

**GOVERNMENT OF TELANGANA
DEPARTMENT OF TECHNICAL EDUCATION**

From
Navin Mittal, IAS,
Commissioner of Technical Education,
2nd Floor, Vidya Bhavan,
Nampally, Hyderabad

To
The Director,
Employment & Training,
ITI Mallepally Campus,
Vijayanagar Colony,
Hyderabad

JS ✓
9/1/2020

Sir,

Sub:- Academic-I -T.E. – Vertical Mobility of ITI Passed candidates for lateral entry into 2nd Year Diploma Courses – Bridge Course – conduct for the Practicals in Physics and Chemistry– Reg.

- Ref:-**
1. G.O.Rt.No. 25, Higher Education (TE.II) Department, Dated: 07.01.2014
 2. Letter no. SBTET/B3/1112/2002 of the Secretary, SBTET, Hyderabad, Dated: 04.08.2015
 3. Minutes of the Meeting, Dated:27.05.2019
 4. Your Lr.No.I-1/D2/9142/2011, of the Director Employment and Training, ITI Mallepally Campus, Hyderabad dt:11.12.2019
 5. This Office Lr. No. CTE-ACD2/PCDA/45/2019-ACADEMIC-II Date:02.01.2020

In pursuance of the letter 4th cited, the Secretary, State Board of Technical Education & Training (SBTET), Hyderabad has been requested to take necessary action for conducting Practical examinations (Physics & Chemistry) for the ITI pass-out Candidates at the Government Polytechnics, as the ITI Institutions do not have the lab facilities for Practical exams (Physics & Chemistry), for implementing the decisions taken on the Minutes of the Meeting 3rd cited whereupon the Secretary, SBTET, Hyderabad has suggested to effect a corrigendum to the Minutes of Meeting as shown below:-

2. Department of Employment & Training shall take steps at their end for the conduct of bridge courses for the subjects of Physics, Chemistry and Mathematics (Theory & Practicals) in the prescribed syllabus communicated by Secretary, SBTET, Hyderabad, vide Lr.No.SBTET/B3/1112/2002, dt: 01.04.2014, may be read as
- 2. Department of Employment & Training shall take steps at their end for the conduct of bridge courses for the subjects of Physics, Chemistry and Mathematics (Theory & Practicals) in the prescribed syllabus of Curriculum-2018 (C-18) of SBTET, Hyderabad.**

Therefore, the Director, Employment & Training, Hyderabad and the Secretary, SBTET, Hyderabad are hereby requested to take necessary action in the above matter accordingly.

(This has the approval of the Commissioner of Technical Education)

Yours faithfully,

Signature valid
Digitally signed by GUNDA GIRIBABU
Date: 2020.01.09 14:00:51
Reason: Approved
For Commissioner

Copy to the Secretary, SBTET, Hyderabad for information and necessary action

Department of Technical Education - TELANGANA
State Board of Technical Education and Training - HYDERABAD

Course Title : BASIC ENGINEERING MATHEMATICS	Course Code : 18A-102F
SEMESTER : I	Course Group : COMMON
Teaching Scheme (L : T : P) : 36 :24: 0 (in periods)	Credits : 3 Credits
Type of Course : Lecture + Assignments	Total Contact Periods : 60
CIE : 60 Marks	SEE : 40 Marks
Programmes : Common to all Engineering Diploma Programmes	

Course Content and Blue Print of Marks for SEE

Unit No	Unit name	Periods	Questions for SEE			Marks weightage	Weight age %
			R	U	A		
1.	Logarithms ,Partial Fractions:	6(2+4)	2(1+1)	0+1	0	09(2+7)	8
2	Matrices and Determinants	12	1	1	0	12(2+10)	11
3	Compound angles , Multiple and sub multiple angles	12(6+6)	2(1+1)	1(1+0)	1(0+1)	24(4+10+10)	22
4.	Properties of triangles, Hyperbolic functions, Complex Numbers	8(2+2+4)	3(1+1+1)	1(0+0+1)	0	11(6+5)	10
5.	Transformations , Inverse trigonometric functions	12(6+6)	1(1+0)	2(1+1)	2(1+1)	32(2+5+5+10+10)	29
6.	Solution of Simultaneous equations using Matrices & Determinants , Solutions of triangles	10(6+4)	1(0+1)	2(1+1)	1(1+0)	22(2+5+5+10)	20
	Total	60	10	6	6	110	100

R – Remembering : 20 M ; U – Understanding : 40 M ; A -- Application : 50 M

Pre requisites

This course requires the basic knowledge of Algebra, Trigonometry in Mathematics at Secondary school level

Course Outcomes

CO 1	Solve the problems on Logarithms
CO 2	Resolve a given fraction into Partial Fractions
CO 3	Find the Sum , Product of Matrices , Value of the determinant and Inverse of a Matrix .
CO 4	Solve simple problems using concepts of Trigonometric Functions
CO 5	Solve simultaneous Linear Equations using Matrices and Determinants
CO 6	Solve a Triangle and an Inverse Trigonometric Equation .

Course Content :**Algebra****Unit-I****Duration: 06 Periods (L: 3.6 – T: 2.4)****1. Logarithms:**

Definition of logarithm and its properties, natural and common logarithms; the meaning of e and exponential function, logarithm as a function and its graphical representation – Solve some simple problems.

2. Partial Fractions:

Rational, proper and improper fractions of polynomials. Resolving rational fractions in to their partial fractions covering the types mentioned below:

$$\begin{array}{ll}
 \text{i)} \quad \frac{f(x)}{(x+a)(x+b)(x+c)} & \text{ii)} \quad \frac{f(x)}{(x+a)^2(x+b)(x+c)} \\
 \text{iii)} \quad \frac{f(x)}{(x^2+a)(x+b)} & \text{iv)} \quad \frac{f(x)}{(x+a)(x^2+b)^2}
 \end{array}$$

Unit – II**Duration: 12 Periods (L: 7.2 – T:4.8)**

3. **Matrices and Determinants** : Definition of matrix, types of matrices-examples, algebra of matrices-equality of two matrices, sum , difference , scalar multiplication and product of matrices. Transpose of a Matrix - Symmetric, Skew symmetric matrices - Minor, cofactor of an element - Determinant of a square matrix up to 3rd order - Laplace's expansion, properties of determinants. Singular and non-singular matrices - Adjoint and multiplicative inverse of a square matrix – related problems.

Trigonometry:

Unit-III

Duration: 12 Periods (L: 7.2 – T: 4.8)

4. **Compound angles**: Formulae of $\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$, $\cot(A \pm B)$, and related identities with problems - Derive the values of $\sin 15^\circ$, $\cos 15^\circ$, $\sin 75^\circ$, $\cos 75^\circ$, $\tan 15^\circ$, $\tan 75^\circ$ etc.- Derive identities like $\sin(A+B) \sin(A-B) = \sin^2 A - \sin^2 B$ etc.,
5. **Multiple and sub multiple angles**: Trigonometric ratios of multiple angles $2A$, $3A$ and submultiples angle $A/2$ with problems - Derive useful allied formulas like $\sin^2 A = \left(\frac{1 - \cos 2A}{2} \right)$ etc., - Solve simple problems using the above formulae

Unit – IV

Duration: 08 Periods (L: 4.2 – T:3.8)

6. **Properties of triangles**: Statements of Sine rule, Cosine rule, Tangent rule and Projection rule
7. **Hyperbolic functions**: Definitions of hyperbolic functions - $\sinh x$, $\cosh x$, $\tanh x$ etc., - identities of hyperbolic functions, inverse hyperbolic functions and expression of inverse hyperbolic functions in terms of logarithms.
8. **Complex Numbers**: Definition of a complex number, Modulus and conjugate of a complex number, Arithmetic operations on complex numbers, Modulus - Amplitude (polar) form, Exponential (Euler) form of a complex number.

Algebra & Trigonometry

Unit – V

Duration: 12 Periods (L: 7.2 – T:4.8)

9. **Transformations**: Transformation of products into sums or differences and vice versa -

simple problems - Solve problems by applying these formulae to sum or difference or product of three or more terms.

- 10 **Inverse trigonometric functions:** Define inverses of six trigonometric functions along with their domains and ranges - Derive relations between inverse trigonometric functions so that given $A = \sin^{-1}x$, express angle A in terms of other inverse trigonometric functions - with examples - State various properties of inverse trigonometric functions and identities like $\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2}$ etc - Derive formulae like $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-xy}\right)$ where $x \geq 0, y \geq 0, xy < 1$ etc., and solve simple problems.

Unit – VI

Duration: 10 Periods (L: 6 – T: 4)

11. **Solution of Simultaneous equations using Matrices & Determinants.:** System of linear equations in 3 Variables - Solutions by Cramer's rule, Matrix inversion method – Examples - Elementary row operations on Matrices - Gauss-Jordan method to solve a system of equations in 3 unknowns .
12. **Solutions of triangles:** Solve a triangle when (i) three sides (SSS) (ii) two sides and an Included angle (SAS) (iii) one side and two angles are given (SAA) - Simple problems.

References

1. Text Book of Matrices – by Shanthi Narayan
2. Plane Trigonometry - by S. L .Loney
3. NCERT Mathematics Text Books Of Class XI , XII .
4. Intermediate Mathematics Text Books (Telugu Academy)

Suggested E-Learning references

1. www.freebookcentre.net/mathematics/introductory-mathematics-books.html
2. E-books: www.mathebook.net

Suggested Learning Outcomes

Algebra

UNIT – I

1.0 Use Logarithms in engineering calculations

- 1.1 Define logarithm and list its properties.
- 1.2 Distinguish natural logarithms and common logarithms.
- 1.3 Explain the meaning of e and exponential function.
- 1.4 State logarithm as a function and its graphical representation.
- 1.5 Use the logarithms in engineering calculations.

2.0 Resolve Rational Fraction into sum of Partial Fractions in engineering problems

- 2.1 Define the following fractions of polynomials:
 1. Rational,
 2. Proper and
 3. Improper
- 2.2 Explain the procedure of resolving rational fractions of the type mentioned below into partial fractions

$$\begin{array}{ll}
 \text{i)} \quad \frac{f(x)}{(x+a)(x+b)(x+c)} & \text{ii)} \quad \frac{f(x)}{(x+a)^2(x+b)(x+c)} \\
 \text{iii)} \quad \frac{f(x)}{(x^2+a)(x+b)} & \text{iv)} \quad \frac{f(x)}{(x+a)(x^2+b)^2}
 \end{array}$$

UNIT – II**3.0 Use Matrices for solving engineering problems**

- 3.1 Define a matrix and order of a matrix.
- 3.2 State various types of matrices with examples (emphasis on 3rd order square matrices).
- 3.3 Compute sum, scalar multiplication and product of matrices.
- 3.4 Illustrate the properties of these operations such as associative, distributive, commutative properties with examples and counter examples.
- 3.5 Define the transpose of a matrix and write its properties.
- 3.6 Define symmetric and skew-symmetric matrices.
- 3.7 Resolve a square matrix into a sum of symmetric and skew-symmetric matrices with examples in all cases.
- 3.8 Define minor, co-factor of an element of a 3x3 square matrix with examples.
- 3.9 Expand the determinant of a 3 x 3 matrix using Laplace expansion formula.
- 3.10 Distinguish singular and non-singular matrices.
- 3.11 Apply the properties of determinants to solve problems.
- 3.12 Define multiplicative inverse of a matrix and list properties of adjoint and inverse.
- 3.13 Compute adjoint and multiplicative inverse of a square matrix.

Trigonometry :**UNIT – III****4.0 Solve simple problems on Compound Angles**

- 4.1 Define compound angles and state the formulae of $\sin(A \pm B)$, $\cos(A \pm B)$, $\tan(A \pm B)$ and $\cot(A \pm B)$
- 4.2 Give simple examples on compound angles to derive the values of $\sin 15^\circ$, $\cos 15^\circ$, $\sin 75^\circ$, $\cos 75^\circ$, $\tan 15^\circ$, $\tan 75^\circ$ etc.
- 4.3 Derive identities like $\sin(A+B) \sin(A-B) = \sin^2 A - \sin^2 B$ etc.,
- 4.4 Solve simple problems on compound angles.

5.0 Solve problems using the formulae for Multiple and Sub- multiple Angles

- 5.1 Derive the formulae of multiple angles $2A$, $3A$ etc and sub multiple angles $A/2$ in terms of angle A of trigonometric functions.
- 5.2 Derive useful allied formulas like $\sin A = (1 - \cos 2A)/2$ etc.,
- 5.3 Solve simple problems using the above formulae

UNIT – IV**6.0 Appreciate Properties of triangles**

- 6.1 State sine rule, cosine rule, tangent rule and projection rule.

7.0 Represent the Hyperbolic Functions in terms of logarithm functions

- 7.1 Define $\sinh x$, $\cosh x$ and $\tanh x$ and list the hyperbolic identities.
- 7.2 Represent inverse hyperbolic functions in terms of logarithms.

8.0 Represent Complex numbers in various forms

- 8.1 Define complex number, its modulus, conjugate and list their properties.
- 8.2 Define the operations on complex numbers with examples.
- 8.3 Define amplitude of a complex number
- 8.4 Represent the complex number in various forms like modulus-amplitude (polar) form, Exponential (Euler) form – illustrate with examples.

UNIT – V**9.0 Apply Transformations for solving the problems in Trigonometry**

- 9.1 Derive the formulae on transforming sum or difference of two trigonometric ratios into a product and vice versa- examples on these formulae.
- 9.2 Solve problems by applying these formulae to sum or difference or product of three or more terms.

10.0 Use Inverse Trigonometric Functions for solving engineering problems

- 10.1 Explain the concept of the inverse of a trigonometric function by selecting an appropriate domain and range.
- 10.2 Define inverses of six trigonometric functions along with their domains and ranges.

10.3 Derive relations between inverse trigonometric functions so that given $A = \sin^{-1}x$, express angle A in terms of other inverse trigonometric functions - with examples.

10.4 State various properties of inverse trigonometric functions and identities like

$$\sin^{-1}x + \cos^{-1}x = \frac{\pi}{2} \text{ etc.}$$

10.5 Derive formulae like $\tan^{-1}x + \tan^{-1}y = \tan^{-1}\left(\frac{x+y}{1-xy}\right)$, where $x \geq 0, y \geq 0, xy < 1$

etc., and solve simple problems.

UNIT – VI

11.0 Apply Matrices and Determinants in solving system of Linear Equations

11.1 Solve system of 3 linear equations in 3 unknowns using Cramer's rule.

11.2 Solve system of 3 linear equations in 3 unknowns by matrix inversion method

11.3 State elementary row operations.

11.4 Solve a system of 3 linear equations in 3 unknowns by Gauss- Jordan method

12.0 Apply Properties of Triangles to solve a triangle .

12.1 Solve a triangle when (i) three sides, (ii) two sides and an included angle, (iii) two sides and an opposite angle-case of two solutions and (iv) one side and two angles are given.

Suggested Student Activities

1. Student visits Library to refer Standard Books on Mathematics and collect related material .
- 2 .Quiz
- 3.Group discussion
- 4.Surprise test
5. Seminar

Question Paper Blue Print for SEE

Course: ENGG. MATHEMATICS –I CODE: 18COMMON102F

UNIT No./NAME		No. of Hours	PART – A 2 Marks	PART – B 5 Marks	PART– C 10 Marks	Marks weightage	Weightage (%)
1	a).Logarithms	02	01	----	----	09	08
	b).Partial Fractions	04	01	01	----		
2	Matrices and determinants	12	01	----	01	12	11

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3	a).Compound Angles	06	01	----	01	24	22
	b).Multiple angles & Submultiple angles	06	01	----	01		
4	a).Properties of triangles	02	01	----	----	11	10
	b).Hyperbolic Functions	02	01	----	----		
	c).Complex numbers	04	01	01	----		
5	a).Transformations	06	01	01	01	32	29
	b).Inverse Trigonometric Functions	06	----	01	01		
6	a).Solutions of Simultaneous Equations	06	----	01	01	22	20
	b).Solutions of Triangles	04	01	01	----		
TOTAL		60	10	06	06	110	100
Questions to be Answered			10	04	04	80	

Department of Technical Education

State Board of Technical Education & Training (TS)

Course Title	Basic Physics	Course Code	18A-103F
Semester	Semester-I	Course Group	Core
Teaching Scheme in Pds/Hrs(L:T:P)	30:15:0 Hrs 40:20:00 Pds	Credits	3
Type of course	Lecture+Assignments	Total Contact Hrs	60Pds
CIE	60 Marks	SEE	40 Marks

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Periods	Question to be set for SEE			Marks Weigh tage	Weightage (%)
			R	U	A		
1	UNITS, DIMENSIONS AND FRICTION	10	1(2M)	1(5M)	0	07	6.36
2	ELEMENTS OF VECTORS	10	1(2M)	1(5M)	1(10M)	17	15.46
3	MECHANICS	10	1(2M)	1(5M)	1(10M)	17	15.46
4	PROPERTIES OF MATTER	10	1(2M)	1(5M)	0	07	6.36
5	HEAT AND THERMODYNAMICS	10	3(2M+2M+2M)	1(5M)	2(10M+10M)	31	28.18
6	CONSERVATION LAWS AND ENERGY SOURCES	10	3(2M+2M+2M)	1(5M)	2(10M+10M)	31	28.18
	TOTAL	60	10(20M)	06(30M)	06(60M)	110	100.00

Cognitive levels: R=Remember, U=Understand, A=Apply

Pre requisites: Basic High school science, basic mathematics

Course Objectives: After studying this course, the student will be able to understand and appreciate the role of Engineering Physics in different areas of engineering and technology.

Course outcomes: On successful completion of the course, the student will have the ability to attain below Course outcomes (CO):

Course Outcomes		Linked POs	Teaching Hours
CO 1	Write the correct units and dimensions of physical quantities and know the concept of friction	PO1,PO2	10
CO 2	Apply knowledge of vectors as a tool to solve engineering problems	PO1, PO2	10
CO 3	Apply knowledge of mechanics to solve engineering problems	PO1, PO2	10
CO 4	Apply knowledge of properties of matter to understand engineering problems	PO1, PO2	10
CO 5	Apply Heat and thermodynamic processes to solve engineering problems	PO1, PO2	10
CO 6	Apply conservation laws to engineering problems and utilization of energy sources	PO1, PO2, PO3,PO6	10

BASIC PHYSICS

COURSE CONTENTS

1. UNIT – 1 UNITS, DIMENSIONS AND FRICTION

Duration: 10 periods (L: 6.0 – T: 4.0)

Physical quantity - Fundamental and derived quantities – Unit –definitions - S.I units - Advantages of S.I. units - Dimensions and dimensional formula - definitions-units and dimensional formula for physical quantities - Principle of homogeneity - Applications of dimensional analysis–Friction – causes - types of friction - Normal reaction - Laws of static friction - coefficients of friction - expression- rough horizontal surface - expressions for Acceleration, Displacement, Time taken to come to rest and Work done Advantages and disadvantages of friction - Methods to reduce friction – Problems on friction only.

2. UNIT – 2 ELEMENTS OF VECTORS Duration: 10 periods (L:6.0 – T: 4.0)

Scalar and vector quantities – definitions and examples – Graphical representation of a vector - Classification of vectors (Proper vector, Unit vector, Equal vector, Negative vector, Collinear vector and Position vector) Resolution of vector - Triangle law of vector addition – Parallelogram law of vectors – statement- expression for magnitude and direction of resultant vector –derivation- illustrations(working of sling and flying bird) - Representation of a vector in unit vectors **i**, **j** and **k** – Dot product of vectors-definition- application to work done by force – properties of dot product - Cross product of vectors –definition – Right hand thumb rule and right hand screw rule - application to moment of force - properties of vector product - area of parallelogram and triangle in terms of cross product - - related problems

3. UNIT – 3 MECHANICS**Duration: 10 periods (L:6.0 – T: 4.0)**

Projectile motion – definition - examples - Horizontal projection – Time of flight and Horizontal range – derivations - Oblique projection – Expression for path of a projectile in oblique projection - derivation– Maximum height, Time of ascent, Time of descent, Time of flight and Horizontal range and maximum horizontal range - derivations – Circular motion, angular velocity, time period and frequency of revolutions– Definitions– Relation between linear velocity and angular velocity - derivation– centripetal force – centrifugal force – definitions and expressions only- application (banking of curved path) - angle of banking- expression only - related problems

4. UNIT – 4 PROPERTIES OF MATTER Duration: 10 periods (L:6.0 – T: 4.0)

Elasticity and plasticity- definitions - Stress and Strain – definitions and expressions - elastic limit - Hooke's law – statement - modulus of elasticity - Young's modulus – Derivation – Cohesive and adhesive forces - Surface tension - Illustrations - Capillarity –angle of contact – definition- examples for capillarity- Formula for Surface tension based on capillarity (no derivation) – Viscosity - Illustrations of viscosity - Newton's formula for viscous force – derivation - Coefficient of viscosity - Poiseuille's equation - Effect of temperature on viscosity of liquids and gases– streamlines - laminar flow- turbulent flow-Reynold's number- equation of continuity – statement - related problems.

5. UNIT – 5 HEAT AND THERMODYNAMICS**Duration: 10 periods (L:6.0 – T:****4.0)**

Heat – expansion of gases - Boyle's law –concept of absolute zero - Absolute scale of temperature – Charles' laws - Ideal gas equation – derivation - value of universal gas constant 'R' – Isothermal and Adiabatic, processes - Differences between isothermal and adiabatic processes - Internal energy and external work done – Expression for work done – derivation – first law of thermodynamics –application of first law to isothermal, and adiabatic processes - second law of thermodynamics – specific heat of a gas – molar specific heat of a gas – definitions – derive relation between C_p and C_v - related problems.

6. UNIT – 6 CONSERVATION LAWS AND ENERGY SOURCES**Duration: 10 periods (L:6.0 – T:****4.0)**

Work and Energy - Potential Energy and kinetic energy–examples – expressions for PE and KE-derivations - Work- Energy theorem – derivation – Law of conservation of

energy – examples - Law of conservation of energy in the case of freely falling body – proof – Illustration of conservation of energy in the case of simple pendulum– Non renewable and renewable energy sources – definition and applications (solar cooker, wind mill and biogas) – Green house effect - related problems

References:

1. **Engineering. Physics by R.K. Gaur, S.L. Gupta, Dhanpatrai Publications, New Delhi.**
2. **ISC Physics, Book I&II, P. Vivekanandan, DK Banerjee, S Chand, New Delhi.**
3. **Intermediate Physics, Vol. I&II, Telugu Academy, TS, Hyderabad.**
4. **Fundamentals of Physics by Halliday and Resnick.**

Suggested learning outcomes:

Upon completion of the course the student shall be able to

1. know the concepts of units, dimensions and friction

- 1.1 Define Physical quantity, fundamental quantity and derived physical quantities
- 1.2 Define Unit.
- 1.3 List advantages of S.I. units
- 1.4 Define dimensions and dimensional formula.
- 1.5 Write dimensional formulae of physical quantities
- 1.6 State principle of homogeneity of dimensions.
- 1.7 State applications of dimensional analysis.
- 1.8 Define friction and state its causes.
- 1.9 State types of friction
- 1.10 Explain normal reaction.
- 1.11 State laws of friction.
- 1.12 Define coefficients of friction.
- 1.13 Derive expression for acceleration of a body moving on rough horizontal surface.
- 1.14 Derive expressions for displacement and time taken to come to rest and work done in the case of a body moving on a rough horizontal surface.
- 1.15 List the advantages and disadvantages of friction.
- 1.16 Solve related numerical problems in friction only.

2. know the concepts of Elements of Vectors

- 2.1 Define scalar and vector quantities with examples.
- 2.2 Represent a vector graphically.
- 2.3 Classify types of vectors – Proper vector, Unit vector, Equal vector, Negative vector, Collinear vector and Position vector.
- 2.4 Resolve a vector – Vector and Scalar components and relation between them.
- 2.5 State and explain Triangle law of vector addition
- 2.6 State Parallelogram law – derive expression for magnitude and direction of resultant vector.

- 2.7 Illustrations of parallelogram law – working of sling and flying bird.
- 2.8 Representation of vector in terms of unit vectors ($\mathbf{i}, \mathbf{j}, \mathbf{k}$)
- 2.9 Define Dot product of vectors
- 2.10 Application of dot product for work done by force.
- 2.11 List the properties of dot product.
- 2.12 Define Cross product of vectors.
- 2.13 Apply cross product in the case of moment of force.
- 2.14 Explain Right hand screw rule and right hand thumb rule.
- 2.15 Expressions for area of parallelogram and triangle in terms of cross product.
- 2.16 List the properties of cross product.
- 2.17 Solve related problems

3. know the concepts of Mechanics

- 3.1 Define Projectile motion with examples
- 3.2 Define Horizontal projection – Derive expressions for (a) Time of flight (b) Horizontal range
- 3.3 Define Oblique projection- Derive expression for path of a projectile in oblique projection.
- 3.4 Derive expressions for (a) Maximum height (b) Time of ascent (c) Time of descent (d) Time of flight (e) Horizontal range and (f) maximum horizontal range in oblique projection.
- 3.5 Define circular motion.
- 3.6 Define angular velocity, time period and frequency of revolutions in circular motion.
- 3.7 Derive the relation between linear velocity and angular velocity.
- 3.8 Define centripetal and centrifugal forces.
- 3.9 Define angle of banking.
- 3.10 Explain banking of curved path and write the expression for angle of banking.
- 3.11 Solve related numerical problems.

4. know the concepts of Properties of matter

- 4.1 Define the terms Elasticity and Plasticity with examples
- 4.2 Define Stress and Strain and write their expressions.
- 4.3 Define elastic limit and state Hooke's law.
- 4.4 Define modulus of elasticity.
- 4.5 Define Young's modulus
- 4.6 Derive the formula for Young's modulus.
- 4.7 Define cohesive force and adhesive force.
- 4.8 Define Surface tension. Give illustrations of Surface tension
- 4.9 Define capillarity and angle of contact.
- 4.10 List the examples for capillarity.
- 4.11 Write the formula for Surface tension $T = \frac{1}{2} h \rho g r$ based on capillarity.
- 4.12 Define Viscosity. Give illustrations of viscosity.
- 4.13 Derive Newton's formula for viscous force.
- 4.14 Define coefficient of viscosity.
- 4.15 Write Poiseuille's equation for coefficient of viscosity.
- 4.16 Discuss effect of temperature on viscosity of liquids and gases.

- 4.17 Define streamline flow, turbulent flow.
- 4.18 Define Reynold's number.
- 4.19 State equation of continuity and explain the terms with diagram.
- 4.20 Solve related problems

5. know the concepts of Heat and Thermodynamics

- 5.1 Explain expansion of gases.
- 5.2 State and explain Boyle's law and its limitations
- 5.3 Explain concept of absolute zero using the relations $P_t = P_0(1 + t/273)$ and $V_t = V_0(1 + t/273)$
- 5.4 Define Absolute scale of temperature
- 5.5 State Charles' law in terms of absolute temperature
- 5.6 Define Ideal gas and derive ideal gas equation
- 5.7 Calculate the value of Universal gas constant (R)
- 5.8 State gas equation in terms of density
- 5.9 Define Isothermal and Adiabatic processes.
- 5.10 Distinguish between isothermal and adiabatic processes.
- 5.11 Explain the terms internal energy and external work done
- 5.12 Derive the expression for work done by the gas [$W = P(V_2 - V_1)$]
- 5.13 State first law of thermodynamics.
- 5.14 Application of first law to isothermal and adiabatic processes.
- 5.15 State second law of thermodynamics.
- 5.16 Define specific heat a gas.
- 5.17 Define molar specific heat of a gas.
- 5.18 Derive the relation between C_p , C_v and R.
- 5.19 Solve related problems

6. know the concepts of conservation laws and energy sources

- 6.1 Define work and energy.
- 6.2 Define potential and kinetic energy with examples
- 6.3 Derive the expressions for Potential energy and Kinetic energy.
- 6.4 State and prove Work-Energy theorem.
- 6.5 State law of conservation of energy with example.
- 6.6 Derive the law of conservation of energy in the case of a freely falling body.
- 6.7 Illustrate law of conservation of energy in the case of simple pendulum.
- 6.8 Define non renewable and renewable energy sources. Give examples
- 6.9 Explain solar cooker, wind mill and biogas.
- 6.10 Explain briefly Green house effect.
- 6.11 Solve related numerical problems.

Internal evaluation

Test	Units	Marks	Pattern
Mid Sem 1	1 and 2	20	Part A-5 Short answer questions Part B-2 Essay questions out of 3 Questions

			Part C-2 Essay questions out of 3 Questions
Mid Sem 2	3 and 4	20	Part A-5 Short answer questions Part B-2 Essay questions out of 3 Questions Part C-2 Essay questions out of 3 Questions
Slip Test 1	1 and 2	5	2 Essay Questions out of 3 Questions
Slip Test 2	3 and 4	5	2 Essay Questions out of 3 Questions
Assignment	1	5	Different group assignments of Higher order Questions that develop problem solving skills and critical thinking should be given
Seminars	1	5	
	Total	60	

Suggested Student Activities

1. Student visits Library to refer Text books, reference books and manuals to find their specifications.
2. Student inspects the available equipment in the Physics Lab to familiarize with them.
3. Quiz
4. Seminar
5. Group discussion
6. Surprise test

Department of Technical Education

State Board of Technical Education & Training (TS)

Course Title: General Engineering Chemistry	Course Code: 18A-104F
Semester : Semester I	Course Group :
Teaching Scheme in Hrs(L:T:P) : 30:15:0	Credits : 3
Type of course : Lecture + Assignments	Total Contact Hours : 60Pds
CIE : 60 Marks	SEE : 40 Marks

Course Content and Blue Print of Marks for SEE

Unit No	Unit Name	Period	Questions to be set for SEE			Marks Weightage	Weightage (%)
			R (Section A)	U (Section B)	A (Section C)		
1	Fundamentals of Chemistry	10	2M + 2M	5M	5M	14	12.73
2	Solutions and Colloids	10	2M	5M	5M	12	10.9
3	Acids and Bases	10	2M	5M	5M	12	10.9
4	Environmental Studies-I	10	2M + 2M	5M	5M	14	12.73
5	Water Technology	10	2M+2M	5M	20M	29	26.37
6	Electro Chemistry	10	2M+2M	5M	20M	29	26.37
	Total	60	20	30	60	110	100

Prerequisite: Basic knowledge of chemistry in secondary education.

Course Objectives: After studying this course, the student will be able to understand and appreciate the role of Chemistry and environmental studies in different spheres of industries.

Course Outcome: On successful completion of the course, the students will have ability to attain below Course Outcomes (CO):

CO	Course outcome	CL	Linked PO	Teaching periods
CO1	Explain Bohr's atomic model, the different types of chemical bonding in certain molecules and concept of oxidation, reduction and oxidation number	R/U/A	1,2,9	10
CO2	Understand and explain mole, molarity and normality and solve the	R/U/A	1,2,9	10

	problems and colloids and their applications.			
CO3	Explain the different theories of acids and bases , concept of pH, buffer solutions and buffer action.	R/U/A	1,2,3,9	10
CO4	Compare the renewable and non renewable energy sources, to take measures to protect the biodiversity and also the environment.	R/U/A	1,2,5,6,7,9,10	10
CO5	Distinguish the temporary and permanent hardness, apply the different methods of softening of hard water and desalination.	R/U/A	1,2,3,9,10	10
CO6	Explain electrolysis and applications of electrolysis, Solve the problems on Faraday's laws of electrolysis	R/U/A	12,3, 4.	10
	Total Periods			60

Cognitive levels: R = Remember, U= Understand, A = Apply

GENERAL ENGINEERING CHEMISTRY

COURSE CONTENTS

UNIT-I: Fundamentals of Chemistry

(10Periods)

Atomic Structure: Introduction – Atomic number – Mass number- Bohr's Atomic theory - Aufbau principle - Hund's rule - Pauli's exclusion Principle- Orbitals, shapes of s, p and d orbitals - Electronic configuration of elements

Chemical Bonding: Introduction – Electronic theory of valency - Types of chemical bonds - Ionic, covalent and co-ordinate covalent bond with examples - Properties of Ionic and Covalent compounds

Oxidation-Reduction: Electronic Concepts of Oxidation-Reduction, Oxidation Number- calculations.

UNIT-II: Solutions and Colloids

(10 Periods)

Introduction-Classification of solutions based on physical state- Molecular weights ,Equivalent weights- Expression of concentration – Mole concept, Molarity, Normality, Numerical problems on Mole,molarityand normality - Colloids- Types of colloids- Lyophilic and Lyophobic- Industrial applications of colloids.

UNIT-III: Acids and Bases

(10 Periods)

Introduction - theories of acids and bases and limitations - Arrhenius theory-Bronsted -Lowry theory - Lewis acid base theory - Ionic product of water - pH and related numerical problems - Buffer solutions- buffer action - Applications of buffer solution.

UNIT-IV: Environmental Studies-I

(10 Periods)

Introduction - environment -scope and importance of environmental studies- important terms - renewable and non renewable energy sources - Concept of ecosystem, producers, consumers and decomposers - Biodiversity, definition and threats to Biodiversity- Forest resources- Over exploitation- Deforestation.

UNIT-V: Water Technology**(10 Periods)**

Introduction -soft and hard water - causes of hardness – types of hardness -disadvantages of hard water - degree of hardness (ppm) - softening methods - permutit process - ion exchange process - drinking water - municipal treatment of water for drinking purpose - Osmosis, Reverse Osmosis - advantages of Reverse osmosis – Desalination by Electro -dialysis – Defluoridation – Nalgonda technique.

UNIT-VI: Electrochemistry:**(10 periods)**

Conductors, insulators, electrolytes –Types of electrolytes - Arrhenius theory of electrolytic dissociation - Electrolysis –Electrolysis of fused NaCl and aqueous NaCl – applications of electrolysis - Faraday's laws of electrolysis- numerical problems.

Reference Books :

1. Engineering chemistry – Jain & Jain – Dhanpat Rai Publishing Company.
2. A Text book of Engineering Chemistry – S.S.Dara – S.Chand Publications.
3. Environmental Studies – A.K.De.
4. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press
5. Intermediate Chemistry I and II – Telugu Academy TS

Suggested Learning Outcomes

Upon completion of the course, the student will have ability to

UNIT- I: FUNDAMENTALS OF CHEMISTRY

- 1.1 Explain the concept of atomic number and mass number
- 1.2 State the Postulates of Bohr's atomic theory and its limitations
- 1.3 Explain 1.Aufbau's principle, 2.Hund's rule and 3.Pauli's exclusion principle with examples.
- 1.4 Define Orbital.
- 1.5 Draw the shapes of s, p and d Orbitals.
- 1.6 Distinguish between Orbit and Orbital
- 1.7 Write the electronic configuration of elements up to atomic number 30
- 1.8 Define chemical bond.
- 1.9 Explain the Postulates of Electronic theory of valency.
- 1.10 Define and explain three types of Chemical bonding viz., Ionic, Covalent, Coordinate Covalent bond with examples.
- 1.11 Explain bond formation in NaCl and MgO.
- 1.12 List the Properties of Ionic compounds.
- 1.13 Explain covalent bond formation in Hydrogen molecule, Oxygen molecule, and Nitrogen Molecules using Lewis dot method.
- 1.14 List the Properties of Covalent compounds.
- 1.15 Distinguish between ionic compounds and covalent compounds.
- 1.16 Electronic concept of Oxidation and Reduction.
- 1.17 Define Oxidation Number
- 1.18 Calculate the Oxidation Number.

UNIT-II: SOLUTIONS AND COLLOIDS

- 2.1 Define the terms 1.Solution, 2.Solute and 3.Solvent.
- 2.2 Classify solutions based on physical state.
- 2.3 Calculate Molecular weight and equivalent weights of acids, bases and salts.
- 2.4 Define mole.
- 2.5 Explain Mole concept with examples.
- 2.6 Define Molarity and Normality.
- 2.7 Solve Numerical problems on Mole, Molarity and Normality.
- 2.8 Define Colloids .
- 2.9 Types of colloids- Lyophilic and Lyophobic.
- 2.10 Industrial applications of colloids.

UNIT-III: ACIDS AND BASES

- 3.1 Explain Arrhenius theory of Acids and Bases.
- 3.2 State the limitations of Arrhenius theory of Acids and Bases
- 3.3 Explain Bronsted - Lowry theory of acids and bases.
- 3.4 State the limitations of Bronsted - Lowry theory of acids and bases.
- 3.5 Explain Lewis theory of acids and bases.
- 3.6 State the limitations of Lewis theory of acids and bases.
- 3.7 Explain the Ionic product of water.
- 3.8 Define pH and explain Sorenson scale.
- 3.9 Solve the Numerical problems on pH (Strong Acids and Bases).
- 3.10 Define buffer solutions and give examples of acidic and basic buffers.
- 3.11 State the applications of buffer solutions.
- 3.12 Explain the buffer action of acidic and basic buffers.

UNIT-IV: ENVIRONMENTAL STUDIES-I

- 4.1 Define the term environment
- 4.2 Explain the scope and importance of environmental studies
- 4.3 Define and understand the following terms
 - 1) Lithosphere, 2) Hydrosphere, 3) Atmosphere, 4) Biosphere, 5) Pollutant, 6) Contaminant
 - 7) Pollution, 8)receptor, 9)sink, 10) particulates, 11) Dissolved oxygen (DO), 12) Threshold limit value (TLV),13).BOD and 14).COD
- 4.4 Explain the growing energy needs.
- 4.5 Explain renewable (non-conventional) and non renewable (conventional) energy sources with examples.
- 4.6 Define an Ecosystem. Understand biotic and abiotic components of ecosystem.
- 4.7 Define and explain the terms:
 - 1) Producers, 2) Consumers and 3) Decomposers with examples.
- 4.8 Explain biodiversity and threats to biodiversity.
- 4.9 Explain the uses of forests and over exploitation of forest resources and deforestation..

UNIT V: WATER TECHNOLOGY

- 5.1 State the various Sources of water.
- 5.2 Define the terms soft water and hard water with examples
- 5.3 Define hardness of water.
- 5.4 Explain temporary and permanent hardness of water.
- 5.5 List the usual chemical compounds causing hardness (with Formulae)
- 5.6 Disadvantages of using hard water in industries.
- 5.7 Define Degree of hardness, units of hardness in ppm (mg/L) and numerical problems related to hardness.
- 5.8 Explain the methods of softening of hard water: a) permutit process b).Ion-Exchange process.
- 5.9 Essential qualities of drinking water.

- 5.10 Explain municipal treatment of water for drinking purpose.
 5.11 Define Osmosis and Reverse Osmosis(RO).
 5.12 List the applications and advantages of RO.
 5.13 Desalination of sea water by Electro dialysis.
 5.14 Defluoridation - Nalgonda Technique.

UNIT VI: ELECTROCHEMISTRY

- 6.1 Define the terms 1. Conductor, 2. Insulator, 3. Electrolyte and 4. Non - electrolyte
 6.2 Types of electrolytes.- strong and weak electrolytes with examples.
 6.3 Distinguish between metallic conductors and Electrolytic conductors.
 6.4 Arrhenius theory of electrolytic dissociation
 6.5 Explain electrolysis of fused NaCl and aqueous NaCl
 6.6 Applications of Electrolysis- Electroplating-Electrolytic refining of metal (Copper)
 6.7 Explain Faraday's laws of electrolysis
 6.8 Define Chemical equivalent, Electrochemical equivalent.
 6.9 Relationship between chemical equivalent and electrochemical equivalent
 6.10 Solve the Numerical problems based on Faraday's laws of electrolysis

Internal evaluation

Test	Units	Marks	Pattern
Mid Sem 1	1 and 2	20	Part A- 5 Short answer questions Part B- 2 Essay questions out of 3 Questions Part C- 2 Essay questions out of 3 Questions
Mid Sem 2	3 and 4	20	Part A 5 Short answer questions Part B 2 Essay questions out of 3 Questions Part C- 2 Essay questions out of 3 Questions
Slip Test 1	1 and 2	5	2 Essay Questions out of 3 Questions
Slip Test 2	3 and 4	5	2 Essay Questions out of 3 Questions
Assignment	1	5	Different group assignments of Higher order Questions that develop problem solving skills and critical thinking should be given
Seminars	1	5	
	Total	60	

Suggested Student Activities for Induction Program:

	Forenoon	Afternoon
Day1	Registration	Class work as per Time table Chemistry Lab practice classes may be conducted
Day2	Rules and Regulations	
Day3	Getting acquainted with Head and faculty	
Day4	Familiarization with Institutional facilities	
Day5	Interaction with Class teacher and Seniors	
Day6	Introducing the mentor	
Day7	Parent –Teacher meeting	

Suggested Student Activities

1. Student visits Library to refer to Text books, reference books and manuals to find their specifications
2. Student inspects the available equipment in the Chemistry Lab to familiarize with them.
- 3.. Quiz
4. Group discussion
5. Seminar
6. Surprise test

E - learning links:

<https://iupac.org/>

<https://www.youtube.com>

<https://www.khanacademy.org/>

www.nptel.ac.in

Mid term Examination marks distribution

	Short answer	Essay	Marks
Part A	5	0	10
Part B	0	2/3	10
Part C	0	2/3	20
Total	5	4/6	40

ENGINEERING MATHEMATICS

Course Title : ENGINEERING MATHEMATICS	Course Code : 18C-202F
SEMESTER : II	Course Group : Foundation
Teaching Scheme (L : T : P) : 36 : 24 : 0 (in Periods)	Credits : 3 Credits
Type of Course : Lecture + Assignments	Total Contact Periods : 60
CIE : 60 Marks	SEE : 40 Marks
Programme : Common to all Engineering Diploma Programmes	

Pre requisites

This course requires the basic knowledge of Algebra, Trigonometry in Mathematics at Secondary school level and Basic Engineering Mathematics at Diploma 1st Semester level

Course Outcomes: COs

At the end of the course, the student will have the ability to:

CO 1	Formulate the equations of Straight Line, Circle and Conic Sections
CO 2	Evaluate the Limits of different Functions
CO 3	Determine the Derivatives of Various Functions
CO 4	Find the Successive Derivatives and Partial Derivatives of Functions
CO 5	Use Differentiation in Geometrical and Physical Applications
CO 6	Use Differentiation for finding Maxima and Minima.

Course Contents:**Co-ordinate geometry****Unit – I**

Duration: 10 Periods (L: 6.0 – T:4.0)

- 1. Straight lines:** Write the different forms of a straight line – point slope form, two point form, intercept form, normal form and general form - Find distance of a point from a line, acute angle between two lines, intersection of two non-parallel lines and distance between two parallel lines - perpendicular distance from a point to a line - Solve simple problems on the above forms
- 2. Circle:** Define locus of a point, circle and its equation. Find equation of the Circle given (i) Centre and radius, (ii) two ends of a diameter (iii) Centre and a point on the circumference

(iv) three non collinear points and (v) Centre and tangent equation - general equation of a circle - finding Centre, radius - tangent, normal to circle at a point on it - simple problems.

Unit – II

Duration: 8 Periods (L: 4.8 – T:3.2)

3. **Conic Sections:** Define a conic section, focus, directrix, eccentricity, axes and latus rectum – Find equation of a conic when focus directrix and eccentricity are given. Properties of parabola, ellipse and hyperbola - standard forms with Vertex (Centre) at the Origin and Axis (Axes) along Co – Ordinate Axes only – Simple Problems.

Differential Calculus

Unit-III

Duration: 12 Periods (L: 7.2 – T:4.8)

4. **Functions & Limits :** Concept of Limit- Definition- Properties of Limits and Standard

Limits (without proof) - $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$, $\lim_{x \rightarrow 0} \frac{\sin x}{x}$, $\lim_{x \rightarrow 0} \frac{\tan x}{x}$, $\lim_{x \rightarrow 0} \frac{a^x - 1}{x}$, $\lim_{x \rightarrow 0} \frac{e^x - 1}{x}$,

$\lim_{x \rightarrow 0} (1+x)^{\frac{1}{x}}$, $\lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x$ - Simple Problems . Evaluate the limits of the type

$$\lim_{x \rightarrow l} \frac{ax^2 + bx + c}{\alpha x^2 + \beta x + \gamma} \text{ and } \lim_{x \rightarrow \infty} \frac{f(x)}{g(x)}$$

5. **Differentiation – I :** Concept of derivative - definition from first principle as $\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ - different notations - derivatives of elementary functions like x^n , a^x , e^x , $\log x$, $\sin x$, $\cos x$, $\tan x$, $\sec x$, $\csc x$ and $\cot x$. Derivatives of sum, product, quotient, scalar multiplication of functions - problems. Derivative of function of a function (Chain rule) with illustrative examples such as

$$(i) \sqrt{t^2 + \frac{2}{t}} \quad (ii) x^2 \sin 2x \quad (iii) \frac{x}{\sqrt{x^2 + 1}} \quad (iv) \log(\sin(\cos x))$$

Unit – IV

Duration: 12 Periods (L: 7.2 – T:4.8)

6. **Differentiation – II:** Derivatives of inverse trigonometric functions, derivative of a function with respect to another function, derivative of parametric functions, derivative of hyperbolic, implicit functions, logarithmic differentiation – problems in each case. Higher order derivatives - examples – functions of several variables – partial differentiation, Euler's theorem-simple problems.

Applications of Derivatives:

Unit – V

Duration: 8 Periods (L: 4.8 – T:3.2)

7. **Geometrical Applications:** Geometrical meaning of the derivative, equations of Tangent and normal to a curve at any point on the curve. Lengths of tangent, normal, sub tangent and subnormal to the curve at any point on it. Angle between two intersecting curves - problems.

Unit – VI

Duration: 10 Periods (L: 6 – T:4)

8. **Physical Applications:** Physical applications of the derivative – Explain the derivative as a rate of change in distance-time relations to find the velocity and acceleration of a moving particle with examples. Explain the derivative as a rate measure in the problems where the quantities like volumes, areas vary with respect to time- illustrative examples– Simple Problems.
9. **Maxima & Minima:** Applications of the derivative to find the extreme values – Increasing and decreasing functions, finding the maxima and minima of simple functions - problems leading to applications of maxima and minima.

References

1. Co - Ordinate Geometry – by S.L. Loney
2. Thomas Calculus, Pearson Addison – Wesley Publications
3. Calculus – I by Shanti Narayan and Manicavachagam Pillai, S.V Publications.
4. NCERT Mathematics Text Books Of Class XI, XII.
5. Intermediate Mathematics Text Books (Telugu Academy)

Suggested E-Learning references

1. www.freebookcentre.net/mathematics/introductory-mathematics-books.html
2. E-books: www.mathebook.net

Suggested Learning Outcomes

Coordinate Geometry

Unit – I

1.0 Solve the problems on Straight lines

- 1.1 Write the different forms of a straight line – point slope form, two point form, intercept form, normal form and general form
- 1.2 Solve simple problems on the above forms
- 1.3 Find distance of a point from a line, acute angle between two lines, intersection of two non-parallel lines and distance between two parallel lines.

2.0 Solve the problems on Circles

- 2.1 Define locus of a point, circle and its equation.
- 2.2 Find the equation of a circle given
 - (i) Centre and radius
 - (ii) Two ends of a diameter
 - (iii) Centre and a point on the circumference
 - (iv) Three non collinear points
 - (v) Centre and tangent
- 2.3 Write the general equation of a circle and find the centre and radius.
- 2.4 Write the equation of tangent and normal at a point on the circle.
- 2.5 Solve the problems to find the equations of tangent and normal.

Unit – II

3.0 Appreciate the properties of Conics in engineering applications

- 3.1 Define a conic section.
- 3.2 Understand the terms focus, directrix, eccentricity, axes and latus rectum of a conic with illustrations.
- 3.3 Find the equation of a conic when focus, directrix and eccentricity are given
- 3.4 Describe the properties of Parabola, Ellipse and Hyperbola
- 3.5 Solve problems in simple cases of Parabola, Ellipse and Hyperbola.

Differential Calculus

UNIT - III

4.0 Use the concept of Limit for solving the problems

- 4.1 Understand the concept of limit and meaning of $\lim_{x \rightarrow a} f(x) = l$ and state the properties of limits.

4.2 Mention the Standard limits $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$, $\lim_{x \rightarrow 0} \frac{\sin x}{x}$, $\lim_{x \rightarrow 0} \frac{\tan x}{x}$, $\lim_{x \rightarrow 0} \frac{a^x - 1}{x}$,

$$\lim_{x \rightarrow 0} \frac{e^x - 1}{x}, \lim_{x \rightarrow 0} (1+x)^{\frac{1}{x}}, \lim_{x \rightarrow \infty} \left(1 + \frac{1}{x}\right)^x \quad (\text{All without proof}).$$

4.3 Solve the problems using the above standard limits

4.4 Evaluate the limits of the type $\lim_{x \rightarrow l} \frac{ax^2 + bx + c}{\alpha x^2 + \beta x + \gamma}$ and $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)}$

5.0 Appreciate Differentiation and its meaning in engineering situations

5.1 State the concept of derivative of a function $y = f(x)$ – definition, first principle as

$\lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ and also provide standard notations to denote the derivative of a function.

5.2 State the significance of derivative in scientific and engineering applications.

5.3 Find the derivatives of elementary functions like x^n , a^x , e^x , $\log x$, $\sin x$, $\cos x$, $\tan x$, $\sec x$, $\csc x$ and $\cot x$ using the first principles.

5.4 Find the derivatives of simple functions from the first principle.

5.5 State the rules of differentiation of sum, difference, scalar multiplication, product and quotient of functions with illustrative and simple examples.

5.6 Understand the method of differentiation of a function of a function (Chain rule) with illustrative examples such as

$$(i) \sqrt{t^2 + \frac{2}{t}} \quad (ii) x^2 \sin 2x \quad (iii) \frac{x}{\sqrt{x^2 + 1}} \quad (iv) \log(\sin(\cos x))$$

Unit – IV

6.0 Appreciate Differentiation and its meaning in engineering situations

6.1 Find the derivatives of Inverse Trigonometric functions and examples.

6.2 Understand the method of differentiation of a function with respect to another function and also differentiation of parametric functions with examples.

6.3 Find the derivatives of hyperbolic functions.

6.4 Explain the procedures for finding the derivatives of implicit function with examples.

6.5 Explain the need of taking logarithms for differentiating some functions with examples like $[f(x)]^{g(x)}$.

6.6 Explain the concept of finding the higher order derivatives of second and third order with examples.

- 6.7 Explain the concept of functions of several variables, partial derivatives and difference between the ordinary and partial derivatives with simple examples.
- 6.8 Explain the definition of Homogenous function of degree n
- 6.9 Explain Euler's theorem for homogeneous functions with applications to simple problems.

Applications of Differentiation

UNIT - V

7.0 Understand the Geometrical Applications of Derivatives

- 7.1 State the geometrical meaning of the derivative as the slope of the tangent to the curve $y=f(x)$ at any point on the curve.
- 7.2 Explain the concept of derivative to find the slope of tangent and to find the equation of tangent and normal to the curve $y=f(x)$ at any point on it.
- 7.3 Find the lengths of tangent, normal, sub-tangent and sub normal at any point on the curve $y=f(x)$.
- 7.4 Explain the concept of angle between two curves and procedure for finding the angle between two given curves with illustrative examples.

Unit – VI

8.0 Understand the Physical Applications of Derivatives

- 8.1 Explain the derivative as a rate of change in distance-time relations to find the velocity and acceleration of a moving particle with examples.
- 8.2 Explain the derivative as a rate measurer in the problems where the quantities like volumes, areas vary with respect to time- illustrative examples.

9.0 Use Derivatives to find extreme values of functions

- 9.1 Define the concept of increasing and decreasing functions.
- 9.2 Explain the conditions to find points where the given function is increasing or decreasing with illustrative examples.
- 9.3 Explain the procedure to find the extreme values (maxima or minima) of a function of single variable - simple problems yielding maxima and minima.
- 9.4 Solve problems on maxima and minima in applications like finding areas, volumes, etc.

Suggested Student Activities

1. Student visits Library to refer Standard Books on Mathematics and collect related material.
2. Quiz
3. Group discussion
4. Surprise tests

5. Seminars
6. Home assignments.

CO / PO - MAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	Mapped POs
CO1	3	2	2	1			1			3	1,2,3,4,7,10
CO2	3	2	2	1			1			3	1,2,3,4,7,10
CO3	3	2	2	1			1			3	1,2,3,4,7,10
CO4	3	2	2	1			1			3	1,2,3,4,7,10
CO5	3	2	2	1			1			3	1,2,3,4,7,10
CO6	3	2	2	1			1			3	1,2,3,4,7,10

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MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

MID SEM –II EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Semester End Examination

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R		U	A		
1	I	4	1		9(a)	13(a)	
2	II						
3	III		2		10(a)	14(a)	
4	IV						
5	V		3	5, 6	9(b)	13(b)	
6	VI				11(a) 11(b)	15(a) 15(b)	
		8		8			8

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

Applied Physics

Course Title	Applied Physics	Course Code	18C-203F
Semester	II	Course Group	Foundation
Teaching Scheme in Pds/Hrs(L:T:P)	30:15:0 Hrs 40:20:00 Pds	Credits	3
Type of course	Lecture+Assignments	Total Contact Hrs	60Pds
CIE	60 Marks	SEE	40 Marks

Pre requisites: Basic High school science, basic mathematics

Course Objectives: After studying this course, the student will be able to understand and appreciate the role of Engineering Physics in different areas of engineering and technology.

Course outcomes: On successful completion of the course, the student will have the ability to attain below Course outcomes (CO):

Course Outcomes		Linked POs	Teaching Hours
CO 1	Apply knowledge of waves and sound in engineering problems.	PO1,PO2	10
CO 2	Apply knowledge of Simple Harmonic Motion to solve engineering problems	PO1, PO2	10
CO 3	Use modern instruments in engineering	PO1, PO2,PO3, PO4	10
CO 4	Use various magnetic materials in engineering equipments	PO1, PO2,PO3	10
CO 5	Use various electrical measuring instruments as tools in engineering	PO1, PO2,PO3,PO 4	10
CO 6	Apply Electronics principles in engineering problems	PO1, PO2,PO3,PO 4	10

APPLIED PHYSICS

Course Contents

1. UNIT – 1 WAVES AND SOUND Duration: 10 periods (L:6.0 – T: 4.0)

Wave motion – definition and characteristics – audible range – infrasonic and ultrasonic – longitudinal and transverse waves – examples – Relation between wavelength, frequency and velocity of a wave – derivation –stationary waves- beats - applications of beats - Doppler effect – list of applications – ultrasound and radar in medicine and engineering as special emphasis- echo –definition - applications - relation between time of echo and distance of obstacle –derivation- Reverberation and time of reverberation - Sabine’s formula - Free and forced vibrations - Resonance - Conditions of good auditorium - noise pollution – definition – causes, effects and methods to minimize noise pollution - problems

2. UNIT – 2 SIMPLE HARMONIC MOTION Duration: 10 periods (L:6.0 – T: 4.0)

Periodic motion - Simple Harmonic Motion (SHM)– definition - examples - Conditions for SHM –Projection of circular motion on any diameter of a circle is SHM - Expressions for Displacement, Velocity and Acceleration of a particle executing SHM – derivations - Time period, frequency, amplitude and phase of a particle in SHM - Ideal simple pendulum – time period of simple pendulum –derivation - laws of simple pendulum-Seconds pendulum- problems.

3. UNIT – 3 MODERN PHYSICS Duration: 10 periods (L:6.0 – T: 4.0)

Photo electric effect - Einstein’s photo electric equation – Work function and threshold frequency - laws of photo electric effect - applications of photo electric effect – photo cell - concept of Refraction of light - critical angle and total internal reflection - principle of Optical fiber - Applications of optical fiber – LASER – definition and characteristics – principle of LASER - spontaneous emission and stimulated emission - population inversion - examples of LASER – Uses.

4. UNIT-4 MAGNETISM Duration: 10 periods (L:6.0 – T: 4.0)

Magnetic field - magnetic lines of force -properties - Uniform and Non-uniform magnetic field – Magnetic length, pole strength – magnetic induction field strength- definition - Coulomb’s inverse square law of magnetism - expression for moment of couple on a bar magnet placed in a uniform magnetic field – derivation - expression for magnetic induction field strength at a point on the axial line of a bar magnet –derivation - Dia, Para and Ferro magnetic materials – examples - related problems.

5.UNIT-5 ELECTRICITY AND MEASURING INSTRUMENTS Duration: 10 periods (L:6.0 – T: 4.0)

Ohm's law – Ohmic and non ohmic conductors – examples - Temperature dependence of resistance – coefficients of resistance with examples - Specific resistance – units – conductance-series and parallel combination of resistors - moving coil galvanometer - conversion of galvanometer into ammeter and voltmeter with diagram (qualitatively) – Kirchhoff's current and voltage laws in electricity – Expression for balancing condition of Wheatstone's bridge – derivation – Meter bridge –working with neat diagram –Superconductivity-definition-superconductors - definition and examples – applications - related problems.

6. UNIT – 6 ELECTRONICS (L:6.0 – T: 4.0)

Duration: 10 periods

Solids – definition – energy bands in solids- valence band, conduction band and forbidden band – Energy band diagram of conductors, insulators and semiconductors – concept of Fermi level - Intrinsic semiconductors - examples - Concept of holes in semiconductors - Doping - Extrinsic semiconductor - P-type and N-type semiconductors - PN Junction diode – Forward Bias and Reverse Bias - Applications of PN diode - Diode as rectifier – principle – principle of Light Emitting Diode and solar cell.

References:

5. Engineering Physics by R.K. Gaur, S.L. Gupta, Dhanpatrai Publications, New Delhi.
6. ISC Physics, Book I&II, P. Vivekanandan, DK Banerjee, S Chand, New Delhi.
7. Intermediate Physics, Vol. I&II, Telugu Academy, TS, Hyderabad.
8. Fundamentals of Physics by Halliday and Resnick.

Suggested learning outcomes:

Upon completion of the course the student shall be able to

1. know the concept of Waves and Sound

- 1.1 Define wave. Explain the characteristics of a wave (frequency, wavelength, amplitude, time period).
- 1.2 Explain audibility range of sound.
- 1.3 Define infrasonic and ultrasonic sounds.
- 1.4 Define longitudinal and transverse wave motion. Write examples for each. Distinguish between them.
- 1.5 Derive the relation between wavelength, frequency and velocity of a wave ($v = n\lambda$)
- 1.6 Define stationary waves.
- 1.7 Explain the phenomenon of beats. List the applications of beats.
- 1.8 Explain Doppler Effect. List the applications of Doppler Effect.
- 1.9 Application of Doppler Effect in medicine and engineering - ultrasound and radar.
- 1.10 Define echo. List the applications of echo.
- 1.11 Derive the relation between time of echo and distance of obstacle.
- 1.12 Explain Reverberation and time of reverberation.
- 1.13 Write Sabine's formula and explain the terms.
- 1.14 Define free and forced vibrations.
- 1.15 Define resonance with examples.

- 1.16 State the conditions of a good auditorium.
- 1.17 Define noise pollution.
- 1.18 List the causes, effects and methods to minimize noise pollution.
- 1.19 Solve related numerical problems.

2. know the concept of Simple Harmonic Motion

- 2.1 Define periodic motion.
- 2.2 Define Simple Harmonic Motion (SHM).
- 2.3 List the examples of SHM.
- 2.4 State the conditions of simple harmonic motion.
- 2.5 Projection of circular motion on any diameter of a circle is SHM.
- 2.6 Define the terms time period, frequency, amplitude and phase of particle in SHM.
- 2.7 Derive the expressions for Displacement, Velocity and Acceleration of a particle executing in SHM.
- 2.8 Define Ideal simple pendulum and derive the expression for time period of simple pendulum.
- 2.9 State the laws of simple pendulum.
- 2.10 Define seconds pendulum.
- 2.11 Solve related numerical problems.

3. know the concept of Modern Physics

- 3.1 Explain Photo electric effect.
- 3.2 Define the terms work function and threshold frequency.
- 3.3 State Einstein's photo electric equation and explain the terms.
- 3.4 State laws of photo electric effect.
- 3.5 List the applications of photo electric effect.
- 3.6 Explain working of photocell.
- 3.7 Explain the concept of refraction of light.
- 3.8 Define critical angle.
- 3.9 Define Total internal reflection.
- 3.10 State conditions for Total internal reflection.
- 3.11 Explain principle and working of optical fiber.
- 3.12 List the applications of optical fiber.
- 3.13 Define LASER. State the characteristics of LASER.
- 3.14 Explain the principle of LASER.
- 3.15 Define spontaneous emission and stimulated emission.
- 3.16 Define population inversion.
- 3.17 List the examples of LASER.
- 3.18 List the uses of LASER.

4 know the concept of Magnetism

- 4.1 Define magnetic field.
- 4.2 Define magnetic lines of force.
- 4.3 State the properties of magnetic lines of force.
- 4.4 Define Uniform and Non-uniform magnetic field.
- 4.5 Define the terms magnetic length and pole strength of a bar magnet.
- 4.6 Define magnetic induction field strength.
- 4.7 State and explain Coulomb's inverse square law of magnetism.
- 4.8 Derive the expression for moment of couple on a bar magnet placed in a uniform magnetic field.

- 4.9 Derive the formula for magnetic induction field strength at a point on the axial line of a bar magnet.
- 4.10 Define Dia, Para and Ferro magnetic materials with examples.
- 4.11 Solve related numerical problems.

5 know the concept of Electricity and measuring instruments

- 5.1 State Ohm's law – Define ohmic and non ohmic conductors with examples
- 5.2 Explain temperature dependence of resistance – types of temperature coefficients with examples
- 5.3 Define specific resistance. Write its units.
- 5.4 Define conductance.
- 5.5 Write the formulae for effective resistance in series and parallel combination of resistors with diagram.
- 5.6 Explain moving coil galvanometer.
- 5.7 Conversion of a galvanometer into ammeter and voltmeter. Explain with diagram.
- 5.8 State and explain Kirchhoff's current and voltage laws in electricity.
- 5.9 Derive an expression for balancing condition of Wheatstone's bridge with legible sketch.
- 5.10 Explain briefly Meter Bridge with neat diagram.
- 5.11 Define superconductivity.
- 5.12 Define superconductor. Give examples.
- 5.13 List the applications of superconductors.
- 5.14 Solve related numerical problems.

6 know the concepts of Electronics and applications

- 6.1 Define solid.
- 6.2 Define valence band, conduction band and forbidden band in solids.
- 6.3 Explain conductors, insulators and semiconductors on the basis of energy band diagram.
- 6.4 Explain the concept of Fermi level.
- 6.5 Define intrinsic semiconductors.
- 6.6 List the examples for intrinsic semiconductors.
- 6.7 Explain the concept of hole in semiconductors.
- 6.8 Define doping.
- 6.9 Define extrinsic semiconductors.
- 6.10 Explain P-type and N-type semiconductors.
- 6.11 Explain PN Junction Diode (formation only).
- 6.12 Explain forward and reverse bias of PN diode (biasing and flow of majority and minority carriers with diagram only)
- 6.13 List the applications of PN Diode.
- 6.14 Explain the principle of diode as a rectifier.
- 6.15 Explain working principle of Light Emitting Diode (LED)
- 6.16 Explain the working principle of solar cell.

MID SEM-I EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	
MID SEM –II EXAM					
S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Semester End Examination

Sl No	Unit No.	Questions to be set for SEE				Remarks		
		R		U	A			
1	I	4	1		9(a)	13(a)		
2	II							
3	III		2		10(a)	14(a)		
4	IV							
5	V		3	5, 6	9(b)	13(b)		
6	VI				7,8	11(a)		15(a)
						11(b)		15(b)
				10(b)	14(b)			
				12(a)	16(a)			
				12(b)	16(b)			
Total Questions		8		8	8			

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks

Engineering Chemistry and Environmental Studies

Course Title: Engineering Chemistry and Environmental Studies		Course Code : 18C-204F
Semester : Semester II		Course Group : Foundation
Teaching Scheme in hours (L:T:P) : 30:15:00		Credits : 3
Type of course : Lecture + Assignments		Total Contact Hours : 60 periods
CIE : 60 Marks		SEE : 40 Marks

Prerequisite:

Basic knowledge of chemistry in secondary education.

Course Objectives: After studying this course the student will be able to understand and appreciate the role of Chemistry and environmental studies in different spheres of industries.

Course Outcome:

On successful completion of the course, the students will have ability to attain below Course Outcomes (CO):

CO	Course outcome	CL	Linked PO	Teaching periods
CO1	Understand and explain the different metallurgical processes, alloys and applications of alloys	R/U/A	1,2,9,10	10
CO2	Understand and explain corrosion and preventive methods of corrosion	R/U/A	1,2,9,10	10
CO3	List out the different methods of preparation and industrial uses of plastics, rubber and fibers. vulcanization of rubber and its applications	R/U/A	1,2,5,6,7, 10	12
CO4	Classify the fuels and explain basic terms of fuel, outline the composition and industrial use of gaseous fuels	R/U/A	1,2,10	8
CO5	Under stand and Explain Galvanic cell, emf of cell - electro chemical series-Applications of Galvanic cells, batteries and cells and distinguish the Galvanic and electrolytic cell	R/U/A	1,2,5	12
CO6	Explain the causes, effects and controlling methods of air and water pollutions.	R/U/A	1,2,5,7	8
	Total Periods			60

Legends: R = Remember, U= Understand, A = Apply

ENGINEERING CHEMISTRY AND ENVIRONMENTAL STUDIES COURSE CONTENTS

UNIT - I: Metallurgy:(10 periods)

Characteristics of Metals - distinguish between Metals and Non Metals- Ore, Gangue, Flux, Slag - Concentration of Ore -Froth floatation - Methods of Extraction of crude Metal - Roasting, Calcination, Smelting – Alloys-purpose of making alloys - Composition of Brass, German silver, Nichrome, Stainless steel and Duralumin

UNIT – II:Corrosion:

(10 periods)

Introduction - factors influencing the rate of corrosion - electrochemical theory of corrosion - composition, stress and concentration cells- rusting of iron and its mechanism - prevention of corrosion - coating methods, Paints-constituents and characteristics of paints-cathodic protection.

UNIT – III: Polymers:

(12 periods)

Introduction - polymerization - types of polymerization - addition, condensation with examples - plastics - types of plastics - advantages of plastics over traditional materials - Disadvantages of using plastics - preparation and uses of the following plastics: 1. Polythene 2. PVC 3. Teflon 4. Polystyrene 5. Urea formaldehyde 6. Bakelite - Rubber - Elastomers –Preparation of Butyl rubber, Buna-s, Neoprene rubber and their uses-Fibres-Preparation and uses of fibres-Nylon 6,6-Polyester.

UNIT – IV: Fuels:

(8 periods)

Definition and classification of fuels- characteristics of good fuel - Calorific value-HCV and LCV- Calculation of oxygen required for combustion of methane and ethane - composition and uses of gaseous fuels- a) water gas b) producer gas, c) natural gas, d) coal gas, e) Bio gas and f) acetylene.

UNIT – V: Electro Motive Force (12 periods)

Galvanic cell – standard electrode potential –electro chemical series -emf of cell-Batteries-Types of batteries-Fuel cells.

UNIT – VI: ENVIRONMENTAL STUDIES-II :(8 periods)

Introduction- classification of air pollutants based on origin and states of matter-Air pollution - causes-Effects - control methods - Water pollution - causes - effects - control measures.

Reference Books :

1. Engineering chemistry – Jain & Jain – Dhanpat Rai Publishing Company.
2. A Text book of Engineering Chemistry – S.S.Dara – S.Chand Publications.
3. Environmental Studies – A.K.De.
4. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press
5. Intermediate Chemistry I and II – Telugu Academy TS

Upon completion of the course, the student will have ability to

UNIT – I: METALLURGY

- 1.1. List the Characteristics of Metals.
- 1.2. Distinguish between Metals and Non Metals
- 1.3. Define the terms 1.Mineral, 2.Ore, 3. Gangue, 4. Flux and 5.Slag
- 1.4. Describe Froth Floatation method of concentration of ore.
- 1.5. Describe the methods involved in extraction of crude metal- Roasting, Calcination and Smelting.
- 1.6. Define an Alloy
- 1.7. Explain the purpose of making of alloys
- 1.8. Write the Composition of the following alloys:1.Brass, 2.German silver, 3.Nichrome
4. Stainless steel, 5. Duralumin
- 1.9. List the uses of following Alloys: Brass, German silver, Nichrome, Stainless steel, Duralumin

UNIT – II: CORROSION

- 2.1. Define the term corrosion
- 2.2. Explain the Factors influencing the rate of corrosion

- 2.3. Explain the concept of electrochemical theory of corrosion
- 2.4. Describe the formation of a) composition cell, b) stress cell c) concentration cell
- 2.5. Define rust and explain the mechanism of rusting of iron with chemical reactions.
- 2.6. Explain the methods of prevention of corrosion:
 - a) Protective Coatings i) Metallic coatings (Anodic and cathodic coatings) ii) Inorganic coatings iii) Organic coatings, paint, constituent of paint and characteristics of good paint.
 - b) Cathodic protection (Sacrificial anode process and Impressed - voltage process).

UNIT – III: POLYMERS

- 3.1. Explain the concept of polymerization
- 3.2. Describe the methods of polymerization a) addition polymerization
b) condensation polymerization with examples.
- 3.3. Define the term plastic
- 3.4. List the Characteristics of plastics.
- 3.5. State the advantages of plastics over traditional materials
- 3.6. State the disadvantages of using plastics.
- 3.7. Types of plastics with examples.
- 3.8. Distinguish between thermoplastics and thermosetting plastics
- 3.9. Explain the methods of preparation and uses of the following plastics:
 1. Polythene, 2. PVC, 3. Teflon, 4. Polystyrene 5. Urea formaldehyde 6. Bakelite
 (only flow chart for Bakelite i.e. without chemical equations).
- 3.10. Define the term natural rubber
- 3.11. Explain preparation of natural rubber
- 3.12. State the structural formula of Natural rubber
- 3.13. List the Characteristics of natural rubber
- 3.14. Explain the process of Vulcanization
- 3.15. List the Characteristics of Vulcanized rubber
- 3.16. Define the term Elastomer
- 3.17. Describe the preparation and uses of the following synthetic rubbers a) Butyl rubber,
b) Buna-s and c) Neoprene rubber.
- 3.18. Define fibre.
- 3.19. Explain the preparation and uses of fibres –Nylon 6,6 and Polyester

UNIT – IV: FUELS

- 4.1. Define the term fuel
- 4.2. Classify the fuels based on physical state - solid, liquid and gaseous fuels with examples.
- 4.3. Classify the fuels based on occurrence- primary and secondary fuels with examples.
- 4.4. List the characteristics of a good fuel
- 4.5. Advantages of gaseous fuels
- 4.6. Define Calorific value- HCV and LCV.
- 4.7. Calculate the oxygen required for the combustion of Methane and Ethane fuel gases.
- 4.8. State the composition and uses of the following gaseous fuels:
 - a) water gas, b) producer gas, c) natural gas, d) coal gas, e) Bio gas and f) acetylene

UNIT – V: Electro Motive Force

- 5.1. Define Galvanic cell
- 5.2. Explain the construction and working of Galvanic cell
- 5.3. Distinguish between electrolytic cell and galvanic cell
- 5.4. Explain standard electrode potential
- 5.5. Explain standard hydrogen electrode
- 5.6. Define electrochemical series and explain its significance.
- 5.7. Define and explain emf of a cell.

- 5.8. Solve the numerical problems on emf of cell
 5.9. Explain Batteries (Cells) and types of batteries with examples –working and applications of Dry cell (Leclanche cell), Lead storage battery, Ni-Cd cell
 5.10. Explain working and advantages of Fuel cell (Hydrogen - Oxygen Fuel Cell)

UNIT – VI: ENVIRONMENTAL STUDIES-II

- 6.1. Define air pollution
 6.2. Classify the air pollutants- based on origin and states of matter
 6.3. Explain the causes of air pollution
 6.4. Explain the effects of air pollution on human beings, plants and animals
 6.5. Explain the green house effect - ozone layer depletion and acid rain
 6.6. Explain the methods of control of air pollution
 6.7. Define water pollution
 6.8. Explain the causes of water pollution
 6.9. Explain the effects of water pollution on living and non living things
 6.10. Explain the methods of control of water pollution.

Suggested Student Activities for Induction Program:

	Forenoon	Afternoon
Day1	Registration	Class work as per Time table Chemistry Lab practice classes may be conducted
Day2	Rules and Regulations	
Day3	Getting acquainted with Head and faculty	
Day4	Familiarization with Institutional facilities	
Day5	Interaction with Class teacher and Seniors	
Day6	Introducing the mentor	
Day7	Parent –Teacher meeting	

Suggested Student Activities

1. Student visits Library to refer to Text books, reference books and manuals to find their specifications
2. Student inspects the available equipment in the Chemistry Lab to familiarize with them.
3. Quiz
4. Group discussion
5. Seminar
6. Surprise test

E learning links:

<https://iupac.org/>
<https://www.youtube.com>
<https://www.khanacademy.org/>
www.nptel.ac.in

Blue Print**MID SEM-I EXAM**

S.No	Unit Name	R	U	A	Remarks
1	Unit-I	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-II	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

MID SEM –II EXAM

S.No	Unit Name	R	U	A	Remarks
1	Unit-III	1, 2	5(a) 5(b)	7(a) 7(b)	
2	Unit-IV	3, 4	6(a) 6(b)	8(a) 8(b)	
Total Questions		4	4	4	

Semester End Examination

Sl No	Unit No.	Questions to be set for SEE				Remarks	
		R		U	A		
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2	II						
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4	IV						
5	V		3	5, 6	9(b)	13(b)	
					11(a)	15(a)	
					11(b)	15(b)	
6	VI		7,8	10(b)	14(b)		
				12(a)	16(a)		
				12(b)	16(b)		
Total Questions		8		8	8		

Legend:	Remembering (R)	1 Mark
	Understanding (U)	3 Marks
	Application (A)	5 Marks