

## Eng-112ENGLISH

### Total contact hours

Theory	64	T	P	C
Practical	0	2	0	2

**AIMS** At the end of the course, the students will be equipped with cognitive skill to enable them to present facts in a systematic and logical manner to meet the language demands of dynamic field of commerce and industry for functional day-to-day use and will inculcate skills of reading, writing and comprehension.

### COURSE CONTENTS

#### ENGLISH PAPER "A"

#### 1 PROSE/TEXT 16 hours

1.1 First eight essays of Intermediate English Book-II

#### 2 CLOZE TEST 4 hours

2.1 A passage comprising 50-100 words will be selected from the text. Every 11th word or any word for that matter will be omitted. The number of missing word will range between 5-10. The chosen word may or may not be the one used in the text, but it should be an appropriate word.

#### ENGLISH PAPER "B"

#### 3 GRAMMAR 26 hours

3.1 Sentence Structure.

3.2 Tenses.

3.3 Parts of speech.

3.4 Punctuation.

3.5 Change of Narration.

3.6 One word for several

3.7 Words often confused

#### 4. COMPOSITION 8 hours

4.1 Letters/Messages

4.2 Job application letter

4.3 For character certificate/for grant of scholarship

4.4 Telegrams, Cablegrams and Radiograms, Telexes, Facsimiles

4.5 Essay writing

4.6 Technical Education, Science and Our life, Computers, Environmental Pollution, Duties of a Student.

**5. TRANSLATION**

5.1 Translation from Urdu into English.

For Foreign Students: A paragraph or a dialogue.

**4 hours**

**6 hours**

**RECOMMENDED BOOKS**

1. Intermediate English Book-II.

2. An English Grammar and Composition of Intermediate Level.

3. A Hand Book of English Students By Gatherer.

## Eng-112ENGLISH

### INSTRUCTIONAL OBJECTIVES

#### PAPER-A

#### 1. DEMONSTRATE BETTER READING, COMPREHENSION AND VOCABULARY

- 1.1 Manipulate, skimming and scanning of the text.
- 1.2 Identify new ideas.
- 1.3 Reproduce facts, characters in own words

1.4 Write summary of stories

#### 2. UNDERSTAND FACTS OF THE TEXT

- 2.1 Rewrite words to fill in the blanks recalling the text.
- 2.2 Use own words to fill in the blanks.

#### PAPER-B

#### 3. APPLY THE RULES OF GRAMMAR IN WRITING AND SPEAKING

- 3.1 Use rules of grammar to construct meaningful sentences containing a subject and a predicate.
- 3.2 State classification of time, i.e present, past and future and use verb tense correctly in different forms to denote relevant time.
- 3.3 Identify function words and content words.
- 3.4 Use marks of punctuation to make sense clear.
- 3.5 Relate what a person says in direct and indirect forms.
- 3.6 Compose his writings.
- 3.7 Distinguish between confusing words.

#### 4. APPLY THE CONCEPTS OF COMPOSITION WRITING TO PRACTICAL SITUATIONS

- 4.1 Use concept to construct applications for employment, for character certificate, for grant of scholarship.
- 4.2 Define and write telegrams, cablegrams and radiograms, telexes, facsimiles
- 4.3 Describe steps of a good composition writing.
- 4.4 Describe features of a good composition.
- 4.5 Describe methods of composition writing
- 4.6 Use these concepts to organize facts and describe them systematically in practical situation.

#### 5. APPLIES RULES OF TRANSLATION

- 5.1 Describe confusion.
- 5.2 Describe rules of translation.
- 5.3 Use rules of translation from Urdu to English in simple paragraph and sentences.

**Math-113      APPLIED MATHEMATICS-I**

<b>T</b>	<b>P</b>	<b>C</b>
3	0	3

**Total Contact Hours**

Theory            96 Hours.

**Pre-requisite:** Must have completed a course of Elective Mathematics at Matric level.

**AIMS:** After completing the course the students will be able to

- 1.Solve problems of Algebra, Trigonometry, vectors, Mensuration, Matrices and Determinants.
- 2.Develop skill, mathematical attitudes and logical perception in the use of mathematical instruments as required in the technological fields.
- 3.Acquire mathematical clarity and insight in the solution of technical problems.

**COURSE CONTENTS**

- |   |                |
|---|----------------|
| <b>1.      QUADRATIC EQUATIONS</b>                | <b>6 Hours</b> |
| 1.1    Standard Form                              |                |
| 1.2    Solution                                   |                |
| 1.3    Nature of roots                            |                |
| 1.4    Sum & Product of roots                     |                |
| 1.5    Formation                                  |                |
| 1.6    Problems                                   |                |
| <b>2.      ARITHMETIC PROGRESSION AND SERIES.</b> | <b>3 Hours</b> |
| 2.1    Sequence                                   |                |
| 2.2    Series                                     |                |
| 2.3    nth term                                   |                |
| 2.4    Sum of the first n terms                   |                |
| 2.5    Means                                      |                |
| 2.6    Problems                                   |                |
| <b>3.      GEOMETRIC PROGRESSION AND SERIES.</b>  | <b>3 Hours</b> |
| 3.1    nth term                                   |                |
| 3.2    Sum of the first n terms                   |                |
| 3.3    Means                                      |                |
| 3.4    Infinite Geometric progression             |                |
| 3.5    Problems                                   |                |
| <b>4.      BINOMIAL THEOREM</b>                   | <b>6 Hours</b> |
| 4.1    Factorials                                 |                |

- 4.2 Binomial Expression
  - 4.3 Binomial Co-efficient
  - 4.4 Statement
  - 4.5 The General Term
  - 4.6 The Binomial Series
  - 4.7 Problems.
- 5. PARTIAL FRACTIONS 6 Hours**
- 5.1 Introduction
  - 5.2 Linear Distinct Factors Case I
  - 5.3 Linear Repeated Factors Case II
  - 5.4 Quadratic Distinct Factors Case III
  - 5.5 Quadratic Repeated Factors Case IV
  - 5.6 Problems
- 6. FUNDAMENTALS OF TRIGONOMETRY 6 Hours**
- 6.1 Angles
  - 6.2 Quadrants
  - 6.3 Measurements of Angles
  - 6.4 Relation between Sexagesimal & circular system
  - 6.5 Relation between Length of a Circular Arc & the Radian Measure of its central Angle
  - 6.6 Problems
- 7. TRIGONOMETRIC FUNCTIONS AND RATIOS 6 Hours**
- 7.1 Trigonometric functions of any angle
  - 7.2 Signs of trigonometric Functions
  - 7.3 Trigonometric Ratios of particular Angles
  - 7.4 Fundamental Identities
  - 7.5 Problems
- 8. GENERAL IDENTITIES 6 Hours**
- 8.1 The Fundamental Law
  - 8.2 Deductions
  - 8.3 Sum & Difference Formulae
  - 8.4 Double Angle Identities
  - 8.5 Half Angle Identities
  - 8.6 Conversion of sum or difference to products
  - 8.7 Problems
- 9. SOLUTION OF TRIANGLES 6 Hours**
- 9.1 The law of Sines
  - 9.2 The law of Cosines
  - 9.3 Measurement of Heights & Distances

9.4	Problems	
<b>10.</b>	<b>MENSURATION OF SOLIDS</b>	<b>30 Hours</b>
10.1	Review of regular plane figures and Simpson's Rule	
10.2	Prisms	
10.3	Cylinders	
10.4	Pyramids	
10.5	Cones	
10.6	Frusta	
10.7	Spheres	
<b>11.</b>	<b>VECTORS</b>	<b>9 Hours</b>
11.1	Scalars & Vectors	
11.2	Addition & Subtraction	
11.3	The unit Vectors $i, j, k$	
11.4	Direction Cosines	
11.5	Scaler or Dot Product	
11.6	Deductions	
11.7	Dot product in terms of orthogonal components	
11.8	Vector or cross Product	
11.9	Deductions	
11.10	Analytic Expression for $a \times b$ .	
11.11	Problems	
<b>12.</b>	<b>MATRICES AND DETERMINANTS</b>	<b>9 Hours</b>
12.1	Definition of Matrix	
12.2	Rows & Columns	
12.3	Order of a Matrix	
12.4	Algebra of Matrices	
12.5	Determinants	
12.6	Properties of Determinants	
12.7	Solution of Linear Equations	
12.8	Problems	

### REFERENCE BOOKS

1. Ghulam Yasin Minhas - Technical Mathematics Vol-I, Ilmi Kitab Khana, Lahore.
2. Prof. Riaz Ali Khan - Polytechnic Mathematic Series Vol I & II, Majeed Sons, Faisalabad
3. Prof. Sana Ullah Bhatti - A Text Book of Algebra and Trigonometry, Punjab Text Book Board, Lahore.

**INSTRUCTIONAL OBJECTIVES**

**1.USE DIFFERENT METHODS FOR THE SOLUTION OF QUADRATIC EQUATIONS.**

- 1.1      Define a standard quadratic equation.
- 1.2 Use methods of factorization and method of completing the square for solving the equations.
- 1.3      Derive quadratic formula.
- 1.4      Write expression for the discriminant.
- 1.5      Explain nature of the roots of a quadratic equation.
- 1.6      Calculate sum and product of the roots.
- 1.7      Form a quadratic equation from the given roots.
- 1.8      Solve problems involving quadratic equations.

**2.UNDERSTAND APPLY CONCEPT OF ARITHMETIC PROGRESSION AND SERIES.**

- 2.1      Define an Arithmetic sequence and a series.
- 2.2      Derive formula for the nth term of an A.P.
- 2.3      Explain Arithmetic Mean between two given numbers.
- 2.4      Insert n Arithmetic means between two numbers.
- 2.5      Derive formulas for summation of an Arithmetic series.
- 2.6      Solve problems on Arrthmetic Progression and Series..

**3.      UNDERSTAND GEOMETRIC PROGRESSION AND SERIES.**

- 3.1      Define a geometric sequence and a series.
- 3.2      Derive formula for nth term of a G.P.
- 3.3      Explain geometric mean between two numbers.
- 3.4      Insert n geometric means between two numbers.
- 3.5      Derive a formula for the summation of geometric Series.
- 3.6      Deduce a formula for the summation of an infinite G.P.
- 3.7      Solve problems using these formulas.

**4.      EXPAND AND EXTRACT ROOTS OF A BINOMIAL.**

- 4.1      State binomial theorem for positive integral index.
- 4.2      Explain binomial coefficients:  $(n,0)$ ,  $(n,1)$ ....., $(n,r)$ .....,  $(n,n)$
- 4.3      Derive expression for the general term.
- 4.4      Calculate the specified terms.
- 4.5      Expand a binomial of a given index.
- 4.6      Extract the specified roots.
- 4.7      Compute the approximate value to a given decimal place.
- 4.8      Solve problems involving binomials.

## **5.RESOLVE A SINGLE FRACTION INTO PARTIAL FRACTIONS USING DIFFERENT METHODS.**

- 5.1 Define a partial fraction, a proper and an improper fraction.
- 5.2 Explain all the four types of partial fractions.
- 5.3 Set up equivalent partial fractions for each type.
- 5.4 Explain the methods for finding constants involved.
- 5.5 Resolve a single fraction into partial fractions.
- 5.6 Solve problems involving all the four types.

## **6. UNDERSTAND SYSTEMS OF MEASUREMENT OF ANGLES.**

- 6.1 Define angles and the related terms.
- 6.2 Illustrate the generation of an angle.
- 6.3 Explain sexagesimal and circular systems for the measurement of angles.
- 6.4 Derive the relationship between radian and degree.
- 6.5 Convert radians to degrees and vice versa.
- 6.6 Derive a formula for the circular measure of a central angle.
- 6.7 Use this formula for solving problems.

## **7.APPLY BASIC CONCEPTS AND PRINCIPLES OF TRIGONOMETRIC FUNCTIONS.**

- 7.1 Define the basic trigonometric functions/ratios of an angle as ratios of the sides of a right triangle.
- 7.2 Derive fundamental identities.
- 7.3 Find trigonometric ratios of particular angles.
- 7.4 Draw the graph of trigonometric functions.
- 7.5 Solve problems involving trigonometric functions.

## **8.USE TRIGONOMETRIC IDENTITIES IN SOLVING TECHNOLOGICAL PROBLEMS.**

- 8.1 List fundamental identities.
- 8.2 Prove the fundamental law.
- 8.3 Deduce important results.
- 8.4 Derive sum and difference formulas.
- 8.5 Establish half angle, double angle & triple angle formulas.
- 8.6 Convert sum or difference into product & vice versa.
- 8.7 Solve problems.

## **9.USE CONCEPTS, PROPERTIES AND LAWS OF TRIGONOMETRIC FUNCTIONS FOR SOLVING TRIANGLES.**

- 9.1 Define angle of elevation and angle of depression.
- 9.2 Prove the law of sines and the law of cosines.
- 9.3 Explain elements of a triangle.
- 9.4 Solve triangles and the problems involving heights and distances.



**10.USE PRINCIPLES OF MENSURATION IN FINDING SURFACES, VOLUMES AND WEIGHTS OF SOLIDS.**

- 10.1 Define mensuration of plane and solid figures.
- 10.2 List formulas for perimeters & areas of plane figure.
- 10.3 Define pyramid and cone.
- 10.4 Define frusta of pyramid and cone.
- 10.5 Define a sphere and a shell.
- 10.6 Calculate the total surface and volume of each type of solid.
- 10.7 Compute weight of solids.
- 10.8 Solve problems of these solids.

**11.USE THE CONCEPT AND PRINCIPLES OF VECTORS IN SOLVING TECHNOLOGICAL PROBLEMS.**

- 11.1 Define vector quantity.
- 11.2 Explain addition and subtraction of vector.
- 11.3 Illustrate unit vectors  $i, j, k$ .
- 11.4 Express a vector in the component form.
- 11.5 Explain magnitude, unit vector, direction cosines of a vector.
- 11.6 Derive analytic expression for dot product and cross product of two vector.
- 11.7 Deduce conditions of perpendicularity and parallelism of two vectors.
- 11.8 Solve problems

**12.USE THE CONCEPT OF MATRICES & DETERMINANTS IN SOLVING TECHNOLOGICAL PROBLEMS.**

- 12.1 Define a matrix and a determinant.
- 12.2 List types of matrices.
- 12.3 Define transpose, adjoint and inverse of a matrix.
- 12.4 State properties of determinants.
- 12.5 Explain basic concepts.
- 12.6 Explain algebra of matrices.
- 12.7 Solve linear equation by matrices.
- 12.8 Explain the solution of a determinant.
- 12.9 Use Crammers Rule for solving linear equations.

## Phy-113 APPLIED PHYSICS

### Total Contact Hours

Theory	64	T	P	C	
Practicals	96		2	3	3

**AIMS:** The students will be able to understand the fundamental principles and concept of physics, use these to solve problems in practical situations/technological courses and understand concepts to learn advance physics/technical courses.

### COURSE CONTENTS

#### 1 MEASUREMENTS.

2 Hours.

- 1.1 Fundamental units and derived units
- 1.2 Systems of measurement and S.I. units
- 1.3 Concept of dimensions, dimensional formula
- 1.4 Conversion from one system to another
- 1.5 Significant figures

#### 2 SCALARS AND VECTORS.

4 Hours.

- 2.1 Revision of head to tail rule
- 2.2 Laws of parallelogram, triangle and polygon of forces
- 2.3 Resolution of a vector
- 2.4 Addition of vectors by rectangular components
- 2.5 Multiplication of two vectors, dot product and cross product

#### 3 MOTION

4 Hours.

- 3.1 Review of laws and equations of motion
- 3.2 Law of conservation of momentum
- 3.3 Angular motion
- 3.4 Relation between linear and angular motion
- 3.5 Centripetal acceleration and force
- 3.6 Equations of angular motion

#### 4 TORQUE, EQUILIBRIUM AND ROTATIONAL INERTIA.

4 Hours.

- 4.1 Torque
- 4.2 Centre of gravity and centre of mass
- 4.3 Equilibrium and its conditions
- 4.4 Torque and angular acceleration
- 4.5 Rotational inertia

#### 5 WAVE MOTION.

5 Hours

- 5.1 Review Hooke's law of elasticity

- 5.2 Motion under an elastic restoring force
- 5.3 Characteristics of simple harmonic motion
- 5.4 S.H.M. and circular motion
- 5.5 Simple pendulum
- 5.6 Wave form of S.H.M.
- 5.7 Resonance
- 5.8 Transverse vibration of a stretched string

**6 SOUND.**

**5 Hrs**

- 6.1 Longitudinal waves
- 6.2 Intensity, loudness, pitch and quality of sound
- 6.3 Units of Intensity of level and frequency response of ear
- 6.4 Interference of sound waves silence zones, beats
- 6.5 Acoustics
- 6.6 Doppler effect.

**7 LIGHT.**

**5 Hours**

- 7.1 Review laws of reflection and refraction
- 7.2 Image formation by mirrors and lenses
- 7.3 Optical instruments
- 7.4 Wave theory of light
- 7.5 Interference, diffraction, polarization of light waves
- 7.6 Applications of polarization in sunglasses, optical activity and stress analysis

**8 OPTICAL FIBER.**

**2 Hours**

- 8.1 Optical communication and problems
- 8.2 Review total internal reflection and critical angle
- 8.3 Structure of optical fiber
- 8.4 Fiber material and manufacture
- 8.5 Optical fiber - uses.

**9 LASERS.**

**3 Hours**

- 9.1 Corpuscular theory of light
- 9.2 Emission and absorption of light
- 9.3 Stimulated absorption and emission of light
- 9.4 Laser principle
- 9.5 Structure and working of lasers
- 9.6 Types of lasers with brief description.
- 9.7 Applications (basic concepts)
- 9.8 Material processing
- 9.9 Laser welding
- 9.10 Laser assisted machining
- 9.11 Micro machining

9.12	Drilling, scribing and marking	
9.13	Printing	
9.14	Lasers in medicine	
<b>10</b>	<b>HEAT.</b>	<b>4 hrs.</b>
10.1	Review of calorimetry and gas laws	
10.2	Thermal expansion of solids, liquids and gases	
10.3	Heat of fusion, vaporization	
10.4	Humidity, absolute and relative	
10.5	Law of cooling	
10.6	Thermoelectricity	
10.7	Thermocouple.	
<b>11</b>	<b>THERMODYNAMICS.</b>	<b>4 Hours</b>
11.1	Heat energy and internal energy	
11.2	First law of thermodynamics	
11.3	Isometric and adiabatic processes	
11.4	Efficiency of heat engine	
11.5	Second law of thermodynamics (both statements)	
11.6	Heat engine and refrigerator.	
<b>12</b>	<b>TRANSFER OF HEAT.</b>	<b>5 Hours</b>
12.1	Review: modes of transfer of heat	
12.2	Emission and absorption of heat	
12.3	Black Body Radiation	
12.4	Laws of Energy Distribution	
12.5	Planck's Quantum Theory	
12.6	The Photoelectric effect.	
12.7	X-rays, production, properties and uses.	
<b>13</b>	<b>ELECTROMAGNETIC WAVES.</b>	<b>3 Hours</b>
13.1	Magnetic field around a current carrying conductor	
13.2	Electric field induced around a changing magnetic flux	
13.3	Moving fields	
13.4	Types of electromagnetic waves	
13.5	Generation of Radio Waves	
13.6	Spectrum of electromagnetic waves.	
<b>14</b>	<b>ATOMIC NUCLEUS.</b>	<b>5 Hours</b>
14.1	Structure of the nucleus	
14.2	Radioactivity	
14.3	Radioactive series	
14.4	Transmutation of elements	

- 14.5 The fission reaction
- 14.6 The fusion reaction
- 14.7 The nuclear reactor.

**15 NUCLEAR RADIATIONS.**

**5 Hours**

- 15.1 Properties and interaction with matter
- 15.2 Radiation detectors
- 15.3 Radiation damage and its effects
- 15.4 Radiation therapy
- 15.5 Radioactive tracers
- 15.6 Application of radiation techniques in archeology, agriculture, chemical industry, polymerization, sterilization, food preservation, gauging and control, radiography.

**16 ARTIFICIAL SATELLITES.**

**2 Hours**

- 16.1 Review law of gravitation
- 16.2 Escape velocity
- 16.3 Orbital velocity
- 16.4 Geosynchronous and geostationary satellites
- 16.5 Use of satellites in data communication.

**17 MAGNETIC MATERIALS.**

**2 Hours**

- 17.1 Magnetism
- 17.2 Domains theory
- 17.3 Para, dia and ferromagnetism and magnetic materials
- 17.4 B.H. curve and hysteresis loop.

**18 SEMI CONDUCTOR MATERIALS.**

**2 Hours**

- 18.1 Crystalline structure of solids
- 18.2 Conductors, semiconductors, insulators
  - 18.3 P-type and N-type materials
  - 18.4 P-N junction
  - 18.5 P-N junction as a diode
  - 18.6 Photovoltaic cell (solar cell)

**RECOMMENDED BOOKS**

- 1 Tahir Hussain, Fundamentals of Physics Vol-I and II
- 2 Farid Khawaja, Fundamentals of Physics Vol-I and II
- 3 Wells and Slusher, Schaum's Series Physics .
- 4 Nelkon and Oyborn, Advanced Level Practical Physics
- 5 Mehboob Ilahi Malik and Inam-ul-Haq, Practical Physics
- 6 Wilson, Lasers - Principles and Applications
- 7 M. Aslam Khan and M. Akram Sandhu, Experimental Physics Note Book

## Phy-113 APPLIED PHYSICS

### INSTRUCTIONAL OBJECTIVES

#### 1 USE CONCEPTS OF MEASUREMENT TO PRACTICAL SITUATIONS AND TECHNOLOGICAL PROBLEMS.

- 1.1 Write dimensional formulae for physical quantities
- 1.2 Derive units using dimensional equations
- 1.3 Convert a measurement from one system to another
- 1.4 Use concepts of measurement and Significant figures in problem solving.

#### 2 USE CONCEPTS OF SCALARS AND VECTORS IN SOLVING PROBLEMS INVOLVING THESE CONCEPTS.

- 2.1 Explain laws of parallelogram, triangle and polygon of forces
- 2.2 Describe method of resolution of a vector into components
- 2.3 Describe method of addition of vectors by rectangular components
- 2.4 Differentiate between dot product and cross product of vectors
- 2.5 Use the concepts in solving problems involving addition resolution and multiplication of vectors.

#### 3 USE THE LAW OF CONSERVATION OF MOMENTUM AND CONCEPTS OF ANGULAR MOTION TO PRACTICAL SITUATIONS.

- 3.1 Use law of conservation of momentum to practical/technological problems.
- 3.2 Explain relation between linear and angular motion
- 3.3 Use concepts and equations of angular motion to solve relevant technological problems.

#### 4 USE CONCEPTS OF TORQUE, EQUILIBRIUM AND ROTATIONAL INERTIA TO PRACTICAL SITUATION/PROBLEMS.

- 4.1 Explain Torque
- 4.2 Distinguish between Centre of gravity and centre of mass
- 4.3 Explain rotational Equilibrium and its conditions
- 4.4 Explain Rotational Inertia giving examples
- 4.5 Use the above concepts in solving technological problems.

#### 5 USE CONCEPTS OF WAVE MOTION IN SOLVING RELEVANT PROBLEMS.

- 5.1 Explain Hooke's Law of Elasticity
- 5.2 Derive formula for Motion under an elastic restoring force
- 5.3 Derive formulae for simple harmonic motion and simple pendulum
- 5.4 Explain wave form with reference to S.H.M. and circular motion
- 5.5 Explain Resonance
- 5.6 Explain Transverse vibration of a stretched string
- 5.7 Use the above concepts and formulae of S.H.M. to solve relevant problems.

## **6 UNDERSTAND CONCEPTS OF SOUND.**

- 6.1 Describe longitudinal wave and its propagation
- 6.2 Explain the concepts: Intensity, loudness, pitch and quality of sound
- 6.3 Explain units of Intensity of level and frequency response of ear
- 6.4 Explain phenomena of silence zones, beats
- 6.5 Explain Acoustics of buildings
- 6.6 Explain Doppler effect giving mathematical expressions.

## **7 USE THE CONCEPTS OF GEOMETRICAL OPTICS TO MIRRORS and LENSES.**

- 7.1 Explain laws of reflection and refraction
- 7.2 Use mirror formula to solve problems
- 7.3 Use the concepts of image formation by mirrors and lenses to describe working of optical instruments, e.g. microscopes, telescopes, camera and sextant.

## **8 UNDERSTAND WAVE THEORY OF LIGHT**

- 8.1 Explain wave theory of light
- 8.2 Explain phenomena of interference, diffraction, polarization of light waves
- 8.3 Describe uses of polarization given in the course contents.

## **9 UNDERSTAND THE STRUCTURE, WORKING AND USES OF OPTICAL FIBER.**

- 9.1 Explain the structure of the Optical Fiber
- 9.2 Explain its principle of working
- 9.3 Describe use of optical fiber in industry and medicine.

## **10 UNDERSTAND THE STRUCTURE, WORKING AND USES OF LASERS.**

- 10.1 Explain the stimulated emission of radiation
- 10.2 Explain the laser principle
- 10.3 Describe the structure and working of lasers
- 10.4 Distinguish between types of lasers
- 10.5 Describe the applications of lasers in the fields mentioned in the course contents.

## **11 UNDERSTAND CONCEPTS OF HEAT.**

- 11.1 Explain calorimetry
- 11.2 Explain Gas laws giving mathematical expressions
- 11.3 Explain Thermal expansion of solids, liquids and gases
- 11.4 Distinguish between heat of fusion, vaporization
- 11.5 Distinguish between absolute and relative Humidity
- 11.6 Describe Laws of cooling
- 11.7 Explain basic concepts of Thermoelectricity
- 11.8 Describe Thermocouple, giving its principle, structure and working.

## **12 UNDERSTAND LAWS OF THERMODYNAMICS.**

- 12.1 Distinguish between heat energy and internal energy
- 12.2 Explain first law of thermodynamics giving its applications
- 12.3 Distinguish between isometric and adiabatic processes
- 12.4 Explain second law of thermodynamics describing alternate statements
- 12.5 Distinguish between work of heat engine and refrigerator.

**13 UNDERSTAND LAWS OF ENERGY DISTRIBUTION AND EMISSION OF RADIATION.**

- 13.1 Explain modes of transfer of heat
- 13.2 Explain Black Body Radiation and Laws of Energy Distribution
- 13.3 Describe Planck's Quantum Theory
- 13.4 Explain photoelectric effect
- 13.5 Explain production, properties and uses of X-rays.

**14 UNDERSTAND NATURE, TYPES, GENERATION AND SPECTRUM OF ELECTROMAGNETIC WAVES.**

- 14.1 Explain magnetic field due to current and electric field due to changing magnetic flux
- 14.2 Explain moving fields
- 14.3 Describe types of electromagnetic waves
- 14.4 Explain generation of Radio Waves
- 14.5 Explain spectrum of electromagnetic waves.

**15 UNDERSTAND THE STRUCTURE OF THE ATOMIC NUCLEUS AND RELEVANT ACTIVITIES.**

- 15.1 Describe the structure of the Nucleus
- 15.2 Explain Radioactivity and Radioactive series
- 15.3 Explain transmutation of elements
- 15.4 Distinguish between fission reaction and fusion reaction
- 15.5 Explain the structure and working of the nuclear reactor.

**16 UNDERSTAND NUCLEAR RADIATIONS THEIR EFFECTS AND USES.**

- 16.1 Describe properties of nuclear radiations and their interaction with matter
- 16.2 Explain working of radiation detectors
- 16.3 Explain damaging effects of nuclear radiations
- 16.4 Explain radiation therapy
- 16.5 Describe radioactive tracers
- 16.6 Describe applications of radiation techniques in course contents.

**17 UNDERSTAND TYPES AND USES OF ARTIFICIAL SATELLITES.**

- 17.1 Explain escape velocity
- 17.2 Explain orbital velocity
- 17.3 Distinguish between geosynchronous and geostationary satellites



17.4 Describe uses of artificial satellites in data communication.

**18 UNDERSTAND BASIC CONCEPTS AND CLASSIFICATION OF MAGNETIC MATERIALS.**

18.1 Explain domains theory of magnetism

18.2 Distinguish between para, dia and ferromagnetism and magnetic materials

18.3 Distinguish between B and H

18.4 Describe B.H. Curve

18.5 Describe hysteresis loop.

**19 UNDERSTAND BASIC CONCEPTS OF SEMI-CONDUCTOR MATERIALS AND THEIR USES.**

19.1 Explain crystalline structure of solids

19.2 Distinguish between conductors, semiconductors and insulators

19.3 Describe semiconductors giving examples with reference to their structure

19.4 Distinguish between P-type and N-type materials

19.5 Explain working of P-N junction as a diode

19.6 Explain working of solar cell.

**LIST OF PRACTICALS.**

- 1 Draw graphs representing the functions:
  - a)  $y=mx$  for  $m=0, 0.5, 1, 2$
  - b)  $y=x^2$
  - c)  $y=1/x$
- 2 Find the volume of a given solid cylinder using vernier callipers.
- 3 Find the area of cross-section of the given wire using micrometer screw gauge.
- 4 Prove that force is directly proportional to (a) mass, (b) acceleration, using fletchers' trolley.
- 5 Verify law of parallelogram of forces using Grave-sands apparatus.
- 6 Verify law of triangle of forces and Lami's theorem
- 7 Determine the weight of a given body using
  - a) Law of parallelogram of forces
  - b) Law of triangle of forces
  - c) Lami's theorem
- 8 Verify law of polygon of forces using Grave-sands apparatus.
- 9 Locate the position and magnitude of resultant of like parallel forces.
- 10 Determine the resultant of two unlike parallel forces.
- 11 Find the weight of a given body using principle of moments.
- 12 Locate the centre of gravity of regular and irregular shaped bodies.
- 13 Find Young's Modules of Elasticity of a metallic wire.
- 14 Verify Hooke's Law using helical spring.
- 15 Study of frequency of stretched string with length.
- 16 Study of variation of frequency of stretched string with tension.
- 17 Study resonance of air column in resonance tube and find velocity of sound.
- 18 Find the frequency of the given tuning fork using resonance tube.
- 19 Find velocity of sound in rod by Kundt's tube.
- 20 Verify rectilinear propagation of light and study shadow formation.
- 21 Study effect of rotation of plane mirror on reflection.
- 22 Compare the refractive indices of given glass slabs.
- 23 Find focal length of concave mirror by locating centre of curvature.
- 24 Find focal length of concave mirror by object and image method
- 25 Find focal length of concave mirror with converging lens.
- 26 Find refractive index of glass by apparent depth.
- 27 Find refractive index of glass by spectrometer.
- 28 Find focal length of converging lens by plane mirror.
- 29 Find focal length of converging lens by displacement method.
- 30 Find focal length of diverging lense using converging lens.
- 31 Find focal length of diverging lens using concave mirror.
- 32 Find angular magnification of an astronomical telescope.
- 33 Find angular magnification of a simple microscope (magnifying glass)

- 34 Find angular magnification of a compound microscope.
- 35 Study working and structure of camera.
- 36 Study working and structure of sextant.
- 37 Compare the different scales of temperature and verify the conversion formula.
- 38 Determine the specific heat of lead shots.
- 39 Find the coefficient of linear expansion of a metallic rod.
- 40 Find the heat of fusion of ice.
- 41 Find the heat of vaporization.
- 42 Determine relative humidity using hygrometer.

## Comp-122COMPUTER APPLICATIONS

<b>Total contact hours</b>					
Theory	32 Hours	T	P	C	
Practicals	96 Hours		1	3	2
<b>Pre-requisite</b>	None				

**AIMS** This subject will enable the student to be familiar with the operation of a Micro-computer. He will also learn DOS, BASIC language and word processing to elementary level.

### COURSE CONTENTS

1. **ELECTRONIC DATA PROCESSING (EDP)** **6 Hours**
  - 1.1 Basics of computers
  - 1.2 Classification of computers
  - 1.3 Block diagram of a computer system
  - 1.4 Binary number system
  - 1.5 BIT, BYTE, RAM, ROM, EROM, EPROM
  - 1.6 Input and output devices
  - 1.7 Secondary storage media details
  - 1.8 Processors and types
  - 1.9 Using computer for system software
  - 1.10 Using computers for application software.
  - 1.11 Common types of software and their application.
  
2. **DISK OPERATING SYSTEM (DOS)** **6 Hours**
  - 2.1 Internal commands
  - 2.2 External commands
  - 2.3 Batch files
  - 2.4 Advance features.
  
3. **BASIC LANGUAGE** **10 Hours**
  - 3.1 Introduction to high level languages
  - 3.2 Introduction to BASIC
  - 3.3 REM Statement
  - 3.4 Assignment statement
  - 3.5 Input statement
  - 3.6 Read-Data statement
  - 3.7 IF-THEN statement
  - 3.8 IF-THEN Else statement
  - 3.9 FOR-NEXT statement
  - 3.10 DIM statement
  - 3.11 L PRINT statement

- 3.12 STOP statement
- 3.13 END statement
- 3.14 Logic of a BASIC Programme
- 3.15 Running a BASIC Programme
- 3.16 Saving and Retrieving a Programme
- 3.17 Advance features

#### **4. WORD PROCESSING**

**7 Hours**

- 4.1 Starting word processor session
- 4.2 Opening a document
- 4.3 Saving a document
- 4.4 Ending word processor session (Temporarily)
- 4.5 Retrieving a document
- 4.6 Spell check
- 4.7 Margins and tab setting
- 4.8 Aligning Paragraph
- 4.9 Printing a document
- 4.10 Advance features

#### **5.COMPUTER GRAPHIC IN BASIC**

**3 hours**

- 5.1Graphic fundamentals
  - 5.2Points and lines
- 5.3Dots in space
- 5.4A lightening blot
- 5.5Shapes
- 5.6Expanding circles and rectangles

#### **RECOMMENDED BOOKS**

1. Ron S. Gottfrid, Programming with BASIC,
  2. Any Word Processor Latest Release (e.g., Word, Word-Perfect etc).
  3. ABC'S of DOS (latest release).
- 4.Judd Robbins, Mastering DOS 6.0 and 6.2

## Comp-122COMPUTER APPLICATIONS

### INSTRUCTIONAL OBJECTIVES

1. **UNDERSTAND ELECTRONIC DATA PROCESSING (EDP).**
  - 1.1 Describe basics of computers.
  - 1.2 Enlist different classification of computers.
  - 1.3 Explain block diagram of a computer system.
  - 1.4 Describe binary number system.
    - 1.5 State the terms used in computers such as BIT, BYTE, RAM, ROM, EROM, EPROM.
    - 1.6 Identify input and output devices.
    - 1.7 Describe secondary storage media.
    - 1.8 Explain processor.
    - 1.9 Name different types of processors.
    - 1.10 Explain the use of computer for system software.
    - 1.11 Explain the use of computer for application software.
    - 1.12 Enlist common types of software and their application.
    - 1.13 Explain various application of above softwares mentioned in 1.12
2. **UNDERSTAND DISK OPERATING SYSTEM (DOS).**
  - 2.1 Explain the use of various internal command of DOS.
  - 2.2 Explain the use of various external command of DOS.
  - 2.3 Describe batch files.
  - 2.4 Identify advanced features
3. **UNDERSTAND BASIC LANGUAGE.**
  - 3.1 Explain high level languages.
  - 3.2 Explain Basic language.
  - 3.3 Describe Rem statement
  - 3.4 Describe assignment statement
    - 3.5 Explain Input statement
    - 3.6 Explain Read-Data statement
    - 3.7 Explain If-Then Statement
    - 3.8 Explain If-then-Else Statement
    - 3.9 Explain For-Next Statement
    - 3.10 Explain DIM Statement
    - 3.11 Explain LPRINT statement
    - 3.12 Explain stop statement
    - 3.13 Explain end Statement
    - 3.14 Describe Logic of Basic program
    - 3.15 Describe running a Basic Program
    - 3.16 Describe saving & retrieving Basic Program
    - 3.17 Describe some Advance features of Basic program

#### **4. UNDERSTAND WORD PROCESSING SESSION**

- 4.1. Describe word-processing
- 4.2 Name command to be entered on Dos-prompt to load word-processor
- 4.3 Identify initial screen
- 4.4 Describe the command to open a document
- 4.5 Describe the procedure for naming the document
- 4.6 Explain importance of giving extension to a document
- 4.7 Describe saving and retrieving a document
- 4.8 Explain importance of saving the work at regular intervals
- 4.9 State temporarily Ending word-processing session & document retrieval
- 4.10 State procedure to re-enter word processor
- 4.11 State procedure to re-open the document and editing
- 4.12 Describe spell-check facility
- 4.13 Describe Margins & Tab Setting
- 4.14 Describe to align paragraph
- 4.15 Describe Re-editing techniques
- 4.16 Describe procedure to set-up printer
- 4.17 Describe command for printouts
- 4.18 Explain multiple-copy printout procedure
- 4.19 Explain some advance features
- 4.20 Describe procedure of condensed printing
- 4.21 Describe procedure for change of fonts

#### **5.UNDERSTAND PROGRAMMING INSTRUCTIONS FOR COMPUTER GRAPHIC IN BASIC LANGUAGE**

- 5.1Identify graphic fundamentals in basic language
- 5.2Explain to draw points and lines
- 5.3Explain to draw dot in space
- 5.4Explain to draw lighting blot
- 5.5Explain to draw shapes
- 5.6Explain to draw expanding circles and rectangles

## Comp-122COMPUTER APPLICATIONS

### LIST OF PRACTICALS

96 hours

#### DOS

- 1 Identify key board, mouse, CPU, disk drives, disks, monitor & printer
- 2 Practice for booting up of a computer system with DOS system disk and power off system at DOS prompt
- 3 Practice for CLS, VER, VOL, DATE & TIME commands
- 4 Practice for COPY, REN commands
- 5 Practice for DEL, TYPE, PATH, PROMPT, COPY CON, MD, CD, RD commands
- 6 Practice of the practicals at S. No. 3, 4, 5
- 7 Practice for FORMAT command with /s, /4, /u switches
- 8 Practice for DISKCOPY, DISKCOMP commands
- 9 Practice for SCANDISK, XCOPY, DELTREE, TREE, LABEL commands
- 10 Practice for PRINT, UNDELETE commands
- 11 Practice for the practicals at S. No. 8, 9, 10, 11
- 12 Practice for creating a batch file

#### BASIC

- 1 Practice for loading & unloading BASIC software and identify role of function keys in Basic
- 2 Identify role of various keys in continuation with ALT key in BASIC programming
- 3 Practice for CLS, LOAD, SAVE, FILE, RENUM command by loading any existing BASIC Program
- 4 Practice for editing any existing BASIC Program
- 5 Prepare BASIC Program to display sum of two numbers using INPUTS
- 6 Prepare BASIC Program to display sum of two numbers using READ-DATA
- 7 Prepare BASIC Program to multiply two numbers
- 8 Prepare BASIC Program to calculate Area of Rectangle, when length and width are given
- 9 Prepare BASIC Program to calculate area of a circle when radius/diameter is given
- 10 Prepare very simple BASIC Programs using IF-THEN-ELSE and FOR-NEXT statement
- 11 Identify DIM statement
- 12 Practice for LPRINT statement for various Programs hard-copy output



## **WORD PROCESSING**

- 1 Practice for loading & unloading a word processor
- 2 Practice for creating document & saving it
- 3 Practice for spell-check facility of the word-processor
- 4 Practice for editing an existing document
- 5 Practice for various word-processing Menu Options
- 6 Practice for printing a document
- 7 Practice for margin and TAB setting and document alignment
- 8 Practice for some advance features

**TOPICS.**

**1 UNITS AND DIMENSIONS**

- 1.1 Primary and Secondary quantities
  - 1.2 Dimensions of Secondary quantities
  - 1.3 System of Measurement
  - 1.4 Units and their conversion
- Conversion of units of following quantities into English/Metric system.
- Pressure
  - Viscosity
  - Density
  - Force
  - Energy
  - Work
  - Gas constant
- 1.5 Dimensional and Dimension less formula.

**2 GRAPH, TYPES OF GRAPH.**

- 2.1 Drawing simple graph.

**3 PRODUCTION OF LOW TEMPERATURE BY REFRIGERATION**

- 3.1 Definition, methods of refrigeration
- 3.2 Refrigerant and their properties
- 3.3 Application of Refrigeration
- 3.4 Schematic diagram of Refrigeration
- 3.5 Working Principle of refrigerator

**4 PIPE AND TUBES**

- 4.1 Type of pipes
- 4.2 Cast iron pipe, wrought iron pipe, steel pipe Aluminium pipes, plastic pipe, Rubber pipes.
- 4.3 Pipe standards.
- 4.4 Pipe fitting
- 4.5 Types of valves
- 4.6 Construction, working and application of gate valve, globe valve ball valve, plug cock.

**5 STEAM TRAP AND THEIR TYPES**

- Bucket trap, expansion trap, inverted bucket trap, Impulse trap.

**6 THERMAL INSULATION,**

- 6.1 Insulating material, properties and uses.
- 6.2 Insulation technique for steam pipes and vessels.
- 6.3 Insulation technique for low temperature pipes

**7 SYMBOLS**

- 7.1 Symbols for fitting
- 7.2 Symbols for equipments

## **8 PETROLEUM TESTS**

8.1 Flash point, Aniline point pour point, cloud point, Diesel index, sedimentation Number

8.2 Octane number, Cetane number

## **9 INTRODUCTION TO PHOTOCOPYING**

### **REFERENCE BOOKS**

Manual for basic chemical Engineering

Introduction to chemical Engineering by Walter L Bedger and

Julims T Bencharo

Introduction to chemical Engineering by Little John

## **CHT-153 BASIC CHEMICAL ENGINEERING**

### **INSTRUCTIONAL OBJECTIVES**

#### **1. UNITS AND DIMENSION**

- 1.1. The students will know the primary and secondary quantities.
  - 1.1.1 Define primary quantity and secondary quantity.
  - 1.1.2 Give examples of primary quantities and secondary quantities.
- 1.2 Understand Dimensions of secondary Quantities.
  - 1.2.1 Explain the secondary quantities in terms of primary quantities.
  - 1.2.2 Write the dimension of secondary quantities.
- 1.3 Understand the Systems of Measurement.
  - 1.3.1 Name different systems of measurement.
  - 1.3.2 Name basic quantities of each system.
  - 1.3.3 Develop dimensions of derived quantities in each system.
- 1.4 Understand units and their conversions.
  - 1.4.1 Develop units to measure the derive quantities in different systems.
  - 1.4.2 Define different units used.
  - 1.4.3 Convert the units of one system into the other system.
- 1.5 Understand Dimensional and Dimensionless Formula.
  - 1.5.1 Differentiate between dimensional formula and dimensionless formula.
- 1.5.2 Check the dimension of an engineering formula. Like Reynold Number  
Potential Energy. Kinetic energy.

#### **2. GRAPH**

- 2.1 Understand the concept of graph.
  - 2.1.1 Define graph.
  - 2.1.2 Explain the types of graph.
- 2.1.3 Give comparison between tabular and graphic representation of data.
- 2.2 Understand the method of Drawing Simple Graph.
  - 2.2.1 Explain the steps necessary to draw a graph.
  - 2.2.2 Draw a simple graph.
  - 2.2.3 Note the end point from a graph.
  - 2.2.4 Take reading from a graph.
  - 2.2.5 Make extrapolation and interpolation on a graph.

#### **3. PRODUCTION OF LOW TEMPERATURE BY REFRIGERATION.**

- 3.1 Know the Methods of refrigeration.
  - 3.1.1 Define the refrigeration.
- 3.1.2 Name different methods of refrigeration based on the refrigeration used.
  - 3.1.3 Compare different methods of REFRIGERATION.
- 3.2 Understand Refrigeration and their properties.
  - 3.2.1 Define the refrigerant.

- 3.2.2 Name different refrigerants used in the field.
- 3.2.3 Enlist the properties of a good refrigerant.
- 3.3 Understand application of refrigeration
  - 3.3.1 Give domestic application of refrigeration.
  - 3.3.2 Give industrial application of refrigeration.
- 3.4 Understand Schematic diagram of refrigeration.
  - 3.4.1 Draw a schematic diagram of refrigeration.
  - 3.4.2 Explain the function of each component in the diagram.
- 3.5 Understand working principle of refrigeration.
  - 3.5.1 Explain working principle of single fluid refrigerator.
  - 3.5.2 Explain working principle of two fluid refrigeration.

#### **4. PIPES AND TUBES**

- 4.1 Know the types of pipes.
  - 4.1.1 Enlist the types of pipes used by chemical industries.
  - 4.1.2 Give the field of applications of different types of pipes used
  - 4.1.3 Give characteristics of different types of pipes used by chemical engineer.
- 4.2 Apply the pipe standards.
  - 4.2.1 Understand the concept of schedule Nos used for pipe.
  - 4.2.2 Select the schedule No according to the pipe duty (Pressure).
- 4.3 Understand pipe fittings.
  - 4.3.1 Define pipe fittings.
  - 4.3.2 Enlist the different pipe fitting used.
- 4.3.3 Explain the functions of different pipe fittings used in chemical industries.
- 4.4 Know the types of valves.
  - 4.4.1 Define valve.
  - 4.4.2 Enlist the types of a valves.
- 4.5 Understand construction and working of valves
  - 4.5.1 Explain the construction and working of gate value
  - 4.5.2 Explain the construction and working of globe value.
  - 4.5.3 Explain the construction and working of ball value
  - 4.5.4 Select a proper valve according to need

#### **5. STEAM TRAP**

- 5.1 Know the steam trap
  - 5.1.1 Explain the function of steam trap
  - 5.1.2 Enlist the types of steam traps
- 5.2 Understand different types of Traps
  - 5.2.1 Explain the construction and working of bucket trap
- 5.2.2 Explain the construction and working of inverted Bucket trap
  - 5.2.3 Explain the construction and working of expansion 0e trap

5.2.4 Explain the construction and working of impulse trap

**6. THERMAL INSULATION**

- 6.1 Understand insulating materials, properties and uses
  - 6.1.1 Define thermal insulation
  - 6.1.2 Explain the need of thermal insulation
  - 6.1.3 Enlist the insulating materials used in chemical industry
  - 6.1.4 Enlist the properties of a good insulating material
  
- 6.2 Apply the insulation technique for steam pipes and valves
  - 6.2.1 Explain the method of steam pipe insulation (lagging)
  - 6.2.2 Calculate the thickness of insulation layer on steam pipe by using the formula ( $q=K\Delta T$ )
- 6.3 Understand insulation technique for low temperature pipes
  - 6.3.1 Decide the nature of insulation material for low temperature pipes
  - 6.3.2 Explain the method of pipe insulation

**7. SYMBOLS**

- 7.1 Understand symbols of fittings
  - 7.1.1 Read symbols of fittings
  - 7.1.2 Draw symbols to represent different fittings
  
- 7.2 Understand symbols for equipments
  - 7.2.1 read symbols of equipments
  - 7.2.2 Draw symbols to represent different equipments and vessels of chemical engineering

**8. PETROLEUM TEST**

- 8.1 Understand different tests of petroleum
  - 8.1.1 Understand the importance of petroleum testing
  - 8.1.2 Define flash point, Aniline point, pour point and cloud point
  - 8.1.3 Explain procedure to perform above tests for petroleum sample
    - 8.1.4 Define diesel index
    - 8.1.5 Explain procedure to find diesel index
    - 8.1.6 Define sedimentation number
    - 8.1.7 Explain method to note sedimentation No
    - 8.1.8 Define octane number and cetane number

**9. INTRODUCTION TO PHOTOCOPYING**

- 9.1 Understand the photocopying
  - 9.1.1 Explain the concept of photocopying
  - 9.1.2 Explain the methods of photocopying
- 9.1.3 Enlist the precautions to be observed while operating a photocopier

**CHT. 153            BASIC CHEMICAL ENGINEERING.**

**LIST OF PRACTICALS**

- 1     Calculation of dimensions of different secondary quantities.
- 2     Determination of units of different quantities in different measuring systems.
- 3     Conversion of units in different systems
- 4     Drawing of simple graph.
- 5     Graph reading
- 6     Production of low temperature by use of refrigerant, study of refrigerator/Deepfreezers.
- 7     Pipe cutting
- 8     Pipe Threading
- 9     Pipe fittings
- 10    Installation of valves
- 11    Insulation of steam traps
- 12    Insulation of steam pipe lines
- 13    Demonstration of Flash point
  - a     Aniline point
  - b     Pour point
  - c     Cloud point
  - d     Diesel index
- 18    Study of Photo copy machine, Photocopying practice
- 19    Preparation of Transparencies.



**OBJECTIVES**

- 1 To present the students the principles of General chemistry.
- 2 To develop understanding of the scientific methods as applied to the development of laws of chemistry.
- 3 To prepare the students for advance Laboratory Work.
- 4 To present the basic knowledge of Metallurgy to the students.

**TOPICS COURSE OUTLINES**

**1 CONCEPT OF CHEMISTRY**

- 1.1 Language of Chemistry
- 1.2 Molecular formula, Empirical formula
- 1.3 Chemical Equation

**2 CHEMICAL LAWS**

- 2.1 Law of conservation of mass, Law of constant proportion and their problems.
- 2.2 Law of Reciprocal proportion, Law of multiple proportion and their problems.

**3 ATOMIC STRUCTURE**

- 3.1 Passage of electricity through electrolytes solution and gases.
- 3.2 Rutherford atomic model and its defects.
- 3.3 Plank's theory, different types of spectrum and Bohr's theory, Defects in Bohr's theory.
- 3.4 Calculation of Energy, Radius and wave number.
- 3.5 Frequency of Electron by Bohr's atomic model.

**4 CHEMICAL BOND**

- 4.1 Ionic Bond
- 4.2 Covalent bond, definition with examples in each case.
- 4.3 Ionization Potential, Electron Affinity.
- 4.4 Electronegativity and Bond Energy.
- 4.5 Co-ordinate covalent Bond, sigma and pi Bond definition with example in each
- 4.6 Hybridization, structure of CH<sub>4</sub>, H<sub>2</sub>O and NH<sub>3</sub> etc.

**5 GASES**

- 5.1 Behavior of gases, Kinetic theory of gases.
- 5.2 Boyle's and Charles law, General gas equation solution of problems (concerning gas laws)
- 5.3 Graham's law of diffusion Dalton's law of partial pressure and Gay Lussac law.

## **6 LIQUIDS**

- 6.1 Properties of liquid viscosity its measurement.
- 6.2 Surface tension and its measurement.

## **7 SOLIDS**

- 7.1 Preparation and properties of solid.
- 7.2 Classification of solid classification of crystal Lattice Energy.

## **8 SOLUTION**

- 8.1 Solution Types of solution units.
- 8.2 Ideal and non ideal solution

## **9 OXID**

- 9.1 Oxidation and reduction Important oxidising and reducing agents.
- 9.2 Balancing of equation by oxidation number method.

## **10 WATER**

- 10.1 Sources impurities of water causes of hardness.
- 10.2 Hard and soft water, removal of permanent and temporary hardness.

## **11 ALLOYS DEFINITION AND CHEMISTRY**

- 11.1 Composition properties and uses of stainless steel.
- 11.2 German silver Bronze.
- 11.3 Nichrom and Amalgam.
- 11.4 Bell metal and solder.

## **12 ACID AND BASE**

- 12.1 Concept of acid and base properties of acid of base.
- 12.2 Strong and weak acid and base examples.
- 12.3 Basicity and acidity.

## **13 SALT**

- 13.1 Salt types.
- 13.2 Examples of types of salts

## **14 METALS**

- 14.1 Difference between metal and non metal.
- 14.2 General methods of purification of ores.

## **15 IRON ORES, IRON PURIFICATION**

- 15.1 Manufacture of pig iron from blast furnace.
- 15.2 Manufacture of steel and its uses.

## **16 COPPER**

- 16.1 Ores Extraction
- 16.2 Refining and uses of copper.

**17 ALUMINIUM**

17.1 Ores and Extraction and uses.

**18 CHROMIUM**

18.1 Ores Extraction uses.

**TEXT AND REFERENCE BOOKS**

- 1 Chemistry part I for class XI
- 2 Chemistry part II for class XII  
recommended by the text book Board Punjab.
- 3 Practical chemistry for Intermediate classes.

**INSTRUCTIONAL OBJECTIVES.****1. CONCEPT OF CHEMISTRY.**

- 1.1 Understand language of chemistry 2. HRS  
 1.1.1 Give symbols of various elements  
 1.1.2 Describe valency  
 1.1.3 Explain radicals
- 1.2 Write molecular formula and empirical formula 1. HRS  
 1.2.1 Write molecular formula of different compounds  
 1.2.2 Write empirical formula of different compounds
- 1.3 Understand chemical equation 2. HRS  
 1.3.1 Write skeleton equation  
 1.3.2 Balance chemical equation by hit and trial method  
 1.3.3 Balance chemical equation by partial equation method  
 1.3.4 Balance chemical equation by ionic method

**2 TOPIC CHEMICAL LAWS**

- 2.1 Understand law of conservation of mass and law of constant proportion  
 2.1.1 State law of conservation of mass  
 2.1.2 State law of constant proportion  
 2.1.3 Solve the problem based on law of constant proportion
- 2.2 Understand law of reciprocal proportion and law of multiple proportion  
 2.2.1 State law of reciprocal proportion  
 2.2.2 State law of multiple proportion  
 2.2.3 Solve problems based on law of multiple proportion

**3 ATOMIC STRUCTURE**

- 3.1 Understand passage of electricity through electrolytic solution  
 3.1.1 Name the particles of atoms  
 3.1.2 Describe discovery of electron  
 3.1.3 Describe discovery of proton  
 3.1.4 Explain discovery of neutron
- 3.2 Understand Rutherford's model atom and Bohr's atom  
 3.2.1 Enlist theories of atom  
 3.2.2 Describe Rutherford's model atom  
 3.2.3 Tell defects in Rutherford's model atom
- 3.3 Understand Planck's theory  
 3.3.1 Illustrate Planck's theory  
 3.3.2 Enlist defects in Planck's theory  
 3.3.3 Define band spectrum  
 3.3.4 Define line spectrum  
 3.3.5 Explain Bohr's theory of atom  
 3.3.6 Give arrangement of electrons in Bohr's atom  
 3.3.7 Enlist postulates of Bohr's theory
- 3.4 Understand energy of atom 1. HRS

- 3.4.1 Define wave number
- 3.4.2 Calculate energy of atom
- 3.5 Understand frequency of electron 1. HRS
  - 3.5.1 Define frequency of electron
  - 3.5.2 Calculate frequency of electoral

#### **4. CHEMICAL BOND**

- 4.1 Understand ionic bond 2. HRS
  - 4.1.1 Define ionic bond
  - 4.1.2 Illustrate ionic compounds
  - 4.1.3 Enlist ionic compounds
- 4.2 Understand covalent bond 3. HRS
  - 4.2.1 Explain covalent bond
  - 4.2.2 Define single bond and give examples
  - 4.2.3 Illustrate double bond and give examples
  - 4.2.4 Describe triple bond and give examples
  - 4.2.5 Describe covalent compounds
  - 4.2.6 Name covalent compounds
- 4.3 Know ionization potential 2. HRS
  - 4.3.1 Define ionization potential
  - 4.3.2 Illustrate electron affinity
  - 4.3.3 Give ionization potential of different atoms
- 4.4 Know electro negativity 2. HRS
  - 4.4.1 Explain electro negativity
  - 4.4.2 Define bond energy
  - 4.4.3 Give example of electro negativity
- 4.5 Understand co ordinate bond
  - 4.5.1 Describe co ordinate bond
  - 4.5.2 Understand hybridization
  - 4.5.3 Describe hyridization
- 4.6 Give example of Sigma bond
  - 4.6.1 Distinguish between Sigma and pie bond
  - 4.6.2 Illustrate structure of different hybridized atom

#### **5 GASES**

- 5.1 Understand behaviour of gases 1. HRS
  - 5.1.1 Explain kinetic theory of gases
  - 5.1.2 Describe temperature effect on gases
- 5.2 Understand gas laws 2. HRS
  - 5.2.1 State boyel's law
  - 5.2.2 State charler law
  - 5.2.3 Describe absolute temperature
  - 5.2.4 Derive gas equation
  - 5.2.5 Solve problem based on gas equation
  - 5.2.6 State Graham's law of diffusion
  - 5.2.7 Explain dalton's law of partial pressure
  - 5.2.8 State gay lussanc law
  - 5.2.9 Solve problems based on graham's low of diffusion
  - 5.2.10 Solve problems based on gay lssac's law

- 6 LIQUIDS**
- 6.1 Understand properties of liquids 2. HRS
- 6.1.1 Define viscosity
- 6.1.2 Give units of viscosity in different systems
- 6.1.3 Enlist methods of measurement of viscosity
- 6.1.4 Explain measurement of viscosity by ostwald's viscometer
- 6.1.5 Describe temperature effect on viscosity
- 6.2 Understand surface tension 2. HRS
- 6.2.1 Describe surface tension
- 6.2.2 Name the units of surface tension
- 6.2.3 Enlist methods for the measurement of surface tension.
- 6.2.4 Explain measurement of surface tension by torsion balance.
- 7. SOLID**
- 7.1 Understand properties of solids.
- 7.1.1 Enlist the properties of solids
- 7.1.2 Explain density
- 7.1.3 Give units of density
- 7.1.4 Give effect of temperature on volume.
- 7.1.5 Define amorphous state
- 7.1.6 Explain colloidal state.
- 7.1.7 Distinguish amorphous state, collridal state and solid state.
- 7.2 Understand crystal habits.
- 7.2.1 Name types of crystals
- 7.2.2 Define crystal lattice.
- 8. SOLUTION**
- 8.1 Understand types of solution
- 8.1.1 Name of types of solution
- 8.1.2 Give example of different type of solution
- 8.1.3 Enlist the units used for the coricentration of sol
- 8.1.4 Know ideal and no ideal solution
- 8.2 Know ideal and no ideal solution.
- 8.2.1 Give examples of ideal solution
- 8.2.2 Distinguish between ideal solution and non ideal solution
- 9. OXIDATION, REDUCTION 1. HRS**
- 9.1 Understand oxidation and reduction.
- 9.1.1 Describe oxidation with examples
- 9.1.2 Describe reduction with examples
- 9.1.3 Enlist oxidizing agent
- 9.1.4 Name reducing agent.
- 9.2 Understand balancing equation by oxidation number
- 9.2.1 Calculate oxidation number of an element in a compound.
- 9.2.2 Balance the equation.

**10. UNDERSTAND WATER.**

- 10.1.1 Enlist water sources
- 10.1.2 name the impurities of water
- 10.1.3 Explain causes of hardness..
- 10.1.4 Define hard water
- 10.1.5 Describe soft water.
- 10.1.6 Explain causes of harshness.
- 10.1.7 Explain removal of permanent hardness by different methods.
- 10.1.8 Explain removal of temporary hardness by different methods.

**11. ALLOYS**

- 11.1 Know composition of alloys
  - 11.1.1 Define alloys
  - 11.1.2 Give examples of alloys with their composition
  - 11.1.3 Enlist general properties of alloys
  - 11.1.4 Give uses of alloys.
- 11.2 Know German silver and bronze
  - 11.2.1 Give composition of German silver.
  - 11.2.2 Give composition of bronze
  - 11.2.3 Enlist uses of German silver.
  - 11.2.4 Give uses of bronze
- 11.3 Know Nichrom and Amalgam
  - 11.3.1 Give the composition of Nick Rom
  - 11.3.2 Enlist uses of Nick Rom
  - 11.3.3 Define amalgam
- 11.4 Know bell metal and solder.
  - 11.4.1 Give composition of bell metal
  - 11.4.2 Define solder
  - 11.4.3 Give composition of solder
  - 11.4.4 Enlist uses of bell metal
  - 11.4.5 Give uses of solder

**12. ACID AND BASE**

- 12.1 Understand properties of acid and base
  - 12.1.1 Define acid
  - 12.1.2 Distinguish between acid and base
  - 12.1.3 Describe general properties of acids
  - 12.1.4 Explain in general properties of bases.
- 12.2 Understand strong and week acid
  - 12.2.1 Give examples of strong acid
  - 12.2.2 Enlist examples of weak acid
  - 12.2.3 Distinguish between strong and weak acid
- 12.3 Know acidity and basicity
  - 12.3.1 Define acidity.
  - 12.3.2 Define basicity
  - 12.3.3 Calculate acidity and basicity.

**13 SALT**

- 13.1 Understand types of salts
  - 13.1.1 Define salt

2. HRS

- 13.1.2 Name types of salt
- 13.1.3 Explain mental salt with examples
- 13.1.4 Explain acidic salt with examples
- 13.1.5 Explain basic salt with examples
- 13.1.6 illustrate double salt with examples
- 13.1.7 Distinguish between double salt and complex salt

**14 METAL**

- 14.1 Understand metals 1. HRS
  - 14.1.1 Define metals
  - 14.1.2 Give examples of materials
  - 14.1.3 Differentiate metals and non metals
- 14.2 Understand purification of ores 2. HRS
  - 14.2.1 Define ores
  - 14.2.2 Name impurities of ores
  - 14.2.3 Enlist methods of purification of ores
  - 14.2.4 Explain different methods of purification of ores
- 14.3 Understand methods of extraction of metals 1. HRS
  - 14.3.1 Name methods of extraction of metals
  - 14.3.2 describe different methods of extraction

**15 IRON**

- 15.1 understand iron purification 1. HRS
  - 15.1.1 List ores of iron
  - 15.1.2 Name impurities of iron ores
  - 15.1.3 List steps involed in the purification of iron
- 15.2 Understand manufacture of pig iron 2. HRS
  - 15.2.1 Define pig iron
  - 15.2.2 Name the furnaces used for manufacture of pig iron
  - 15.2.3 List the material required for melting of pig iron
  - 15.2.4 Explain reactions of blast furnace
- 15.3 Understand manufacture of steel 1. HRS
  - 15.3.1 Enlist types of steel
  - 15.3.2 Give composition of steel
  - 15.3.3 Describe manufacture of steel

**16 COPPER**

- 16.1 Understand extractijon of copper 2. HRS
  - 16.1.1 Enlist ores of copper
  - 16.1.2 Name the extraction methods of copper
  - 16.1.3 Name equipment used for extraction of copper
  - 16.1.4 Describe copper extraction
- 16.2 Understand copper refining and uses of copper 1. HRS
  - 16.2.1 Explain refining of copper
  - 16.2.2 Enlist of copper

**17. ALUMINIUM**

- 17.1 Understand extraction of aluminium 1. HRS
  - 17.1.1 List ores of aluminium
  - 17.1.2 Name methods of aluminium extraction
  - 17.1.3 Explain electrolysis of bauxite



17.1.4 Give the uses of aluminium

**18 CHROMIUM**

- 18.1 Understand chromium extraction 1. HRS
- 18.1.1 Enlist chromium ores
  - 18.1.2 Describe chromium extraction
  - 18.1.3 Name alloys of chromium
  - 18.1.4 Enlist use of chromium

**BOOKS RECOMMENDED**

1. Chemistry part-I (for F.Sc students) by Dr. K.M. Ibne Rasa  
Dr. M. Afzal
2. Practical chemistry for intermediate class.

**LIST OF PRACTICALS.**

Salt Analysis  
Acidic Radicals  
Dilute Acid Group  
Concentrated Acid Group  
Special Group  
BASIC RADICALS  
IST group Radicals  
IIND group Radicals  
    2nd A  
    2nd B  
IIIRD Group Radicals  
4th Group Radicals  
5th Group Radicals  
6th Group Radicals  
ANALYTICAL BALANCE WEIGHING TECHNIQUES  
SEPARATION OF SALTS BY  
    Sublimation process  
    Filtration process  
    Sedimentation process  
PRACTICAL NOTE BOOK  
SALT ANALYSIS SCHEME

**MT-143 BASIC ENGINEERING DRAWING & CAD-I**

<b>T</b>	<b>P</b>	<b>C</b>
<b>1</b>	<b>6</b>	<b>3</b>

**Total contact hrs.**

Theory 32  
Practicals 192

**Pre-requisite:** None

**AIMS**At the end of this course the students will be able to understand the fundamentals of engineering drawing used in the various fields of industry specially in the Mechanical Technology. The student will be familiarized with the use of conventional drawing instruments as well as the modern technology used for this subject. The CAD portion of the subject will provide the student the knowledge & use of computer in the subject of Engineering Drawing.

**COURSE CONTENTS**

**PART-A ENGINEERING DRAWING**

- 1. USES AND APPLICATIONS OF TECHNICAL DRAWING 1 Hours**
  - 1.1 Technical drawing and the technician.
  - 1.2 Use of technical drawing.
  - 1.3 Common drawing forms.
  - 1.4 Application of drawing forms.
  - 1.5 Practices and conventions.
  
- 2. DRAWING TOOLS AND ACCESSORIES. 2 Hours**
  - 2.1 Drawing pencil
  - 2.2 Drawing papers specifications
  - 2.3 Drawing Instruments
  - 2.4 Use and care of drawing instruments and material.
  
- 3. ALPHABET OF LINES USED IN DRAWING 2 Hours**
  - 3.1 Importance the alphabet of lines.
  - 3.2 Common alphabet of lines
  - 3.3 Uses and correct line weightage of the line.
  - 3.4 Application of line
  
- 4. LETTERING. 2 Hours**
  - 4.1 Importance of good lettering.
  - 4.2 Single stroke of gothic.
  - 4.3 Letter strokes.
  - 4.4 Letter guide lines.
  - 4.5 Vertical single stroke gothic
  - 4.6 Inclined single stroke gothic
  - 4.7 Composition of lettering
  
- 5. DRAWING LINES TECHNOLOGY 2 Hours**
  - 5.1 Introduction to sketching techniques

- 5.2 Sketching lines
  - 5.3 Sketching circles and arcs
  - 5.4 Sketching ellipse.
  - 5.5 Sketching views of objects
- 6. GEOMETRICAL CONSTRUCTIONS 2 Hours**
- 6.1 Introduction to geometry
  - 6.2 Definition of terms
  - 6.3 Different conventional shapes, surfaces and objects
  - 6.4 Basic geometrical construction
  - 6.5 Construction, ellipse, parabola
  - 6.6 Involute and cycloids
- 7. INTRODUCTION TO MULTI-VIEW PROJECTIONS 3 Hours**
- 7.1 Definition and concept of multi-view drawings
  - 7.2 Proceptual vies of plan of projections
  - 7.3 Orthographic projections
  - 7.4 1st angle and 3rd angle projections
  - 7.5 Principal views
  - 7.6 Arrangement of views
  - 7.7 Multi-view drawings
- 8. INTRODUCTION TO PICTORIAL DRAWINGS. 2 Hours**
- 8.1 Uses of pictorial
  - 8.2 Three types of pictorial views
  - 8.3 Isometric sketching of rectangular block
  - 8.4 Isometric sketching of Arcs and circles
  - 8.5 Oblique sketching of rectangular block
  - 8.6 One point perspective sketching of a rectangular block.
  - 8.7 Two point perspective sketching of a rectangular block.
  - 8.8 Preparation of pictorial drawings of simple objects.
- 9. BASIC DIMENSIONING. 2 Hours**
- 9.1 Definition of dimensioning.
  - 9.2 Types of dimensioning.
  - 9.3 Elements of dimensioning.
  - 9.4 System of measurements.
  - 9.5 Dimensioning multi-view drawings.
  - 9.6 Dimensioning pictorial views.
  - 9.7 Dimensioning rules and practices.
  - 9.8 Notes and specification
- 10. SECTIONING AND SECTIONAL VIEWS. 2 Hours**
- 10.1 Definition and purpose.
  - 10.2 Cutting planes position and cutting plane lines
  - 10.3 Types of sectional views.
  - 10.4 Conventional section lines of different materials.
  - 10.5 Practice sectioned views.
- 11. MULTI-VIEW DRAWING OF MACHINE ELEMENTS 2 Hours**

- 11.1 Terminology and drawing of rivets and riveted joints
- 11.2 Terminology and drawing of screw threads
- 11.3 Terminology and drawing of keys and cotters
- 11.4 Description and drawing of simple bearings
- 11.5 Describe and drawing of simple coupling

**PART-B : CAD-I**

**12. CAD FUNDAMENTALS** **2 Hours**

- 12.1 CAD & its importance
- 12.2 Purposes
- 12.3 Advantages

**13. CAD SOFTWARE** **2 Hours**

- 13.1 CAD Abbreviations
- 13.2 CAD Help
- 13.3 Co-ordinate systems

**14. BORDER TEMPLATE** **2 Hours**

- 14.1 Drawing area
- 14.2 SNAP & GRID
- 14.3 Pedit & Qsave

**15. TITLE BLOCK** **2 Hours**

- 15.1 Change Command
- 15.2 Layer creation
- 15.3 Zooming
- 15.4 Typefaces of CAD
- 15.5 Plotting

**16. LINES & CIRCLES** **2 Hours**

- 16.1 Dedit
- 16.2 Analyzed line drawing
- 16.3 U & Redo command
- 16.4 Drawing a circle

**RECOMMENDED BOOKS:**

1. Engineering drawing by French Wirk
2. ABC's of Auto CAD Release-12 by Alan R Miller

## **MT-143 BASIC ENGINEERING DRAWING & CAD-I**

### **INSTRUCTIONAL OBJECTIVES**

#### **SECTION-I ENGINEERING DRAWING**

##### **1. USES AND APPLICATIONS OF TECHNICAL DRAWING**

###### **1.1 Know the uses of Technical Drawing**

- 1.1.1 Describe the importance of Technical Drawing from the point of view of a Technician
- 1.1.2 Explain the main uses of Technical Drawing from the point of view of a Technician

###### **1.2 Recognizes the different application of Technical drawing**

- 1.2.1 Identify commonly used drawing forms
- 1.2.2 Illustrate the different drawing forms
- 1.2.3 Differentiate different drawing forms
- 1.2.4 Develop Technical vocabulary

##### **2. KNOW THE COMMON DRAWING TOOLS AND ACCESSORIES**

- 2.1 Identify the uses of different pencils for Technical Drawing.
- 2.2 Identify different paper sizes for drawing.
- 2.3 Identify different types of papers suitable for drawing.
- 2.4 Identify different types of erasers and their uses.
- 2.5 Maintain a well sharpened pencil for drawing.
- 2.6 Describe the drawing instruments.
- 2.7 State the use of drawing instruments.

##### **3. UNDERSTAND THE IMPORTANCE OF ALPHABET, CORRECT WEIGHTAGE AND APPLICATION OF LINES USES IN TECHNICAL DRAWING.**

- 3.1 Knows the importance of lines.
- 3.2 Knows the Alphabet of lines.
- 3.3 Identify the lines characteristics of each alphabet of lines.
- 3.4 Draw horizontal, vertical and inclined lines
- 3.5 Draw a line with correct weightages

##### **4. APPLIES THE GOOD LETTERING IN A DRAWING**

- 4.1 Know the importance of lettering in a Technical engineering drawing.
- 4.2 Identify the letter style used in Technical drawing.
- 4.3 State letter strokes and guide lines.
- 4.4 Perform better stroke in single stroke gothic.
- 4.5 Print vertical single stroke letters and numbers.
- 4.6 Print inclined single stroke letters and numbers.
- 4.7 Observe stability and pleasing appearance of letters in printing

##### **5. UNDERSTAND SELECTING OF CIRCLES, ARCS, AND VIEWS OF OBJECTS.**

- 5.1 Draw a circular arc using circular line method.
- 5.2 Draw a circular arc using square method.
- 5.3 Draw an ellipse using rectangular method.
- 5.4 Draw views of simple objects.

**6. APPLY DRAWING SKILL WITH THE AID OF DRAWING INSTRUMENTS IN GEOMETRICAL CONSTRUCTION**

- 6.1 Define common terms used in geometrical construction.
- 6.2 Explain different geometrical shapes, surfaces of objects.
- 6.3 Draw basic geometrical construction.
- 6.4 Draw involute, cycloid, spiral, tangent to circle and arc

**7. UNDERSTAND THE MULTI VIEW OF PROJECTIONS SPECIFIC OBJECTIVE**

- 7.1 Define the concept of multi-view drawings.
- 7.2 Knows principle planes of projections.
- 7.3 Knows the orthographic method of projection.
- 7.4 Explain the 1st and 3rd angle projections.
- 7.5 State six principle views.
- 7.6 Practice multi-view projections.

**8. APPLY THE USE, TYPES AND METHODS OF PICTORIAL VIEWS**

- 8.1 Knows the use of pictorial views.
- 8.2 Knows the pre-requisite of pictorial drawing.
- 8.3 State three types of pictorial drawings.
- 8.4 Draw isometric view of rectangular Blocks, Arcs, circles.
- 8.5 Draw oblique sketching of rectangular blocks.
- 8.6 Draw one-point perspective view of a Rectangular block.
- 8.7 Draw Two point perspective view of a rectangular block.
- 8.8 Prepare/draw pictorial drawings of simple objects.

**9. APPLY GOOD DIMENSIONING ON MULTIVIEWS AND PICTORIALS.**

- 9.1 Define dimensioning.
- 9.2 Identify the types of dimensioning.
- 9.3 Enlist the elements of dimensioning.
- 9.4 Identify the system of measurements.
- 9.5 Indicate complete dimension on multi view drawings.
- 9.6 Indicate complete dimension on pictorial drawings.
- 9.7 Follow the general rules for dimensioning.
- 9.9 Indicate notes and specification on multiview drawings.

**10. APPLY THE SECTIONING METHODS OF MATERIAL AND DRAW SECTIONAL VIEWS.**

- 10.1 Define sectioning and its purpose.
- 10.2 Describe cutting planes and lines.
- 10.3 State types of sectional views.
- 10.4 Explain conventional section lines of different materials.
- 10.5 Practice sectioning.

**11. APPLY DRAWING METHODS TO DRAW MULTIVIEWS OF MACHINE ELEMENTS.**

- 11.1 Draw multiviews of vee-block.
- 11.2 Draw multiviews of Gland
- 11.3 Draw keys & cotters.
- 11.4 Draw Multi views of simple bearing.

**SECTION-II COMPUTER AIDED DESIGN.**

**12. UNDERSTAND CAD FUNDAMENTALS.**

- 12.1 Define CAD.
- 12.2 Describes importance of CAD.
- 12.3 States purpose of CAD.
- 12.4 Explain advantages of CAD.
- 12.5 Establish importance of CAD usage in industry.

**13. UNDERSTAND CAD SOFTWARE.**

- 13.1 Describe computer system requirements for CAD (e.g Auto CAD release 12 or latest).
- 13.2 State procedure of giving command to CAD.
- 13.3 State CAD (e.g autocad rel. 12 or latest) abbreviations.
- 13.4 State use of function keys.
- 13.5 Describe procedure of giving commands with a mouse.
- 13.6 Explain procedure of getting general help for a specific command.
- 13.7 Explain drawing cursor and coordinate read out.
- 13.8 Explain cartesian notion.
- 13.9 Explain polar notation.

**14. UNDERSTAND BORDER TEMPLATE OF A DRAWING.**

- 14.1 Describe setting up of drawing area.
- 14.2 Describe setting of displayed digits.
- 14.3 Explain changing the drawing limits.
- 14.4 Explain use of grid system (auto rel-12 or latest).
- 14.5 Explain adjustment of drawing scale.
- 14.6 Explain procedure of drawing line with line command.
- 14.7 Explain P-edit command for widening boarder.
- 14.8 Explain procedure of saving boarder template.

**15. UNDERSTAND ADDING A TITLE BLOCK TO THE BORDER DRAWING.**

- 15.1 Describe checking the drawing time.
- 15.2 Explain Change command.
- 15.3 Explain creation of layer for title block.
- 15.4 Explain procedure of creating a title block.
- 15.5 Explain Zoom command.
- 15.6 Explain importance of saving a drawing.
- 15.7 Explain use of CAD (Autocad R-12 or latest).
- 15.8 Explain filling in the title block by writing drawing title, name etc.
- 15.9 Explain procedure of plotting drawing on a plotter or printer.
- 15.10 Explain Qsave command.

**16. UNDERSTAND DRAWING LINES AND CIRCLES.**

- 16.1 State beginning of a new drawing.
- 16.2 Explain Dedit command (autocad R-12 or latest).
- 16.3 Describe viewing the entire drawing.
- 16.4 Explain drawing of angled line.
- 16.5 Explain U-command.
- 16.6 Explain Redo command.



- 16.7 Explain drawing a circle with circle command.
- 16.8 Explain automatic work saving procedures.

**A. BASIC ENGINEERING DRAWING:**

1. Lettering 5mm height
2. Lettering 3mm height
3. Use of Tee Square and set squares for drawing horizontal, vertical and inclined lines.
4. Use of Tee square and for drawing centres, crossing of lines
5. Use of compass, circles, half circles, radius.
6. Draw round corners, figure inside and outside circle.
7. Plane geometry angles and triangles.
8. Plane Geometry quadrilateral square rhombus, rectangle and parallelogram
9. Plane geometry parallel-lines, perpendicular, bisect line and angle.
10. Plane geometry equal division of line and some ratio with the help of compass and set square.
11. Plane geometry inscribe and circumscribe square, triangle and hexagon.
12. Plane geometry of construction of polygon, five, six, seven and eight sides.
13. Plane geometry of inscribe pentagon in a circle and pentagon by general and different methods.
14. Plane geometry of tangent of circle inside and outside
15. Plane geometry of construction of ellipse with two methods.
16. Plane geometry of construction of ellipse with next two methods.
17. Plane geometry of construction of parabola curve 4 methods
18. Plane geometry of construction of hyperbola curve
19. Plane geometry of Spiral curve
20. Plane geometry of helix curve.
21. Plane geometry of construction of involute curve of square rectangle hexagon and circle
22. Different types of drawing lines.
23. Orthographic projection 1 and 3rd angle L block
24. Orthographic projection 1 and 3rd angle Step Block
25. Orthographic projection 1 and 3rd angle Vee block
26. Orthographic projection 1 and 3rd angle Given Block
27. Orthographic projection 1 and 3rd angle Additional Block
28. Orthographic projection and Isometric Drawing Given Block
29. Orthographic projection and Isometric Drawing Given Block next
30. Orthographic projection and Isometric Drawing Given Block next
31. Different types of sectioning
32. Different section lines for different material
33. Orthographic projection of Vee block sectional views.
34. Orthographic projection Gland sectional views
35. Orthographic projection Open bearing sectional views
36. Concept for different types of Drawings
37. Isometric and oblique drawings of cube with one hole.
38. Isometric and oblique drawings of another given block.
39. Missing lines and portions on given views

40. Missing lines and portions on given views next
41. Missing lines and portions on given views next
42. Missing lines and portions on given views next
43. Isometric scale and development of cube
44. Development of prism
45. Development of cylinder
46. Development of Cone
47. Development of Pyramid
48. Thread profile of square and vee threads.
49. Different types of threads
50. Sketch of hexagonal nut and bolt
51. Rivet heads
52. Single riveted lap joint
53. Single riveted but joint

**B. COMPUTER AIDED DESIGN (Auto cad Rel-12 or latest).**

1. Practice loading CAD software into computer memory.
2. Practice un loading CAD software safely and cone to Dos prompt.
3. Practice CAD abbreviations, auto CAD release 12 of latest (e.g A for Arc, C for circle, E for Erase etc).
4. Practice function keys for short cuts.
5. Practice to draw two points using cartesian Notation on graph paper
6. Practice to draw straight line using polar coordinates on graph paper
7. Set-up drawing area using CAD software
8. Practice for Turning GRID ON and OFF and SNAP on and OFF
9. Draw a line with line command
10. Widen Border lines with pedit
11. Save Border Template (QSAVE)
12. Create layers and move border to it's own layer
13. Create a layer for Title Block
14. Create Title Block
15. Practice for Zoom command
16. Practice for CAD Type faces (Auto CAD Rel-12 or latest)
17. Practice for filling Title Block
18. Practice for plotting the drawing on plotter or printer
19. Begin a New drawing
20. Practice with Dedit command to make changes in the drawing
21. Draw an Angled line
22. Practice with U-Command and Redo command
23. Draw a circle with circle command