



Shri Vile Parle Kelavani Mandal's
SHRI BHAUGUBHAI MAFATLAL POLYTECHNIC



CIVIL ENGINEERING DEPARTMENT

CURRICULUM 2022





Shri Vile Parle Kelavani Mandal's
Shri Bhagubhai Mafatlal Polytechnic
Vile Parle (W), Mumbai 400 056
TEACHING AND EXAMINATION SCHEME



PROGRAMME: CIVIL ENGINEERING
SEMESTER: I

With effect from Batch admitted in June, 2022 progressively
Duration: 16 Weeks

Sr. No.	Course Name (code)	Scheme of Instructions and Periods per week					Theory Paper Duration and Marks (ESE)		Scheme of Examination and Maximum Marks							Gr	Scheme L/P/Cr
		L	P	D	T	Cr (L+P+D+T)	Hrs	Mks	SSL	TA	TH	TW	PR	OR	Total		
1.1	Basic Mathematics (BMT220001)	3	-	-	2	5	3	70	20	10	70	25	-	-	125	B	325
1.2	Applied Chemistry (ACH220002)	4	2	-	-	6	1.5	70@	20	10	70	25	50	-	175	B	426
1.3	Environmental Studies (EVS220003)	2	-	-	-	2	-	-	-	-	-	25	-	-	25	B	202
1.4	Universal Human Values (UHV220004)	2	-	-	1	3	-	-	-	-	-	25	-	-	25	B	213
1.5	Applied Mechanics (APM220005)	3	2	-	1	6	3	70	20	10	70	50	-	-	150	C	336
1.6	Engineering Drawing (EDG220101)	2	-	4	-	6	-	-	-	-	-	50	50	-	100	C	246
1.7	Civil Engineering Materials (CEM220102)	3	-	-	-	3	3	70	20	10	70	50	-	-	150	C	303
	TOTAL	19	04	04	04	31	No. of Papers=04		80	40	280	250	100	-	750		19/12/31
		TOTAL PERIODS = 31					TOTAL MARKS = 750										

Theory, practical, drawing, and tutorial periods of 1 hour duration each is equal to one credit

Award Winning, @ Online Examination

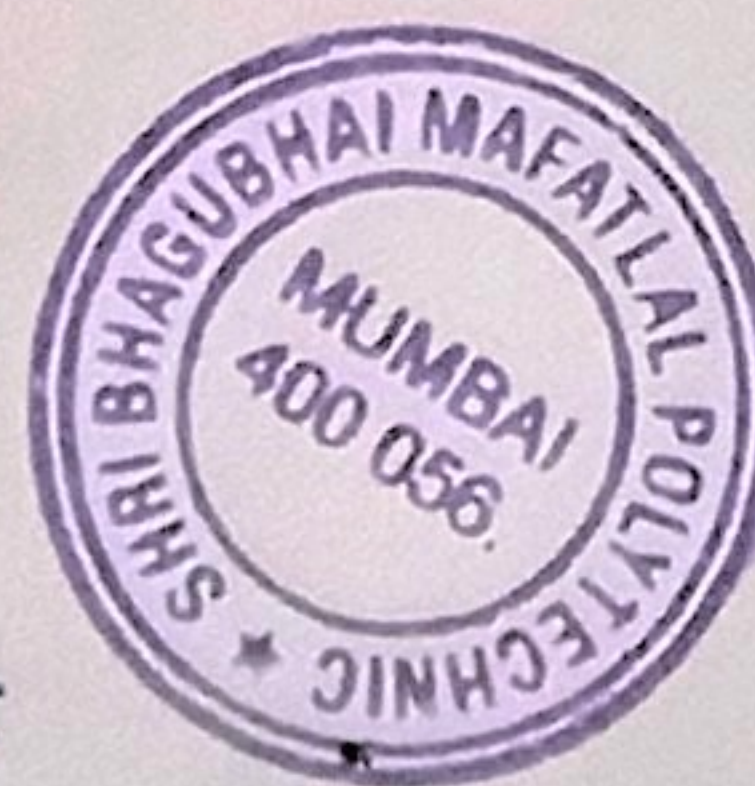
L- Lecture, P- Practical, D- Drawing Practice, T- Tutorial, Cr- Credit, ESE- End Semester Examination, SSL- Sessional, TA- Teachers assessment, TH- Theory,

TW- Term Work, PR- Practical, OR- Oral, Gr- Group, B- Basic, C- Core, A- Application, M- Management

PR/OR - Assessed by Internal and External Examiners Jointly, TW - Assessed by Internal Examiner Only

Head of Department

Controller of Examination



Secretary CDC

Principal



PROGRAMME: CIVIL ENGINEERING
SEMESTER - II

Shri Vile Parle Kelavani Mandal's
Shri Bhagubhai Mafatlal Polytechnic
Vile Parle (W), Mumbai 400 056
TEACHING AND EXAMINATION SCHEME

With effect from Batch admitted in June, 2022 progressively
Duration: 16 Weeks

Sr. No.	Course Name (code)	Scheme of Instructions and Periods per week					Theory Paper Duration and Marks (ESE)		Scheme of Examination and Maximum Marks							Gr	Scheme L/P/Cr
		L	P	D	T	Cr (L+P+D+T)	Hrs	Mks	SSL	TA	TH	TW	PR	OR	Total		
2.1	Engineering Mathematics (EMT220006)	3	-	-	2	5	3	70	20	10	70	25	-	-	125	B	325
2.2	Applied Physics (APH220007)	4	2	-	-	6	1.5	70@	20	10	70	25	50	-	175	B	426
2.3	Communication Skills (CMS220008)	3	-	-	1	4	3	70	20	10	70	25	-	-	125	B	314
2.4	Building Construction (BCN220103)	3	2	-	-	5	3	70	20	10	70	25	-	50	175	C	325
2.5	Surveying-I (SUR220104)	3	4	-	-	7	3	70	20	10	70	50	50	-	200	C	347
2.6	Workshop Practice (CE) (WSP220105)	-	4	-	-	4	-	-	-	-	-	50	-	-	50	C	044
	TOTAL	16	12	-	03	31	No. of Papers=05		100	50	350	200	100	50	850		16/15/31
		TOTAL PERIODS = 31					TOTAL MARKS = 850										

Theory, practical, drawing, and tutorial periods of 1 hour duration each is equal to one credit

Award Winning, @ Online Examination

L- Lecture, P- Practical, D-Drawing Practice, T- Tutorial, Cr- Credit, ESE-End Semester Examination, SSL- Sessional, TA-Teachers assessment, TH-Theory,

TW- Term Work, PR- Practical, OR- Oral, Gr- Group, B - Basic, C - Core, A - Application, M - Management

PR/OR - Assessed by Internal and External Examiners Jointly, TW - Assessed by Internal Examiner Only



Head of Department

Controller of Examination

Secretary CDC

Principal



Shri Vile Parle Kelavani Mandal's
SHRI BHAUGUBHAI MAFATLAL POLYTECHNIC



CIVIL ENGINEERING DEPARTMENT

SEM - I

1. COURSE DETAILS

Programme: CE/ME/EE/PL/CH/EXTC	Semester: I
Course: Basic Mathematics	Group: B
Course Code: BMT220001	Duration: 16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D +T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
3	-	-	2	5	3	70	20	10	70	25	-	-	125

3. COURSE OBJECTIVE

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

4. SKILL COMPETENCY

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

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

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

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



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

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Basic Mathematics (BMT220001)	CO1	3	1	1		1		2	2	1
	CO2	3	2	2	2	1	2	2	2	2
	CO3	2	1	1		1		1	1	1
	CO4	2	1			1		2	1	1
	CO Avg.	2.5	1.25	1.33	2	1	2	1.75	1.5	1.25

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

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Basic Mathematics (BMT220001)	CO1	3	1	1		1		2		1
	CO2	3	2	2	2	1	2	2	1	1
	CO3	2	1	1		1		1	1	1
	CO4	2	1			1	2	2		1
	CO Avg.	2.5	1.25	1.33	2	1	2	1.75	1	1

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

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Basic Mathematics (BMT220001)	CO1	3	1	1		1		2		1
	CO2	3	2	2	2	1	2	2	1	1
	CO3	2	1	1		1		1	1	1
	CO4	2	1			1		2		1
	CO Avg.	2.5	1.25	1.33	2	1	2	1.75	1	1



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

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
Basic Mathematics (BMT220001)	CO1	3	1	1		1		2			
	CO2	3	2	2	2	1	2	2	1	1	
	CO3	2	1	1		1		1			
	CO4	2	1			1	2	2	1	1	
	CO Avg.	2.5	1.25	1.33	2	1	2	1.75	1	1	

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

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Basic Mathematics (BMT220001)	CO1	3	1	1		1		2		
	CO2	3	2	2	2	1	2	2	1	1
	CO3	2	1	1		1		1		
	CO4	2	1			1	2	2	3	1
	CO Avg.	2.5	1.25	1.33	2	1	2	1.75	2	1

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

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Basic Mathematics (BMT220001)	CO1	3	1	1		1		2	1	1
	CO2	3	2	2	2	1	2	2	2	2
	CO3	2	1	1		1		1	1	1
	CO4	2	1			1		2	1	1
	CO Avg.	2.5	1.25	1.33	2	1	2	1.75	1.25	1.25



7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	CO
I	Logarithm 1.1 Concept 1.2 Basic Laws of logarithm (without proof) 1.3 Numerical on Change of Base (without proof)	CO1
II	Partial Fraction 2.1 Introduction: Proper and improper fractions 2.2 Type 1: Non-repeated linear factor 2.3 Type 2: Repeated linear factor 2.4 Type 3: Irreducible quadratic form 2.5 Examples using Substitution	CO1
III	Straight Lines 3.1 Revision: Slope of straight lines 3.2 Revision: Various form of Straight lines 3.3 General equation of line and its relation to standard form 3.4 Angle between two lines 3.5 Condition of parallel and perpendicular lines 3.6 Perpendicular distance from a point on the line 3.7 Perpendicular distance between two parallel lines	CO1
IV	Trigonometry 4.1 Revision of Trigonometry Formulas 4.2 Trigonometric ratios of Compound, allied, multiple and sub-multiple angles (without proofs) 4.3 Factorization and de-factorization formulae (without proofs) 4.4 Inverse Trigonometric function 4.5 Principle values and Relation between Trigonometric and Inverse Trigonometric function	CO2
V	Determinants & Matrices 5.1 Revision: Determinants of 2 x 2 order 5.2 Value of Determinants of 3 x 3 order 5.3 Cramer's rule to solve three unknowns 5.4 Introduction to Matrices 5.5 Algebra of Matrices 5.6 Transpose, Adjoint and Inverse of Matrices 5.7 Solution of simultaneous equation by Matrix inversion method. (2 and 3	CO3



UNIT NO.	TOPIC/Sub-topic	CO
	unknowns)	
VI	Function and Limits 6.1 Introduction and Definition 6.2 Simple Numerical based on concept of function 6.3 Odd and Even Functions 6.4 Introduction and Definition 6.5 Concepts of limits 6.6 Limits of algebraic, trigonometric, exponential and logarithmic functions	CO4

8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

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

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	CO
1	Tutorials on Logarithms based on laws and change of base.	2	CO1
2	Tutorials on partial fraction (Non-repeated and repeated linear factor)	2	CO1
3	Tutorials on partial fraction (Irreducible quadratic form and using Substitution)	2	CO1
4	Tutorials on straight lines. (General equation of line and Angle between two lines)	2	CO1
5	Tutorials on straight lines. (Condition of parallel and perpendicular lines Perpendicular distance from a point on the line	2	CO1
6	Tutorials on trigonometric. (Trigonometric ratios of Compound, allied, multiple and sub-multiple angles.	4	CO2
7	Tutorials on factorization and de-factorization formulae	3	CO2
8	Tutorials on trigonometric. (Inverse Trigonometric function)	3	CO2
9	Tutorials on Determinates. (Basic solving and Cramer's rule)	2	CO3
10	Tutorials on matrices. (Algebra of Matrices ,Transpose, Adjoint and Inverse of Matrices)	1	CO3
11	Practicing matrices and on Matlab.	4	CO3
12	Tutorials on function. (Types of functions)	2	CO4
13	Tutorials on Limits. (Limits of algebraic, trigonometric, exponential and logarithmic functions	3	CO4
	TOTAL	32	

9. TEACHERS ASSESSMENT (TA): Assessment to be based on one of the following tools and rubrics for evaluation of TA to be well defined by course teacher.

1. Assignment based on application of Mathematics in real life or in engineering field.
2. Mathematical programming using Sci-Lab.
3. Quiz test



10. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Assignments
3. Home Work Assignment

11. SUGGESTED LEARNING RESOURCES

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

12. WEB REFERENCES

1. www.mic-mathematics.com
2. www.math.com
3. www.lenerstv.com
4. www.onlinetutorials.com
5. www.mathplanet.com

13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Logarithm	3	2	2		4
II	Partial Fraction	4	4	4		8
III	Straight Lines	5	2	2	4	8
IV	Trigonometry	14	2	8	6	16
V	Determinants & Matrices	12	6	8	4	18
VI	Function & Limits	10	2	8	6	16
	TOTAL	48	18	32	20	70

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

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



14. COURSE EXPERT COMMITTEE MEMBERS

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



1. COURSE DETAILS

Programme: CE/ME/EE/PE/CHE/EXTC	Semester: I/II
Course: Applied Chemistry	Group: B
Course Code: ACH220002	Duration: 16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D +T)	Theory Paper Duration and marks (ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
4	2	-	-	6	1.5	@70	20	10	70	25	50	-	175

3. COURSE OBJECTIVE

The course of applied chemistry is designed considering two aspects

- Basic principles of Chemistry
- Chemistry of materials

The basic principles of Chemistry included in Atomic Structure, Electrochemistry, concepts of Corrosion and Lubrication are essential to understand the various processes and their feasibility while the knowledge of chemical behaviour of different chemicals and materials (metallic and non-metallic) help in appropriate selection of material for various engineering applications. The selection of materials not only depend on physical and chemical behaviour but is also based on environmental and eco-friendly factors.

4. SKILL COMPETENCY

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

- Identify the concepts involved in various industrial processes.
- Analyze salt solutions for ions present.
- Measure various quantities accurately and interpret the observation.
- Observe, infer and record various reactions and processes.
- Handle reagents and glassware following safety precautions.

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

CO No.	COURSE OUTCOME
CO1	Predict the chemical and physical properties of different elements and write the correct names and formulae of different compounds.
CO2	Select appropriate cells/batteries for different purposes.
CO3	Select appropriate material- metallic, non-metallic, lubricants for different engineering applications.
CO4	Identify the type of corrosion and apply suitable preventive measures.
CO5	Analyze water sample and predict its suitability for various processes.



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

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Applied Chemistry (ACH220002)	CO1	3								
	CO2	3								
	CO3	3	2	2	1	2		1	1	
	CO4	2	2	2		2		1	1	
	CO5	2	2	1	1	1			1	
	CO Avg.	2.6	2	1.67	1	1.67		1	1	

6b. CO-PO, CO- PSO MAPPING TABLE-MECHANICAL ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Applied Chemistry (ACH220002)	CO1	3								
	CO2	3								
	CO3	3	2	2	1	2		1		1
	CO4	2	2	2		2		1		1
	CO5	2	1	2		1				1
	CO Avg.	2.6	1.67	2	1	1.67		1		1

6c. CO-PO, CO- PSO MAPPING TABLE-ELECTRICAL ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Applied Chemistry (ACH220002)	CO1	3		1						
	CO2	3	1	2	1					1
	CO3	3	1	2	1	2		1		1
	CO4	2	1	1		2		1		1
	CO5	2				1				
	CO Avg.	2.6	1	1.5	1	1.67		1		1



6d. CO-PO, CO- PSO MAPPING TABLE-PLASTICS ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
Applied Chemistry (ACH220002)	CO1	3	2	2	2				2		2
	CO2	3									
	CO3	3	2	2		2		2	1		2
	CO4	2	1	1		2			1		1
	CO5	2	1			1					1
	CO Avg.	2.6	1.5	1.67	2	1.67		2	1.33		1.5

6e. CO-PO, CO- PSO MAPPING TABLE-CHEMICAL ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Applied Chemistry (ACH220002)	CO1	3		2	1				2	
	CO2	3								
	CO3	3	2	2	1	2		1	2	
	CO4	2	2	1	1	2		1	2	
	CO5	2	1	1		1		1	1	
	CO Avg.	2.6	1.67	1.5	1	1.67		1	1.75	

6f. CO-PO, CO- PSO MAPPING TABLE-ELECTRONICS & TELECOMMUNICATIONS ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Applied Chemistry (ACH220002)	CO1	3		1						
	CO2	3	1	2	1					1
	CO3	3	1	2	1	2		1		1
	CO4	2	1	1		2		1		1
	CO5	2				1				
	CO Avg.	2.6	1	1.5	1	1.67		1		1



7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	CO
I	1. Atomic Structure 1.1 Structure of atom Definition of Atom, Fundamental Particles of Atom – their Mass, Charge, Location, Definition of Atomic no, Atomic Mass no., Isotopes & Isobars 1.2 Bohr's Theory and Quantum Numbers Concept of Orbits & Orbitals. 1.3 Rules for distribution of electrons in an atom Hund's Rule, Aufbau's Principle, Pauli's exclusion principle Electronic configuration of first twenty elements 1.4 Nuclear stability and Numerical problems based on it 1.5 Chemical Bonding Valency, Octet Rule, Duplet Rule Formation of Electrovalent & Covalent Compounds e.g., NaCl, CaCl ₂ , MgO, AlCl ₃ , CO ₂ , H ₂ O, Cl ₂ , NH ₃ , C ₂ H ₄ , N ₂ , C ₂ H ₂	CO1
II	2. Electrochemistry 2.1 Concept of Ionization & Electrolytic Dissociation Arrhenius' theory, Degree of ionization 2.2 Electrolysis. Terms Involved in Electrolysis. Mechanism of electrolysis. Faraday's Laws of Electrolysis and Numerical problems based on it. 2.3 Applications of electrolysis Electroplating & Electro refining, Electrometallurgy & Electrotyping 2.4 Cells and Batteries – Classification Primary cell (Daniel cell), Secondary cell (Lead Acid Storage cell) Lithium batteries Solar cells – advantages, disadvantages. Hydrogen Fuel cell -Working, advantages and disadvantages.	CO2
III	3. Metals & Alloys Metals 3.1 Characteristics of Metals 3.2 General Metallurgical processes 3.3 Physical properties and applications of some commonly used metals such as Fe, Cu, Al, Cr, Ni, Sn, Pb, Zn, Ag and Si. 3.4 Alloys Preparation, purposes of making alloy, classification (Ferrous & Non-Ferrous) Composition, properties and application of Duralumin, Magnalium, Monel metal, Gun metal, Brass, Bronze, Babbitt metal	CO3
IV	4. Water and pH: 4.1 Physical and chemical characteristics of water. 4.2 Hardness of water a) Causes and Types of Hardness b) Disadvantages of hard water – (Domestic and Industrial) Hard water in boilers and prevention: Boiler corrosion, caustic embrittlement, priming and foaming, scales and sludge. 4.3 Degree of Hardness and numerical problems based on it. Water softening: zeolite process, ion exchange process (cation exchange and anion exchange).	CO5



	4.4 pH- Concept of pH Applications of pH and numerical problems based on it.	
V	5. Corrosion and Protective Coatings: 5.1 Types of Corrosion 5.2 Mechanism of Corrosion 5.3 Factors affecting corrosion 5.4 Methods of prevention of corrosion. 5.5 Methods of applying Metal coatings. 5.6 Stress corrosion – Causes and effects 5.7 Corrosion of Polymers- Causes and effects	CO4
VI	6. Non-Metallic Engineering Materials 6.1 Lubricants: Definition, Functions of Lubricants, Theories of lubrication, Classification and characteristics of Lubricants, Selection of Lubricants for different machines 6.2 Polymerization- Types. 6.3 Plastics – Definition, types, compounding of plastic, properties and application 6.4 Rubber – Natural rubber & synthetic rubber properties of rubber, application rubber, Vulcanization of rubber 6.5 Thermal Insulators – Definition, characteristics, preparation, properties and applications of Thermocole and Glasswool.	CO3

8. LIST OF PRACTICALS

Term Work consists of Journal containing minimum number of 10 Experiments

Sr. No.	Title of Experiment	Approx. hrs required	CO
01 to 03	Techniques of determination of concentration of solutions: <u>Volumetric Analysis</u> a. Neutralization Titration Titration between Strong Acid and Strong Base using Phenolphthalein as indicator. b. Titration between Strong Acid and Strong Base using Methyl orange as indicator. c. Redox Titration Titration between KMnO_4 and $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$	10	CO4 CO5
04 to 07	<u>Qualitative Analysis</u> of solutions containing one basic and one acidic radical listed below: a. Basic Radicals: Pb^{+2} , Cu^{+2} , Al^{+3} , Fe^{+2} , Fe^{+3} , Ca^{+2} , Ba^{+2} , Mg^{+2} , K^+ , Na^+ . b. Acidic Radicals: Cl^- , SO_4^{-2} , CO_3^{-2} , NO_3^-	10	CO1 CO2 CO5
08 to 09	Determine: a. Hardness of water using EDTA b. Determine pH of different solutions.	04	CO2 CO5
10	Calculate the electrochemical equivalent of copper sulphate solution using copper electrodes	02	CO2 CO5



Sr. No.	Title of Experiment	Approx. hrs required	CO
11	Determine Viscosity of a Lubricant.	02	CO3
12	Determine Flash Point of a Lubricant using: a. Abel's Flash Point Apparatus b. Pensky Marten's Flash Point Apparatus	04	CO3
	TOTAL	32	

9. TEACHERS ASSESSMENT (TA): Assessment to be based on one of the following tools and rubrics for evaluation of TA to be well defined by course teacher.

1. Seminar/ Presentation
2. Model/Chart making
3. Surveys
4. Quiz

10. IMPLEMENTATION STRATEGY (PLANNING)

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

11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Chemistry of Engineering Materials	Jain and Jain	Dhanpat Rai Publishing Co. New Delhi
2	A Text Book of Engineering Chemistry	Dara S.S.	S. Chand & Company, New Delhi
3	Applied Chemistry	Shete S.D.	S. Chand & Company
4	Applied Chemistry	B.S. Godbole	Satya Prakashan, New Delhi
5	Polytechnic Chemistry	Rao A.A.	New Age International 2007

12. WEB REFERENCES

- www.chemistryexplained.com
- <https://schools.aglasem.com>
- <https://www.thebalance.com>
- <https://water.usgs.gov/edu/hardness.html>
- <https://engineeringinsider.org>
- <http://web.mit.edu/5.33/www/lec/poly.pdf>



13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Format of End semester exam is MCQ online. 70 multiple choice questions will be administered which are to be answered in 1.5 hrs.

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Atomic Structure	12	8	4	3	15
II	Electrochemistry	10	2	4	4	10
III	Metals and Alloys	09	4	2	4	10
IV	Water and pH	09	2	4	3	09
V	Corrosion and Protection	11	2	7	2	11
VI	Non-metallic engineering material	13	6	4	5	15
TOTAL		64	24	25	21	70

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

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

14. COURSE EXPERT COMMITTEE MEMBERS

Sr.No.		NAME
1	Internal	K.P. Bhawe
2	Internal	S.V. Suvarna
3	External	Mrs. M.A. Moghe
		Organization: Vidyalankar Polytechnic, Wadala, Mumbai



1. COURSE DETAILS

Programme: CE/ME/EE//PE/CH/EXTC	Semester: I
Course: Environmental Studies	Group: B
Course Code: EVS220003	Duration: 16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D +T)	Theory Paper Duration and marks (ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
2	--	--	--	2	--	--	--	--	--	25	--	--	25

3. COURSE OBJECTIVE

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

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

4. SKILL COMPETENCY

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

Following skills and competency will be developed

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



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

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

6. CO-PO, CO- PSO MAPPING TABLE**A. CIVIL ENGINEERING**

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
- Environmental Studies (EVS220003)	CO1	2		1		3		1	1	
	CO2					2				
	CO3			3		2		1	1	
	CO4	2		2		2	1	1	1	1
	CO 5		1	2		2	1			1
	CO Avg.	2	1	2		2.2	1	1	1	1

B. MECHANICAL ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
- Environmental Studies (EVS220003)	CO1	2		1		3			1	
	CO2					2				
	CO3			3		2			1	
	CO4		1	2		2	1		1	
	CO5	2		2		2	1	1		
	CO Avg.	2	1	2		2	1	1	1	



C. ELECTRICAL ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Environmental Studies (EVS220003)	CO1	2		1		3		1		1
	CO2					2				
	CO3			3		2		1		
	CO4	2		2		2	1	1		1
	CO 5		1	2		2	1			1
	CO Avg.	2	1	2		2.2	1	1		1

D. PLASTICS ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
- Environmental Studies (EVS220003)	CO1	2		1		3			1		
	CO2					2					
	CO3			3		2			1		1
	CO4		1	2		2	1		1		1
	CO5	2		2		2	1	1			1
	CO Avg.	2	1	2		2.2	1	1	1		1

E. CHEMICAL ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
- Environmental Studies (EVS220003)	CO1	3				2		1	1	
	CO2	3				2		1		
	CO3	.3		1	1	2		1	1	
	CO4	.3		1	1	2	1	1	1	
	CO 5	3		1		2	1	1	1	
	CO Avg.	3		1	1	2	1	1	1	



F. ELECTRONICS AND TELECOMMUNICATIONS ENGINEERING

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Environmental Studies (EVS220003)	CO1	2		1		3		1		1
	CO2					2				
	CO3			3		2		1		
	CO4	2		2		2	1	1		1
	CO5		1	2		2	1			1
	CO Avg.	2	1	2		2.2	1	1		1

7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	CO
I	1. The Multidisciplinary nature of environmental studies: 1.1 Definition, scope and importance Need for public awareness 1.2 Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems 1.21 Forest resources: Use and over-exploitation, deforestation. Timber extraction, mining, dams and their effects on forest and tribal people. 1.22 Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams' benefits and problems. 1.23 Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. 1.24 Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. 1.25 Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. 1.3 Energy resources: 1.31 Renewable Energy Resources – Biogas, Solar energy, Wind energy, Energy from falling water, Energy from wastes and tidal energy. 1.32 Non-Renewable Energy Resources – Coal, Oil, Natural gas Issue of economic viability and ability to meet demands. Inequitable use of energy in urban and rural areas	CO 1
II	2. Eco Systems: 2.1 Concept of ecosystem 2.2 Major ecosystems in the world.	CO 2



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

8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of 05 Assignments

Sr. No.	Title of Assignment	Approx. Hrs required	CO
1	Write a note on different renewable sources of energy.	04	CO, CO3
2	List any two man-made disasters. Analyze their causes and effects on environment.	04	CO5
3	Analyze the problem of water scarcity and water management in India. Suggest a suitable solution for the same.	06	CO1, CO4, CO5
4	Describe one endangered species and measures to protect it.	04	CO2, CO3
5	Collect data regarding quality of air in different parts of the city. Analyze and draw conclusion about air pollution in the city. (Group Project)	08	CO 4
6	Identify any one environmental problem and suggest solution for it.	06	CO1, CO4, CO2
TOTAL		32	



9. TEACHERS ASSESSMENT (TA): NA

10. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of assignments.
3. Slides
4. Self-Learning Online Resources

11. SUGGESTED LEARNING RESOURCES

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

12. WEB REFERENCES

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

13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN – NA\

14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mrs. Keerti Bhawe
2	Internal	Mrs. Sneha Suvarna
3	External	Mrs. Kshama Sawant
		Organization: Vidyalkar Polytechnic, Wadala Mumbai



1. COURSE DETAILS

Programme: CE/ME/EE/PE/CH/EXTC	Semester: I
Course: Universal Human Values	Group :B
Course Code: UHV220004	Duration:16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
2	-	-	1	3	-	-	-	-	-	25	-	-	25

3. COURSE OBJECTIVE

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

4. SKILL COMPETENCY

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

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

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

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



6. CO-PO, CO- PSO MAPPING TABLE

Civil Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Universal Human Values (UHV220004)	CO 1	2	-	-	-	2	-	3	1	1
	CO 2	-	3	-	-	2	2	3		
	CO 3	-	-	-	-	2	-	3	1	1
	CO 4	-	1	-	-	-	1	3		
	CO Average	2.00	2.00	-	-	2	1.5	3	1	1

Mechanical Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Universal Human Values (UHV220004)	CO 1	2	-	-	-	2	-	3	1	1
	CO 2	-	3	-	-	2	2	3		
	CO 3	-	-	-	-	2	-	3	1	1
	CO 4	-	1	-	-	-	1	3		
	CO Average	2.00	2.00	-	-	2	1.5	3	1	1



Electrical Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Universal Human Values (UHV220004)	CO 1	2	-	-	-	2	-	3	1	1
	CO 2	-	3	-	-	2	2	3		
	CO 3	-	-	-	-	2	-	3	1	1
	CO 4	-	1	-	-	-	1	3		
	CO Average	2.00	2.00	-	-	2	1.5	3	1	1

Plastics Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3
Universal Human Values (UHV220004)	CO 1	2	-	-	-	2	-	3	1		1
	CO 2	-	3	-	-	2	2	3			
	CO 3	-	-	-	-	2	-	3	1		1
	CO 4	-	1	-	-	-	1	3			
	CO Average	2.00	2.00	-	-	2	1.5	3	1		1



Chemical Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Universal Human Values (UHV220004)	CO 1	2	-	-	-	2	-	3	1	1
	CO 2	-	3	-	-	2	2	3		
	CO 3	-	-	-	-	2	-	3	1	1
	CO 4	-	1	-	-	-	1	3		
	CO Average	2.00	2.00	-	-	2	1.5	3	1	1

Electronics & Telecommunication Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Universal Human Values (UHV220004)	CO 1	2	-	-	-	2	-	3	1	1
	CO 2	-	3	-	-	2	2	3		
	CO 3	-	-	-	-	2	-	3	1	1
	CO 4	-	1	-	-	-	1	3		
	CO Average	2.00	2.00	-	-	2	1.5	3	1	1



7. COURSE CONTENTS

UNIT No.	TOPIC/Sub-topic	CO	Hrs.
I	Introduction to Universal Human values 1.1 Universal Human Values, Definition, concept and need 1.2 Understanding Self exploration: content & process 1.3 Happiness and Prosperity as a part of universal values	CO 1	04
II	Understanding Harmony in Human Being 2.1 Human being more than just the body 2.2 Harmony of Self (I) with Body 2.3 Understanding the needs of Self and the Body 2.4 Understanding the activities of Self and Body	CO1	04
III	Understanding Harmony in Family, Society and Nature 3.1 Family as source of human values, respect, affection, love 3.2 Values in Social life: Reverence, Glory, Kindness, Honesty, Gratitude 3.2 Harmony in Nature; The four orders in nature, harmony in Existence	CO1	04
IV	Professional Ethics 4.1 Concepts of Professional ethics 4.2 Issues in Professional ethics 4.3 understanding importance of professional ethics 4.4 Competence, Honesty, Equality, discipline, trustworthiness, Team work	CO2	06
V	Importance of Life skills 5.1 Concept & meaning of life skills 5.2 Essential life skills: 5.2.1 Time Management, 5.2.2 Stress Management with Yoga & sports 5.2.3 Decision making, 5.2.4 SWOT Analysis, 5.2.5 Leadership 5.3 Application of life skills in personal and professional life	CO3	08
VI	Indian Constitution 6.1 Preamble of Indian Constitution 6.2 Historical Making of constitution 6.3 Fundamental Rights and Duties 6.4 Union, State and Local Administration 6.5 Election Commission of India	CO4	06
	TOTAL		32



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

A. Five MCQ/Subjective Assignments (10 Marks) (6 hrs.)

1	Introduction to Universal Human values	CO1
2	Understanding Harmony in Human Being	CO1
3	Understanding Harmony in Family , Society and Nature	CO1
4	Professional Ethics & Importance of Life skills	CO2, CO3
5	Indian constitution	CO4

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

1	Self-Exploration: Introduce yourself in detail. What are the goals in your life? How do you set your goals in your life? How do you differentiate between right and wrong?	CO1
2	Understanding Happiness and prosperity: What are the 3 key problems you see around yourself at each of the 4 levels – individual, family, society and nature/existence?	CO1
3	Understanding the needs of Self ('I') and 'Body': Discuss and Write down five needs of yourself and five needs of your body. Discuss and Write down Five activities of yourself, five activities of your body and five activities of your body + self.	CO1
4	Professional Ethics & Importance of Life skills: Case studies and Worksheets are used to assess the different life skills.	CO2 CO3
5	Indian constitution: Discuss your fundamental Rights & duties. Discuss major Constitutional Amendments. https://www.constitutionofindia.net/blogs/the_indian_constitution_in_the_classroom__law__history_and_politics	CO4

C. Home Assignment: (5 Marks)

1	How many hours are you actually devoting to study per day? In addition, how are you spending the rest of your time – what are the five key activities where you spend the rest of the time?	CO3
2	List out 5 instances where you have done over evaluation and under/otherwise evaluation of the other/yourself. What would have been the right evaluation in that situation, as you are now able to see?	CO1

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



9. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
- 2 Submission of assignments.
3. Guest/Expert lectures
5. Role Play
6. Slides
7. Self-Learning Online Resources
- 8 Group Discussions
9. Seminar
- 10 survey
11. Interviews
12. Questionnaire

10. SUGGESTED LEARNING RESOURCES

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

11. WEB REFERENCES:

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

12. COURSE EXPERT COMMITTEE MEMBERS

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



1. COURSE DETAILS

Programme: CE / ME / PL / CH	Semester: I
Course: Applied Mechanics	Group: C
Course Code: APM220005	Duration:16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D +T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
3	2	-	1	6	03	70	20	10	70	50	-	-	150

3. COURSE OBJECTIVE

The objective of this course is to study forces and their effect on moving or stationary bodies, to understand the principles and laws of mechanics and its laws in various engineering applications. The concept of mechanics will be prerequisite subject to further courses like materials & structures, analysis of structures and design of structures.

4. SKILL COMPETENCY

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

- Apply concepts and behavior of forces on the structures
- Analyze the structure for the loads acting on it in terms of its resultant force, equilibrant force and stability through centre of gravity
- Apply the concept of lifting machines

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

CO No.	COURSE OUTCOME
CO1	Define force and classify force system
CO2	Calculate resultant and equilibrant of system of forces analytically as well as graphically for its application in determining beam reactions
CO3	Apply analysis of calculated force systems to friction and centroid
CO4	Define and calculate velocity ratio, mechanical advantage, frictional losses and efficiency of simple lifting machines.



6. CO-PO, CO- PSO MAPPING TABLE

Civil Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Applied Mechanics (APM220005)	CO1	3	2	1	-	-	-	-	-	-
	CO2	3	3	2	1	-	-	-	3	1
	CO3	3	2	2	2	-	-	-	2	-
	CO4	3	1	-	-	-	-	-	2	1
	CO Avg.	3	2	1.67	1.5	-	-	-	2.33	1

Mechanical Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Applied Mechanics (APM220005)	CO1	3	2	1	-	-	-	-	3	1
	CO2	3	3	2	1	-	-	-	3	1
	CO3	3	2	2	2	-	-	-	3	1
	CO4	3	1	-	-	-	-	-	2	-
	CO Avg.	3	2	1.67	1.5	-	-	-	2.75	1

Plastics Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
Applied Mechanics (APM220005)	CO1	3	2	1	-	-	-	-	3	2	1
	CO2	3	3	2	1	-	-	-	2	1	-
	CO3	3	2	2	2	-	-	-	1	2	-
	CO4	3	1	-	-	-	-	-	1	3	2
	CO Avg.	3	2	1.67	1.5	-	-	-	1.75	2	1.5



Chemical Engineering

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Applied Mechanics (APM220005)	CO1	3	2	1	-	-	-	-	1	-
	CO2	3	3	2	1	-	-	-	1	-
	CO3	3	2	2	2	-	-	-	2	-
	CO4	3	1	-	-	-	-	-	1	-
	CO Avg.	3	2	1.67	1.5	-	-	-	1.25	-

7. COURSE CONTENT

UNIT NO.	TOPIC / Sub-topic	CO
I	1.0 Introduction and fundamentals of force system: 1.1 Mechanics definition, classification, statics & dynamics, kinematics, Kinetics, fundamental units of measurements (FPS, MKS, SI), derived units, Conversion of units, Scalars & Vectors with examples 1.2 Definition of particle, body and rigid body, mass & weight. 1.3 Concept of force, definition, unit, graphical representation of force 1.4 Concept of system of forces, non-coplanar, coplanar, concurrent, Parallel, non-concurrent & non-parallel forces	CO1
II	2.0 Resolution and Composition of forces: 2.1. Resolution of a force into two components along any direction. 2.2 Resolution of a force into two component straight angles to each other by analytical method. 2.3 Composition and Resultant of force 2.4 Law of parallelogram of forces, 2.5 Moment of force, couples lever arm, 2.6 Varignon's theorem 2.7. Resultant of coplanar concurrent, parallel, and non- concurrent, non-parallel forces	CO2
III	3.0 Equilibrium 3.1 Definition of equilibrant, relation between Resultant and Equilibrant, Conditions of Equilibrium, Types of Equilibrium (Stable, Unstable	CO2



UNIT NO.	TOPIC / Sub-topic	CO
	<p>and Neutral equilibrium)</p> <p>3.2 Equilibrium of coplanar concurrent forces, Lami's theorem, equilibrium of coplanar parallel forces & coplanar Non-concurrent forces.</p> <p>3.3 Analytical conditions of equilibrium for coplanar concurrent & Non-concurrent Forces.</p> <p>3.4 Types of supports: simple, roller hinged & fixed.</p> <p>3.5 Types of Beams: simply supported, hinged & roller Supported, Cantilever, Overhang Beams</p> <p>3.6 Types of Loads: Point Load, Uniformly Distributed Load (UDL)</p> <p>3.7 Problems on above combination of loads.</p> <p>3.8 Space diagram, Bows notation, Law of Triangle of forces, Polygon of forces, Force/ Vector diagram</p> <p>3.9 Resultant and equilibrium of concurrent forces Polar diagram, Funicular polygon</p> <p>3.10 Resultant and equilibrium of non-concurrent and nonparallel forces</p>	
IV	<p>4.0 Friction:</p> <p>4.1 Definition of friction, force of friction, limiting frictional force, coefficient of friction, angle of friction, angle of repose, relation between angle of friction, angle of repose and coefficient of friction, cone of friction, types of friction, laws of friction, advantages and disadvantages of friction.</p> <p>4.2 Equilibrium of bodies on level plane –external force applied horizontal and inclined up and down.</p> <p>4.3 Equilibrium of bodies on inclined plane – external forces is applied parallel to the plane,</p> <p>4.4 Ladder Friction</p>	CO3
V	<p>5.0 Centroid and Centre of Gravity:</p> <p>5.1 Definition of Centre of gravity of solids and centroid of plane laminas</p> <p>5.2 Concept of parallel forces applied to find c.g. and centroid of basic regular Shapes.</p>	CO3
VI	<p>6.0 Simple Lifting Machine:</p> <p>6.1 Definition: mechanical advantage, velocity ratio, efficiency, relation between m.a., v.r. and efficiency, friction in machine in terms of load & effort, law of machine, maximum m.a., maximum efficiency, condition for reversibility of a machine</p>	CO4



UNIT NO.	TOPIC / Sub-topic	CO
	6.2 Study of machines –Simple and Differential Axle & Wheel, Simple screw jack, Double purchase crab winch, system of pulleys	

8. LIST OF PRACTICALS

Term Work consists of Journal containing minimum 10 experiments as mentioned below
 (* – Compulsory experiments)

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	CO
1.	*Study of Compression of spring, calculation of spring constant and verification of Hook's Law	2	CO1
2.	*Study of bell crank lever and verification of condition of equilibrium.	3	CO2
3.	*Determination of support reactions for simply supported beam	3	CO2
4.	*Apply Lami's theorem to determine unknown force	3	CO2
5.	Determination of resultant of nonparallel nonconcurrent forces	3	CO2
6.	*Graphics statics	3	CO2
7.	Use force table to determine resultant of concurrent force system applying law of polygon of forces	2	CO2
8.	*Determination of coefficient of friction for motion on horizontal plane	2	CO3
9.	*Determination of coefficient of friction for motion on inclined plane	2	CO3
10.	*Determine Centroid of Geometrical plane figures	3	CO3
	*Theory of Simple Lifting Machine	2	CO4
11.	*Study of Simple screw jack and find law of machine.	3	CO4
12.	*Study of Single purchase crab and find law of machine.	3	CO4
	TOTAL	32	

LIST OF TUTORIALS

Sr. No.	Title	Hours	CO
1.	Tutorial on Introduction and fundamentals of force system	2	CO1
2.	Tutorial on Resolution and Composition of forces	3	CO2
3.	Tutorial on Equilibrium and Beam reaction	3	CO2
4.	Tutorial on Friction	3	CO3
5.	Tutorial on Centroid and Centre of Gravity	3	CO3
6.	Tutorial on Simple Lifting Machine	2	CO4
	TOTAL	16	



9. TEACHERS ASSESSMENT (TA): Assessment to be based on one of the following tools and rubrics for evaluation of TA to be well defined by course teacher.

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

10. IMPLEMENTATION STRATEGY

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

11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Applied Mechanics	Dhade & Jamdar	Central Techno Publishers, Nagpur
2	Applied Mechanics	R.S. Khurmi	S. Chand & Company Ram Nagar ,New Delhi-110055
3	Engineering Mechanics Statics & Dynamics	A.K. Tayal	Umesh Publications
4	Applied Mechanics Vol.I&II	Sunil M Deo	Nirali / Pragati Publications
5	Applied Mechanics	M. D. Dayal	Nandu Publishers Chembur, Mumbai-71.

12. WEB REFERENCES

1. www.nptel.ac.in
2. www.discoveryforengineers.com
3. www.swayam.gov.in
4. www.researchgate.net
5. https://www.vssut.ac.in/lecture_notes

13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction and fundamentals of force system	4	3	5	-	8
II	Resolution and Composition of forces	10	3	3	8	14



Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
III	Equilibrium & Beam Reactions	14	3	3	10	16
IV	Friction	6	-	3	7	10
V	Centroid and Centre of Gravity	8	-	4	8	12
VI	Simple Lifting Machine	6	-	4	6	10
	TOTAL	48	9	22	39	70

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

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

14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mr. Atulyakumar Singh
2	Internal	Mr. Vinod Vanvari
3	External	Mr. Dheeraj Pandirkar
		Organization: Chief Engineer, MHADA



1. COURSE DETAILS

Programme: Civil Engineering	Semester: I
Course: Engineering Drawing	Group: C
Course Code: EDG220101	Duration:16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks (ESE)		SSL	TA	T H	TW	PR	OR	TOTAL
					Hour	Marks							
02	--	04	--	06	--	--	--	--	--	50	50	--	100

3. COURSE OBJECTIVE

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

4. SKILL COMPETENCY

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

- Draw projection and sections
- Prepare orthographic projections, isometric projections and curves manually using prevailing drawing instruments
- Prepare free hand sketches of given engineering elements

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

CO No.	COURSE OUTCOME
CO1	Draw two – dimensional, non – sectional views of given object using principles of orthographic projections and isometric views of given component or from orthographic projections
CO2	Draw geometric figures and conic curves
CO3	Draw projections of 2D standard regular objects
CO4	Draw projections of 3D standard regular objects



6. CO-PO, CO- PSO MAPPING TABLE

Course Name & Code	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Engineering Drawing (EDG220101)	CO1	3	2	2	-	-	1	3	3	1
	CO2	3	1	3	-	-	1	3	3	1
	CO3	3	2	2	-	-	3	3	3	1
	CO4	3	3	3	-	-	3	3	3	1
	CO Avg.	3	2	2.5	-	-	2	3	3	1

7. COURSE CONTENT

Unit No.	Topic / Sub-Topics	CO No.
I	1. Drawing Instruments and their uses 1.1. Introduction: Importance of Engineering Drawing for the learning of technical courses. 1.2. Learning the use of drawing instruments, drawing sheet layout, sheet size, margin, borderlines, border & frames, title block 1.3. Study the use of different Scales in Engineering Drawings, Reduce Scale. Enlarge Scale, Full Size Scale Geometrical constructions i) To draw a perpendicular bisector of a given line ii) To divide the line into number of equal parts iii) To draw line parallel to one another iv) To divide the given circle into number of equal parts 1.4. To draw regular polygon of given side Types of lines, line thickness and dimensioning techniques used in Engineering Drawings.	CO4
II	2. Engineering curves 2.1 Ellipse: Introduction and methods to draw an ellipse by oblong, arcs of circle and concentric circle methods 2.2 Parabola: Introduction and methods to draw parabola by Directrix – Focus and rectangular methods 2.3 Hyperbola: Introduction and methods to draw hyperbola by directrix – focus and rectangular methods	CO2



Unit No.	Topic / Sub-Topics	CO No.
III	3. Orthographic projections 3.1 Introduction to orthographic and isometric projections, concept and applications. 3.2 Orthographic projection by First angle and Third angle method and their symbols. 3.3 Conversion of pictorial view into Orthographic View 3.4 Objects – object containing plain surfaces, slanting surfaces, slots, ribs, cylindrical surfaces. (use First Angle Projection Method Only). 3.5 Introduction to Cutting plane line, hatching line and sectioning conventions 3.6 Types of sectional views: Half section, Full section and Off-set sectional views 3.7 Conversion of pictorial views into sectional orthographic views	CO1
IV	4. Isometric view and projection 4.1 Introduction to Isometric scale and Natural Scale. 4.2 Introduction to Isometric view and isometric projection. 4.3 Illustrative problems related to objects having plain, Slanting, cylindrical surfaces and slots on slanting surfaces 4.4 Conversion of orthographic views into isometric View/projection. (Isometric of sphere and composite solids not to be included.)	CO3
V	5. Projection of planes 5.1 Projection of Planes- Projections of regular polygons and circle-inclined to one reference plane and perpendicular to another. 5.2 Reverse problems with true shape given and derive the inclination of the plane 5.3 Types of solids- Polyhedron and solids of revolutions 5.4 Projection of regular solids like prisms, pyramids, cylinders and cones with axis i) Perpendicular to one of the reference planes, ii) inclined to one reference plane and parallel to another	CO3
VI	6. Projection of solids 6.1 Types of solids- Polyhedron and solids of revolutions 6.2 Projection of regular solids like prisms, pyramids, cylinders and cones with axis i) Perpendicular to one of the reference planes, ii) inclined to one reference plane and parallel to another	CO4



8. LIST OF DRAWINGS

Term work consist of Drawing folder containing minimum six sheets of below mentioned

Sr. No.	Title of Drawings	Approx. Hrs required	COs
01	One sheet on lettering, lines, dimensioning techniques and geometrical constructions.	06	CO1
02	One sheet with four problems on non-sectional orthographic views for the objects with curvilinear features	10	CO1
03	One sheet with four problems on Sectional orthographic projections with full and half section.	12	CO1
04	One sheet with four problems on ellipse, parabola and hyperbola.	06	CO2
05	One sheet with four problems on Isometric views and projections.	08	CO3
06	One sheet on free hand sketches of Thread Profiles and Screw Fasteners	08	CO4
07	One sheet with four problems on projection of planes.	08	CO1
08	One sheet with four problems on projection of solids.	06	CO3
	Total	64	

9. IMPLEMENTATION STRATEGY (PLANNING)

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

10. SUGGESTED LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	Engineering drawing	R.K. Dhawan	S. Chand & Co.Ltd.
2.	Engineering drawing	N.H. Dubey	Nandu Prakashan
3.	Engineering Drawing Practice for Schools and Colleges IS: SP-46	Bureau of Indian Standards.	BIS, Government of India,
4.	Engineering Drawing	Bhatt, N.D.	Charotar Publishing House
5.	Machine Drawing	Bhatt N.D., Panchal, V. M.	Charotar Publishing House
6.	Engineering Drawing	Shah, P. J.	S. Chand and Company



11. WEB REFERENCES

1. <https://www.sanfoundry.com/best-reference-books-engineering-drawing/>
2. <https://www.theengineersreference.com/tutorials/engineering-drawings/>
3. <https://buildmyvocab.com/sentences/books/best-reference-books-for-engineering-drawing/>
4. <http://pstulpule.com/>
5. <https://www.machinedesignonline.com>

12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Ms. Neelam Nagraj Petkar
2	Internal	Mr. Atulyakumar Singh
3	External	Architect: Mr. Javeed Gazali
		Practising Architect



1. COURSE DETAILS

Programme: Civil Engineering	Semester: I
Course: Civil Engineering Materials	Group: C
Course Code: CEM220102	Duration: 16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D +T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
3	-	-	-	3	3	70	20	10	70	50	-	-	150

3. COURSE OBJECTIVE

Construction material is a key element in construction project. A diploma engineer has to constantly deal with selection of materials for various engineering materials for various engineering project, such as residential /commercial buildings, roads, metro, dams, flyovers etc.

The development of advance technology generates the necessity of new engineering materials, which is durable, economical and ecofriendly.

Modern technologies are developed to handle and use the materials for economic and safer design of engineering studies.

4. SKILL COMPETENCY

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

- Select the suitable material for required applications
- Compare natural and artificial material

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

CO No.	COURSE OUTCOME
CO1	List materials to be used for specific civil engineering applications.
CO2	Classify different construction materials.
CO3	Identify relevant natural and artificial construction materials for intended uses
CO4	Identify the properties of materials with respect to uses in civil engineering



6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Civil Engineering Materials (CEM220102)	CO1	3	-	-	1	2	-	1	3	1
	CO2	2	-	-	2	1	-	1	1	1
	CO3	1	-	-	2	-	-	-	2	2
	CO4	2	-	-	-	3	-	1	1	3
	CO Avg.	2	-	-	1.67	2	-	1	1.75	1.75

7. COURSE CONTENTS

Unit No.	Topic / Sub-topic	CO
I	1.0 Ingredients Of Concrete 1.1 Chemical composition of Cement 1.2 Types: (1) Portland Cement, (2). Portland Pozzolana Cement, (3) Portland Slag Cement (4). Sulphate resistant cement, (6) White cement, and their uses. 1.3 Manufacturing process of cement : Raw materials and manufacturing process 1.4 Testing of Cement: Setting and hardening of cement and relative strength. Grades of cement, List of tests and necessity of these tests ,Field tests. 1.5 Sources, properties and uses of Sand 1.6 Types of sand : Natural sand, manufactured sand / recycled sand . 1.7 Classification of limes, Uses of limes, 1.8 Gypsum, Gypsum Plaster, Gypsum sheet, POP and their uses.	CO4
II	2.0 Masonry Materials 2.1 Bricks: Quality of good bricks, Strength of bricks, Tests on bricks, Classification of bricks, Uses of bricks clay brick, Special brick, hollow brick, Fly-ash bricks 2.2 Stones, suitability of stones for masonry work, quality of stones, dressing of stones, Uses of stones 2.3 Concrete blocks : Ingredients , Suitability 2.4 Light weight Autoclaved aerated concrete (AAC) block : Ingredients , Suitability	CO1



Unit No.	Topic / Sub-topic	CO
III	5.0 Glass And Plastics 5.1 Glass, Toughened glass, Structural glazing glass: Properties ,Suitability 5.2 Plastics: Types of Plastic Products in Civil Engineering (PVC,UPVC, CPVC, PPRC, Korean, Vinyl, PPF, etc)	CO3
IV	4.0 Timber And Timber Products 4.1 Timber as a material of construction, Relative advantages of its use as compared to other materials 4.2 Types of Boards: Ply, Veneer, Medium Density Fiber Board (MDF), and Block Board, Laminates, their properties and uses. 4.3 Props (Bamboos and Ballies) : properties uses of Props.	CO3
V	3.0 Tiles 3.1 Characteristics of good tiles 3.2 Types of tiles: (i). Floor tiles: Ceramic, vitreous, Wooden, Kotah, marble, granite (ii). Wall Cladding: Dado, dry-cladding, (iii). Roof Tiles: Mangalore, Allahabad	CO4
VI	6.0 Surface Protection: Paint, Varnish And Polishing: 5.1 Characteristics of good paint 5.2 White wash, Cement Paint, distemper, Plastic Emulsion Paint, Acrylic Paint,oil painting. 5.3 Varnish: water varnish, oil varnish, spirit varnish and turpentine varnish. 5.4 Wood polishing, melamine, PU	CO2

8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of home assignments of a journal on units mentioned below:

Sr. No.	Title of Assignments	CO
1	Assignment No 1: Ingredients Of Concrete	CO4
2	Assignment No 2: Masonry Materials	CO1
3	Assignment No 3: Glass And Plastics	CO3
4	Assignment No 4: Timber And Timber Products	CO3
5	Assignment No 5: Tiles	CO4
6	Assignment No 6: Surface Protection: Paint, Varnish And Polishing	CO2



9. TEACHERS ASSESSMENT (TA): Assessment to be based on one of the following tools and rubrics for evaluation of TA to be well defined by course teacher.

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

10. IMPLEMENTATION STRATEGY (PLANNING)

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

11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Materials of constructions	D.N. Ghosh	Tata Ma-Graw Hill Publishing
2	Engineering Materials	S.C. Rangwala	Charotar Publication
3	Civil Engineering Materials	T.T.T.I Chandigarh	Tata Ma-Graw Hill Publishing
4	Building Construction	Sushil Kumar	Standard New Delhi

12. WEB REFERENCES

1. www.nptel.ac.in
2. www.quora.com
3. www.constructionworld
4. www.aci.in
5. www.asce.in

13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory			
			Marks			
			R Level	U Level	A Level	Total Marks
I	Ingredients of concrete	19	12	16	---	28
II	Masonry Materials	7	5	5	---	10
III	Glass & Plastics	2	-	4	---	4



Unit No.	Unit Title	Teaching Hours	Distribution of Theory			
			Marks			
			R Level	U Level	A Level	Total Marks
IV	Timber & Timber Products	10	4	6	---	10
V	Tiles	6	4	6	---	10
VI	Paint Varnish & Polishing	4	4	4	---	8
	TOTAL	48	29	41	--	70

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

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

14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mr. Vinod Vanvari
2	Internal	Mrs. Supriya Patil
3	External	Arch. Jaweed Ghazali
		Organization: Practicing Architect





Shri Vile Parle Kelavani Mandal's
SHRI BHAUGUBHAI MAFATLAL POLYTECHNIC



CIVIL ENGINEERING DEPARTMENT

SEM - II

1. COURSE DETAILS

Programme: CE/ME/EE/PL/CH/EXTC	Semester:II
Course: Engineering Mathematics	Group:B
Course Code: EMT220006	Duration:16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D +T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
3	-	-	2	5	3	70	20	10	70	25	-	-	125

3. COURSE OBJECTIVE

. This Course is being introduced to provide mathematical background needed for any Diploma engineer. It intends to enable the students to apply basic facts, concepts and principles of differential calculus, vector algebra, complex number, Indefinite integral, Numerical method and Statistics as a tool to analyze engineering problems.

4. SKILL COMPETENCY

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

- Solve broad-based Engineering problems using the Advanced Knowledge of mathematics

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

CO No.	COURSE OUTCOME
CO1	Use the concepts of differential calculus to solve engineering related problems.
CO2	Apply basic concepts of vector algebra and complex number in the field of elementary engineering problems.
CO3	Apply the concept of Indefinite Integral.
CO4	Understand the concept of Probability distribution and Statistics apply to evaluate the problems.



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

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Engineering Mathematics (EMT220006)	CO1	3	2	2	1	1	1	2	-	1
	CO2	2	-	1	1	1	1	2	1	1
	CO3	2	1	1	1	1	1	2	-	1
	CO4	3	2	2	2	1	2	2	1	1
	CO Avg.	2.5	1.25	1.5	1.25	1	1.25	2	1	1

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

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Engineering Mathematics (EMT220006)	CO1	3	2	2	1	1	1	2	1	2
	CO2	3	-	1	1	1	1	2	1	1
	CO3	3	1	1	1	1	1	2	1	2
	CO4	3	2	2	2	1	2	2	1	2
	CO Avg.	3	1.25	1.5	1.25	1	1.25	2	1	1.75

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

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Engineering Mathematics (EMT220006)	CO1	3	2	2	1	1	1	2	-	2
	CO2	3	-	1	1	1	1	2	-	2
	CO3	3	1	1	1	1	1	2	-	1
	CO4	3	2	2	2	1	2	2	-	1
	CO Avg.	3	1.67	1.5	1.25	1	1.25	2	-	1.5



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

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
Engineering Mathematics (EMT220006)	CO1	3	2	2	1	1	1	2	-	2	-
	CO2	3	-	1	1	1	1	2	-	2	-
	CO3	3	1	1	1	1	1	2	-	1	-
	CO4	3	2	2	2	1	2	2	-	1	-
	CO Avg.	3	1.67	1.5	1.25	1	1.25	2	-	1.5	-

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

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Engineering Mathematics (EMT220006)	CO1	3	2	2	1	1	1	2	3	-
	CO2	3	-	1	1	1	1	2	2	-
	CO3	3	1	1	1	1	1	2	3	-
	CO4	3	2	2	2	1	2	2	3	-
	CO Avg.	3	1.67	1.5	1.25	1	1.25	2	3	-

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

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Engineering Mathematics (EMT220006)	CO1	3	2	2	1	1	1	2	2	1
	CO2	3	-	1	1	1	1	2	2	1
	CO3	3	1	1	1	1	1	2	2	1
	CO4	3	2	2	2	1	2	2	2	1
	CO Avg.	3	1.67	1.5	1.25	1	1.25	2	2	1



7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	CO
I	Derivatives 1.1 Definition of Derivatives 1.2 Rules of Differentiation 1.3 Composite function 1.4 Inverse trigonometric function 1.5 Implicit function 1.6 Logarithmic function 1.7 Parametric function 1.8 Partial derivatives of first order(two variable) 1.9 Second order differentiation	CO1
II	Vector Algebra 2.1 Definition of vector 2.2 Algebra of vectors, equality, addition, subtraction and multiplication, 2.3 Dot product and Cross product 2.4 Scalar triple product 2.5 Work done 2.6 Moment of force about a point and line	CO2
III	Probability Distribution 3.1 Definition of probability, addition and multiplication theory of probability 3.2 Probability Distribution <ul style="list-style-type: none"> • Normal Distribution • Binomial Distribution • Poisson's distribution 	CO4
IV	Integration 4.1 Definition of integration as anti-derivative 4.2 Integration of standard functions 4.3 Composite Integrals 4.4 Integration of sum and difference of two or more functions 4.5 Integrals of Simple Algebraic Rational Function	CO3



UNIT NO.	TOPIC/Sub-topic	CO
	4.6 Integrals of Simple Trigonometric Function 4.7 Method of integration • By Partial fraction	
V	Complex Number 5.1 Definition of complex number 5.2 Algebra of complex number - equality, addition, subtraction, multiplication and division 5.3 De Moivre's theorem 5.4 Euler's form of circular function	CO2
VI	Statistics 6.1 Range, coefficient of range of discrete and grouped data 6.2 Mean deviation and standard deviation from mean of grouped and ungrouped data, weighted means 6.3 Variance and coefficient of variance 6.4 Comparison of two sets of observation	CO4

8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of 10 tutorials.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	CO
1	Tutorials on Differentiation. (Rules of Differentiation)	4	CO1
2	Tutorials on Composite function, Inverse trigonometric function, Implicit function	4	CO1
3	Tutorials on Differentiation. (Logarithmic function Parametric function, Partial derivatives of first order, Second order differentiation)	3	CO2
4	Tutorials on Vectors. (Dot product and Cross product	2	CO2
5	Tutorials on Scalar triple product	2	CO4
6	Tutorials on Vectors. (Work done, Moment of force about a point and line)	4	CO3
7	Tutorials on Probability. (Probability Distribution, Normal Distribution, Binomial Distribution, Poisson's distribution)	4	CO3



Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	CO
8	Tutorials on Integration. (Integration of standard functions Composite Integrals, Integration of sum and difference of two or more functions)	3	CO4
9	Tutorials on Integration. (Integrals of Simple Algebraic Rational Function, Integrals of Simple Trigonometric Function)	3	CO2
10	Tutorials on Method of integration	3	CO3
	TOTAL	32	

9. TEACHERS ASSESSMENT (TA): Assessment to be based on one of the following tools and rubrics for evaluation of TA to be well defined by course teacher.

1. Assignment based on application of Mathematics in real life or in engineering field.
2. Mathematical programming using Sci-Lab.
3. Quiz test

10. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Assignments
3. Home Work Assignment

11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Calculus for Polytechnics	Shri. S.P.Deshpande	Pune Vidyarthi Gruha Prakashan Pune-30
2	Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna Publishers 2/B, Delhi-6
3	Applied Mathematics	G.V.Kumbhojkar	P.Jamnadas LLP

12. WEB REFERENCES

1. www.mic-mathematics.com
2. www.math.com
3. www.lernerstv.com
4. www.onlinetutorials.com
5. www.archieves.math.utk.edu



13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Derivatives	12	9	8	-	17
II	Vector Algebra	06	2	3	4	09
III	Probability Distribution	06	2	3	4	09
IV	Integration	12	6	9	-	15
V	Complex Number	06	3	2	4	09
VI	Statistics	06	2	3	6	11
	TOTAL	48	24	28	18	70

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

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

14. COURSE EXPERT COMMITTEE MEMBERS

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



1. COURSE DETAILS

Programme: CE/ME/EE/PL/CH/EXTC	Semester: I/II
Course: APPLIED PHYSICS	Group: B
Course Code: APH220007	Duration: 16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D +T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
4	2	-	-	6	1.5	70@	20	10	70	25	50	-	175

3. COURSE OBJECTIVE

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

4. SKILL COMPETENCY

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

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

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

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



6. CO-PO, CO- PSO MAPPING TABLE

Civil Engineering:

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
APPLIED PHYSICS (APH220007)	CO1	3	2	-	3	-	-	-	1	-
	CO2	3	2	1	1	-	-	-	1	-
	CO3	3	2	-	2	-	-	-	1	-
	CO4	3	2	1	3	-	-	-	1	-
	CO Avg.	3.00	2.00	1.00	2.25	-	-	-	1.00	-

Mechanical Engineering:

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
APPLIED PHYSICS (APH220007)	CO1	3	2	-	3	-	-	-	1	1
	CO2	3	2	1	1	-	-	-	1	1
	CO3	3	2	-	2	-	-	-	1	1
	CO4	3	2	1	3	-	-	-	1	1
	CO Avg.	3.00	2.00	1.00	2.25	-	-	-	1.00	1.00

Electrical Engineering:

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
APPLIED PHYSICS (APH220007)	CO1	3	2	-	3	-	-	-	1	-
	CO2	3	2	1	1	-	-	-	1	-
	CO3	3	2	-	2	-	-	-	1	-
	CO4	3	2	1	3	-	-	-	1	-
	CO Avg.	3.00	2.00	1.00	2.25	-	-	-	1.00	-



Plastics Engineering:

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
APPLIED PHYSICS (APH220007)	CO1	3	2	-	3	-	-	-	1	-	1
	CO2	3	2	1	1	-	-	-	1	-	1
	CO3	3	2	-	2	-	-	-	1	-	1
	CO4	3	2	1	3	-	-	-	1	-	1
	CO Avg.	3.00	2.00	1.00	2.25	-	-	-	1.00	-	1.00

Chemical Engineering:

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
APPLIED PHYSICS (APH220007)	CO1	3	2	-	3	-	-	-	1	-
	CO2	3	2	1	1	-	-	-	1	-
	CO3	3	2	-	2	-	-	-	1	-
	CO4	3	2	1	3	-	-	-	1	-
	CO Avg.	3.00	2.00	1.00	2.25	-	-	-	1.00	-

Electronics and Telecommunications Engineering:

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
APPLIED PHYSICS (APH220007)	CO1	3	2	-	3	-	-	-	1	1
	CO2	3	2	1	1	-	-	-	1	1
	CO3	3	2	-	2	-	-	-	1	1
	CO4	3	2	1	3	-	-	-	1	1
	CO Avg.	3.00	2.00	1.00	2.25	-	-	-	1.00	1.00



7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	CO
I	1.0 Measurement and errors: 1.1 Fundamental, Derived, Supplementary SI units. 1.2 Accuracy and Precision in Measurement. 1.3 Significant figures in measured quantities. 1.4 Dimensions, dimensional formula 1.5 Errors, types of errors: instrumental, systematic and random error, estimation of errors: absolute, relative and percentage error	CO1
II	2.0 Properties of matter: Elasticity, Surface Tension and Viscosity 2.1 Elasticity: 2.1.1 Deforming force, restoring 2.1.2 Stress and strain with their types. 2.1.3 Elastic limit, Hooke's law. 2.1.4 Moduli of elasticity, Constants of elasticity by Searle's method. 2.1.5 Stress-strain diagram, behavior of wire under continuously increasing load. 2.1.6 Definition of yield point, ultimate stress, factor of safety. 2.1.7 Numerical on stress, strain and Young's modulus. 2.2 Surface Tension: 2.2.1 Molecular force, cohesive and adhesive force, molecular range, sphere of influence. 2.2.2 Definition of surface tension and its S.I. unit, angle of contact. 2.2.3 Capillary action with examples, shape of meniscus for water and mercury. 2.2.4 Relation between surface tension, capillary rise and radius of capillary (no derivation). 2.2.5 Effect of impurity and temperature on surface tension, 2.2.6 Numerical on relation between surface tension, capillary rise and radius. 2.3 Viscosity: 2.3.1 Fluid friction, viscous force. 2.3.2 Definition of viscosity, velocity gradient. 2.3.3 Newton's law of viscosity, Definition coefficient of viscosity and its S.I. unit. 2.3.4 Streamline and turbulent flow with examples, critical velocity. 2.3.5 Variation of viscosity with temperature. 2.3.6 Reynolds number and its significance.	CO2 CO3
III	3.0 Heat, Temperature, Sound, ultrasonic and acoustics 3.1 Heat: 3.1.2 Law of thermal conductivity, coefficient of thermal conductivity and its S.I. unit. 3.1.3 Definition of linear, aerial and cubical expansion and relation between them (no derivation). 3.2 Temperature: 3.2.1 Boyle's law, Charle's law, Gay Lussac's law. 3.2.2 Absolute zero temperature, Kelvin scale of temperature, general gas equation (statement only). 3.2.3 Effect of temperature on physical parameter Specific heat of gas at constant pressure, volume (C_p and C_v). 3.2.4 Temperature measurement: Constant volume hydrogen gas thermometer, Optical pyrometer, Thermoelectric thermometer.	CO2



	<p>3.3 : Simple Harmonic Motion</p> <p>3.3.1 Uniform circular motion, periodic, Vibrational motion (definition with examples),</p> <p>3.3.2 Simple Harmonic Motion (S.H.M.) (Definition), Characteristics of S.H.M., Amplitude, Frequency, Period of S.H.M.</p> <p>3.3.3 General equations of (S.H.M.) (no derivation), Graphical representation of S.H.M. (only diagram), Numerical on amplitude, frequency and period of S.H.M.</p> <p>3.4 Wave Motion:</p> <p>3.4.1 Definition of Wave motion, amplitude, period, frequency and wavelength, Equation of progressive wave (no derivation).</p> <p>3.4.2 Longitudinal and transverse wave, Definition and formation of stationary wave, Definition of Node, Antinode, Free vibration, Forced vibration and Resonance.</p> <p>3.4.3 Velocity of sound by resonance tube, Frequency of A.C. Supply by Sonometer.</p> <p>3.5 Acoustics and Reverberation:</p> <p>3.5.1 Definition of Echo, Reverberation, Reverberation time, Sabine's formula (no derivation), Definition of Absorption coefficient, Open window unit (OWU), Absorption coefficient.</p> <p>3.5.2 Essential features for good acoustics or Acoustical planning.).</p> <p>3.5.3 Numerical on relation $v = n\lambda$ and resonance.</p> <p>3.6 Acoustics and Reverberation:</p> <p>3.6.1 Definition of Echo, Reverberation, Reverberation time, Sabine's formula (no derivation), Definition of Absorption coefficient, Open window unit (OWU), Absorption coefficient.</p> <p>3.6.2 Essential features for good acoustics or Acoustical planning.).</p> <p>3.6.3 ULTRASONIC - Production and uses; Sonic, Subsonic, Supersonic, Numerical Problems.</p>	CO3
IV	<p>4.0 OPTICS</p> <p>4.1 Photoelectric effect :</p> <p>4.1.1. Statement of photoelectric effect, Planck's hypotheses,</p> <p>4.1.2 Einstein's equation. Definition: Threshold wavelength, Threshold frequency, Work function.</p> <p>4.1.3 Study of experimental set up for study of photoelectric effect, Study of factors on which photoelectric effect depend on. Definition: Stopping potential. Characteristics of photoelectric effect.</p> <p>4.1.4 Photocells: Photo emissive, photoconductive, photovoltaic.</p> <p>4.1.5 Engineering applications.</p> <p>4.1.6 Numerical on energy of photon, work function, Einstein's equation.</p> <p>4.2 Interference :</p> <p>4.2.1 Interference of light, Interference pattern. Constructive interference, Destructive interference. Steady interference of light.</p> <p>4.2.3 Conditions for steady interference pattern.</p> <p>4.2.4 Newton's rings, Newton's rings setup, Wavelength of source of light (No derivation)</p> <p>4.2.5 Optical flatness,</p> <p>4.2.6 Engineering Applications,</p> <p>4.3 Diffraction :</p> <p>4.3.1 Diffraction of light, Diffraction at a slit, Diffraction Grating, Characteristics of grating spectra.</p> <p>4.4 Polarization :</p> <p>4.4.1 Polarization of light, Definition: Plane of polarization, plane of vibration. Explanation of polarization of light,</p>	CO2 CO3



	4.4.2 Nicol prism.	
V	<p>5.0 ELECTRICITY AND MAGNETISM</p> <p>5.1 Coulomb's law , Intensity and Potential : Coulomb's inverse square law for electric charges, Electric fields, Intensity of electric field. Electric line of forces, Properties of electric line of forces. Electric flux, Electric flux density, Relation between flux density and Intensity of electric field. Electric potential, Absolute electric potential. Numerical problems.</p> <p>5.2 Capacitor : Capacity of conductor, Definition: Capacitance, Farad. Capacitance of Spherical conductor, Principle of capacitor (condenser). Capacitors in series and parallel, Expression for the energy stored, Numerical on capacitor.</p> <p>5.3 Current electricity : Ohm's law, Resistance, Specific resistance, Combination of resistances, e.m.f. and p.d., Temperature coefficient of resistance. Potentiometer, Applications, Numerical problems on specific resistances.</p> <p>5.4 Magnetic materials : Modern concepts of magnetism, Dia, Para, Ferromagnetism, Testing of magnetic materials , Current carrying conductor in magnetic field,3 Shunt, Moving coil galvanometer.</p>	CO2 CO4
VI	<p>6. MODERN PHYSICS</p> <p>6.1 Crystal Structure Space lattice, Unit cell, Cubic Crystal Structures- Simple cubic,(S.C.), Body centered cubic(B.C.C.), Face centered cubic(F.C.C.). Number of atoms per unit cell, Atomic radius, Co-ordination number, Packing density. Atomic planes and spacing, Miller indices.</p> <p>6.2 Lasers : Elementary idea, Spontaneous and Stimulated emissions, population inversion, pumping methods, Helium-neon laser construction and working, ruby laser.</p> <p>6.3 Bhor's theory of hydrogen atom.</p> <p>6.3 Fiber optics Total internal reflection, optical fiber-step index and graded index, Applications.</p> <p>6.4 X-rays : Production of X-rays, types of X-ray spectra-continuous and characteristics, X-ray wavelength (simple Problems), properties of X-rays. Applications of X-rays.</p> <p>6.5 SUPERCONDUCTIVITY AND NANOTECHNOLOGY</p> <p>6.5.1 Super conductivity : Principle of superconductivity, zero ohmic resistance, Meissner effect. Properties and Applications.</p> <p>6.5.2 Nanotechnology : Nano – Technology, Nano – science, Nano – materials, Nano – machines.2 Instruments being used in Nano – technology, Five generation of Nano – technology, Carbon allotropes, Applications.</p>	CO2 CO3 CO4



8. LIST OF PRACTICALS

Term Work consists of Journal containing minimum number of –10 Experiments and 03 Demonstrations.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	CO
1	Use of Measuring instruments – Vernier Callipers, Micrometer Screw Gauge, Spherometer.	2	CO1
2	Elastic constants by Searle's method.	2	CO1
3	Surface tension by capillary rise method.	2	CO1
4	Viscosity by Poiseuille's method.	2	CO2
5	Thermal conductivity of a good conductor by Searle's apparatus.	2	CO2
6	Velocity of sound by resonance.	2	CO2
7	Frequency of A.C. supply by sonometer.	2	CO3
8	Wavelength of light by diffraction grating	2	CO3
9	Wavelength of Laser Beam (He-Ne) by diffraction grating.	4	CO4
10	Study of crystal structure.	2	CO4
11	Use of potentiometer (principle and operation).	2	CO4
12	Calibration of voltmeter by potentiometer.	2	CO4
13	Study of spectrometer(Angle of minimum deviation, Refractive index)	2	CO4

14.	Demonstration		
(i)	Optical pyrometer	1	CO2
(ii)	Spectra of Ionized Gases	1	CO3
(iii)	Study of photocell	1	CO3
(iv)	Study of Newton's rings	1	CO3
(v)	Study of Para and Diamagnetism by Electromagnet.	1	CO4
	Total	32	

9. TEACHERS ASSESSMENT (TA): Assessment to be based on one of the following tools and rubrics for evaluation of TA to be well defined by course teacher.

1. Seminars/Presentations
2. Model/Chart making
3. Surveys
4. Quiz

10. IMPLEMENTATION STRATEGY (PLANNING)

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



11. SUGGESTED LEARNING RESOURCES :

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

12. WEB REFERENCES:

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

13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Measurement and errors	04	01	01	02	04
II	Properties of matter: elasticity, surface tension and viscosity	13	03	05	05	13
III	Heat and temperature, sound, ultrasonic and acoustics	15	06	06	06	18
IV	Optics	10	03	04	04	11
V	Electricity and Magnetism	10	02	04	04	10
VI	Modern physics	12	04	04	06	14
TOTAL		64	19	24	27	70

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

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



14. COURSE EXPERT COMMITTEE MEMBERS:

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



1.COURSE DETAILS:

Programme: CE/ME/EE/PE/CH/EXTC	Semester: II
Course: Communication Skills	Group: B
Course Code: CMS220008	Duration:16 Weeks

2.TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs. L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
3	-	-	1	4	03	70	20	10	70	25	-	-	125

3.COURSE OBJECTIVE: The communicative competence in English is the pre-requisite for the employment market at national and international level today. However, the ability to communicate effectively does not come easily to many people. No matter how brilliant and invaluable your idea is, it is worthless until shared either orally or in written manner. Here arises the need to learn communication skills, which will enable the students to enhance their comprehension, writing and oral skills in English.

4. SKILL COMPETENCY The aim of this course is to help the student to attain the following Industry identified competency through various teaching learning experiences.

- **Communication**
- **Interpersonal Skills**
- **Negotiation Skills**
- **Convincing Skills**
- **Writing Skills**
- **Reading Skills**
- **Listening Skills**
- **Speaking skills**
- **Public Speaking skills**



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

CO No.	COURSE OUTCOME_s
CO1	Understand the concept of communication, its types and application in real life situations.
CO2	Apply various grammatical structures, idioms for effective oral and written communication.
CO3	Demonstrate proficiency in language skills (L.S.R.W.) by using language lab.
CO4	Draft written communication for personal and professional use .

6.CO-PO, CO- PSO MAPPING TABLE

Civil Engineering

Course and Code	Course Outcomes	Programme Outcomes								
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Communication Skills (CMS220008)	CO 1	1	1	1		2	3	1		
	CO 2	1	1	1	1	1	3	1	1	1
	CO 3		1				3	1		
	CO 4	1	1	1	1	1	3	2	1	1
	CO Avg.	1	1	1	1	1.33	3	1.25	1	1

Mechanical Engineering

Course and Code	Course Outcomes	Programme Outcomes								
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Communication Skills (CMS220008)	CO 1	1	1	1		2	3	1	1	1
	CO 2	1	1	1	1	1	3	1		
	CO 3		1				3	1		
	CO 4	1	1	1	1	1	3	2	1	1
	CO Avg.	1	1	1	1	1.33	3	1.25	1	1



Electrical Engineering

Course and Code	Course Outcomes	Programme Outcomes								
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Communication Skills (CMS220008)	CO 1	1	1	1		2	3	1		
	CO 2	1	1	1	1	1	3	1	1	1
	CO 3		1				3	1		
	CO 4	1	1	1	1	1	3	2	1	1
	CO Avg.	1	1	1	1	1.33	3	1.25	1	1

Plastics Engineering

Course and Code	Course Outcomes	Programme Outcomes									
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3
Communication Skills (CMS220008)	CO 1	1	1	1		2	3	1			
	CO 2	1	1	1	1	1	3	1	1	1	1
	CO 3		1				3	1			
	CO 4	1	1	1	1	1	3	2	1	1	1
	CO Avg.	1	1	1	1	1.33	3	1.25	1	1	1

Chemical Engineering

Course and Code	Course Outcomes	Programme Outcomes								
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Communication Skills (CMS220008)	CO 1	1	1	1		2	3	1		
	CO 2	1	1	1	1	1	3	1	1	1
	CO 3		1				3	1		
	CO 4	1	1	1	1	1	3	2	1	1
	CO Avg.	1	1	1	1	1.33	3	1.25	1	1



Electronics & Telecommunications Engineering

Course and Code	Course Outcomes	Programme Outcomes								
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Communication Skills (CMS220008)	CO 1	1	1	1		2	3	1		
	CO 2	1	1	1	1	1	3	1	1	1
	CO 3		1				3	1		
	CO 4	1	1	1	1	1	3	2	1	1
	CO Avg.	1	1	1	1	1.33	3	1.25	1	1

7. COURSE CONTENTS:

UNIT NO.	TOPIC/Sub-topic	CO
I	Basics of Communication 1.1 Communication: Definition & Meaning, 1.2 Characteristics of Communication 1.3 Communication cycle 1.4 Oral & Written Communication 1.4 Barriers To Communication	CO1
II	Nonverbal Communication 2.1 Concept & Meaning 2.2 Importance of Body language & its aspects: Postures, Gestures, Facial Expressions, Eye contact, Dressing 2.3 Non Verbal Codes: Proxemics, Haptics, Chronemics, Vocalics, Chronemics	CO1
III	Grammar & Vocabulary Building 3.1 Tenses, 3.2 Change the Degree 3.3 Idioms & Collocations 3.4 Word formation Processes	CO2
IV	Phonetics & Spoken English 4.1 Sounds of English (RP): Consonants. Vowels, Diphthongs 4.2 Difference between British Accent & American accent 4.3 Phonetic Transcription of words	CO3



UNIT NO.	TOPIC/Sub-topic	CO
V	Reading Comprehension: 5.1 Importance of Comprehension 5.2 Seen & Unseen passages 5.3 Interpretation of passages in written and Spoken form .	CO3
VI	Writing Skills: 6.1 Job application & Resume writing 6.2 Paragraph Writing: Descriptive, Narrative 6.3 Dialogue writing 6.4 Writing e-mails , Use of Netiquettes	CO4

8. A. LIST OF ASSIGNMENT: Term Work consists of five assignments. (15 Marks)

Sr . N o.	List of Assignments	Hrs.	Marks	CO
1	Explain the barriers to communication with pictures.	03	03	CO1
2	Write an examples of Tenses and its sub types	03	03	CO2
3	Write the phonemic transcription to given 25 words	02	03	CO3
4	Write Paragraph and/or dialogues on given topics.	02	03	CO4
5	Prepare /Draft a job application letter with resume.	02	03	CO4
	TOTAL	12	15	

8. B. LIST OF ASSIGNMENTS: Two Assignments to be completed in Language lab (10 Marks)

Sr. No.	List of Assignments	Hrs.	Marks	CO
1	Listen & Repeat the Sounds in English , Speeches , situational conversation in English	02	05	CO3
2	Listen & read the seen / unseen passage for Comprehension	02	05	CO3
	Total	4	10	



9. TEACHER ASSESSMENT (TA): (10 MARKS)

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

1. Book Review
2. Seminar /Presentation
3. Case Study
4. MCQ Quiz
5. Role Play
6. Reading / Recitation sessions

10. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments.
3. Guest/Expert lectures
4. Role Play
5. Slides
6. Self-Learning Online Resources
7. Group Discussions
8. Seminar

11. SUGGESTED LEARNING RESOURCES

Sr.No	Title of Book	Author	Publication
1	Communication Skills for Engineers	C. Murali Krishna	Pearson Education
2	Technical Communication Principles and Practice	Meenakshi Raman, Sangeeta Sharma	Oxford university press , Chennai
3	A Communicative Grammar of English	Geoffrey Leech, Jan Swartvik	ELBS – with Longman
4	High School English Grammar & Composition	Wren and Martin	S Chand Publishing New Delhi
5	Body Language	Allan Pease	Sheldon Press, London
6	Basics of Management and Communication Skills	Dr. P.C. Shejwalkar	Everest Publishing House
7	Business Communication Strategies	Matthukutty M. Monippally	Tata – McGraw – Hill

12. WEB REFERENCES:

1. <https://www.fictioncommunication.com/communication-cycle-explained-with-examples/>
2. <https://digiade.com/communication-cycle/>
3. <https://phicare.com/competencies/communicationbarriers.php>
4. <https://opentext.wsu.edu/organizational-behavior/chapter/8-3-communication-barriers/>



5. <https://www.usingenglish.com/resources/letter-writing.php>
6. <https://www.paragraphpunch.com/>
7. <https://literacyideas.com/writing-perfect-paragraphs/>
8. <https://learnenglish.britishcouncil.org/grammar/english-grammar-reference>

13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Basics of Communication	08	06	06	-	12
II	Nonverbal Communication	08	06	06	-	12
III	Grammar & Vocabulary Building	08	-	06	06	12
IV	Phonetics & Spoken English	06	-	-	06	06
V	Reading Comprehension	06	-	10	-	10
VI	Writing skills	12	-	08	10	18
	TOTAL	48	12	36	22	70

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

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

14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	Signature
1	Internal	Mr. Balaji M. Pande, Senior Lecturer in English	
2	Internal	Mrs Kirti P. Bhawe , Lecturer , Selection Grade	
3	External	Dr. Dharmaji Kharat	
		Organization: SNTD's P.V. Polytechnic, Santacruz (west) Mumbai	



1. COURSE DETAILS

Programme: Civil Engineering	Semester: II
Course: Building Construction	Group: C
Course Code: BCN220103	Duration: 16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D +T)	Theory Paper Duration and marks (ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
3	2	-	-	5	03	70	20	10	70	25	-	50	175

3. COURSE OBJECTIVE

Building construction is a core subject in civil engineering, which deals with construction processes such as substructure, superstructure & building finishes. In construction, different processes play key role as far as safety, stability, economy, aesthetic sense are concerned. Working knowledge of this will enable the student to plan effectively, execute building construction work with quality in construction. Working knowledge of this will enable the student to supervise and maintain better in the field of civil Engineering activities.

4. SKILL COMPETENCY

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

- Prepare a foundation plan to mark lay out on the ground of the framed structure and load bearing structure, from the given building plan independently on the field.
- Select suitable types of finishes, masonry and means of vertical circulation.
- Execute different construction processes & activities on field.

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

CO No.	COURSE OUTCOME
CO1	Identify different components of building & determine physical properties of cement.
CO2	Understand suitability of various types of foundation, floors, roofs
CO3	Identify and select various construction activities like type of masonry, flooring, doors and windows etc for intended use
CO4	Explain various types of finishes and means of vertical circulation & observe safety precautions & safe practices on the construction site



6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Building Construction BCN220103	CO1	1		2	3	2			3	2
	CO2	1			1	1				
	CO3				1	2	2	2	3	1
	CO4	1			1	1	2	2	3	2
	CO Avg.	1		2	1.5	1.5	2	2	3	1.67

7. COURSE CONTENTS

Unit No.	Topic / Sub-topic	CO
I	1.0 INTRODUCTION 1.1 Definition of Building as per IS 1256-1958 1.2 Components of structure: Substructure (Foundation, Plinth & DPC) and Superstructure (Wall, Pier Floor, Lintel, Sill, Chhajjas, Beams, Roof, Staircase, Wall finishes), their functions and requirement. 1.3 Load Bearing structure and framed structure. Comparison between load bearing and framed structures.	CO1
II	2.0 FOUNDATION 2.1 Definition, Function and essential requirement of good foundation, 2.2 Types of foundation. Shallow and Deep Foundation. Depth and size of foundation. sketches of Spread footing (Wall footing and isolated footing), Combined footing, Strap footing, Grillage foundation, Mat or Raft footing, Pile foundation, suitability of each type of foundations 2.3 Job layout, site clearance, preparing job layout for framed structure & load bearing structure by centre line method & face line method. 2.4 DPC: Definition, Causes, effects, DPC 2.5 Treatment to wall and basement.	CO2
III	3.0 MASONRY 3.1 Technical terms used in stone masonry: facing, hearting, backing, through stone, corner stone, cornice 3.2 Precautions to be taken in construction of stone masonry	CO3



Unit No.	Topic / Sub-topic	CO
	<p>3.3 Brick masonry: Technical terms used in brick masonry: bed joint, perpends, lap, closer- Queen closer, King closer, Bevelled, Mitred closer, Bat</p> <p>3.4 Rules for bonds in brick work, Different types of bonds, Stretcher, Header, English and Flemish bond. Procedure of laying of bricks.</p> <p>3.5 Precautions to be taken in brick masonry construction, tools & plants used.</p> <p>3.6 Comparison of Stone and brick masonry.</p> <p>3.7 Scaffolding: necessity & purposes of scaffolding, types of scaffolding,</p> <p>3.8 Purposes of shoring & underpinning</p>	
IV	<p>4.0 WALL FINISHES & CONSTRUCTION SAFETY</p> <p>4.1 Plastering: Definition, Object & requirement of good plaster.</p> <p>4.2 Different terminologies used in plastering work.</p> <p>4.3 Tools for plastering, number of coats of plaster.</p> <p>4.4 Detailed procedure of cement plastering. Types of plaster finishes, Defects in plastering.</p> <p>4.5 Pointing: Definition, mortar used in pointing, preparation of surface, methods of pointing & types of pointing.</p> <p>4.6 Objective and Scope of Statutory safety regulations</p> <p>4.7 Safety-specific Statutory acts and rules, relevant sections of rules,</p> <p>4.8 Recommendations of BIS,</p> <p>4.9 Accidents and safety measures at construction sites</p> <p>4.10 Activity and reasons for accidents</p> <p>4.11 Insurance cover for the cost of the accidents</p> <p>4.12 Safety Training and its objective</p> <p>4.13 Fire safety, Electrical safety, Environmental safety</p>	CO4
V	<p>5.0 FLOORS, ROOFS, LINTELS & ARCHES</p> <p>5.1 Floor tiles: Procedure of laying Ceramic, vitreous, Wooden, Kotah, marble, granite</p> <p>5.2 Roof : Definition, Different technical terms Requirement of ideal roof, Classification of roofs, Pitched roof (Lean to roof, King post truss, Queen post truss), Types of Flat roof (RCC roof), steel trusses (advantages & disadvantages)</p> <p>5.3 Necessity of lintels, types of lintels</p> <p>5.4 Technical terms used in arches, advantages & disadvantages of arches</p> <p>5.5 Types of arches, according to shape & purposes</p>	CO3



Unit No.	Topic / Sub-topic	CO
VI	6.0 HORIZONTAL & VERTICAL CIRCULATION 6.1 Definition of technical terms, location of doors and windows, size and type of doors panelled doors, battened doors, flush doors, collapsible doors, rolling shutters, revolving doors, Glazed doors. 6.2 Types of windows fully panelled, partly panelled & glazed, glazed wooden, steel, Aluminum windows, sliding windows, louvered window, ventilators, cement grills, sizes of doors & windows 6.3 Fixtures and fastenings for doors and windows. 6.4 Term used: Baluster, handrail, newel post, soffit, tread, rise, scotia, headroom, flight, landing, pitch, stringer 6.5 Classification of stairs, specifications and suitability 6.6 Ramps, Escalator, Elevators 6.7 Planning of doglegged staircase for one storey	CO4

8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of –08 Experiments/assignments/drawings.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	CO
1	*Fineness test on Cement by Sieving	2	CO3
2	*Standard consistency test of cement	2	CO3
3	*Initial & Final setting time test on cement	2	CO3
4	*Compressive strength test on cement	2	CO3
5	Prepare a report on visit to construction site to include masonry work, wall finishes, scaffolding & construction safety measures.	4	CO1
6	*Any one of following experiments. a) Assemble 1½ thick brick wall in English bond b) Assemble 1½ thick brick wall in Flemish bond	4	CO4
	*Drawing of sketches on quarter imperial sheet / A4 size drawing sheet or sketch book. (Sr. No. 7 – 11)	10	CO2
7	Shallow foundation & deep foundation		
8	Rectangle Combined footing and Trapezoidal footing		
9	Spread footing for column		
10	Strap footing and grillage rectangular footing		
11	DPC treatment to wall and basement		
12	Brick Work:	4	CO3



Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	CO
	Elevation of Brick wall a) Plan showing alternate courses of brick walls in different thickness as 1 thick brick, 1½ thick brick in English bond b) Plan showing alternate courses of brick walls in different thickness as 1 thick brick, 1½ thick brick in Single and Double Flemish bond.		
13	*Drawing of Plan, elevation and sectional elevation of any four types of Doors and Windows	4	CO1
14	*Drawing of Plan and sections of Dog legged stair case with mid landing.	4	CO4
	TOTAL	32	

9. TEACHERS ASSESSMENT (TA): Assessment to be based on one of the following tools and rubrics for evaluation of TA to be well defined by course teacher.

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

10. IMPLEMENTATION STRATEGY (PLANNING)

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

11. SUGGESTED LEARNING RESOURCES

Sr.No.	Title of Book	Author	Publication
1	Building Construction	S.P. Arrora & Bindra	Dhanpat Rai Publication, Delhi Edition
2	Building Construction	S.C. Rangwala	Charotar Publication, Dist.-Anand
3	Building Construction	B.C. Punmia & A.K. Jain	Firewall Media
4	Building Construction	Sushil kumar sharma	S. Chand & Co. Pvt ltd. New Delhi



12. WEB REFERENCES

1. www.nptel.ac.in
2. <http://www.learningconstruction.com/>
3. www.constructionworld.in
- 4 <http://www.constructionknowledge.net/>
- 5 https://easyengineering.net/building-materials-and-construction_18/

13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction	2	2	-	-	2
II	Foundation	8	4	8	-	12
III	Masonry	8	4	8	-	12
IV	Wall finishes & construction safety	12	4	6	6	16
V	Floors roofs, lintels & arches	10	6	10	-	16
VI	Horizontal & vertical circulation	8	6	6	-	12
TOTAL		48	26	38	6	70

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

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

14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mrs Supriya Prasad Patil
2	Internal	Ms. Neelam Nagraj Petkar
3	External	Mr. Binu Patel
		Organization: Proprietor, Procem Consultant



1. COURSE DETAILS

Programme: Civil engineering	Semester: II
Course: Surveying - I	Group: C
Course Code: SUR220104	Duration: 16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per					Examination Scheme and Maximum Marks								
Theory Hrs	Practical Hrs P	Drawing Hrs	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Mark							
3	4	-	-	7	03	70	20	10	70	50	50	-	200

3. COURSE OBJECTIVE

This is core technology subject which is intended to teach the students core facts, concepts, principles and procedures in surveying and leveling. With this knowledge and skill, he/she will be able to choose appropriate surveying and levelling methods depending upon requirement, to carry out survey work in Building Construction system, Transportation Engineering system, Environmental Engineering system and Irrigation Engineering system for investigation of projects before and during execution of work, while serving as investigator for design department, supervisor on the site of work and draftsman in the drawing office.

4. SKILL COMPETENCY

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

- Apply principles and methods of different types of survey.
- Carry out leveling independently on the field.
- Apply surveying knowledge to various problems on site related to survey.
- Undertake civil engineering surveys.

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

CO No.	COURSE OUTCOME
CO1	Explain principles of survey and types of surveying along with various symbolic representation of components.
CO2	Make use of chain, cross staff and prismatic compass to analyze field condition and calculate incorrect length of chain and included angle for traverse survey
CO3	Utilize levelling and planimeter instruments to determine reduced level and area of ground points to draw/interpret contour maps of an area collecting field data.



6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Surveying –I (SUR220104)	CO1	3	3	1	-	1	-	2	1	3
	CO2	3	3	2	3	1	1	3	1	3
	CO3	3	3	3	3	1	3	3	1	3
	CO Avg.	3	3	2	3	1	2	2.67	1	3

7. COURSE CONTENTS

UNIT NO.	TOPIC / Sub-topic	CO
I	1.0 Introduction and types of survey: 1.1 Scope of surveying and their purpose. 1.2 General principles of surveying 1.3 Types of surveying: Primary –Plain, Geodetic. Secondary – Based On Instruments, Method, Object, Nature Of Field 1.4 Conventional symbols in survey plans/maps such as cutting, embankment, marshy land, road, railway, stream, river, bridge, tunnel, fencing, orchard, Cultivated land, transmission line, places of worship etc. (To be taught in practical / drawing hours)	CO1
II	2.0 Chain and Cross Staff Survey: 2.1 Equipment used in Chain survey like ranging rods, pegs, chain, arrow, wooden mallet, tapes etc. 2.2. Ranging, direct and Indirect Ranging, line ranger. 2.3 Opening and closing of chain and testing of chain, different parts of a 30 m chain. 2.4 Offsets, perpendicular and oblique offset, different methods of setting out offsets, cross staff, cross staff survey use and application, different types of cross staff, French and open cross staff 2.5 Errors in chaining, location sketch, recording in field book, plotting the cross-staff survey, Obstacles in chaining.	CO2



UNIT NO.	TOPIC / Sub-topic	CO
	2.6 Problems based on incorrect length of chain and cross staff survey.	
III	3.0 Chain and Compass Surveying: 3.1 Meridians Magnetic, arbitrary and true, bearing, WCB, RB, fore Bearing, Back Bearing, Conversion of bearing from one form into the another form 3.2 Prismatic Compass, its use, different parts and functions of each part, Temporary adjustments of prismatic compass, centering, leveling etc. , surveyor's compass and trough compass 3.3 Included angles, traverse, open and close traverse, checks on close traverse, Magnetic declination, local attraction, sources and effects, dip of magnetic needle. 3.3 Traversing with compass, plotting of traverse, adjustments of closed traverse. 3.4 Problems based on calculation of included angles, Correction of Local Attraction, declination and dip of magnetic needle. 3.5 Measurement of linear distances with digital distance meter.	CO2
IV	4.0 leveling: 4.1 Terminologies: Level surfaces, Horizontal and vertical surfaces, Datum, Bench Marks- GTS, Permanent, Arbitrary and Temporary, Reduced Level, Rise, Fall, Line of collimation, Station, Back sight, Fore sight, intermediate sight, Change point, Height of instruments etc 4.2 Parts of Dumpy level and its telescope, line of collimation, plane of collimation, bubble tube and focusing, parallax, bench marks, use of dumpy level, temporary adjustments, permanent adjustments (only introduction). Leveling Staffs, Reduction of level by Line of collimation method and Rise/ Fall Method 4.3 Leveling Types: Simple, Differential, Fly, Profile and Reciprocal Leveling 4.4 Computation of missing readings, Errors in Leveling 4.5 Recording in level books, rise and fall method, Height of Instruments method. 4.6 Methods of leveling for longitudinal and cross sections, precautions in leveling, sources of errors in leveling, permissible errors, etc.	CO3
V	5.0 Contouring survey: 5.1 Contour, contour interval, horizontal equivalent. 5.2 Contour maps: Characteristics and uses 5.3 Methods of Contouring: Direct and indirect 5.4 Methods of interpolation of contours: approximate, arithmetic and graphical 5.5 Characteristics of contour, interpolation of contours	CO3



UNIT NO.	TOPIC / Sub-topic	CO
	5.6 Topo sheets and their reading.	
VI	6.0 Planimeter: 6.1 Parts, their functions, and use in measurements of areas, zero circle, problems based on area calculation, etc. 6.2 Digital planimeter, its use, various parts, setting of scale, recording measurements, calculation of area etc	CO3

8. LIST OF PRACTICALS/ASSIGNMENTS/ TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of –15 experiments & drawings.

(* – Compulsory experiments & drawings)

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	CO
1	*Study, opening and closing, Testing of Chain and Measurement of distances with chain and tape.	2	CO2
2	*Direct ranging and Reciprocal ranging	2	CO2
3	*Study of Cross Staff Survey and Offsetting and taking out area of the given plot by cross staff survey	2	CO2
4	Cross Staff Survey Project	2	CO2
5	*Study of Prismatic Compass and Taking Out different types of bearing and calculating included angles from the observed bearings	2	CO2
6	*Calculating included angles from the observed bearings of Closed Traverse	2	CO2
7	*Correcting the observed bearings of a closed traverse and calculating included angles	2	CO2
8	Compass Traverse Survey Project by adjusting error of closure	2	CO2
9	*Study of Dumpy Level, Levelling Staff, temporary adjustments of level and reading the levelling staff	2	CO3
10	*Height of Instruments Method of levelling	2	CO3
11	*Rise and Fall Method of levelling	2	CO3
12	*Negative staff reading	2	CO3
13	Fly Levelling	2	CO3
14	Setting of survey points at required level	2	CO3
15	Compute area of irregular plan by planimeter	2	



Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	CO
16	Profile levelling Project Running a longitudinal section for a length of about 500 m with cross sections at 10m or 20 m centre to centre. The length of cross section may be upto 9 m on either side with staff readings at 10 m interval. Spot levels should be taken at every 10 m along the base line, plotting the L section and cross section on a full-size imperial sheet.	16 (2 days)	CO2
17	Contour Survey Project Running a level survey for plot of 25x25 meters minimum, with blocks of 5m x 5m. the contour shall be drawn with the contour interval of 0.5 m	8 (1 day)	CO3
18	*Drawing sheet of symbols	6	CO1
19	*Drawing sheet of Cross Staff Survey Project	6	CO2
20	*Drawing sheet of Compass Survey Project	6	CO2
21	*Drawing Sheet of Profile Levelling project	12	CO3
22	*Drawing Sheet of Contour Survey project	6	CO3
	TOTAL	64	

9. TEACHERS ASSESSMENT (TA): Assessment to be based on one of the following tools and rubrics for evaluation of TA to be well defined by course teacher.

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

10. IMPLEMENTATION STRATEGY (PLANNING)

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



11. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Surveying I and II	Punmia B.C.	Laxmi publication New Delhi
2	Surveying Vol. I	Kanetkar and Kulkarni	Pune VidyarthiGruha
3	Surveying and. Levelling Volume- I	Bhavikatti, S. S	I. K. International, New Delhi
4	Surveying & Levelling	Basak N.N.	Tata McgrawHill , New Delhi

12. WEB REFERENCES

1. <https://nptel.ac.in/courses/105107122/>
2. <https://swayam.gov.in/>
3. www.oupinheonline.com
4. www.mtu.edu/technology/
5. www.civilengineeringnotes.com

13. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I	Introduction and types of survey	04	02	04	--	06
II	Chain and Cross Staff Survey	10	02	04	08	14
III	Chain and Compass Surveying	10	03	04	08	15
IV	Levelling	15	04	04	15	23
V	Contouring survey	05	--	02	04	06
VI	Planimeter	04	--	02	04	06
	TOTAL	48	11	20	39	70

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

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



14. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME
1	Internal	Mr. Neelam Nagraj Petkar
2	Internal	Mrs. Supriya Prasad Patil
3	External	Balasaheb Toraskar
		Organization: Architect, V. B. Toraskar & Associates



1. COURSE DETAILS

Programme: Civil Engineering	Semester: II
Course: Workshop Practice (CE)	Group: C
Course Code: WSP220105	Duration: 16 Weeks

2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D +T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
-	4	-	-	4	-	-	-	-	-	50	-	-	50

3. COURSE OBJECTIVE

The objective of this course is to make students know safety precautions while working on various machine and tools. They need to understand, select and use various tools and equipment's in carpentry, welding and plumbing. Read and interpret formwork drawings and inspect the job for specifications and should be able to produce same.

4. SKILL COMPETENCY

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

- Select the material for formwork
- Selection of proper tools for plumbing work
- Compare the various bonds in machinery construction

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

CO No.	COURSE OUTCOME
CO1	Identify various construction form work and material for form work at site, Applying tips for construction safety.
CO2	Identify and select various plumbing fixtures and fittings.
CO3	Inspect the masonry job activities at site.
CO4	Interpret the fabrication drawings and test the welded connections.



6. CO-PO, CO- PSO MAPPING TABLE

Course and Code	Course Outcomes	Programme Outcomes							Programme Specific Outcomes	
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
Workshop Practice (CE) (WSP220105)	CO1	1	1	2	-	-	-	1	3	1
	CO2	1	2	1	-	-	-	1	1	1
	CO3	1	2	-	1	-	-	1	3	1
	CO4	-	1	1	1	-	-	1	1	-
	CO Avg.	1.0	1.50	1.33	1.00	-	-	1.00	2.00	1.00

7. COURSE CONTENTS

UNIT NO.	TOPIC/Sub-topic	CO	Hrs.
I	Carpentry : 1.1 Reading and interpretation of drawing and preparation formwork sheeting schedule. 1.2 Construction Formwork making for column, beam, slab, staircase (Any)	CO1	16
II	Plumbing: 2.1 Demonstration of different plumbing tools 2.2 Demonstration of different operations in plumbing, observing different pipe joints and pipe accessories. Different samples of PVC pipes and PVC pipe fittings. 2.3 Demonstration of Pipe threading using standard die sets. 2.4 Testing of pipe joint	CO2	16



UNIT NO.	TOPIC/Sub-topic	CO	Hrs.
III	Building Construction and Materials:	CO1 CO3	16
	3.1 Setting out Foundation Plan on ground for load bearing and framed structure.		
	3.2 To construct dry brick masonry using actual bricks in stretcher. Header, English bond and Flemish bond with closer and bats for half, one		
	3.3 To check the verticality and horizontal level of construction work.		
	3.4 Demonstration of plastering wall surface including preparation of cement mortar with all precautions		
IV	Welded Joints :	CO4	10
	4.1 Welding: Butt & Fillet Joints		
	4.2 Testing of welded joints:		
	a. Visual testing,		
	b. Liquid penetrant testing		
	4.3 Radiographic Testing		
V	Safety:	CO1	06
	5.1 Safety precautions:		
	a. While using of carpentry tools		
	b. While using plumbing tools		
	c. While using welding equipment		
	While using scaffolding and ladder in masonry construction and plastering		
	Total		64



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

Term work consists of Journal containing minimum 12 practicals from below mentioned:

Sr. No.	Title of Experiment / Assignment / Exercise / Tutorial / Drawings	Approx. Hrs. required	COs
1	Reading and interpretation of drawing and preparation formwork sheeting schedule.	4	CO1
2	Construction Formwork making for column, beam, slab, staircase (Any one).	6	CO1
3	Checking of plumb of column formwork.	2	CO1
4	Demonstration of different plumbing tools.	2	CO2
5	Demonstration of different operations in plumbing, observing different pipe joints and pipe accessories. Different samples of PVC pipes and PVC pipe fittings.	2	CO2
6	Demonstration of Pipe threading using standard die sets.	4	CO2
7	Testing of pipe joints	4	CO2
8	Setting out Foundation Plan on ground for load bearing and framed structure.	4	CO3
9	To construct dry brick masonry using actual bricks in stretcher. Header, English bond and Flemish bond with closer and bats for half, one and half brick thick wall.	6	CO3
10	To check the verticality and horizontal level of construction work. Line Level Plumb.	2	CO3
11	Demonstration of plastering wall surface including preparation of cement mortar with all precautions.	6	CO3
12	Visual testing of welded joint	2	CO4
13	Liquid penetrant testing of welded joint.	2	CO4
14	Sketches containing formwork of column, beam, slab, staircase (Any one).	4	CO1
15	Sketches containing plumbing joinery details.	2	CO2
16	Sketches containing stretcher. Header, English bond and Flemish bond with closer and bats for half, one and half brick thick wall	6	CO1
17	Sketches containing symbol of various types of welding.	2	CO4



Sr. No.	Title of Experiment / Assignment / Exercise / Tutorial / Drawings	Approx. Hrs. required	COs
18	Plan and procedure of setting out building column center line	2	CO2
19	Orientation on dos and don'ts while walking at construction site	2	CO1
	Total	64	

09. IMPLEMENTATION STRATEGY (PLANNING)

1. Laboratory plan
2. Minimum no of practical's =12
3. Educational visits
4. Demonstrations
5. Visit to AEC Exhibition

10. SUGGESTED LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	Engineering Materials	S.C. Rangwala	Charotar publication
2.	D.N.Ghosh	Materials of Constructions	Tata MaGraw Hill Publish.
3.	TTTI Chandigarh	Civil Engineering Materials	Tata MaGraw Hill Publish
4	Building Construction	Sushil kumar	Standard New Delhi
5	Welding Technology	O. P. Khanna	Dhanpat Rai Puplication
6	IS 822-1970 : Code of practice for inspection of welds	Bureau of Indian Standard	Bureau of Indian Standard
7	Water Supply & Sanitary Engineering	S. K. Garg	Khanna Publication
8	Formwork for Concrete Structures	Kumar Neeraj Jha	Tata MaGraw Hill Publish
9	Plumbing: Design & Practice	S. G. Deolalikar	Tata MaGraw Hill Publish

11. WEB REFERENCES

1. www.nptel.ac.in
2. www.quora.com
3. www.constructionworld.in
4. <http://www.saavigroup.com>
5. Web site icacai.com for workshop on scaffolding



12. COURSE EXPERT COMMITTEE MEMBER

Sr. No.		NAME
1	Internal	Mr. Vinod B. Vanvari
2	Internal	Mr. Atulyakumar Singh
3	External	Mr. Binu Patel
		Proprietor, Procem Consultants , Mumbai

