6 Plywood, particle board, veneers, laminated board and their uses 3.7 Ferrous and non-ferrous metals and their uses **Course Outcome: CO2 Teaching Hours :5hrs**
4	**Special Construction Materials:** 4.1 Waterproofing materials, Termite proofing materials, Thermal & Sound insulating materials: types, suitability in construction 4.2 Fibers: types – jute, glass, plastic asbestos fibers – uses 4.3 Geopolymer cement: properties, applications. **Course Outcome:CO3 Teaching Hours :2hrs**
5	**Finishing Materials:** 5.1 Plastering materials: lime mortar, cement mortar – uses 5.2 Plaster of Paris (POP): constituents, uses 5.3 Paints: oil paints, distempers, varnishes- uses **Course Outcome:CO4 Teaching Hours :2hrs**

6	**Processed Construction Materials:** 6.1 Industrial waste materials: fly ash, blast furnace slag, granite, marble polishing waste – uses 6.2 Agro waste materials: Rice husk, bagasse, coir fibers – uses 6.3 Special processes construction materials: Geosynthetic, ferrocrete, artificial timber, artificial sand – uses **Course Outcome:CO5 Teaching Hours :4hrs**

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

Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
1	Identify the various sizes of available coarse aggregates from sample of 10 kg in laboratory and prepare report (80, 40, 20,10 mm)	2	CO1
2	Identify the available construction materials in the laboratory on the basis of their sources.	2	CO1
3	Identify the grain distribution pattern in given sample of teak wood in the laboratory and draw the various patterns. (along and perpendicular to the grains)	2	CO2
4	Identify various layers and types of soil in foundation pit by visiting construction site and prepare report consisting photographs and samples.	2	CO2
5	Select first class, second class and third-class bricks from the stake of bricks and prepare report on the basis of its properties.	2	CO2
6	Measure dimensions of 10 bricks and find average dimension and weight. Perform field tests - dropping, striking and scratching by nail and correlate the results obtained.	2	CO2
7	Identify different types of flooring tiles such as vitrified tiles, ceramic tiles, glazed tiles, mosaic tiles, anti- skid tiles, chequered tiles, paving blocks and prepare report about the specifications. Part I	2	CO2
8	Apply the relevant termite chemical on given damaged sample of timber.	2	CO3
9	Apply two or more coats of selected paint on the prepared base of a given wall surface for the area of 1m x 1m using suitable given wall surface for the area of 1m x 1m using suitable brush/rollers adopting safe practices. Part I	2	CO4
10	Prepare the cement mortar of proportion 1:3 or 1:6 using artificial sand as a special processed construction material.	2	CO5

Note: if any

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

1. Collect the market rates for different construction materials from various dealers / suppliers of local market for different brands.
2. Download the IS 456 and IS 800 and attach the printout for following materials.
   i. Steel section
   ii. Mortar of proportion 1:6 and 1:4

iii. Cement concrete mix of 1:2:4, 1:3:6 and 1:4:8

3. Collect the technical brochures of various constructions materials.
4. Undertake a market survey for the cost and technical specification of different brands of following construction materials and prepare comparison chart.
   i. Cement
   ii. Tiles
   iii. Glass
   iv. Paints.

VI. Specification Table:

Unit No	Topic Title	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Introduction	0	0	0	0
2	Natural Construction Materials	0	0	0	0
3	Artificial Construction Materials	0	0	0	0
4	Special Construction Materials	0	0	0	0
5	Finishing Materials for Construction	0	0	0	0
6	Processed Construction Materials	0	0	0	0
	Total	**0**	**0**	**0**	**0**

VII. Assessment Methodologies/Tools

Formative assessment (Assessment for Learning)

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

For laboratory learning 25 marks.

Rubric - Each Practical Carries.
1) 02 Marks for present, (0 Marks for Absent & 01 Marks for extra practical.)
2) 04 Marks for Discipline & involvement in the Practical Expt. (1 Mark for Preparation of Experimental set up,1 Mark for settings & operations, 1 Mark for safety measures, 1 Mark for observations and recording)
3) 04 Marks for Result and Conclusion (1 Mark for Accuracy for result, 1 Mark for Neat clean presentation, 1 Mark for Answer to sample question, 1 Mark for Submission of report in time)

Summative Assessment (Assessment of Learning)

End term examination, Viva-voce, Workshop performance **(50 PR marks)**

End semester assessment of 50 marks through Online Examination

VIII. 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	--	1	3	--	2	--	3	--
CO2	3	3	--	1	3	--	2	--	3	--
CO3	3	3	--	1	3	--	2	--	3	--
CO4	3	2	--	1	3	--	2	--	3	--
CO5	3	2	--	1	3	--	2	--	3	--
CO6	3	3	--	1	3	--	2	--	3	--
Legends: - High:03, Medium:02, Low:01, No Mapping: --										

IX. Suggested Learning Materials / Books

Sr.No	Author	Title	Publisher
1	1 Construction Materials Ghose D.N., Tata MacGraw Hill,	1 Construction Materials Ghose D.N., Tata MacGraw Hill,	1 Construction Materials Ghose D.N., Tata MacGraw Hill,
2	Building Materials	Varghese P.C., PH1 Learning, New Delhi	ISBN-10: 9788120350915
3	Engineering Materials	Rangwala S.C., Charator Publisher, Ahemadabad	ISBN : 978-93-85039-17-1
4	Civil Engineering Materials	Somayaji, Shah, Pearson education,New Delhi	ISBN 10: 0131776436

X. Learning Websites & Portals

Sr.No	Link / Portal	Description
1	https://www.engineeringcivil.com	Civil Engg. Portal
2	www.youtube.com/	For Various materials manufacturing processes
3	http://civildigital.com	Digital Library of Civil engineering subject for students
4	http://www.quora.com/what-is-geocement	For Geocement

5	http://www.nationallibrary.gov.in	The library is a permanent depository of all reading and printed materials produced in India, or written by any foreigner, wherever published and in whatever language

XI. Academic Consultation Committee/Industry Consultation Committee:

Sr. No	Name	Designation	Institute/Organization
1	Mr. Rohan Deokar	Deputy Engineer	MMRDA
2	Mr. Sanjay Kulkarni	Surveyor and Consultant	S R Kulkarni Pvt. Firm
3	Mr. K.V. Kelgandre	Sr. Lecturer in Civil Engg.	K.J. Somaiya Polytechnic
4	Mrs. S. R. Hegonde	Lecturer in Civil Engg.	Govt. Polytechnic Mumbai

Coordinator,
Curriculum Development,
Department of _____ Engineering

Head of Department
Department of _____ Engineering

I/C, Curriculum Development Cell

Principal

Programme: Civil Engg. (Sandwich Pattern) **Semester-I**

SL 23601 Libre Office Calc

OUTLINE :

1. **Introduction to LibreOffice Calc.**
2. **Various toolbars in calc**
3. **Opening new document in calc**
4. **Opening an existing document in calc**
5. **Save and Close a document**
6. **Workbook in calc**
7. **Grid in Calc**
8. **Cells in Calc**
9. **Different bars in calc window**
10. **Saving files in different formats dot xml, dot xlsx and dot xls**
11. **Change font size, font style and font name**
12. **Export as pdf**

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.

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.

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 according ly	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://maharashtranaturepark.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

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 distracters.	Identify distracters 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/cleanshores**

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

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.

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										

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 MostImportant 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
2	Dr. Nitin Deshpande	Lead Consulatnt	Dnyanpeeth Academy, Pune
3	Dr. Chandrakant Shahasane	Founder Trustee	Karnala Charitable Trust, Pune
4	Mr. Sunil V. Joshi	Ex- Sr. Lecturer, Mechanical Engineering,	Government Polytechnic, Mumbai
5	Mrs. Swati D. Deshpande	Principal	Government Polytechnic, Mumbai
6	Mr. U.A. Agnihotri	Lecturer, Mechanical Engineering	Government Polytechnic, Mumbai
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