

FIRST SEMESTER

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1.1 ENGLISH AND COMMUNICATION SKILLS - I

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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

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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 Rorualing; 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

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RATIONALE

Engineering Mathematics forms the backbone of engineering studies. Basic elements of Algebra, Trigonometry, Coordinate geometry have been included in the curriculum as foundation course to be followed by differential and integral calculus. This course will develop analytical abilities to make precise judgements and will provide base for continuing educational base to the students.

DETAILED CONTENTS

1. Algebra (20 hrs)
 - 1.1 Partial fractions: linear factors, repeated linear factors, non-reducible quadratic factors excluding repeated factors
 - 1.2 Series: Arithmetic and geometric progression, its n^{th} term, sum of n^{th} term, sum of n terms, mean, with their applications to engineering problems.
 - 1.3 Permutations and Combinations: Value of ${}^n P_r$, ${}^n C_r$, Simple problems
 - 1.4 Binomial theorem: Binomial theorem for positive integral index, any index, first and second binomial approximation with applications to Engineering problems
 - 1.5 Logarithm and Exponential series: Logarithmic and exponential series and use in calculations of engineering problems
2. Trigonometry (10 hrs)
 - 2.1 Relation between sides and angle of a triangle. Statements of various formula showing relationship between sides and angles of a triangle
 - 2.2 Complex Numbers: Complex number, representation moduls and amplitude, De-movier's theorem, its application in solving algebric equations, modulus function and its properties
 - 2.3 Height and distance: Simple problems on height and distance
 - 2.4 Graphs: Graphs of $\sin x$, $\cos x$, $\tan x$, e^x , $\log x$
3. Co-Ordinate Geometry (16 hrs)
 - 3.1 Straight Line: Equation of straight line in various standard forms

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- 3.2 Conic Section: Circle, Parabola, Ellipse, Hyperbola. Standard forms, their properties, tangents and normals
- 4. Differential Calculus (16 hrs)
 - 4.1 Functions, limits and continuity
 - 4.2 Derivative of function of function, logarithmic differentiation of implicit function. Exponential and logarithmic function
 - 4.3 Applications: Tangent and normal, maxima and minima rate measure, error and approximation
- 5. Integral Calculus (18 hrs)
 - 5.1 Infinite Integration: by substitution, partial fraction and by parts, integration of specific function
 - 5.2 Definite integral: Meaning and properties of definite integral, evaluation of definite integral
 - 5.3 Applications: Finding areas, bounded by simple curves, length of Arc, volume and surface of solids of revolutions, centre of mean of plane curve
 - 5.4 Simpson's and Trapezoidal rules and their applications in simple cases

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	20	30
2	10	10
3	16	20
4	16	20
5	18	20
Total	80	100

1.3 APPLIED PHYSICS – I

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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 (FPS, 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 Introduction of forces in nature – Gravitational, electromagnetic, nuclear weak and strong
 - 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 Conservative and non-conservative forces

- 2.7 Work done by force on bodies
- 2.8 Concept of power and its unit
- 2.9 Kinetic energy, potential energy, concept of energy conservation, various forms of energy
- 3. Dynamics of rigid body (rotational motion) (10 hrs)
 - 3.1 Circular motion, regular velocity, angular acceleration
 - 3.2 Centripetal force, centrifugal forces and its applications
 - 3.3 Rigid bodies, definition of torque, moment of inertia
 - 3.4 Theorems of parallel and perpendicular axis (statements)
 - 3.5 Radius of gyration, expression of M.I. of regular bodies
 - 3.6 Conservation of angular momentum, rotational kinetic energy
- 4. Gravitation and Satellites (4 hrs)
 - 4.1 Kepler's law of planetary motion
 - 4.2 Newton's law of gravitation
 - 4.3 Escape velocities, satellites, geostationary satellite
- 5. Properties of Matter (12 hrs)
 - 5.1 Elasticity, definition of stress and strain, different types of modulus of elasticity stress – strain diagram, Hook's law, poisson ratio
 - 5.2 Surface tension – its units, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension
 - 5.3 Fluid motion, stream line and turbulent flow
 - 5.4 Viscosity and coefficient of viscosity, Stock's law, effect of temperature on viscosity
- 6. Transfer of Heat (08 hrs)
 - 6.1 Modes of transfer of heat (conduction, convection and radiation with examples)
 - 6.2 Coefficient of thermal conductivity. Isothermal surface, temperature gradient, steady state
 - 6.3 Properties of heat radiation
 - 6.4 Black body radiation - Stefan's law, Kirchoff's law, Wien's law, in case of black body radiations
 - 6.5 Conduction of heat through compound media
 - 6.6 Principle of measurement of temperature, different scales of temperature
 - 6.7 Platinum resistance thermometer, thermocouple thermometer
 - 6.8 Difference between heat and temperature

7. Simple Harmonic Motion (04 hrs)
- 7.1 Definition of simple harmonic motion relation for the displacement, velocity, acceleration, and time period of a body executing simple harmonic motion
 - 7.2 Free, forced and resonant vibrations with examples, Q factor (qualitative)
 - 7.3 Simple pendulum, derivation of its periodic time
 - 7.4 Energy conservation in simple harmonic motion
8. Application of Sound Waves (8 hrs)
- 8.1 Standing wave
 - 8.2 Close and open organ pipe, resonance, end correction
 - 8.3 Definition of pitch, loudness, quality and intensity of sound waves
 - 8.4 Echo and reverberation time, control of reverberation time
 - 8.5 Acoustic of building-defects and remedy (qualitative)
 - 8.6 Ultrasonic wave, its applications, production of ultrasonic wave by magneto and piezoelectric effects and its properties

LIST OF PRACTICALS

- 1. Determination of 'Y' (Young's Modulus) by Searle's Method.
- 2. Determination of 'g' by plotting a graph T^2 versus l and using the formula $g = 4\pi^2 / \text{Slope of the graph line}$.
- 3. Determination of Spring Constant.
- 4. Measurement of instantaneous and average wind velocity by indicating cup type anemometer/ hand held anemometer.
- 5. Verification of Law of Parallelogram of forces.
- 6. Determination of velocity of sound by resonance tube.
- 7. Determination of Frequency of a tuning fork by a Sonometer.
- 8. Measurement solar intensity (determine solar constant) with the help of Insulation meter (Suryaamapi).
- 9. Determination of Viscosity Coefficient of liquid by Stoke's law.

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10. Determination of the thickness of glass strip and radius of curvature of a concave surface using a spherometer.
11. Determination of & verification of time period of cantilever by drawing graph between load (w) and depression (D).
12. Determination of coefficient of Friction between two surfaces

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	4	6
5	12	20
6	8	12
7.	4	7
8	8	15
Total	64	100

1.4 APPLIED CHEMISTRY - I

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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 and form the empirical and molecular formula of the compound
 - 1.3 Essentials of a chemical equation, balancing of a chemical equation by hit and trial method
2. Atomic Structure and Chemical Bonding (04 hrs)
 - 2.1 Fundamental particles i.e. electron, proton and neutron, their characteristics (discovery is not included)
 - 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 giving suitable examples to each
 - 2.5 Hydrogen bonding and its effect on physical properties of the compounds

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 with special reference to sludge and scale formation; foaming in boilers
- 3.2 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.
- 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. Estimation of hardness of water sample by O'Hehner's Method and E.D.T.A. Method
- 3.4 Qualities of water used for drinking purposes, treatment of river water to make it fit for town supply
- 3.5 Disinfection of water by chlorination process

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 with simple numerical problems related to these terms
- 4.3 Definition of pH, and different industrial applications of pH, determination of pH of a solution with the help of pH meter

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 with simple numerical problems

- 5.3 Different industrial applications of 'Electrolysis' with special reference to electroplating and electrorefining of metals
- 5.4 Basic concept of Buffer solutions, indicators and solubility product.
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. To analyse the inorganic mixture for two acidic and two basic radicals from the following radicals
 - a) Acidic Radicals CO_3^{2-} , S^{2-} , SO_3^{2-} , SO_4^{2-} , NO_2^- , NO_3^- , CH_3COO^- , Cl^- , Br^- , I^-
 - b) Basic Radicals NH_4^{+} , Pb^{2+} , Cu^{2+} , Cd^{2+} , As^{3+} , Sb^{3+} , Sn^{2+} , Al^{3+} , Fe^{3+} , Cr^{3+} , Mn^{2+} , Ni^{2+} , Co^{2+} , Zn^{2+} , Ba^{2+} , Sn^{4+} , Ca^{2+} and Mg^{2+} ,
4. Find the amount of chlorides in mg per litre in a sample of H_2O with the help of a solution of AgNO_3
5. Determine the degree of temporary hardness of water by O'Heher's method
6. Estimation of total alkalinity of water volumetrically
7. Determine pH of a given sample by using pH meter
8. Determination of solubility of a solid at room temperature
9. Demonstration – Application of FeCl_3 in etching process for designing circuits on PCB (Printed Circuit Board)

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

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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	15
6	4	15
Total	32	100

1.5 FUNDAMENTALS OF COMPUTERS

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RATIONALE

The Computer 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 computer and its scope. 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. Computer fundamental: (8 hrs)
Data processing introduction, introduction to computers, computer organization, Development in data processing and history of computers, categories of computer, Characteristics of computers, comparison of mainframe, micro and mini Computers. Hardware and software. Assembly, Machine and High Level Language, Application of Computers.
2. Computer Organization: (12hrs)
Overview of CPU, ALU, Control Unit, Buses, Interface, Registers, Instructions, Data and instruction flow, Memory- Primary and Secondary, Technologies used in memory (Magnetic, Semiconductor, Thin film, Optical etc.) Concept of memory hierarchy. Cache memory, Virtual memory.
3. Data Presentation: (10 hrs)
Number system, Binary arithmetic, Data representation in computer, Boolean algebra, Logic gates.
4. Input and Output Devices, Backup Storage devices (12 hrs)
 - 4.1 Input devices: Punch cards and card reader, Magnetic Ink Character Reader (MICR). Optical Character Reader (OCR), Optical Mark Reader (OMR), Keyboard, mouse, light pen, joy stick. Tablet, touch panels, Track balls, Voice input
 - 4.2 Output Devices: Printers (Impact & Non- Impact), Plotter, Visual Display Unit (VDU), Computer Output Film

4.3 Backup Storage Devices: Auxiliary Storage devices:- Floppy disk, magnetic disk, magnetic drum, magnetic tape, optical storage.

5. Operating System Concepts: (6 hrs)
Define Operating system, characteristics and function of operating system

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. DOS Commands (internal / external) e.g. TYPE, REN, DEL, CD, MD, COPY, TREE, BACKUP
4. Exercises on entering text and data (Typing Practice using any tutor)
5. Exercises on MS Word, MS Power Point, MS Excel
6. Internet Browsing
7. Features of Windows Operating system
 - Start, Shut down & restart, creating folders, changing setting, using elementary job commands like- creating, saving, modifying, renaming, finding deleting a file

INSRUCTIONAL STRATEGY

Explanation of concepts should be detailed with practical work in the laboratory while conducting practical exercises

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

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- 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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	8	15
2	12	30
3	10	15
4	12	30
5	6	10
Total	48	100

1.6 ENGINEERING DRAWING – I

(Common with Civil, Electrical, Mechanical, Computer Engineering and IT)

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- - 6

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. Third 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. Instructions 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

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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, chord scale

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)

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- 7.1 Fundamentals of isometric projections (theoretical instructions) and isometric scales
- 7.2 Isometric views from 2 or 3 given orthographic views
- 8. Symbols and Conventions (2 sheets)
 - 8.1 Civil engineering sanitary fitting symbols
 - 8.2 Electrical fitting symbols for domestic interior installations and electronics symbols
 - 8.3 Building plan drawing with electrical and civil engineering symbols
- 9. AUTO CAD (for practical and viva-voce only)
 - 9.1 Concept of AutoCAD, Tool bars in AutoCAD, coordinate system, snap, grid, and ortho mode
 - 9.2 Drawing commands – point, line, arc, circle, ellipse
 - 9.3 Editing commands – scale, erase, copy, stretch, lengthen and explode
 - 9.4 Dimensioning and placing text in drawing area
 - 9.5 Sectioning and hatching
 - 9.6 Inquiry for different parameters of drawing entity

RECOMMENDED BOOKS

- 1. Elementary Engineering Drawing by ND Bhatt, Charotar Publishing House
- 2. A Text Book of Engineering Drawing by Surjit Singh, Dhanpat Rai and Co., Delhi
- 3. Engineering Drawing by PS Gill, SK Kataria and sons, Delhi

Note:

- 1. Minimum 15 drawing sheets will be prepared by the students
- 2. No table is suggested for distribution of marks, instead it is emphasized that the examination paper should contain exercises for evaluation of all necessary skills envisaged in the curriculum.
- 3. It is also suggested that a comprehensive viva of each student should be conducted by an external examiner during or just after the examinations to ascertain understanding of the subject e.g. reading and interpreting drawings and development of necessary skills etc.

1.7 GENERAL WORKSHOP PRACTICE - I
(Common with Civil, Electrical, Mechanical, Computer Engineering and IT)

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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. Electric shop – I
5. Sheet Metal Shop
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 Demonstration of various methods of painting wooden items.
 - Job VI Preparation of surface before painting.
 - Job VII Application of primer coat
 - Job VIII Painting wooden items by brush/roller/spray
- 1.5 Demonstration of various methods adopted for painting steel items.
 - Job IX Painting steel items by brush/roller/ spray

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 tools and 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.
- 2.5 Introduction and demonstration of plumbing tools and different connectors and plumbing operations
 - Job VI Preparation of job involving threads on GI pipe and fixing of different types of elbow, T-unions, sockets, stopcocks, taps etc.

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.

3.5 Introduction to gas welding and its demonstration

4. 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 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

5. Sheet metal shop

Introduction to sheet metal process and tools

Job I Making sheet metal joints

Job II Making sheet metal tray or a funnel or a computer chassis

Job III Preparation of sheet metal jobs involving rolling, shearing, creasing, bending and cornering

Job IV Prepare a lap riveting joint of sheet metal pieces

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

RECOMMENDED 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