

1.1 ENGLISH AND COMMUNICATION SKILLS - I

L	T	P	Cr
3	-	2	4

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
 - 1.2 Prose
 - 1.2.1 I Have A Dream – Martin Luther King
 - 1.2.2 On Habits – A. G. Gardiner
 - 1.2.3 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
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)
 - 2.2.1 Tenses
 - 2.2.2 Correction of incorrect sentences
 - 2.2.3 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 NITTTR, Chandigarh is recommended to be used for teaching & 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 NITTTR, 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	5
4	8	15
5	4	10
6	8	20
Total	48	100

1.2 APPLIED MATHEMATICS - I

L	T	P	Cr
5	-	-	5

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 Arithmetic progression, its n th term, sum of n terms with their applications to engineering problems. Geometrical progression, its n th term and sum of n terms and to infinity with application to engineering problems
 - 1.2 Partial fractions (linear factors, repeated linear factors, non-reducible quadratic factors excluding repeated factors)
 - 1.3 Concept of permutations and Combinations: Value of ${}^n P_r$ ${}^n C_r$.
 - 1.4 Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof)
2. Trigonometry (25 hrs)
 - 2.1 Concept of angles, measurement of angles in degrees, grades and radians and their conversions.
 - 2.2 Review of ratios of some standard angles (0,30,45,60,90 degrees), 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).
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, perpendicular

- distance formula (without proof)
- 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. Comprehensive Mathematics, Vol. I & II by Laxmi Publications
9. Engineering Mathematics, Vol I, II & III by V Sundaram et.al, Vikas Publishing House (P) Ltd., New Delhi
10. Engineering Mathematics by N.Ch.S.N Iyengar et.al, Vikas Publishing House (P) Ltd., New Delhi
11. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
12. 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	40
2	25	30
3	25	30
Total	48	100

1.3 APPLIED PHYSICS – I

L T P Cr
4 - 2 5

RATIONALE

Applied physics includes the study of a large number of diverse topics related to things that go in the world around us. It aims at giving an understanding of this world both by observation and prediction in which objects will behave. Concrete uses 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 (08 hrs)
 - 1.1 Physical quantities
 - 1.2 Fundamental and derived units
 - 1.3 Systems of units (CGS, MKS and SI units)
 - 1.4 Dimensions and dimensional formulae of physical quantities (area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, surface tension, gravitational constant, density). Coefficient of viscosity, stress, strain and elasticity)
 - 1.5 Principle of homogeneity
 - 1.6 Uses of Units and Dimensions
 - a) Conversion of one system of unit into another
 - b) Determination of formula of a physical quantity such as time period of simple pendulum and determination of formula for centripetal force by the method of units and dimensions
 - c) Knowing the correctness of a physical equation
 - 1.7 Limitations of dimensional analysis

2. Force and Motion (10 hrs)
 - 2.1 Scalar and vector quantities – definitions with examples
- Simple addition and multiplication of scalar and vector quantities
 - 2.2 Force - resolution and composition of forces, Parallelogram Law of forces with the derivation for the resultant force and direction of the resultant force.
 - 2.3 Newton's Laws of motion – concept of momentum and their application, determination of force equation from Newton's second law of motion, derivation of Newton's third law of motion from 2nd Law, impulse and impulsive forces, simple numerical problems.
 - 2.4 Projectile motion - horizontal and oblique and their equation
 - 2.5 Derivation and definitions of
 - a) Time of flight
 - b) Maximum height
 - c) Horizontal range and the condition for the maximum range
 - 2.6 Linear and angular velocity and acceleration with their relations

- 2.7 Circular motion – centripetal force and centrifugal force in detail
- 2.8 Banking of roads and rails, bending of a cyclist

- 3. Work, Power and Energy (10 hrs)
 - 3.1 Work: definitions and its SI units
 - 3.2 Work done in moving an object on horizontal and inclined plane (incorporating frictional forces)
 - 3.3 Power: definitions and its SI units, calculation of power in simple cases
 - 3.4 Energy: Definitions and its SI units: Types of Kinetic energy and Potential energy, with examples and their derivation
 - 3.5 Principle of conservation of energy (for freely falling bodies), transformation of energy from one form to another

- 4. Properties of Matter (10 hrs)
 - 4.1 Elasticity, definition of stress and strain
 - 4.2 Different types of modulus of elasticity
 - 4.3 Explanation of stress – strain diagram
 - 4.4 Pressure – its units, gauge pressure, absolute pressure, atmospheric pressure, Bourdon’s pressure gauges, manometers and barometer
 - 4.5 Surface tension – its units, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension
 - 4.6 Fluid motion, stream line and turbulent flow, Reynolds number
 - 4.7 Viscosity and coefficient of viscosity; derivation of terminal velocity; effect of temperature on viscosity

- 5. Simple Harmonic Motion (04 hrs)
 - 5.1 Definition of simple harmonic motion relation for the displacement, velocity, acceleration, and time period of a body executing simple harmonic motion
 - 5.2 Free, forced and resonant vibrations with examples

- 6. Rotational Motion (06 hrs)
 - 6.1 Definitions of torque and angular momentum, radius of gyration
 - 6.2 Derivation of rotational kinetic energy and hence definition of moment of inertia
 - 6.3 Conservation of angular momentum and applications

- 7. Temperature and its measurement (08 hrs)
 - 7.1 Difference between heat and temperature on the basis of K.E. of molecules
 - 7.2 Principles of measurement of temperature and different scales of temperature

- 7.3 Bimetallic and Platinum resistance thermometer: their merits and demerits
 7.4 Pyrometers – Disappearing filament optical pyrometer
8. Transfer of Heat (08 hrs)
- 8.1 Modes of transfer of heat (conduction, convection and radiation with examples)
 8.2 Coefficient of thermal conductivity. Determination of coefficient of thermal conductivity of good conductor by Searle's method and bad conductor by Lee's disc method
 8.3 Properties of heat radiation
 8.4 Black body radiation - Stefan's law, Kirchoff's law, Wien's law, in case of black body radiations
 8.5 Prevost's theory of heat exchange

LIST OF PRACTICALS

1. To find the radius and diameter of given wire by screw gauge
2. To find the volume of cylinder (hollow and solid) by vernier calliper
3. To find the thickness of glass strip by spherometer
4. Draw a graph between the load and depression in case of cantilever
5. To determine the coefficient of linear expansion of a given metal rod
6. To find the coefficient of thermal conductivity of a bad conductor by Lee's Disc Method
7. To find the energy of a body dropped from certain height
8. To find the coefficient of thermal conductivity of metal using Searle's apparatus
9. To find the atmospheric pressure using Fortin's Barometer

RECOMMENDED BOOKS

1. Applied Physics Vol. I, TTTI Publication Tata McGraw Hill, Delhi
2. Basic Applied Physics by RK Gaur; Dhanpat Rai Publications
3. Comprehensive Practical Physics - Volume I and II by JN Jaiswal; Laxmi Publishers
4. Numerical Problems in Physics - Volume I and II by RS Bharaj; Tata McGraw Hill
5. Simple Course in Electricity and Magnetism by CL Arora; S Chand and Co, New Delhi

6. Fundamental Physics - Volume I and II by Gomber and Gogia; Pardeep Publications, Jalandhar
7. A Text Book of Optics by Subramanian and Brij Lal
8. Physics Laboratory Manual by PK Palanisamy, Scitech Publications
9. Fundamentals of Physics by Resnick and Halliday, Asian Books Pvt. Ltd., New Delhi
10. Concepts in Physics by HC Verma; Bharti Bhawan Ltd., New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	8	10
2	10	15
3	10	15
4	10	15
5	4	5
6	6	10
7	8	15
8	8	15
Total	64	100

1.4 APPLIED CHEMISTRY - I

L	T	P	Cr
2	-	2	3

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 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.

DETAILED CONTENTS

1. Basics Concepts (04 hrs)
 - 1.1 Definition of matter, element, compound and mixtures, atom, molecule, ion, symbol, formula, valency and chemical equation.
 - 1.2 Writing of the chemical formula of a simple chemical compound. Calculation of percentage composition of a chemical compound
 - 1.3 Essentials of a chemical equation, balancing of a chemical equation by Hit and Trial method

2. Atomic Structure and Chemical Bonding (4 hrs)
 - 2.1 Fundamental particles i.e. electron, proton and neutron (their characteristics)
 - 2.2 Modern periodic law, introduction of periodic table, periods and groups
 - 2.3 Electronic concept of valency
 - 2.4 Elementary account of electrovalent, covalent and coordinate bond formation on the basis of the electronic concept of valency with the help of suitable examples to each

3. Water (08 hrs)
 - 3.1 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.
 - 3.2 Methods to remove hardness of water (i) Clark's Process (ii) Permutit Process (iii) Soda Lime process (iv) Ion-Exchange process. Simple numerical problems related to soda lime process.

- 3.3 Definition of degree of hardness of water and the systems to express the degree of hardness of water. Simple numerical problems related to finding the degree of hardness on different scales.
- 3.4 Qualities of water used for drinking purposes, treatment of river water to make it fit for town supply
- 4. Solutions (06 hrs)
 - 4.1 Concept of homogenous solution, brief introduction of the terms (i) Ionization (ii) Acidity (iii) Basicity (iv) equivalent weight and gram equivalent weight with suitable examples
 - 4.2 Strength of a solution (i) Normality (ii) Molarity (iii) Molality as applied in relation to a solution.
 - 4.3 Definition of pH, and different industrial applications of pH
- 5. Electrolysis (06 hrs)
 - 5.1 Definition of the terms: Electrolytes, Non-electrolytes conductors and non-conductors with suitable examples
 - 5.2 Faraday's Laws of Electrolysis
 - 5.3 Different industrial applications of 'Electrolysis'
 - 5.4 Elementary study of (i) lead acid battery and (ii) Ni-Cd battery with special reference to their reaction mechanisms.
- 6. Environmental Chemistry (04 hrs)
 - 6.1 Scope and significance of Environmental Science
 - 6.2 Decomposition of organic compounds and biodegradability

LIST OF PRACTICALS

- 1. Volumetric analysis and study of apparatus used therein. Simple problems on volumetric analysis equation
- 2. Preparation of standard solution of oxalic acid or potassium dichromate
- 3. Determine the strength of solution of HCl with the help of a solution of NaOH and an intermediate solution of standard oxalic acid
- 4. Find the amount of chlorides in mg per liter in a sample of H₂O with the help of a solution of AgNO₃

5. Determine the degree of temporary hardness of water by Soap Titration method
6. Determine the percentage purity of commercial sample like blue vitriol 12.5 g. of which have been dissolved per litre. Given $M/20 \text{ Na}_2\text{S}_2\text{O}_3$.
7. Estimation of amount of iron in hematite ore volumetrically
8. Estimation of total alkalinity of water volumetrically
9. Determine conductance, pH of water sample using conductance bridge and pH meter
10. Determination of solubility of a solid at room temperature

RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
3. A Text Book of Applied Chemistry-I by SS Kumar; Tata McGraw Hill, Delhi
4. A Text Book of Applied Chemistry-I by Sharma and Others; Technical Bureau of India, Jalandhar
5. Engineering Chemistry by Jain PC and Jain M
6. Chemistry of Engineering by Aggarwal CV
7. Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
8. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	4	15
2	4	20
3	8	20
4	6	15
5	6	20
6	4	10
Total	32	100

1.5 BASICS OF INFORMATION TECHNOLOGY

L T P Cr
- - 4 2

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.

Note:

- i) Teaching of theory should be detailed with practical work.
- ii) The following topics be kept in mind while doing practical exercises in the laboratory.

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 and statistics, printing envelopes 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, 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
 - e) 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

1.6 ENGINEERING DRAWING – I

L T P Cr
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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

- Note:
1. First angle projection is to be followed
 2. Minimum of 15 sheets to be prepared by each student
 3. SP 46 – 1988 should be followed
 4. Instruction relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students

DETAILED CONTENTS

1. Drawing Office Practice
 - 1.1 Drawing instruments
 - 1.2 Sizes and layout of standard drawing sheets
 - 1.3 Sizes of drawing boards
 - 1.4 Drafting table/board
2. Lines, Lettering and Dimensioning (4 sheets)
 - 2.1 Different types of lines in engineering drawing as per BIS specifications
 - 2.2 Instrumental single stroke (vertical and inclined gothic) lettering of 35 mm height in the ratios of 7:4
 - 2.3 Instrumental double stroke lettering of 35 mm height in the ratio of 7:4, vertical
 - 2.4 Free hand lettering (alphabet and numerals) lower case and upper case, single stroke vertical and inclined at 75 degree in different standard series of 2.5, 3, 5, 7, 10, and 15 mm heights in the ratio of 7:4
 - 2.5 Necessity of dimensioning - methods and principles
 - 2.6 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 – chain and parallel dimensioning
3. Simple Geometrical Constructions used in Engineering Practice (2 Sheets)
 - 3.1 Construction of regular polygons (triangle, square, pentagon, hexagon) and circles
 - 3.2 Ellipses (concentric circle method and oblong method)
 - 3.3 Parabola (rectangle and tangent method)
 - 3.4 Curves (cycloid and helix)

4. Scale (2 sheets)
 - 4.1 Scales – their need and importance, Definition of representative fraction (RF); Find RF of a given scale
 - 4.2 Types of scales
 - 4.3 Construction of plain and diagonal scales

5. Principle of Projections (6 sheets)
 - 5.1 Principle of orthographic projection
 - 5.2 Planes of projection, four quadrants, first angle projection and third angle projection
 - 5.3 Projection of points situated in different quadrants
 - 5.4 Projection of lines, Lines inclined to one plane and parallel to the other and vice versa
 - 5.5 Projection of Planes: Planes perpendicular and parallel to either of the planes; planes perpendicular to one plane and parallel to the other or vice versa
 - 5.6 Projection of solids, such as Prism, Cube, Cylinder and Cones with axis perpendicular to horizontal plane or parallel to horizontal plane/vertical plane or both
 - 5.7 Drawing 3 orthographic views of given objects (at least five objects)
 - 5.8 Identification of surfaces on drawn orthographic views from isometric object drawn
 - 5.9 Exercises on missing lines, surfaces and views

6. Sectional Views (1 sheet)
 - 6.1 Need for sectional views – conventional sections of various materials
 - 6.2. Drawing of different conventions for materials in sections, conventional breaks for shafts, pipes, rectangular, square, angle, channel and rolled sections

7. Isometric Views (2 sheets)
 - 7.1 Fundamentals of isometric projections (theoretical instructions) and isometric scales
 - 7.2 Isometric views from 2 or 3 given orthographic views

8. Development of Surfaces (2 sheets)
 - 8.1 Development of surfaces – cubes, prisms, (square, pentagonal and hexagonal), cylinders, pyramids (square, pentagonal, hexagonal) and cones

Note: Minimum 15 drawing sheets will be prepared by the students

RECOMMENDED BOOKS

1. Elementary Engineering Drawing (in first angle projection) by ND Bhatt, Charotar Publishing House
2. A Text Book of Engineering Drawing by Surjit Singh published by Dhanpat Rai and Co., Delhi
3. Engineering Drawing by PS Gill published by SK Kataria and sons, Delhi
4. Engineering Drawing by RB Gupta published by Satya Prakashan, New Delhi

1.7 GENERAL WORKSHOP PRACTICE - I

L T P Cr
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RATIONALE

Manual abilities to handle engineering materials with hand tools need to be developed in the students. This course aims at developing generic manual and machining skills in the students. They will be using different types of tools/equipment in different shops for fabrication purposes. Besides above the development of dignity of labour, precision, safety at work places, team working and development of right attitude are other objectives.

DETAILED CONTENTS

Note: The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook.

PRACTICAL EXERCISES

The following shops are included in the syllabus :

1. Carpentry and Painting shop-I
2. Fitting and Plumbing shop-I
3. Welding shop-I
4. Forging
5. Electric shop-I
6. Electronics shop

1. Carpentry and Painting Shop-I

- 1.1 Introduction to various types of wood by 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 planning practice
 - Job II Extensive planning practice
 - Job III Chiseling practice
- 1.3 Introduction to joints, their relative advantages and uses.
 - Job IV Preparation of half lap joint
 - Job V Preparation of Mortise and Tenon Joint
- 1.4 Importance and need of polishing wooden items, Introduction to polishing materials.
 - Job VI Preparation of surface before polishing.
 - Job VII Application of primer coat.
 - Job VIII Polishing on wooden items.

2. Fitting and Plumbing Shop-I

- 2.1 Introduction to fitting shop, Common materials used in fitting shop, Identification of materials.
- 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 and measuring tools.
 - Job III Filing a dimensioned rectangular or Square piece of an accuracy of +0.25mm.
- 2.3 Introduction to chipping, Demonstration on chipping and its applications. Demonstration and function of chipping tools.
 - Job IV Chipping practice
- 2.4 Description & demonstration of simple operation of hacksawing, demonstration and description of various types of blades, their uses and method of fitting the blade.
 - Job V Making a cutout from a square piece of iron block using 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.
- 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 Common welding defects and inspection.
- 3.4 Various types of joints and end preparation.
 - Job III Preparation of butt joint arc welding.
 - Job IV Preparation of lap joint by arc welding.
 - Job V Preparation of single V/double V butt joint by using electric arc welding.
 - Job VI Preparation of Tee joint by arc welding.

4. Forging shop

Introduction to forging, forging tools, tongs, blowers/pressure blowers, hammers, chisels, punch, anvil, swag-block etc. Forging operations.

- Job I Forge a L hook or Ring from MS rod 6 mm ϕ
- Job II Forge a chisel and give an idea of hardening and tempering
- Job III Lap joint with forge welding
- Job IV High Strength Steel (HSS) tools – forging of Lathe shaper tools like side-tools and V-shape tools

5. Electric Shop-I

- 5.1 Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, ceiling roses, battens, cleats and allied items, tools and accessories.
- 5.2 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 Laying out of complete wiring of a house (i) batten wiring (ii) plastic casing and capping.
- 5.3 Study of common electrical appliances such as electric irons, electric kettles, electric water heaters, table fans and electric mixer.
 - Job III Testing and rectification of simulated faults in above said electrical appliances.
- 5.4 Introduction to a battery and its working.
 - Job IV Charging a battery and testing it with the help of hydrometers and cell testers.
 - Job V Battery connections in series and parallel

6. Electronics shop

- 6.1 Identification, familiarization, demonstration and use of the following electronic instruments:
 - a) Multi-meter digital
 - b) Single beam simple CRO , function of every knob on the front panel
 - c) Power supply, fixed voltage and variable voltage, single output as well as dual output.
- 6.2 Identification, familiarization and uses of commonly used tools; active and passive components; colour code and types of resistor and potentiometers
- 6.3 Cut, strip, join and insulate two lengths of wires/cables (repeat with different types of cables/ wires)
- 6.4 Demonstrate and practice the skill to remove components/wires by unsoldering
- 6.5 Cut, bend, tin component, leads, inserts. Solder components e.g. resistor, capacitor, diodes, transistors on a PCB
- 6.6 Wiring of a small circuit on a PCB/tag strip involving laying, sleeving and use of identifier tags
- 6.7 Demonstrate the joining (or connecting) methods/mounting and dismantling method, as well as uses of the items mentioned below:
 - a) Various types of plugs, sockets, connectors suitable for general-purpose audio video use. Some of such connectors e.g. 2 and 3 pin mains plug and

sockets, Banana plugs, sockets and similar male and female connectors and terminal strips.

- b) Various types of switches such as: normal/miniature toggle, slide, push button piano key, rotary, SPST, SPDT, DPST, DPDT, band selector, multi-way Master Mains Switch.

6.8 Exposure to modern soldering and de-soldering processes (Field visits)

6.9 De-solder pump, remove and clean all the components and wires from a given equipment, a PCB or a tag strip

RECOMMEND BOOKS

1. Manual on Workshop Practice by K Venkata Reddy, KL Narayana and P Kaunaioh; MacMillan India Ltd., New Delhi
2. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi