## 1.1 COMMUNICATION SKILLS

| | L | T | P |
|---|---|---|---|
| **RATIONALE** | **5** | **-** | **2** |

Interpersonal communication is a natural and necessary part of organizational life. Yet, communicating effectively can be challenging because of our inherent nature to assume, over react to and misperceive what actually is happening. Poor communication or lack of communication is often cited as the cause of conflict and poor teamwork. In today's team oriented workplace, managing communication and developing strategies for creating shared meaning are crucial to achieve results and create successful organizations. The goal of the Communicating Skills course is to produce civic-minded, competent communicators. To that end, students must demonstrate oral as well as written communication proficiency. These include organizational and interpersonal communication, public address and performance. The objectives of this subject are understanding how communication works, gaining active listening and responding skills, understanding the importance of body language, acquiring different strategies of reading texts and increasing confidence by providing opportunities for oral and written expressions

### DETAILED CONTENTS

1. **COMMUNICATION SKILLS** **(14 Period)**
   - **1.1** Introduction and Definition of Communication, Process of Communication
   - **1.2** Objectives of Communication
   - **1.3** Media and Modes of Communication
   - **1.4** Channels of Communication
   - **1.5** Barriers to Communication
   - **1.6** Listening Skills
   - **1.7** Body language
   - **1.8** Humour in Communication

2. **Correspondence** **(10 Period)**
   - **2.1** Business Letters
   - **2.2** Personal letters (congratulations, invitations, seeking job, apology, condolence, advice, thanks giving)
   - **2.3** Office letters (requests, complaints)
   - **2.4** Notices

3. **Translation** **(10 Period)**
   - **3.1** Glossary of Technical and Scientific Terms (English and Hindi)
   - **3.2** Translation from Hindi to English

4. **Comprehension** **(10 Period)**

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

5. **Writing a paragraph of 100-150 words from given outlines** **(08 Period)**

   Topic may include noise pollution, deforestation, wild life, green house effect, desertification, water pollution, poverty, illiteracy, population explosion, effect of television etc.

6. **Drafting** **(15 Period)**
   - **6.1** Report Writing
   - **6.2** Inspection Notes

**6.3** Memos, Circulars, Notes and Notices
**6.4** Telegrams
**6.5** Press Release
**6.6** Agenda and Minutes of Meetings
**6.7** Applying for a Job

**7. Vision/ Mission Preparation (08 Period)**

**LIST OF PRACTICALS**

**(Note: The following contents are only for practice. They should not be included in the final theory examination)**

1. How to Seek Information from an Encyclopedia
2. Listening pre-recorded English language learning program
3. Paper Reading before an audience (reading unseen passages)
4. Study of Spelling Rules
5. Essentials of a Good Speech to respond and comprehend visual, oral themes and situations or stimulus and practice before select gathering
6. Exercises on use of different Abbreviations
7. Greetings for different occasions
8. Introducing oneself, others and leave taking
9. Exercises on writing sentences on a topic
10. Practice on browsing Information on Internet
11. Group Discussions
12. Mock Interviews
13. Telephone Etiquette-demonstration and practice
14. Situational Conversation with feedback through video recording
15. Presentation on a given theme (using PowerPoint)
16. Exercises leading to personality development like mannerism, etiquettes and body language etc.
17. Reading unseen passages
18. Writing (developing) a paragraph
19. Exercises on writing notices and telephonic messages

**Note:**

1. 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.
2. Elements of body language will be incorporated in all practicals
3. The writing exercises of practicals may also be included in Theory Examination.

**LIST OF REFERENCE BOOKS**


1. Communicating Effectively in English, Book-I by Revathi Srinivas; Abhishek Publications, Chandigarh.
2. High School English Grammar and Composition by Wren and Martin; S. Chand & Company Ltd., Delhi.
3. Communication Techniques and Skills by R. K. Chadha; Dhanpat Rai Publications, New Delhi.

4. English and Communication Skills, Book-II By Kuldip Jaidka, Alwainder Dhillon and Parmod Kumar Singla, Prescribed by NITTTR, Chandigarh & Published By Abhishek Publication, 57-59, Sector-17, Chandigarh
5. Essentials of Business Communication by Pal and Rorualling; Sultan Chand and Sons
6. The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India
7. A Practical English Grammar by Thomson and Marlinet
8. Spoken English by V Sasikumar and PV Dhamija; Tata McGraw Hill

**SUGGESTED DISTRIBUTION OF MARKS**

| **Topic No.** | **Time Allotted for Lecturers and Tutorials (Periods)** | **Marks Allotted (%)** |
|---|---|---|
| 1. | 14 | 08 |
| 2. | 10 | 06 |
| 3. | 10 | 08 |
| 4. | 10 | 08 |
| 5. | 08 | 06 |
| 6. | 15 | 10 |
| 7. | 08 | 04 |
| **TOTAL** | **75** | **50** |

## 1.2 GENERAL SCIENCE & MATHEMATICS

| L | T | P |
|---|---|---|
| 6 | - | 2 |

**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 observation 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.

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 behaviour 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.

Applied Mathematics forms the backbone of engineering students. The curriculum of mathematics has undergone changes from time to time in accordance with growth of subject.

**Note:- Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles.**

**DETAILED CONTENTS**

**A. PHYSICS**

1. **Units and Dimension** **(05 Period)**
   - **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** Error in measurement, random and systematic errors, types of errors, propagation of errors, significant figures

2. **Force and Motion** **(05 Period)**
   - **2.1** Concept of Scalar and Vector quantities
   - **2.2** Circular motion: Angular displacement, angular velocity and angular acceleration
   - **2.3** Relation between linear and angular variables (velocity and acceleration)
   - **2.4** Application of various forces in lifts

3. **Rotational Motion** **(05 Period)**
   - **3.1** Concept of translatory and rotating motion with examples
   - **3.2** Definitions of torque, angular momentum and their relationship
   - **3.3** Conservation of angular momentum (qualitative) and its examples

**3.4** Moment of inertia and its physical significance, radius of gyration, Theorems of parallel and perpendicular axes (statements), Moment ofinertia of rod, disc, ring and sphere (Formulae only).

**3.5** Application of rotational motions in transport vehicles, trains and aeroplane turbine/engine

**4. Work, Power and Energy (05 Period)**

**4.1** Work: definition and its SI units

**4.2** Work done in moving an object on horizontal and inclined plane(incorporating frictional forces) with its application

**4.3** Power: definition and its SI units, calculation of power with numerical problems

**4.4** Energy: Definition and its SI units: Kinetic energy and Potential energy with examples and their derivation

**4.5** Principle of conservation of mechanical energy (for freely falling bodies)

**5. Thermometry (05 Period)**

**5.1** Difference between heat and temperature

**5.2** Principles of measurement of temperature and different scales of temperature and their relationship

**5.3** Types of thermometers (Concept only)

**5.4** Types of thermometers (Concept only)

**5.5** Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them.

**5.6** Modes of transfer of heat (Conduction, convection and radiation with examples)

**5.7** Co-efficient of thermal conductivity

**6. Waves and Vibrations (03 Period)**

**6.1** Simple Harmonic Motion(SHM): definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M. Equation of simple harmonic progressive wave

**6.2** Wave motion: transverse and longitudinal wave motion with examples, sound and light waves, velocity, frequency and wave length of a wave(relationship $v = n\lambda$) and their applications

**6.3** Free, forced and resonant vibrations with examples

**6.4** Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their application.

**6.5** Ultrasonics – production (magnetostriction and piezoelectric methods)and their engineering and medical applications

## B. CHEMISTRY

**7. Basics Concepts (05 Period)**

**7.1** Definition of chemistry and its importance

**7.2** Definition of matter, element, compound and mixtures, atom, molecule, ion, symbol, formula, valency and chemical equation

**8. Atomic Structure and Chemical Bonding (04 Period)**

**8.1** Fundamental particles i.e. electron, proton and neutron, their characteristics (discovery is not included)

**8.2** Electronic concept of valency

**9. Water (06 Period)**

**9.1** Hard and soft water, types of hardness and its causes, disadvantages of hardness of water (i) in industrial use (ii) in boilers for steam generation with special reference to sludge and scale formation; foaming and priming in boilers

**9.2** Methods to remove hardness of water (i) Clark's Process (ii) Permutit Process (iii) Soda Lime process (iv) Ion-Exchange resin process. Simple numerical problems related to soda lime process.

**10. Environmental Chemistry**. **(02 Period)**

**10.1** General concept of pollution and pollutants

**11. Metallurgy** **(06 Period)**

**11.1** A brief introduction of the terms: Metallurgy, mineral, ore, gangue or matrix, flux, slag, concentration (methods of concentrating the ores), roasting calcinations and refining as applied in relation to various metallurgical operations

**11.2** Metallurgy of (i) Aluminium (ii) Iron

**11.3** Definition of an alloy, purposes of alloying, composition and uses of alloys like magnalium, duralumin, alnico, invar and stainless steel

**12. Fuels** **(03 Period)**

**12.1** Definition of a 'Fuel', characteristics of a good fuel and classification of fuels with suitable examples

## C. MATHEMATICS

**13. Algebra** **(08 Period)**

**13.1** Series: A.P. and G.P., nth term of AP and GP, , sum to nth term, Value of npr and ncr.

**13.2** Determinants and Matrices – expansion of determinants (upto third order), properties of determinants, solution of equations (up to 3 unknowns) by Cramer's rule. Definition of matrix, addition, subtraction, multiplication of matrices (up to third order), minors and co-factors, inverse of a matrix by adjoint method (up to second order)

**13.3** Scalar and vector product of two /three vectors

**14. Co-ordinate Geometry** **(08 Period)**

**14.1** Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines, perpendicular distance formula (without proof)

**14.2** 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

**14.3** Equations of conics (ellipse, parabola and hyperbola), simple problems related to engineering (standards forms only)

**15. Differential Calculus** **(08 Period)**

**15.1** Definition of function; Concept of limits.

**15.2** Differentiation by definition of xn , sin x, cos x, tan x, ex, logax only

**15.3** Differentiation of sum, product and quotient of functions. Differentiation of function of a function.

**15.4** Differentiation of inverse trigonometrical functions, Logarithmic differentiation, Exponential differentiation, Successive differentiation (upto third order only).

**15.5** Applications:

(a) Maxima and minima

(b) Equation of tangent and normal to a curve (for explicit functions only) – Simple problems only

**16. Integral Calculus** **(06 Period)**

- **16.1** Integration as inverse operation of differentiation
- **16.2** Simple standard integrals and related problems
- **16.3** Simple integration by substitution, by parts and by partial fractions (for linear factors only)
- **16.4** Properties of definite integrals

**17. Statistics** **(06 Period)**

- **17.1** Measures of Central Tendency: Mean, Median, Mode
- **17.2** Measures of Dispersion: Mean deviation, Standard deviation
- **17.3** Co-efficient of rank correlation

**LIST OF PRACTICALS (to perform minimum ten experiments)**

1. To find the diameter of wire using a screw gauge
2. To find volume of solid cylinder and hollow cylinder using a vernier calipers
3. To determine the thickness of glass strip and radius of curvature using a spherometer
4. To verify parallelogram law of forces
5. To find the time period of a simple pendulum and determine the length of second's pendulum.
6. To find the velocity of sound by using resonance apparatus at room temperature.
7. To determine the viscosity of glycerin by Stoke's method
8. To determine the coefficient of friction on horizontal plane.
9. To determine the Young';s Modulus by Searles apparatus
10. To determine force Constant of spring using Hooke's Law
11. Volumetric analysis and study of apparatus used therein. Simple problems on volumetric analysis equation
12. Preparation of standard solution of oxalic acid or potassium dichromate
13. To analyse the inorganic mixture for two acidic and two basic radicals from the following radicals
14. a) Acidic Radicals CO3- -, SO4- -, NO3-, CH3 COO -, Cl-, Br-, Ib)
15. Basic Radicals NH4++, Pb+, Cu++, Cd++, As+++, Sb+++, Sn++, Al+++, Fe+++, Cr+++, Mn++, Ni++, Co++, Zn++, Ba++, Sn++, Ca++ and Mg++,
16. Determine the degree of temporary hardness of water by O'Heher's method
17. Estimation of total alkalinity of water volumetrically
18. Determine pH of a given sample by using pH meter
19. Determination of solubility of a solid at room temperature
20. Demonstration – Application of FeCl3 in etching process for designing circuits on PCB (Printed Circuit Board)

**RECOMMENDED BOOKS**


1. Applied Mathematics by Dr. RD Sharma, Dhanpat Rai Publications, Delhi
2. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
3. Applied Mathematics-I (Hindi) by Dr. Kailash Sinha, Nav Bharat Publication, Meerut.
4. Engineering Mathematics by Vol. I & II by S Kohli, IPH, Jalandhar
5. Applied Mathematics, Vol. I & II by SS Sabharwal & Sunita Jain, Eagle Parkashan, Jalandhar
6. Text Book of Physics for Class XI (Part-I, Part-II) N.C.E.R.T
7. Text Book of Physics for Class XII (Part-I, Part-II) N.C.E.R.T
8. Applied Physics Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, New Delhi
9. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
10. Berkeley Physics Course, Vol. I, II &III, Tata McGraw Hill, Delhi

**11.** Comprehensive Practical Physics, Vol. I & II, JN Jaiswal, Laxmi Publishers
**12.** Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
**13.** Applied Physics I & II by RA Banwait & R Dogra, Eagle Parkashan, Jalandhar
**14.** Applied Physics by Jasmer Kaur and Bhupinder Singh, Lords Publications,Jalandhar
**15.** Engineering Physics by Vanchna Singh and Sheeetal Kumar, Cengage Learning India Pvt. Ltd. Patparganj, Delhi
**16.** Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
**17.** Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
**18.** A Text Book of Applied Chemistry-I by SS Kumar; Tata McGraw Hill, Delhi
**19.** A Text Book of Applied Chemistry-I by Sharma and Others; Technical Bureau of India, Jalandhar
**20.** Engineering Chemistry by Jain PC and Jain M,
**21.** Chemistry of Engineering by Aggarwal CV,
**22.** Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
**23.** Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar

## SUGGESTED DISTRIBUTION OF MARKS

| Topic No. | Time Allotted for Lecturers and Tutorials (Periods) | Marks Allotted (%) |
|---|---|---|
| **1.** | 05 | 05 |
| **2.** | 05 | 02 |
| **3.** | 05 | 01 |
| **4.** | 05 | 02 |
| **5.** | 05 | 05 |
| **6.** | 03 | 02 |
| **7.** | 05 | 01 |
| **8.** | 04 | 01 |
| **9.** | 06 | 03 |
| **10.** | 02 | 03 |
| **11.** | 06 | 02 |
| **12.** | 03 | 02 |
| **13.** | 08 | 05 |
| **14.** | 08 | 05 |
| **15.** | 08 | 05 |
| **16.** | 06 | 01 |
| **17.** | 06 | 05 |
| **TOTAL** | **90** | **50** |

## 1.3 GENERAL COMPUTER SKILLS

**L T P**
**02 - 04**

**RATIONALE**

Information technology has great influence on all aspects of life. Almost all work places and living environment are being computerized. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concept of information technology and its scope; operating a computer; use of various tools of MS office; using internet etc. form the broad competency profile of diploma holders. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

**DETAILED CONTENTS**

1. Information Technology – its concept and scope
2. Elements of a computer system, its usefulness and applications, block diagram of a computer, CPU, memory, data – numeric data, alpha numeric data; contents of a program, processing of data
3. Computer organization, computer hardware and software; primary and secondary memory: RAM, ROM, PROM etc.
4. Input devices; keyboard, scanner, mouse etc ; output devices ; VDU and Printer, Plotter
5. Primary and Secondary Storage (Auxiliary Storage), Secondary storage; magnetic disks – tracks and sectors, optical disk (CD, CD-RW and DVD Memory)
6. Introduction to Operating Systems such as MS-DOS and Windows
7. Introduction to internet, browsing using search engine (like Google etc.)
8. Basics of Networking – LAN, WAN, Topologies

**LIST OF PRACTICALS**

1. Given a PC, name its various components and list their functions
2. Identification of various parts of a computer and peripherals
3. Practice in installing a computer system by giving connection
4. DOS Commands (internal / external) e.g. TYPE, REN, DEL, CD, MD, COPY, TREE, BACKUP
5. Exercises on entering text and data (Typing Practice using any tutor)
6. Features of Windows as an operating system
   - Start
   - Shutdown and restore
   - Creating and operating on the icons
   - Opening closing and sizing the windows
   - Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file
   - Creating and operating on a folder
   - Changing setting like, date, time color (back ground and fore ground)
   - Using short cuts

- Using on line help

**7.** MS-Word

- File Management:
- Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, Giving password protection for a file
- Page Set up: Setting margins, tab setting, ruler, indenting
- Editing a document: Entering text, Cut, copy, paste using tool- bars
- Formatting a document: Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods
- Aligning of text in a document, justification of document, Inserting bullets and numbering
- Formatting paragraph, inserting page breaks and column breaks, line spacing
- Use of headers, footers: Inserting footnote, end note, use of comments
- Inserting date, time, special symbols, importing graphic images, drawing tools
- Tables and Borders: Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table
- Print preview, zoom, page set up, printing options
- Using Find, Replace options
- Using Tools like: Spell checker, help, use of macros, mail merge, thesaurus word content

  Statistics, printing envelops and labels
- Using shapes and drawing toolbar,
- Working with more than one window in MS Word,
- How to change the version of the document from one window OS to another
- Conversion between different text editors, software and MS word

**8.** MS-Excel

- Starting excel, open worksheet, enter, edit, data, formulae to calculate values, format data, create chart, printing chart, save worksheet, switching between different spread sheets
- Menu commands: Create, format charts, organize, manage data, solving problem by analyzing data, and exchange with other applications. Programming with MS Excel, getting information while working
- Work books: Managing workbooks (create, open, close, save), working in work books,
- selecting the cells, choosing commands, data entry techniques, formula creation and links, controlling calculations, working with arrays
- Editing a worksheet, copying, moving cells, pasting, inserting, deletion cells, rows, columns, find and replace text, numbers of cells, formatting worksheet
- Creating a chart:
- Working with chart types, changing data in chart, formatting a chart, use chart to analyze data
- Using a list to organize data, sorting and filtering data in list

**9.** MS PowerPoint

a) Introduction to PowerPoint
   - How to start PowerPoint
   - Working environment: concept of toolbars, slide layout, templates etc.
   - Opening a new/existing presentation
   - Different views for viewing slides in a presentation: normal, slide sorter etc.

b) Addition, deletion and saving of slides

c) How to view the slide show?
   - Viewing the presentation using slide navigator
   - Slide transition
   - Animation effects etc.

**10.** Internet and its Applications

a) Log-in to internet

b) Navigation for information seeking on internet

c) Browsing and down loading of information from internet

d) Sending and receiving e-mail
   - Creating a message
   - Creating an address book
   - Attaching a file with e-mail message
   - Receiving a message
   - Deleting a message

**RECOMMENDED BOOKS**


**1.** Fundamentals of Computer by V . Rajaraman; Prentice Hall of India Pvt. Ltd.,New Delhi

**2.** Computers Today by SK Basandara, Galgotia Publication Pvt ltd. Daryaganj, New Delhi.

**3.** MS-Office 2000 for Everyone by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., New Delhi

**4.** Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi

**5.** A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura,New Delhi

**6.** Mastering Windows 95, BPB Publication, New Delhi

**7.** Computer Fundamentals by PK Sinha; BPB Publication, New Delhi

**8.** Fundamentals of Information Technology by Leon and Leon;Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi

**9.** On Your Marks - Net…Set…Go… Surviving in an e-world by Anushka Wirasinha, Prentice Hall of India Pvt. Ltd., New Delhi

**10.** Learning MS Office XP by Ramesh Bangia, Khanna Book Publishing Co. (P) Ltd., New Delhi.

**11.** Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar

## 1.4 DRAWING PRACTICE

**L T P**
**02 - 05**

**RATIONALE**

Drawing is said to be the language of engineers and technicians. Reading and interpreting engineering drawing is their day-to-day responsibility. The course is aimed at developing basic graphic skills 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.

Note:

1. First angle projection is to be followed
2. Instruction relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students
3. S.P. 46.1988 should be followed
4. Minimum of 15 sheets to be prepared by each student

**DETAILED CONTENTS**

**1. Drawing Office Practice, Lines & Lettering (2 Sheets)**

- **1.1** Drawing instruments
- **1.2** Sizes and layout of standard drawing sheets and drawing boards
- **1.3** Different types of lines in engineering drawing as per BIS specifications
- **1.4** Free hand lettering (alphabet and numerals) lower case and upper case, single stroke vertical

**2. Dimensioning (2 Sheets)**

- **2.1** Necessity of dimensioning, Types of dimensioning (chain, parallel and progressive dimensioning, size and location dimensioning) Methods of placing dimensioning (Aligned and unidirectional system), use of leader lines. General principles of dimensioning.
- **2.2** Dimensioning of overall sizes, circles, thread holes, chamfered surfaces, angles, tapered surface holes equally spaced on PCD, counter sunk hole counter bored holes, cylindrical parts, narrow space and gaps, radii, curves and arches.

**3. Scale (2 sheets)**

- **3.1** Scale – their need and importance, Definition of representative fraction (R.F), find RF of given scale
- **3.2** Construction of plain and diagonal scales

**4. Principle of Projections (7 sheets)**

- **4.1** Principle of orthographic projection and introduction to first angle projection and third angle projection
- **4.2** Drawing 3 orthographic views of given objects

**5. Symbols and Conventions (2 sheets)**

**5.1** Electrical fitting symbols for domestic interior installations and electronics Symbols, Instrumentation symbol & process flow diagram, types of riveted joint- lap, butt, chain and zigzag riveting.

**RECOMMENDED BOOKS**


1. Engineering Drawing by C M Verma, Takniki Parkashak, Roorkee.
2. Elementary Engineering Drawing (in First Angle Projection) by ND Bhatt Charotar Publishing House
3. A Text Book of Engineering Drawing by Surjit Singh ; Dhanpat Rai and Co., Delhi
4. Engineering Drawing by PS Gill ; SK Kataria and sons, Delhi
5. Engineering Drawing by RB Gupta ; Satya Prakashan, New Delhi

## 1.5 BUILDING MATERIALS

| | L | P |
|---|---|---|
| **RATIONALE** | **4** | **2** |

Civil Engineering diploma holders have to supervise construction of various types of civil works involving use of various materials like stones, bricks and tiles, cement and cement based products, lime, timber and wood based products, paints and varnishes, metals and other miscellaneous materials. The students should have requisite knowledge regarding characteristics, uses and availability of various building materials and skills in conducting tests to determine suitability of materials for various construction purposes. In addition, specifications of various materials should also be known (PWD/BIS) for effective quality control.

1. Building Stones: (06 hrs)

1.1 Classification of Rocks: (General Review)

1.1.1 Geological classification: Igneous, sedimentary and metamorphic rocks

1.1.2 Chemical classification; Calcareous, argillaceous and siliceous rocks

1.1.3 Physical classification: Unstratified , startified and foliated rocks

1.2 General characteristics of stones – Marble, Kota stone, Granite, Sand, Trap, Basalt stone, Lime stone and Slate

1.3 Requirements of good building stones

**1.4 Identification of common building stones

1.5 Various uses of stones in construction

1.6 Quarrying of stones by blasting and its effect on environment

2. Bricks and Tiles: (12 hrs)

2.1 Introduction to bricks

2.2 Raw materials for brick manufacturing and properties of good brick making earth

2.3 Manufacturing of bricks

2.3.1 Preparation of clay (manual/mechanically)

2.3.2 Moulding: hand moulding and machine moulding brick table; drying of bricks, burning of bricks, types of kilns (Bull's Trench Kiln and Hoffman's Kiln), process of burning, size and weight of standard brick; traditional brick, refractory brick, clay-flyash bricks, sun dried bricks, only line diagram of kilns

2.4 Classification and specifications of bricks as per BIS: 1077

2.5 Testing of common building bricks as per BIS: 3495 Compressive strength, water absorption – hot and cold water test, efflorescence, Dimensional tolerance, soundness

2.6 Tiles

2.6.1 Building tiles; Types of tiles-wall, ceiling, roofing and flooring tiles

2.6.2 Ceramic, terrazo and PVC tiles, cement tiles: their properties and uses

2.7 Stacking of bricks and tiles at site

3. Cement: (09 hrs)

3.1 Introduction, raw materials, flow diagram of manufacturing of cement by wet process

3.2 Various types of Cements, their uses and testing: Ordinary portland cement, rapid hardening cement, low heat cement, high alumina cement, blast furnace slag cement, white and

coloured cement, portland pozzolana cement, super sulphate cement, Test of cement – fineness, soundness, initial and final setting time etc.

3.3 Properties of cement

4. Lime: (04 hrs)

4.1 Introduction: Lime as one of the cementing materials

4.2 Classification and types of lime as per BIS Code

4.3 Calcination and slaking of lime

4.4 Manufacture of lime

4.5 Process of setting and harding action of lime

5. Timber and Wood Based Products: (09 hrs)

5.1 Identification and uses of different types of timber: Teak, Deodar, Shisham Sal, Mango, Kail, Chir,.Fur, Willow

5.2 Market forms of converted timber as per BIS Code

5.3 Seasoning of timber: Purpose, methods of seasoning as per BIS Code

5.4 Properties of timber and specifications of structural timber

5.5 Defects in timber, decay in timber

5.6 Preservation of timber and methods of treatment as per BIS

5.7 Other wood based products, their brief description of manufacture and uses: laminated board, block board, fibre board, hard board, sunmica, plywood, veneers, nu-wood

6. Paints and Varnishes: (07 hrs)

6.1 Introduction, purpose and use of paints

6.2 Types, ingredients, properties and uses of oil paints, water paints and cement paints

6.3 Covering capacity of various paints

6.4 Types, properties and uses of varnishes

6.5 Trade name of different products.

7. Metals: (04 hrs)

7.1 Ferrous metals: Composition, properties and uses of cast iron, mild steel, HYSD steel, high tension steel as per BIS.

7.2 Commercial forms of ferrous, metals.

8. Miscellaneous Materials: (09 hrs)

8.1 Plastics – Introduction and uses of various plastic products in buildings such as doors, water tanks and PVC pipes

8.2 Asbestos – Introduction, specification and uses of asbestos in roofing sheets, pipes and tanks

8.3 Types and uses of insulating materials for sound and thermal insulation

8.4 Construction chemicals like water proofing compound, epoxies, polymers

8.5 Water proofing, termite proofing and fire resistance materials – types and uses

8.6 Materials used in interior decoration works like POP

**PRACTICAL EXERCISES:**

i) To identify different types of stones

ii) To determine the crushing strength of bricks
iii) To determine the water absorption of bricks and stones
iv) To identify various types of timbers such as: Teak, Sal, Chir, Sissoo, Deodar, Kail & Hollock
v) To determine fineness (by sieve and blaine method) of cement
vi) To conduct field test of cement.
vii) To determine normal consistency of cement
viii) To determine initial and final setting times of cement
ix) To determine soundness of cement
ix) To determine compressive strength of cement
x) To identify hydraulic and fat lime.

**INSTRUCTIONAL STRATEGY**

Teachers are expected to physically show various materials while imparting instructions. Field-visits should also be organized to show manufacturing processes and use of various materials in Civil engineering works. Students should be encouraged to collect sample of various building materials so as to create a museum of materials in the polytechnic.

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**RECOMMENDED BOOKS**

1) Sharma, SK; and Mathur, GC; "Engineering Materials;" Delhi-Jalandhar, S. Chand and Co. 2) Surendra Singh; "Engineering Materials;" New Delhi, Vikas Publishing House Pvt. Ltd.
3) Chowdhuri, N; "Engineering Materials;" Calcutta, Technical Publishers of India. 4) Bahl, SK; "Engineering Materials;" Delhi, Rainbow Book Co.
5) TTTI, Chandigarh "Civil Engineering Materials:" New Delhi Tata McGraw Hill Publication
6) Kulkarni, GJ; "Engineering Materials;" Ahmedabad, Ahmedabad Book Depot.
7) Shahane; “Engineering Materials”; Poona, Allied Book Stall.
8) Gurcharan Singh; “Engineering materials”, Delhi Standard Publishers Distributors
9) SC Rangawala, ”Construction Materials”, Charotar Publishers
10) Alam Singh, “Constrution Materials”
11) Dr. Hemant Sood “Lab Manual in Testing of Engineering Materials”, New Age International (P) Ltd., New Delhi