

Duration : 3 Years

**Semester : First**

Sr. No.	Subjects	Study Scheme Hrs/Week		Marks in Evaluation Scheme								Total Marks of Int. & Ext.
				Internal Assessment			External Assessment					
		Th	Pr	Th	Pr	Tot	Th	Hrs	Pr	Hrs	Tot	
1.1	<a href="#">*English and Communication Skills-I</a>	3	2	15	10	25	75	3	25	3	100	125
1.2	<a href="#">*Applied Mathematics-I</a>	5	-	25	-	25	75	3	-	-	75	100
1.3	<a href="#">*Applied Physics-I</a>	4	2	15	10	25	75	3	25	3	100	125
1.4	<a href="#">*Applied Chemistry-I</a>	4	2	15	10	25	75	3	25	3	100	125
1.5	<a href="#">*Engineering Drawing-I</a>	-	7	-	50	50	100	3	-	-	100	150
1.6	<a href="#">*General Workshop Practice-I</a>	-	7	-	100	100	-	-	50 <sup>+</sup>	4	50	150
#Student Centered Activities		-	4	-	50	50	-	-	-	-	-	50
<i>Total</i>		16	24	70	230	300	400	-	125	-	525	825

\* Common Course with other diploma programmes

# Will comprise of co-curricular activities like extension lectures, games, hobby clubs, including photography, seminars, declamation contests, educational field visits, N.C.C., NSS, Cultural Activities etc.

+ Including 25 marks for viva-voce.

**Note : For distribution of marks in internal assessment please refer to the latest guidelines/instructions of the Board.**

## ENGLISH AND COMMUNICATION SKILLS - I

L T P

3 - 2

### RATIONALE

Language is the most commonly used medium of self-expression in all spheres of human life – personal, social and professional. A student must have a fair knowledge of English language and skills to communicate effectively to handle the future jobs in industry. The objective of this course is to enable the diploma holders to acquire proficiency, both in spoken (oral) and written language. At the end of the course, the student will be able to develop comprehension skills, improve vocabulary, use proper grammar, acquire writing skills, correspond with others and enhance skills in spoken English. It is expected that each polytechnic will establish a **communication skill laboratory** for conducting practicals mentioned in the curriculum.

### DETAILED CONTENTS

#### 1. Facets of Literature (14 hrs)

##### 1.1 Short Stories

1.1.1 Homecoming – R.N. Tagore

1.1.2 The Selfish Giant - Oscar Wilde

1.1.3 The Diamond Necklace- Guy- De Maupassant

1.1.4 The Stick – Justice Surinder Singh

##### 1.2 Prose

1.2.1 I Have A Dream – Martin Luther King

1.2.2 On Habits – A. G. Gardiner

1.2.3 My struggle for An Education- Booker T Washington

1.2.4 On Seeing People Off – Max Beerbohm

##### 1.3 Poems

1.3.1 Ozymandias – P.B. Shelley

1.3.2 Daffodils – William Wordsworth

1.3.3 Stopping by Woods on a Snowy Evening – Robert Frost

1.3.4 Forefathers- Edmund Blunden

#### 2. Grammar and Usage (10 hrs)

##### 2.1 Parts of speech

2.1.1 Nouns

2.1.2 Pronouns

2.1.3 Adjectives

2.1.4 Articles

2.1.5 Verbs

- 2.1.6 Adverbs
- 2.1.7 Prepositions
- 2.1.8 Conjunction
- 2.1.9 Interjection
- 2.1.10 Identifying parts of speech
- 2.1.11 Structures: Verb patterns, Question tags,
- 2.1.12 Subject – Verb agreement (concord)

**2.2 Pair of words (Words commonly confused and misused)**

- 2.3 Tenses
- 2.4 Correction of incorrect sentences
- 2.5 One word Substitution

**3. Translation (04 hrs)**

- 3.1 Glossary of Administrative Terms (English and Hindi)
- 3.2 Translation from Hindi into English

**4. Paragraph of 100-150 words from outlines (08 hrs)**

**5. Comprehension (04 hrs)**

Unseen passages of literacy, scientific, data/graph based for comprehension exercises

**6. Communication (08 hrs)**

- 6.1 Definition, Introduction and Process of Communication
- 6.2 Objectives of Communication
- 6.3 Notices

**LIST OF PRACTICALS**

1. Locating a Book in Library
2. How to look up words in a Dictionary: meaning and pronunciation of words as given in the standard dictionary using symbols of phonetics,
3. How to Seek Information from an Encyclopedia
4. Listening pre-recorded English language learning programme
5. Paper Reading before an audience (reading unseen passages)
6. Study of spelling Rules
7. Study of essentials of a Good Speech to respond and comprehend visual, oral themes, situations or stimulus and practice before select gathering
8. Exercises on use of different abbreviations
9. Greetings for different occasions
10. Introducing oneself, others and leave taking
11. Exercises on writing sentences on a topic

**Note:**

1. The Text Book on "English and Communication Skills, Book-I By Kuldip Jaidka et. al. developed by NITTTTR, Chandigarh is recommended to be used for teaching and setting-up the question papers.
2. A communication laboratory may be set up consisting of appropriate audio-video system with facility of playing CDs/DVDs and a video camera for recording the performance of each student with play back facility. A set of CDs from any language training organization e.g. British Council etc. may be procured for use of students.
3. Elements of body language will be incorporated in all practicals
4. The practical exercises involving writing may also be included in Theory Examination.

**RECOMMENDED BOOKS**

1. English and Communication Skills, Book-I By Kuldip Jaidka, Alwainder Dhillon and Parmod Kumar Singla, Prescribed by NITTTTR, Chandigarh Published By Abhishek Publication, 57-59, Sector-17, Chandigarh
2. Essentials of Business Communication by Pal and Rorualling; Sultan Chand and Sons
3. The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India
4. New Design English Grammar, Reading and Writing Skills by AL Kohli (Course A and course B), Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
5. New Design English Reading and Advanced Writing Skills for Class XI and XII by MK Kohli and AL Kohli; Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
6. A Practical English Grammar by Thomson and Marlinet
7. Spoken English by V Sasikumar and PV Dhamija; Tata McGraw Hill
8. English Conversation Practice by Grount Taylor; Tata McGraw Hill
9. Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi
10. Business Correspondence and Report Writing by RC Sharma and Krishna Mohan; Tata McGraw Hill Publishing Company Ltd. New Delhi
11. Communication Skills by Ms R Datta Roy and KK Dhir; Vishal Publication, Jalandhar

**SUGGESTED DISTRIBUTION OF MARKS**

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	14	30
2	10	20
3	4	10
4	8	15
5	4	10
6	8	15
<b>TOTAL</b>	<b>48</b>	<b>100</b>

**RATIONALE**

Applied Mathematics forms the backbone of engineering students. Basic elements of algebra, trigonometry, coordinate geometry have been included in the curriculum as foundation course. This course will develop analytical abilities to make exact calculations and will provide continuing educational base to the students.

**DETAILED CONTENTS**

- 1. Algebra (30 hrs)**
- 1.1 Complex Numbers: Complex number, representation, modulus and amplitude. De-moivre's theorem, its application in solving algebraic equation.
  - 1.2 Geometrical progression, its nth term and sum of n terms and to infinity. Application of Arithmetic progression and Geometrical progression to Engineering problem.
  - 1.2 Partial fractions (linear factors, repeated linear factors, non-reducible quadratic factors excluding repeated factors)
  - 1.4 Permutations and Combinations: Value of  ${}^n P_r$   ${}^n C_r$ . Simple problems
  - 1.5 Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof) first and second binomial approximation with applications to engineering problems
- 2. Trigonometry (25 hrs)**
- 2.1 Concept of angles, measurement of angles in degrees, grades and radians and their conversions.
  - 2.2 T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T-Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2).
  - 2.3 Graphs of Sin x, Cos x, Tan x and  $e^x$
- 3. Co-Ordinate Geometry (25 hrs)**
- 3.1 Cartesian and Polar coordinates (two dimensional), conversion from cartesian to polar coordinates and vice-versa, distance between two points (cartesian co-ordinates), section formulae
  - 3.2 Area of triangle when its vertices are given, co-ordinates of centroid, in center of a triangle when the vertices are given, simple problems on locus.
  - 3.3 Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula

- 3.4 General equation of a circle and its characteristics. To find the equation of a circle, given:
- \* Centre and radius
  - \* Three points lying on it
  - \* Coordinates of end points of a diameter;

#### RECOMMENDED BOOKS

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics by Vol. I & II by S Kohli, IPH, Jalandhar
3. Applied Mathematics by Dr. RD Sharma
4. Applied Mathematics, Vol. I & II by SS Sabharwal & Sunita Jain, Eagle Parkashan, Jalandhar
5. Comprehensive Mathematics, Vol. I & II by Laxmi Publications
6. Engineering Mathematics by Dass Gupta
7. Engineering Mathematics by C Dass Chawla, Asian Publishers, New Delhi
8. Engineering Mathematics, Vol. I, II & III by V Sundaram et al, Vikas Publishing House (P) Ltd., New Delhi
9. Engineering Mathematics by N.Ch.S.N Iyengar et.al, Vikas Publishing House (P) Ltd., New Delhi
10. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
11. Engineering Mathematics, Vol I & II by AK Gupta, MacMillan India Ltd., New Delhi

#### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	30	35
2	25	35
3	25	30
<b>TOTAL</b>	<b>80</b>	<b>100</b>

**RATIONALE**

Applied physics includes the study of a large number of diverse topics all related to things that go on in the world around us. It aims to give an understanding of this world both by observing and by prediction of the way in which objects will behave. Concrete use of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

**DETAILED CONTENTS****1. Units and Dimensions****(10 hrs)**

- 1.1 Physical quantities
- 1.2 Units - fundamental and derived units, systems of units (FPS, CGS, MKS and SI units)
- 1.3 Dimensions and dimensional formulae of physical quantities
- 1.4 Dimensional equations and principle of homogeneity, applications to conversion from one system of units to another, checking the correctness of physical relations and derivation of simple physical relations, limitations of dimensional analysis
- 1.5 Significant figures and error analysis

**2. Force and Motion****(12 hrs)****(12**

- 2.1 Scalar and vector quantities – examples, addition and multiplication (scalar product and vector product) of vectors
- 2.2 Force, resolution and composition of forces – resultant, parallelogram law of forces, equilibrium of forces, Lami's theorem
- 2.3 Newton's Laws of motion – concept of momentum, Newton's laws of motion and their applications, determination of force equation from Newton's second law of motion; Newton's third law of motion, conservation of momentum, impulse, simple numerical problems
- 2.4 Circular motion – angular displacement, angular velocity and angular acceleration
- 2.5 Relation between linear and angular variables (velocity and acceleration)
- 2.6 Centripetal force (derivation) and centrifugal force
- 2.7 Banking of roads

**3. Work, Power and Energy****(12 hrs)**

- 3.1 Work: definition and its SI units
- 3.2 Work done in moving an object on horizontal and inclined plane (incorporating frictional forces)
- 3.3 Power: definition and its SI units, calculation of power in simple cases

- 3.4 Energy: Definition and its SI units: Types: Kinetic energy and Potential energy with examples and their derivation
- 3.5 Principle of conservation of mechanical energy (for freely falling bodies), transformation of energy from one form to another
- 3.6 Concept of friction and its applications

#### **4. Rotational Motion (06 hrs)**

- 4.1 Definitions of torque, angular momentum, their relationship
- 4.2 Conservation of angular momentum (qualitative) and its examples
- 4.3 Moment of inertia and its physical significance, radius of gyration
- 4.4 Theorems of parallel and perpendicular axes (statements)
- 4.5 Moment of inertia of rod, disc, ring and sphere

#### **5. Properties of Matter (12 hrs)**

- 5.1 Elasticity, definition of stress and strain, different types of modulus of elasticity, stress – strain diagram, Hooke's law
- 5.2 Pressure – its units, gauge pressure, absolute pressure, atmospheric pressure, Bourdon's pressure manometers and barometer gauges
- 5.3 Surface tension – its units, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension
- 5.4 Fluid motion, stream line and turbulent flow, Reynolds number
- 5.5 Viscosity and coefficient of viscosity, derivation of terminal velocity, effect of temperature on viscosity

#### **6. Thermometry (12 hrs)**

- 6.1 Principles of measurement of temperature and different scales of temperature
- 6.2 Difference between heat and temperature on the basis of K.E. of molecules
- 6.3 Types of thermometers, Physical properties on which they are based (No description of individual thermometer)
- 6.4 Co-efficient of linear, surface and cubical expansions and relation amongst them
- 6.5 Modes of transfer of heat (Conduction, convection and radiation with examples)
- 6.6 Co-efficient of thermal conductivity, determination of thermal conductivity of good conductor (Searle's method) and bad conductor (Lee's disc method)

#### **LIST OF PRACTICALS**

1. To find the diameter of wire using a screw gauge
2. To find volume of solid cylinder and hollow cylinder using a vernier caliper
3. To determine the thickness of glass strip and radius of curvature of a concave surface using a spherometer
4. To verify the parallelogram law of forces
5. To verify conservation of energy of a rolling solid sphere/cylinder
6. To find the surface tension of a liquid by capillary rise method
7. To determine the atmospheric pressure at a place using Fortin's Barometer
8. To determine the viscosity of glycerin by Stoke's method
9. To determine the coefficient of linear expansion of a metal rod
10. To find the coefficient of thermal conductivity of copper using Searle's conductivity apparatus
11. To find the coefficient of thermal conductivity of bakelite sheet (bad conductor) by Lee's Disc Method

#### RECOMMENDED BOOKS

1. Test Book of Physics for Class XI (Part-I, Part-II) N.C.E.R.T
2. Test Book of Physics for Class XII (Part-I, Part-II) N.C.E.R.T
3. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
4. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
5. Fundamentals of Physics by Resnick and Halliday & Walker, Asian Book Pvt. Ltd., New Delhi
6. Berkeley Physics Course, Vol. I, II & III, Tata McGraw Hill, Delhi
7. The Feynman Lectures on Physics by Feynman, Leighton and Sands, Vol. I & II, Narosa Publishing House, Delhi
8. Fundamentals of Optics by Francis A. Jenkins & Harvey E White, McGraw Hill International Editions, Physics Series
9. A Text Book of Optics by Subramanian and Brij Lal, S Chand & Co., New Delhi
10. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publishers
11. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
12. Applied Physics I & II by RA Banwait & R Dogra, Eagle Parkashan, Jalandhar

#### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	10
2	12	20
3	12	20
4	06	10
5	12	20
6	12	20
<b>TOTAL</b>	<b>64</b>	<b>100</b>

**RATIONALE**

The role of chemistry and chemical products in every branch of engineering is expanding greatly. Now a days various products of chemical industries are playing important role in the field of engineering with increasing number of such products each successive years. The strength of materials, the chemical composition of substances, their behavior when subjected to different treatment and environment, and the laws of heat and dynamic energy have entered in almost every activity of modern life. Chemistry is considered as one of the core subjects for diploma students in engineering and technology for developing in them scientific temper and appreciation of chemical properties of materials, which they have to handle in their professional career. Effort should be made to teach this subject through demonstration and with the active involvement of students.

**DETAILED CONTENTS****1. Basic concepts of Chemistry  
(10 hrs)**

- 1.1 Units and Dimensions, derived units (with special reference to pressure, volume, temperature, density, specific gravity, surface tension, viscosity and conductivity)
- 1.2 Matter, element, compound and mixtures, atom, molecule, ion, symbols and formulae (recapitulation only)
- 1.3 Atomic mass (A), molar mass, mole concept, molar volume of gases
- 1.4 Solution, strength of solutions in grams per liter, molarity (M), molality (m), mass fraction and mole fraction
- 1.5 Chemical equations, thermo-chemical equations, balancing of chemical equations
- 1.6 Numerical problems based on mole concept.

**2. Atomic structure and Chemical Bonding (10 hrs)**

- 2.1 Fundamental particles i.e. electron, proton and neutron (their masses and charges)
- 2.2 Postulates of Bohr model of atom, success and failures of Bohr model of atom
- 2.3 Heisenberg's uncertainty principle
- 2.4 Elementary idea of modern concept of atom, quantum numbers (significance only), definition of shells, sub shells and orbitals, shapes of s & p orbitals only. Electronic configuration of elements (atomic number 1 to 30 only) on the basis of Aufbau principle, Pauli's principle and Hund's rule
- 2.5 Modern periodic law, introduction of periodic table, periods and groups,
- 2.6 Division of the periodic table into s, p, d, and f blocks (details excluded)
- 2.7 Chemical bond and cause of bonding

- 2.8 Ionic bond, covalent bond, orbital concept of covalent bonding, valence bond theory, sigma ( $\sigma$ ) and pi ( $\pi$ ) bonds.
- 2.9 Metallic bonding (electron sea model)
- 2.10 Coordinate bond with examples of ozone, ammonium chloride,  $\text{H}_3\text{N}-\text{BF}_3$  complex

### **3. Water (12 hrs)**

- 3.1 Sources of water
- 3.2 Hard water, soft water, types of hardness, action of soap on hard water
- 3.3 Degree of hardness in terms of calcium carbonate, Units of hardness in Clark degree, French degree and ppm
- 3.4 Estimation of hardness by EDTA method,
- 3.5 Disadvantages of hard water in domestic and industrial uses
- 3.6 Boiler water: causes and prevention of scale and sludge formation, corrosion, priming & foaming and caustic embitterment
- 3.7 Softening of hard water by premutit and ion exchange processes
- 3.8 Qualities of drinking water and purification of available water for drinking purposes
- 3.9 Chemical analysis: Estimation of alkalinity, estimation of total dissolved solids (TDS), free chlorine, chloride, and dissolved oxygen
- 3.10 Numerical problems

### **4. Equilibrium, Acids and Bases. (12 hrs)**

- 4.1 Equilibrium state, equilibrium constant and statement of Le-chatelier's principle with illustration
- 4.2 Ionization of electrolyte in aqueous solution, ionic equilibrium, degree of ionization, self-ionization of water and ionic product of water ( $K_w$ )
- 4.3 Concept of pH and pH scale
- 4.4 Arrhenius concept of acids/bases; strong acids/bases, weak acids/bases, dissociation constants of acids/bases. Neutralization, acid base titration, choice of indicators for acid base titration
- 4.5 Hydrolysis of salts, buffer solutions (acidic and basic), buffer action of a buffer solution, applications of buffer solution
- 4.6 Simple numerical problems

### **5. Electrochemistry. (12 hrs)**

- 5.1 Electronic concept of oxidation and reduction, redox reactions
- 5.2 Electrolytes and non electrolytes
- 5.3 Electrolysis, Faradays laws of electrolysis
- 5.4 Applications of electrolysis in electrometallurgy, electro-refining and electroplating

- 5.5 Galvanic cells (elementary idea) brief description of Daniel cell, Ni-Cd cell, dry cell and lithium iodide cell
- 5.6 Lead storage batteries and maintenance free batteries
- 5.7 Simple numerical problems related to Faraday's laws

## 6. Organic Chemistry.

- 6.1 Tetra covalency of carbon, catenation (definition only)
- 6.2 Structural and condensed formulae of organic compounds
- 6.3 Homologous series, functional groups and following organic families:  
(a) alkanes (b) alkenes (c) alkynes (d) alcohols (e) ethio-alcohals (f) ethers (g) aldehydes and ketones (h) Carboxylic acids (i) esters (j) amides (k) amines thio-alcohols (l) cyanides (m) ethers (with structure and IUPAC names of first two members only)

## LIST OF PRACTICALS

- 1. Introduction to volumetric analysis, apparatus used and molarity based calculations
- 2. To determine strength of given solution of sodium hydroxide by titrating against standard solution of oxalic acid using phenolphthalein indicator.
- 3. To determine strength of given solution of sulphuric acid by titrating against standard solution of sodium carbonate using methyl orange indicator (or by conductometrically).
- 4. To analyse commercial samples of antacids by determining the amount of HCl they can neutralize.
- 5. Estimation of hardness of water by EDTA method.
- 6. Estimation of total alkalinity in the given sample of water by titrating against standard solution of sulfuric acid.
- 7. Determination of the dosage of bleaching powder required for sterilization or disinfection of different samples of water, using standard sodium thiosulfate solution
- 8. Estimation of chloride ions in the given sample of water by titrating against standard solution of silver nitrate.
- 9. To determine %age purity of ferrous sulphate in given solution of known strength using potassium permanganate solution.
- 10. To distinguish between aldehyde and ketone by Tollen's reagent (benzaldehyde and acetone may be used)
- 11. To verify the first law of electrolysis. (Electrolysis of copper sulphate solution using copper electrode).
- 12. To prepare iodoform from ethanol or acetone
- 13. To prepare the Mohr's salt from ferrous sulphate and ammonium sulphate.

## RECOMMENDED BOOKS

- 1. Chemistry in Engineering by J.C. Kuricose And J. Rajaram, Tata McGraw Hill, Publishing Company Limited, New Delhi.

2. Engineering Chemistry by P.C.Jain and Monika Jain, Dhanapat Rai Publishing Company New Delhi.
3. Engineering Chemistry by Shashi Chawla.
4. Progressive Applied Chemistry – I by Dr. G.H. Hugar Eagle Prakashan Jalandhar

#### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
1	10	15
2	10	15
3	12	20
4	12	20
5	12	20
6	08	10
<b>TOTAL</b>	<b>64</b>	<b>100</b>

## **ENGINEERING DRAWING - I**

**L T P**  
**- - 7**

### **RATIONALE**

Drawing is the language of engineers and technicians. Reading and interpreting engineering drawing is their day to day responsibility. The subject is aimed at developing basic graphic skills in the students so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation. The emphasis, while imparting instructions, should be to develop conceptual skills in the students following BIS SP 46 – 1988.

### **Note:**

- i) First angle projection is to be followed
- ii) Minimum of 16 sheets to be prepared
- iii) Instructions relevant to various drawings may be given along with appropriate demonstrations, before assigning drawing practice to students

### **DETAILED CONTENTS**

- 1. Handling, Use and Care of Drawing Instruments and Materials**
  - 1.1 Drawing Instruments
  - 1.2 Materials
  - 1.3 Layout of drawing sheets
  
- 2. Free Hand Sketching and Lettering sheets) (02**
  - 2.1 Different types of lines in Engineering drawing as per BIS specifications
  - 2.2 Practice of free hand sketching of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, circles, ellipses and curves
  
- 3. Lettering Technique and Practice (02 sheets)**
  - 3.1 Instrumental single stroke lettering of 35 mm and 70 mm height in the ratio of 7:4
  - 3.2 Free hand lettering (Alphabet and numerals )- lower case and upper case, single stroke, vertical and inclined at 75 degree in different standards, series of 3, 5, 8 and 12 mm heights in the ratio of 7:4
  
- 4. Dimensioning Technique sheet) (01**
  - 4.1 Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions)
  - 4.2 Dimensioning of overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered surfaces, holes, equally spaced on P.C.D., counter sink holes, counter bored holes, cylindrical parts, narrow spaces and gaps, radii, curves and arches
  
- 5. Scales sheets) (02**

- 5.1 Scales - their need and importance (Theoretical instructions).
- 5.2 Drawing of plain and diagonal scales

**6. Projection sheets) (04**

- 6.1 Theory of projections ( Elaborate theoretical instructions)
- 6.2 Drawing 3 views of given objects (Non-symmetrical objects may be selected for this exercise)
- 6.3 Drawing 6 views of given objects (Non-symmetrical objects may be selected for this exercise)
- 6.4 Identification of surfaces on drawn views and objects drawn
- 6.5 Exercises on missing surfaces and views
- 6.6 Introduction to third angle projections

**7. Sections sheets) (02**

- 7.1 Importance and salient features, Methods of representing sections, conventional sections of various materials, classification of sections, conventions in sectioning
- 7.2 Drawing of full section, half section, partial or broken out sections, Offset sections, revolved sections and removed sections.
- 7.3 Drawing of different conventions for materials in section, conventional breaks for shafts, pipes, rectangular, square, angle, channel, rolled sections
- 7.4 Exercises on sectional views of different objects.

**8. Isometric Views sheets) (02**

- 8.1 Fundamentals of isometric projections (Theoretical instructions)
- 8.2 Isometric views from 2 or 3 given orthographic views.

**9. Symbols and Conventions sheets) (02**

- 9.1 Civil engineering, sanitary fitting symbols
- 9.2 Electrical fitting symbols for domestic interior installations
- 9.3 Building plan drawing with electrical and civil engineering symbols

- 10. Preparation of simple working drawing of furniture items like table, stool and any job prepared in the workshop.  
(01 sheet)

**RECOMMENDED BOOKS**

- 1. A Text Book of Engineering Drawing by Surjit Singh, Dhanpat Rai & Co., Delhi
- 2. Engineering Drawing by PS Gill, SK Kataria & Sons, New Delhi
- 3. Elementary Engineering Drawing in First Angle Projection by ND Bhatt, Charactar Publishing House
- 4. Engineering Drawing I & II by JS Layall, Eagle Parkashan, Jalandhar

## GENERAL WORKSHOP PRACTICE - I

L T P

- - 7

### RATIONALE

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hand on experience about use of different tools and basic manufacturing practices.

This course aims at developing general manual and machining skills in the students. Besides above, the development of dignity of labour, precision, safety at work place, team working and development of right attitude are the other objectives.

### DETAILED CONTENTS (PRACTICALS)

The following shops are included in the syllabus:

1. Carpentry and Painting Shop-I
2. Fitting Shop -I
3. Welding Shop-I
4. Electric Shop -I
5. Smithy Shop -I or Electronic Shop-I
6. Sheet Metal Shop-I

#### Note:

1. The branches e.g. Civil Engineering, Electrical Engineering, Mechanical Engineering, Mechanical (RAC), Production and Industrial Engineering will do **Smithy Shop - I** instead of Electronic shop- I
2. The branches e.g. Electronics and Communication Engineering, ECE (Spl. in Microprocessor), Electronics and Telecommunication Engineering, Instrumentation and Control, Computer Engineering and Information Technology will do **Electronic shop-I** instead of Smithy Shop-I.
3. *The branches e.g Computer Engineering and Information Technology will do ONLY Workshop Practice -I. The details are given in their respective curricula.*

#### 1. Carpentry and Painting Shop – I

- 1.1 Introduction to various types of wood such as Deodar, Kail, Partal, Teak, Hollack, Sheesham, Champ, etc. (Demonstration and their identification).

- 1.2 Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed.  
Job I Marking, sawing and planing practice  
Job II Extensive planing practice on soft wood  
Job III Chiseling practice
- 1.3 Introduction to various types of wooden joints, their relative advantages and uses.  
Job IV Preparation of half lap joint  
Job V Preparation of Mortise and Tenon Joint
- 1.4 Demonstration of various methods of painting wooden items.  
Job V Preparation of surface before painting.  
Job VI Application of primer coat  
Job VII Painting wooden items by brush/roller/spray

## 2. **Fitting Shop – I**

- 2.1 Introduction to fitting shop, common materials used in fitting shop, Identification of materials. (e.g. Steel, Brass, Copper, Aluminium etc.) Identification of various sections of steel such as Flat, Angle, Tee, Channel, Bar Girder, Square, Z-Section, etc.
- 2.2 Description and demonstration of various types of work benches. Holding devices and files, Precautions while filing  
Job I Filing practice (Production of flat surfaces) Checking by straight edge.  
Job II Marking of jobs, use of marking tools and measuring instruments.  
Job III Filing a dimensioned rectangular or Square piece of an accuracy of  $\pm 0.25\text{mm}$ .
- 2.3 Introduction to chipping, Demonstration on chipping and its applications. Demonstration and function of chipping tools.  
Job IV Chipping practice
- 2.4 Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.  
Job V Making a cutout from a square piece of MS Flat using Hand hacksaw.

## 3. **Welding Shop – I**

- 3.1 Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded, introduction to welding equipment e.g. a.c. welding set, d.c. rectifier, Electrode holder, electrodes and their specifications, welding screens and other welding related equipment and accessories.
- 3.2 Electric arc welding, (ac. and dc.) precautions while using electric arc welding, Practice in setting current and voltage for striking proper arc.  
Job I Practice of striking arc while using electric arc welding set.  
Job II Welding practice job on arc welding for making uniform and straight weld beads.
- 3.3 Various types of joints and end preparation.  
Job III Preparation of butt joint by arc welding.  
Job IV Preparation of lap joint by arc welding.  
Job V Preparation of corner joint by using electric arc welding.

Job VI Preparation of Tee joint by arc welding.

#### 4. **Electric Shop – I**

- 4.1 Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, ceiling roses, battens, cleats and allied items, tools and accessories.
- 4.2 Study of electrical safety measures and demonstration about use of protective devices.  
Job I Identification of phase, neutral and earth of domestic appliances and their connection to two pin/three pin, plugs.  
Job II Lay out of complete wiring of a house (i) batten wiring (ii) plastic casing and capping.
- 4.3 Study of common electrical appliances such as electric iron, electric kettle, ceiling fan/ table fan, electric mixer, electric Geyser, desert cooler etc.  
Job III Testing and rectification of simulated faults in above said electrical appliances.
- 4.4 Introduction to a Lead-acid battery and its working.  
Job IV Installation of a battery and to connect in series and parallel  
Job V Charging a battery and testing it with the help of hydrometer and cell tester.

#### 5. **Smithy Shop – I**

- 5.1 Demonstration and detailed explanation of tools and equipment used. Forging operations in Smithy shop. Safety measures to be observed in the smithy shop.
- 5.2 Demonstration and description of bending operation, upsetting operation, description and specification of anvils, swage blocks, hammers etc.
- 5.3 Demonstration and description of tongs, fullers, swages  
Job I To forge a L-Hook.  
Job II To prepare a job involving upsetting process  
Job III To forge a chisel  
Job IV To prepare a cube from a M.S. round by forging method.

**OR**

#### 5. **Electronic Shop - I**

- 5.1 Identification and familiarization with the following tools used in electronic shop:  
Tweezers, Screw drivers (different sizes), Pliers, Cutter, Sniper, Philips Screw Driver (Star Screw Driver), L Keys, Soldering Iron  
Also demonstrate their uses.
- 5.2 Identification and familiarization with the following electronic instruments:  
a) Multimeter analog and digital (Three and half digit)  
b) Single beam simple CRO, Signal Generator and Function Generator; function of every knob on the front panel  
c) Audio-oscillator having sine and square wave output  
d) Regulated Power supply -- fixed voltage and variable voltage, single output as well as dual output.  
Job I - Practice in the use of above-mentioned equipment. For this small experiment may be done

- 5.3 Various types of protective devices such as : Wire fuse, cartridge fuse etc. ,
- 5.4 Identification and familiarization with ear phone speaker connector, telephone jacks and similar male and female connectors
- 5.5 Safety precautions to be observed in the shop

**NOTE: Demonstration Boards for the above components should be made.**

- Job II - Cut, strip, join and insulate two lengths of wires/ cables (repeat with different types of cables/wires)
- Job III - Cut, strip, connect/solder/crimp different kinds of wires/ cables (including co-axial and shielded cable) to different types of power/general purpose/Audio Video/Telephone plugs, sockets, jacks, terminals, binding posts, terminal strips, connectors. The tasks should include making complete recording/ playback/ antenna/ speaker leads for common electronic products such as Radio, TV, CD Players, VCD/DVD Players, Cassette Recorder and Players, Hi-Fi equipment, Hand- set, microphone
- Job IV-Cut, bend, tin component, Leeds, inserts and solder components (resistor, capacitor, diodes, transistors, FETs, IFT coils, ICs etc) on a PCB

**6. Sheet Metal Shop –I**

Introduction to sheet metal shop, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material.

- 6.1 Introduction and demonstration of hand tools used in sheet metal shop.
- 6.2 Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. Shearing Machine, Bar Folder, Burring Machine, Turning Machin, Wiring Machine, Setting Down Machine, Forming Machine , Brake etc.
- 6.3 Introduction to various raw materials used in sheet metal shop e.g. black-plain sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheets etc.
- 6.4 Study of various types of Nuts, Bolts, Rivets, Steel Screws etc.
  - Job I Shearing practice on a sheet using hand shears.
    - a) Single rivetted lap joint/Double rivetted lap joint
    - b) Single cover plate chain type/zig-zag type single rivetted Butt Joint

**RECOMMENDED BOOKS**

- Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay
- Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.
- Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi
- Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi