

**Programme** : Diploma in CE/EE/ET/ME/MT/CM/IT/DDGM  
**Programme Code** : 01/02/03/04/05/06/07/08/21/22/23/24/26/15/16/17/18/19  
**Name of Course** : English  
**Course Code** : HU181

**Teaching Scheme:**

	Hours/Week	Total Hours
Theory	02	32
Practical	02	32

**Evaluation Scheme:**

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term Work
Duration	Two Class Tests each of 60 Minutes	03 Hrs.	---	---	---
Marks	20	80	---	---	25

**Course Rationale:**

This is been noticed that diploma pass outs lack in grammatically correct written and oral communication in English. It is also been noticed that communication is not a problem of students, communication in correct English is the basic problem of Diploma pass outs. Students will have to interact in this language so far as their career in industry is concerned. In order to enhance this ability in students English is introduced as a subject to groom their personality.

**Course Objectives;**

After studying this course, the student will be able to

- Comprehend the passage.
- Answer correctly the questions on unseen passages.
- Increase the vocabulary.
- Apply rules of grammar for correct writing.
- Speak correct English

**Course Content:**

Chapter No.	Name of Topic/Subtopic	Hrs	Marks	
1	<b>GRAMMAR</b>	12	20	
	1.1			Tenses : Past Perfect, Past Perfect Continuous
	1.2			Types of Sentences: Simple, Compound and Complex.
	1.3			Verbs
	1.4			Reported Speech : Complex Sentences
	1.5			Uses of 'too' and 'enough' : Conversion and Synthesis
	1.6			Modal Auxiliary : Will, shall, can, could
	1.7			Articles
	1.8			Preposition
	1.9			Conjunctions Interjections
	1.10			Affirmative and negative, interrogative
1.11	Question tag			

2	<b>PARAGRAPH WRITING</b>		
	2.1	Types of paragraphs (Narrative, Descriptive, Technical)	04 10
3	<b>COMPREHENSION</b>		
	3.1	Unseen passages	10 40
4	<b>VOCABULARY</b>		
	4.1	Homophones: To understand the difference between meaning and spelling of words	04 06
	4.2	Vocabulary : Understanding meaning of new words	02 04
<b>Total</b>			<b>32 80</b>

#### List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs.
1	Building of Vocabulary – 2 assignments 25 new words for each assignment with sentence	04
2	Conversational Skills – Role play student will perform the role on any 6 situations. Dialogue writing for the given situations.	04
3	Grammar – 2 assignments	04
4	Write paragraphs on given topics. 2 assignments.	04
5	Errors in English 2 assignments. Find out the errors and rewrite the sentences given by the teacher.	04
6	Essay writing 2 assignments. Write 2 essays on topic given by the teacher.	04
7	Biography (Write a short biography on your role model approximately in 250-300 words)	04
8	Idioms and phrases Use of idioms and phrases in sentences(20 examples)	04
<b>Total</b>		<b>32</b>

The term work will consist of 10 assignments.

#### Instructional Strategy :

Sr. No.	Topic	Instructional Strategy
1	Grammar	Class room Teaching
2	Paragraph Writing	Class room Teaching
3	Comprehension	Class room Teaching
4	Vocabulary	Class room Teaching

#### Reference Books :

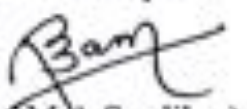
Sr. No.	Author	Title	Publication
1	J.D.O. Connors	Better English Pronunciation	London Cambridge University Press ELBS
2	Geoffrey Leech	A communicative Grammar of English	Essex Longman Group Ltd. : ELBS
3	Randolf Quirk	University Grammar of English	Essex Longman Group Ltd. : ELBS

Learning resources : Books, Audio Visual aids

Specification Table :

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Grammar	--	10	10	20
2	Paragraph Writing	--	05	05	10
3	Comprehension Of Unseen Passages	--	30	10	40
4	Vocabulary/Homophones	02	04	04	10
	<b>Total</b>	<b>02</b>	<b>49</b>	<b>29</b>	<b>80</b>

Prepared by

  
(M. A. Surdikar)  
Lect. in English

(A. S. Zampure)  
Member Secretary PBOS

(N. S. Kadam)  
Chairman PBOS

Mrs Patil S. C.



**Programme** : Diploma in CE/EE/ET/ME/MT/CM/IT/DDGM  
**Programme Code** : 01/02/03/04/05/06/07/08/21/22/23/24/26/15/16/17/18/19  
**Course** : Communication Skills  
**Course Code** : HU182

**Teaching Scheme:**

	Hours/Week	Total Hours
Theory	02	32
Practical	02	32

**Evaluation Scheme:**

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term Work
Duration	One Class Tests of 60 Minutes and an Oral	03 Hrs.	--	--	--
Marks	20	80	--	25	--

**Course Rationale:**

Classified under human sciences this subject is intended to introduce students with the process of communication so that they can identify conditions favorable to effective communication. They will also be taught basic and applied language skills viz. listening, speaking, reading and writing – all useful for the study of a technical course and communication. Specifically, writing and oral presentation skills are two top ranking capabilities needed for professional careers and must be developed systematically.

**Course Objective:**

After studying this course, the student will be able to

- Understand and use the basic concept of communication and principles of effective communication in an organized set up and social context.
- Give a positive feedback in various situations to use appropriate body language & to avoid barrier for effective communication.
- Write the various types of letters and office drafting with the appropriate format.
- Communicate with the Industry Professionals.

**Course content:**

Chapter No.	Name of Topic/Subtopic	Hrs	Marks
I	<b>Basic Concepts And Principles Of Communication</b>		
	1.1 <b>The Communication Event</b> The Communication event : Definition The elements of communication: The sender, receiver, message, channel, feedback	12	24
	1.2 <b>The communication Process</b> The Communication Process : Definition Stages in the process : defining the context, knowing the audience, designing the message, encoding, selecting the proper channels, transmitting, receiving, decoding and giving feedback.		
	1.3 <b>Principles of Effective communication</b> Effective Communication : definition		

		Communication Barriers and how to overcome them at each stage of communication process. Developing effective message: Thinking about purpose, knowing the audience, structuring the message, selecting proper channels, minimizing barriers and facilitating feedback.		
<b>2</b>	<b>Organizational Communication</b>			
	2.1	What is an organization? Goal, Patterns of communication : Upward, Downward, Horizontal and Grapevine	04	12
<b>3</b>	<b>Non-verbal Communication</b>			
	3.1	Non Verbal Codes : Kinesics (eye-contact, gesture, postures, body movements and facial expressions) Proxemics (using space), Haptics (touch), Vocalics (aspect of speech like tone, emphasis, volume, pauses etc.) Physical Appearance, Chronemics (manipulating time), Silence.	06	12
<b>4</b>	<b>Business Correspondence and Office Drafting</b>			
	4.1	Business Correspondence : Letter of Enquiry, Order letter, Complaint Letter.	10	32
	4.2	Office Drafting : Circular, Notice and Memo		
	4.3	Job Application with Resume.		
	<b>Total</b>		<b>32</b>	<b>80</b>

#### List of Practicals/Experiments/Assignments:

Sr. No.	Name of Practical/Experiment/Assignment	Hrs.
1	Self Introduction	02
2	Elocution	04
3	Extempore	04
4	Mock Interview	04
5	Debate	02
6	Variety Application/Reports	02
7	Writing Paragraphs on Technical Subjects	02
8	Business letter	02
9	Individual/Group Presentation on identified topics	02
10	Group discussion	02
11	Role play	06
	<b>Total</b>	<b>32</b>

#### Reference Books :

Sr. No.	Author	Title	Publication
1	MSBTE	Communication skills	MSBTE
2	Joyeeta Bhattacharya	Communication skills	Macmillan Co.
3	Sarah Freeman	Written communication in English	Orient Longman Ltd.
4	Krishna Mohan and Meera Banerji	Developing Communication skills	Macmillan India Ltd.

Learning Resources: Books, Audio - Visual aids

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Basic Concepts and Principles of communication	08	08	08	24
2	Organizational communication	04	04	04	12
3	Non Verbal communication	---	---	12	12
4	Business Correspondence and Office Drafting	---	---	32	32
	<b>Total</b>	<b>12</b>	<b>12</b>	<b>56</b>	<b>80</b>

Prepared by

  
( M. A. Surdikar )  
Lect. in English

( A. S. Zampure )  
Member Secretary PBOS

( N. S. Kadam )  
Chairman PBOS

M. S. Patil S. C.

**Name of Programme** : CE/EE/ET/ME/MT/CM/IT

**Programme Code** : 01/02/03/04/05/06/07/21/22/23/24/26/15/16/17/18/19

**Name of Course** : Applied Mathematics - I

**Course Code** : SC 181

**Prerequisite** : Nil

**Teaching Scheme:**

	Hours / Week	Total Hours
Theory	03	48
Term Work /Tutorial	01	16

**Evaluation:**

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests of 60 minutes duration	3 Hrs	--	--	--
Marks	20	80	--	--	--

**Course Aim:**

The students of Diploma in Engineering and technology must acquire some essential Competencies in Mathematics.

**Course Objectives:**

The students will be able to think logically and systematically. They will learn the importance of accuracy and develop attitude of problem solving with diligence and perseverance.



**Course Contents:**

Sr. No.	Name	Periods	Marks
1	<b>ALGEBRA</b>	<b>18</b>	<b>32</b>
R	1.1 Logarithms: Definition, Laws of Logarithms, Simple examples based on laws.	02	04
	1.2 Determinants: Determinants of second and third orders, solution of simultaneous equations in two and three unknowns (Cramer's Rule), Properties of determinants of order 3 and examples.	03	06
	1.3 Partial fractions: Rational fractions, resolving given rational fraction into partial fraction (Type : Denominator containing non-repeated, repeated linear factors and non repeated quadratic factor)	03	06
	1.4 Matrix Algebra - Definition of a matrix, types of matrices, Equal matrices, Addition, subtraction, multiplication of matrices. Scalar multiple of a matrix. Transpose of a matrix, Singular and Non singular matrix. Adjoint of a square matrix. Inverse of a matrix. Solution of simultaneous linear equations in 3 unknowns by Adjoint method.	06	10
	1.5 Binomial Theorem Definition of factorial notation, definition of permutation and combinations with formula, Binomial theorem for positive index, General term, Binomial theorem for negative index, Approximate value (only formula)	04	06
2.	<b>TRIGONOMETRY</b>	<b>20</b>	<b>32</b>
	2.1 Trigonometric ratios and fundamental identities.	04	08
	2.2 Trigonometric ratios of allied angles, compound angles, multiple angles (2A, 3A), submultiples angle.	06	08
	2.3 Sum and product formulae.	06	08
	2.4 Inverse Circular functions. (definition and simple problems)	04	08
3.	<b>COORDINATE GEOMETRY</b>	<b>10</b>	<b>16</b>
	3.1 Straight Line Slope and intercept of straight line. Equation of straight line in slope point form, slope-intercept form, two-point form, two-intercept form, normal form. General equation of line. Angle between two straight lines. Condition of Parallel and Perpendicular lines. Intersection of two lines. Length of perpendicular from a point on the line and perpendicular distance between parallel lines.	06	10
	3.2 Circle Equation of circle in standard form, Centre-radius form, Diameter form, two intercept form. General equation of a circle and its centre & radius.	04	06

(For Tutorials a batch of 20 students)




Author	Title	Publisher
Shri S.P. Deshpande	Mathematics for Polytechnic Students	Pune Vidyarthi Griha
Shri S.L. Loney	Plane Trigonometry	Macmillan and London
Shri H.K. Dass	Mathematics for Engineers ( Vol.I)	S.Chand and Comp.
Shri Shantinayakan	Engg. Maths Vol.I and II	S. Chand and Comp.

**Learning Resources** – Chalk, Board etc.

**Specification Table :**

Sr. No	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Algebra	08	16	08	32
2.	Trigonometry	08	16	08	32
3.	Co-ordinate Geometry	04	08	04	16
	Total	20	40	20	80

Prepared by

  
( V.B.Shinde )  
Lect.in Mathematics

( A. S. Zangane )  
Member Secretary PBOS

( N.S.Kadam )  
Chairman PBOS

**Name of Programme** : CE/EE/ET/ME/MT/CM/IT  
**Programme Code** : 01/02/03/04/05/06/07/21/22/23/24/26/15/16/17/18/19  
**Name of Course** : Applied Mathematics –II  
**Course Code** : SC 182  
**Prerequisite** : NIL

**Teaching Scheme:**

	Hours /Week	Total Hours
Theory	03	48
Term Work /Tutorial	01	16

**Evaluation:**

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Three class tests of 60 minutes duration	3 Hrs	--	--	--
Marks	20	80	--	--	--

**Course Aim:**

This subject intends to teach students basic facts, concepts, principles and procedure of Mathematics as a tool to analyze Engineering problems and as such it lays down foundation for the understanding of engineering science and core technology subjects.

**Course Objectives:**

The students will be able to,

1. Under stand basic facts of Mathematics about the field of analysis of any Engineering problem.
2. Know the standard ways in which the problem can be approached.
3. Apply basic concepts to engineering problems.

**Course Contents:**

Sr. No.	Name	Periods	Marks
1	<b>FUNCTIONS AND LIMITS :</b>	13	18
	1.1 Functions: Concept of functions, Types of functions; ( only definitions)	03	06
	1.2 Limits: Concept of limits and limits of functions. ( algebraic, trigonometric, logarithmic and exponential.)	10	12
2	<b>DERIVATIVES:</b>	16	24
	2.1 Definition of the derivative, derivatives of standard Functions.	03	04
	2.2 Differentiation of sum, difference, product and quotient of two or more functions	03	04
	2.3 Differentiation of composite, inverse, implicit functions.	04	06
	2.4 Differentiation of parametric, exponential and logarithmic Functions.	04	06
	2.5 Successive differentiation.	02	04
3	<b>APPLICATIONS OF DERIVATIVES:</b>	05	08
	3.1 Geometrical meaning of derivative ( Equations of tangents and Normals)	03	04
	3.2 Maxima and minima of functions.	02	04
4.	<b>VECTORS</b>	06	14
	4.1 Definition of vector, position vector, Algebra of vectors (Equality, addition, subtraction and scalar multiplication)	01	02
	4.2 Dot (Scalar) product with properties.	02	04
	4.3 Vector (Cross) product with properties.	02	04
	4.4 Workdone and moment of force about a point & line	01	04
5.	<b>NUMERICAL METHODS</b>	08	16
	5.1 Solution of algebraic equations : Bisection method, Regulafalsi method and Newton – Raphson method.	04	08
	5.2 Solution of simultaneous equations containing 2 and 3 Unknowns : Gauss elimination method.	04	08
	Iterative methods- Gauss Seidal and Jacobi's method		
		48	80

(For Tutorials a batch of 20 students)



**Reference Books:**

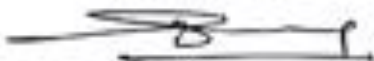
Author	Title	Publisher
Vishwanath	Engineering Mathematics Vol I	Satya Prakashan, New Delhi
S.P. Deshpande	Mathematic for polytechnic students I & II	Pune Vidyarthi Griha Prakashan
H.K. Dass	Mathematics for Engineering Vol-I	S.Chand and Company
Shantinakaran	Engineering Mathematics vol-I and II	S.Chand and Company

**Learning Resources:** Chalk, Board etc.

**Specification Table:**

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Function And Limits	04	08	06	18
2	Derivatives	08	16	00	24
3	Applications Of Derivatives	00	00	08	08
4	Vectors	04	04	06	14
5	Numerical Methods	04	04	08	16
	Total	20	32	28	80

Prepared by



( V.B.Shinde )  
Lect.in Mathematics

( A.S.Zampane )  
Member Secretary PBOS

( N.S.Kadam )  
Chairman PBOS

Name of Programme: CE /EE/ ET/ME/MT/CM/IT

Programme code: 01/02/03/04/05/06/07/21/22/23/24/26/15/16/17/18/19

Name of Course: Engineering Physics

Course Code: SC183

**Teaching Scheme:**

	Hours/Week	Total Hours
Theory	03	48
Term Work/Practical	02	32

**Evaluation:**

	Progressive Assessment	Semester End Examination			Term Work
		Theory	Practical	Oral	
Duration	1hr	3 Hrs	2 Hrs	--	--
Marks	20	80	50	--	--

**Course Aim:**

1. To understand various phenomena, principles and concepts in physics.
2. To understand the applications in Engineering Physics.
3. To solve the applied numerical problems.

**Course Objective:**

1. The student should be able to appreciate the role of physics.
2. The student should be able to think in scientific manner and apply the basic knowledge in different situations.

Sr. No	Topic / Sub topic	Hrs	Weight age
1	<b>Motion</b>	06	08
	<p><b>1.1 Introduction</b></p> <p><b>1.2 Circular Motion:</b> UCM, angular displacement, angular velocity, angular acceleration, radial velocity, tangential velocity, periodic time, frequency, relation between linear and angular velocity, explanation of centripetal and centrifugal force, with application, relation between velocity frequency and wavelength.</p> <p><b>1.3 SHM:</b> Definition, SHM as a projection of UCM on the diameter, Equation of SHM, displacement and graphical representation.</p>		
2	<b>Properties of Matter</b>	08	12
	<p><b>2.1 Surface Tension :</b> Molecular theory of surface tension, Cohesive and adhesive forces, Angle of contact, shape of liquid surface in capillary tube, capillary action (Examples). Surface tension by capillary rise method, (no derivation), simple problem, effect of impurity and temperature on surface tension.</p> <p><b>2.2 Viscosity:</b> Definition, velocity gradient, Newton's &amp; Stokes' law of viscosity, terminal velocity, coefficient of viscosity by stokes method (No derivation), type of flow of liquid - stream line flow, turbulent flow, Reynolds's number (significance), applications and simple problems.</p> <p><b>2.3 Elasticity:</b> Elastic, plastic and rigid bodies, stress and strain, Hook's law, types of elastic moduli with its relation, problems. Behaviour of wire under continuously increasing load.</p>		
3	<b>Sound</b>	03	06
	Wave motion, Transverse and longitudinal waves, free and forced vibrations, Resonance - explanation and example. absorption, reflection and transmission of sound.		
4	<b>Heat</b>	04	06
	Explanation of Gas laws, Boyle's law, Charles's law, Gay Lussac's law, General Gas Equation, problems on gas laws, units of temperature $^{\circ}\text{C}$ , $^{\circ}\text{K}$ with their conversion, absolute scale of temperature, modes of heat transfer, conduction, convection and radiation.		
5	<b>Optics</b>	06	12
	<p><b>5.1</b> Introduction to reflection and refraction of light, Snell's law, physical significance of refractive index, critical angle, total internal refraction of light.</p> <p><b>5.2 Fiber optics :</b> Propagation of light through optical fiber, numerical aperture, types of optical fibers, applications and comparison with electrical cable.</p> <p><b>5.3 LASER:</b> Definition, spontaneous and stimulated emission, population inversion, He-Ne laser- construction and working, applications and properties of LASER.</p>		
6	<b>Electrostatics</b>	06	10



	<p>6.1 Electric charge, Coulomb's law in Electrostatics, unit of charge, electric field, intensity of electric field, electric lines of forces (properties), electric flux, flux density.</p> <p>6.2 Electric potential: Explanation, definition, potential due to a point charge, potential due to a charged sphere, absolute electric potential, simple problems.</p>		
7	<b>Current Electricity</b>	06	10
	<p>7.1 Current, resistance, specific resistance, Whetstone's network, meter bridge, balancing condition of meter bridge, measurement of unknown resistance using meter bridge, problems.</p> <p>7.2 Principle of potentiometer, potential gradient, E.M.F., comparison of E.M.F. using potentiometer.</p> <p>7.3 Electric work, electric power, energy, units and calculations of electric bill.</p>		
8	<b>Electromagnetism</b>	03	06
	Magnetic effect of electric current, Ampere's rule, intensity of magnetic field, magnetic induction, Biot- Savart's Law (Laplace's Law), Fleming's left hand rule, force experienced by current carrying straight conductor placed in magnetic field, problems.		
9	<b>Modern Physics</b>	06	10
	<p>9.1 X- ray's, principle, production, properties and applications.</p> <p>9.2 Photo electricity: Plank's quantum theory, photoelectric effect (circuit diagram and working), threshold frequency, stopping potential, work function, Einstein's photoelectric equation, photocell, problems.</p>		
<b>Total</b>		<b>48</b>	<b>80</b>

### List of Practical's: (Any Eight)

Sr. No.	Name of Experiment
1	Use of vernier calliper to measure the dimensions of different objects.
2	To understand the concept of error in instrument and to measure the dimensions of different objects using micrometer screw gauge.
3	To determine the velocity of sound using resonance tube method.
4	To determine period of simple pendulum.
5	To determine surface tension by capillary rise method.
	Repeat turn for experiments No.1 to 4
6	To determine the specific resistance using Ohm's law
7	To understand the concept of Whetstone's network and to determine the specific resistance using the meter bridge.
8	Comparison of EMF using single cell method.
9	To understand the concept of viscosity and hence to determine the coefficient of viscosity using Stokes' method.
10	Study of concept of total internal reflection.
11	Study of characteristics of photoelectric cell.
12	To determine permittivity of free space.
	Repeat turn for experiments No.5 to 8

### Reference Books:

Author/s	Title	Publisher
R.K. Gaur and S. L. Gupta	Engineering Physics	Dhanpat Rai and Sons Publications
Manikpure, Prakash Deshpande and Dagwar	Basic Applied Physics	S. Chand and Co, New Delhi.
Modern Physics	Text book in Physics for diploma Engg. Student.	Sony Publications Pvt. Ltd.
Applied Physics	Schum's Series.	
Kshirsagar, Avdhanalu-	Engineering Physics	
M.S.Pawar, M.A.Sutar	Basic Physics (E Scheme)	

### Learning Recourses :

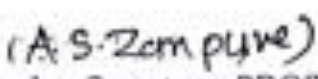
1. Chart
2. Black Board
3. Television
4. Internet
5. Educational CD's
6. Models
7. Experimentation
8. Diagram Demonstration

### Specification Table :

Sr. No	Topic	Cognitive Level			Total
		Knowledge	Comprehension	Applications	
1	General Physics	02	04	02	8
2	Properties of matter	04	04	04	12
3	Sound	02	02	02	06
4	Heat	02	02	02	06
5	Optics	04	04	04	12
6	Electrostatics	04	02	04	10
7	Current Electricity	04	02	04	10
8	Electromagnetism	02	02	02	06
9	Modern Physics	04	02	04	10
	Total	26	24	30	80

Note: Figures in the bracket indicate the marks for which question will be set to account for internal options.

  
(Mrs. Y.D. Bhide)  
Prepared By

  
(A.S. Zornpure)  
Member Secretary, PBOS

(N.S. Kadam)  
Chairman, PBOS



Name of Programme - CE/EE/ET/ME/MT

Programme Code - 01/02/03/04/05/21/22/23/24/15/16/17/18/19

Name of Course - ENGINEERING CHEMISTRY

Course Code - SC184

Teaching Scheme:

	Hours /Week	Total Hours
Theory	03	48
Term Work /Practical	02	32

Evaluation:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests of 60 minutes duration	03 Hrs	02 Hrs	--	--
Marks	20	80	50	--	--

#### COURSE AIM:

Applications of Material Science and Chemical Principles have resulted into the Development of new materials used in modern medicines and automobiles, synthetic fibers polymers, alloys, new energy sources and many other important products and processes.

Hence, Material Science is an important and expanding branch in scientific engineering and economic field of our society. Thus the principles of Material Science have a wide application in all the branches of engineering and technologies. In this syllabus, the coverage of various topics will orient the students to appreciate the principles Material Science in the fields of engineering and Technology.

The topic atomic structure includes the basic structure of matter, which governs the Mechanical, Electrical and Magnetic properties of the matter. Steels, alloys, plastic and Elastomers are included considering their present extensive use in automobiles, chemicals and heavy engineering industries. The contents of this curriculum which provide knowledge of cells and batteries, selection of appropriate materials for engineering applications and methods of protection by metallic and non-metallic coatings. This satisfies the need of the students to cope with the recent use of these materials and processes in their world of work.

Corrosion and methods of prevention will make students realize importance of care and maintenance of machines and equipments. Study of different polymers, insulators, adhesives and their chemical behavior will be useful in their applications in electrical appliances and electronics industries. Study of impurities and hardness in water and methods for water softening will help the students to make proper use of water. The knowledge of environmental pollution and its awareness is helpful to change the attitude towards society and development by caring approach.

Nanomaterials are widely used in engineering field. It will help to understand the need of nonmaterial in different engineering fields.



**COURSE OBJECTIVES:**

The student will be able to

- Develop interest in the fundamental structure of matter, which governs the properties of matter.
- Understand applications of basic concepts in chemistry
- Understand various Chemical Technological processes
- Apply principles and concepts of chemistry, to Engineering situations.
- Identify and formulate the changes and Analyze the chemical changes and effects
- Appreciate effect of chemical changes.
- Aware and Care about the environment

**COURSE CONTENT-**

Sr No	Name of the Topic	Hours	Marks
1	<p><b>ATOMIC STRUCTURE AND CHEMICAL BONDING</b></p> <p><b>1.1 Atomic Structure :</b>            Definition of atom, structure of modern atom, Characteristics of fundamental particles of an atom, definition of atomic number, atomic mass number and their difference, Orbits: Bohr's energy levels, sub-energy levels, s, p, d, f orbital, shapes and description of s and p orbital. Definition and significance of quantum numbers, Aufbau's principle, Hund's rule, orbital electronic configurations (s, p, d, f) of elements having atomic number 1 to 30,</p> <p><b>1.2 CHEMICAL BONDING</b>            • Definitions of valence electrons, valency.            • Definition of electrovalency, positive and negative electrovalency, formation of Electrovalent compounds-<i>NaCl, AlCl<sub>3</sub></i>, Definition of covalency, single, double and triple covalent bonds, formation of Covalent compounds <i>H<sub>2</sub>O, CO<sub>2</sub>, N<sub>2</sub></i></p>	04	08
2	<p><b>Electrochemistry</b></p> <p><b>2.1 Introduction</b>            Definition of an electrolyte, electrolysis, ionization, Assumptions of Arrhenius theory of electrolytic dissociation degree of ionization, factors affecting degree of ionization, Difference between atom and ion, Activity series, Mechanism of electrolysis of i) <i>CuSO<sub>4</sub></i> solution by using platinum, cu rods.</p> <p><b>2.2 Faraday's law of electrolysis.</b>            Statements, explanation Numerical examples based on Faraday's laws of electrolysis.</p> <p><b>2.3 Cell and cell reactions</b>            Concept of electrode potential, standard electrode potential (<math>E^{\ominus}</math>), significance of oxidation-reduction potential, type of electrodes, reference electrode and indicator electrode. Construction and working of hydrogen electrode and calomel electrode. EMF series and its application, constructions and working reactions of lead acid cell, Daniel cell with porous vessel and salt bridge. Applications of Electrolysis Electroplating and Electrorefining</p>	08	12

3	<p><b>METAL AND ALLOYS</b></p> <p><b>3.1 METAL</b> Occurrence of metals, definitions of mineral, ore, flux, matrix, slag and metallurgy, mechanical properties of metal, flow chart showing different processes in metallurgy, classification, properties and application of carbon steel, heat treatment(definition, purposes and methods)</p> <p><b>3.2 Alloys</b> Definition of alloy, purposes of making alloys with examples, classification of alloys(ferrous and non-ferrous), effects of alloying elements on the properties of steel(Ni, Co, Si, Mn, V, W) composition, properties and uses of heat resisting steel, magnetic steel, shock resistance steel, stainless steel, high speed steel spring steel, tool steel, duralumin, woods metal, brass and monel metal.</p>	06	08
4	<p><b>4.1 PLASTIC AND RUBBER (POLYMER AND ELASTOMER)</b> Definition of monomer and polymer, types of polymer (Addition, and Condensation) Definition example-(formation of Polythene, PVC, Teflon, Bakelite) Thermo softening and thermosetting (definition and comparison), applications of Plastic based on its properties. Definition and applications of Conductive polymer, Definition of elastomer, isoprene unit. Natural rubber-drawbacks, vulcanization, properties of rubber and applications based on its properties. Difference between synthetic and natural rubber.</p> <p><b>4.2 ENGG.MATERIALS-</b> Definition Properties and Applications of- 1) Cement and lime 2) Ceramics and composites 3) Glass and Insulating materials 4) Paint and adhesives.</p>	05	10
5	<p><b>WATER</b> Definition of hard water and soft water, causes of hardness, types of hardness, analysis of degree of hardness in calcium carbonate equivalent(numerical), bad effect of hard water in industries (paper, textile, dye, sugar), removal of hardness by lime soda method, zoolite, ion exchange method, reverse osmosis, PH scale, applications of PH in engineering. Numerical based on PH and hardness.</p>	05	08
6	<p><b>CORROSION</b> Definition, causes of corrosion types of corrosion-definition (atmospheric and electro chemical) Types of oxide films, mechanism of atmospheric and electrochemical corrosion (evolution of hydrogen, absorption of oxygen), factors affecting rate of atmospheric corrosion and electrochemical corrosion. Protection Methods- Galvanization and tinning processes, sherardizing, metal spraying, metal cladding.</p>	05	08
7	<p><b>LUBRICANT</b> Definition and functions of lubricant, mechanism of lubrication(fluid film, boundary, extreme pressure lubrication), classification of lubricant, properties of lubricating oils(physical and chemical), selection of lubricant, for light machines, I.C.E., gears, cutting tools, high pressure and low speed machines, transformers, spindles in textile industry, for refrigeration system.</p>	04	08



8.	<b>FUELS</b> Definition, classification of fuels, characteristics of good fuel, comparison between solid, liquid and gaseous fuel, types of coal, analysis of coal by proximate and ultimate analysis, refining of crude petroleum, fractions obtained by distillation of crude oil, gasoline, kerosene, diesel as a fuel (properties and uses)	04	08
9.	<b>MATERIAL SCIENCE AND ENGINEERING</b> Definition of material science, terminology and scales, properties of materials, (mechanical, electrical, magnetic, optical, thermal with example) structure depended properties (example of hardness versus structure of steel.)Types of materials- metals, semiconductor, polymer ceramic and composites (examples and properties and applications).Engineering nanomaterial and its applications.	04	04
10	<b>ENVIRONMENTAL EFFECT (Awareness Level)</b> Definition, types of pollution, air, water, soil, sound, nuclear pollution. (Causes, effect, control method), E-waste (origin effect control) deforestation, ozone depletion, greenhouse effect, preventative environmental management activities.	03	06

#### LIST OF EXPERIMENTS:

SR NO.	NAME OF THE EXPERIMENT	Hours
1.	Write the electronic configuration of atoms (atomic no.1-30) Write the formation of compounds NaCl, AlCl <sub>3</sub> , H <sub>2</sub> O, CO <sub>2</sub> , N <sub>2</sub>	04
2.	Determine acidic and basic radical from unknown solution (any two)	04
3.	Measure the voltage developed due to chemical reactions by setting up Daniel cell.	02
4.	To determine the percentage of iron in given steel sample by redox titration.	02
5.	To determine total hardness of sample of water by EDTA method.	02
6.	To determine chloride content in given sample of water by Mohr's method	02
	Revision / Repetition ( Expts.1 to 6 )	02
7.	To determine the percentage of Ca content in cement.	02
8.	To determine electrode potential of various metals to study their tendency to corrosion	02
9.	To determine the acid value of lubricant by using KOH	02
10.	To determine coefficient of viscosity by using Ostwald's viscometer.	02
11.	To determine percentage of ash or moisture in a given coal sample by proximate analysis.	02
12.	To determine the strength of hydrochloric acid by titrating against sodium hydroxide solution by using PH meter.	02
	Revision / Repetition ( Expts.7 to12 )	02



**LEARNING RESOURCES:**

Author	Title	Publisher
V. P. Mehta	Polytechnic Chemistry	Jain Brothers, New Delhi.
P.C. Jain and Monica Jain	Applied Chemistry	Dhanpat Rai and sons, New Delhi
M.M. Uppal	Engineering Chemistry	Khanna Publisher, Delhi.
S.N. Narkhede, M.M. Thatte	Applied Chemistry	Nirali Prakashan, Pune.

Internet, You tube ,Videos etc.

**Specification Table:**

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1	Atomic structure and chemical bonding.	04	02	02	08
2	Electrochemistry	04	06	02	12
3	Metal and alloys	04	02	02	08
4	Polymer ,Elastomer and Engg materials	04	02	04	10
5	Water	02	03	03	08
6	Corrosion	04	02	02	08
7	Lubricant	03	03	02	08
8	Fuel	03	03	02	08
9	Material science and Engineering.	00	02	02	04
10	Environmental effects	02	02	02	06
	Total	30	27	23	80

Prepared by

for

( Smt.K.V. Mankar )  
Lect.in Chemistry

( A.S.Zampyre )  
Member Secretary PBOS

( N.S.Kadam )  
Chairman PBOS