

1.1 ENGLISH LANGUAGE – I

L T P
3 - 2

RATIONALE

Knowledge of English Language plays an important role in career development. This subject aims at introducing basic concepts of communication besides laying emphasis on developing listening, speaking, reading and writing skills as parts of Communication Skill.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

- Understand the importance of good communication
- Describe process of communication.
- Explain, Compare and re-write the types of communication
- Identify and match the parts of speech
- Rewrite sentences correctly
- Modify sentences and relate them with real life situations.
- Reproduce and match words and sentences in a paragraph.
- Re-write the sentences according to given situation.
- Relate and use various words using proper vocabulary and grammar.
- Write the various types of paragraphs, notices and composition on picture with appropriate format.

DETAILED CONTENTS

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|---|--|--------------|
| 1 | Basics of Communication | (08 periods) |
| | 1.1 Definition and process of communication | |
| | 1.2 Types of communication - formal and informal, oral and written, verbal and non-verbal | |
| 2 | Functional Grammar | (15 periods) |
| | 2.1 Noun, pronoun, verb classification (Main Verb, Auxiliary Verb and modals) | |
| | 2.2 Punctuation | |
| | 2.3 Tenses | |
| 3 | Reading Skill | (10 periods) |
| | Unseen passage for comprehension (one word substitution, prefixes, suffixes, antonyms, synonymsetc. based upon the passage should be covered under this topic) | |
| 4 | Writing Skill | (15 periods) |
| | 4.1 Picture composition | |
| | 4.2 Writing paragraph | |
| | 4.3 Notice | |

LIST OF PRACTICALS

Note: Teaching Learning Process should be focused on the use of the language in writing reports and making presentations.

Topics such as Effective listening, effective note taking, group discussions and regular presentations by the students need to be taught in a project oriented manner where the learning happens as a byproduct.

Listening and Speaking Exercises

1. Self and peer introduction
2. Newspaper reading
3. Just a minute session-Extempore
4. Greeting and starting a conversation
5. Leave taking
6. Thanking
7. Wishing well
8. Talking about likes and dislikes
9. Group Discussion
10. Listening Exercises.

INSTRUCTIONAL STRATEGY

Student should be encouraged to participate in role play and other student centered activities in class room and actively participate in listening exercises

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests
- Actual practical work, exercises and viva-voce
- Presentation and viva-voce

RECOMMENDED BOOKS

1. Communicating Effectively in English, Book-I by RevathiSrinivas; Abhishek Publications, Chandigarh.
2. Communication Techniques and Skills by R. K. Chadha; DhanpatRai Publications, New Delhi.
3. High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.
4. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

1. <http://www.mindtools.com/> page 8.html – 99k
2. <http://www.letstalk.com.in>
3. <http://www.englishlearning.com>
4. <http://learnenglish.britishcouncil.org/en/>
5. <http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	08	20
2	15	30
3	10	30
4	15	20
Total	48	100

1.2 APPLIED MATHEMATICS - I

L T P
5 - -

RATIONALE

Contents of this course provide fundamental base for understanding engineering problems and their solution algorithms. Contents of this course will enable students to use basic tools like logarithm, binomial theorem, partial fractions, matrices, t-ratios and co-ordinates for solving complex engineering problems with exact solutions in a way which involve less computational task. By understanding the logarithm, they will be able to make long calculations in short time and it is also a pre-requisite for understanding Calculus.

LEARNING OUTCOMES

After undergoing this course, the students will be able to:

- Apply complex number in engineering problems.
- Apply permutation and combination to count without actual counting.
- Apply permutation and combination to understand binomial theorem.
- Calculate the approximate value of roots of certain expressions in engineering problems by application of binomial theorem.
- Resolve rational functions to partial fractions for the use in Integral Calculus.
- Use matrices to provide solution to engineering problems.
- Solve different problems using trigonometry.
- Understand the geometric shapes used in engineering problems by Co-ordinate Geometry.
- Explore the idea of location, graph, and linear relationships between two variables.

DETAILED CONTENTS

1. Algebra (40 periods)
 - 1.1 Complex Numbers: definition of complex number, real and imaginary parts of a complex number, Polar and Cartesian Form and their inter conversion, Conjugate of a complex number, modulus and amplitude, addition subtraction, multiplication and division of complex number
 - 1.2 Logarithms and its basic properties
 - 1.3 Meaning of ${}^n P_r$ & ${}^n C_r$ (mathematical expression). Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof), first binomial approximation with application to engineering problems.
 - 1.4 Determinants and Matrices – Evaluation of determinants (upto 2nd order), solution of equations (upto 2 unknowns) by Cramer's rule, definition of

Matrices and its types, addition, subtraction and multiplication of matrices (upto 2nd order).

2. Trigonometry (20 periods)
- 2.1 Concept of angle, measurement of angle in degrees, grades, radians and their conversions.
- 2.2 T-Ratios of Allied angles (without proof), Sum, Difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa)
- 2.3 Applications of Trigonometric terms in engineering problems such as to find an angle of elevation, height, distance etc.
3. Co-ordinate Geometry (20 periods)
- 3.1 Cartesian and Polar co-ordinates (two dimensional), conversion from cartesian to polar co-ordinates and vice-versa
- 3.2 Slope of a line, equation of straight line in various standards forms (without proof); (slope intercept form, intercept form, one-point form, two-point form, symmetric form, normal form, general form), intersection of two straight lines, concurrency of lines, angle between straight lines, parallel and perpendicular lines, perpendicular distance formula, conversion of general form of equation to the various forms.
- 3.3 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

INSTRUCTIONAL STATREGY

Basic elements of algebra, trigonometry and co-ordinate geometry can be taught in the light of their applications in the field of engineering and technology. By laying more emphasis on applied part, teacher can also help in providing a good continuing education base to the students. Students need to be taught the skills needed to use software tools built by experts through multiple problem solving based on the topics related to Algebra, Trigonometry and Coordinate Geometry that the industry requires. Examples to be used should be related to engineering. Students should be able to relate to the actual use of these examples and the way mathematical calculations will help them in doing their job.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making

RECOMMENDED BOOKS

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics Vol. I & II by S Kohli, IPH, Jalandhar
3. Applied Mathematics, Vol. I & II by SS Sabharwal & Dr Sunita Jain, Eagle Parkashan, Jalandhar
4. Engineering Mathematics, Vol I, II & III by V Sundarametal, Vikas Publishing House (P) Ltd., New Delhi
5. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
6. Applied Mathematics I, by Archana Sharma, Lords Publications, Jalandhar.
7. Engineering Mathematics by Srimanta Pal and Subodh C. Bhunia; Oxford University Press, New Delhi
8. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1.	40	50
2.	20	25
3.	20	25
Total	80	100

1.3 APPLIED PHYSICS – I

L T P
4 - 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.

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. In all contents, SI units should be followed. Working in different sets of units can be taught through relevant software.

LEARNING OUTCOMES

After undergoing this subject, the students will be able to:

- Identify physical quantities, parameters and select their units for use in engineering solutions.
- Compute units and dimensions of different physical quantities.
- Represent physical quantities as scalar and vectors.
- Solve difficult problems (walking of man, motion of lawn roller.)
- Analyse and design banking of roads and apply conservation of momentum principle to explain recoil of gun etc.
- Define work, energy and power and their units.
- Derive work, power and energy relationship and solve problems about work and power
- State the principle of conservation of energy.
- Identify forms of energy, conversion from one form to another.
- Compare and contrast the physical properties associated with linear motion and rotational motion and give examples of conservation of angular momentum.
- Describe the surface tension phenomenon and its units, cause of surface tension and effects of temperature on surface tension.
- Describe the viscosity of liquids.
- Define stress and strain.
- State Hooke's law and conditions under which it is valid.
- Measure temperature in various processes on different scales (Celsius, Kelvin Fahrenheit etc.)
- Distinguish between conduction, convection and radiation.
- Use equipments like vernier calliper, screw gauge, spherometer.

DETAILED CONTENTS

1. Units and Dimensions (12 periods)
 - 1.1 Physical quantities Units - fundamental and derived units, systems of units (FPS, CGS and SI units)
 - 1.2 Dimensions and dimensional formulae of physical quantities (area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, surface tension, stress, strain, moment of inertia.)
 - 1.3 Principle of homogeneity of dimensions
 - 1.4 Dimensional equations and dimensional analysis. Applications of dimensional equations, conversion from one system of units to other for density, force, work, energy, velocity and acceleration, checking of correctness and derivation of formulas (potential energy, kinetic energy, pressure)
 - 1.5 Limitations of dimensional analysis

2. Force and Motion (15 periods)
 - 2.1 Scalar and vector quantities – examples, representation of vector
 - 2.2 Addition of Vectors, Triangle and Parallelogram law (Statement only), Scalar and Vector Product(statement and formula only)
 - 2.3 Force, Rectangular components, Resolution of force.
 - 2.4 Newton's laws of motion(Statement and examples), Momentum, Conservation of linear momentum(statement only),its applications such as recoil of gun.
 - 2.5 Impulse and its examples
 - 2.6 Circular motion, definition of angular displacement, angular velocity, angular acceleration, frequency, time period.
 - 2.7 Relation between linear and angular velocity, linear acceleration and angular acceleration
 - 2.8 Centripetal and centrifugal forces(definition and formula only)
 - 2.9 Application of centripetal force such as Banking of roads(derivation of angle of banking)

3. Work, Power and Energy (10 periods)
 - 3.1 Work: and its units, types of work (zero work, positive work and negative work with examples)
 - 3.2 Energy and its units: Kinetic energy and potential energy with examples and their derivation
 - 3.3 Principle of conservation of mechanical energy for freely falling bodies, examples of transformation of energy.
 - 3.4 Power (definition,formula and units)

4. Rotational Motion (06 periods)
 - 4.1 Rotational motion with examples
 - 4.2 Definition of torque and angular momentum and their examples
 - 4.3 Conservation of angular momentum (quantitative) and its examples

- 4.4 Moment of inertia and its physical significance, radius of gyration (definition, derivation and formula).
5. Properties of Matter (12 periods)
- 5.1 Definition and types of stress and strain, Hooke's law, different types of module of elasticity.
- 5.2 Pressure: definition, its units, atmospheric pressure, gauge pressure, absolute pressure
- 5.3 Surface tension: definition, its units, applications of surface tension, effect of temperature on Surface tension
- 5.4 Viscosity: definition, units, effect of temperature on viscosity
- 5.5 Fluid motion, stream line and turbulent flow.
6. Heat and temperature (09 periods)
- 6.1 Difference between heat and temperature
- 6.2 Modes of transfer of heat (Conduction, convection and radiation with examples). Properties of heat radiation
- 6.3 Different scales of temperature and their relationship
- 6.4 Principles of measurement of temperature.
- 6.5 Thermal conductivity(definition),co-efficient of thermal conductivity

LIST OF PRACTICALS (to perform minimum seven experiments)

1. Familiarisation with verniercaliper,screw gauge, spherometer and find their leastcount.
2. To find diameter of solid cylinder using a verniercaliper
3. To find internal diameter and depth of a beaker using a verniercaliper and hence find its volume.
4. To find the diameter of wire using screw gauge
5. To find thickness of paper using screw gauge.
6. To determine the thickness of glass strip using a spherometer
7. To verify parallelogram law of forces
8. To determine the atmospheric pressure at a place using Fortin's Barometer
9. To determine force constant of spring using Hooke's law

INSTRUCTIONAL STATREGY

Teacher may use various teaching aids like models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. Students need to be exposed to use of different sets of units and conversion from one unit type to another. Software may be used to solve problems involving conversion of units. The teacher should explain about field

applications before teaching the basics of mechanics, work, power and energy, rotational motion, properties of matter etc. to develop proper understanding of the physical phenomenon. Use of demonstration can make the subject interesting and develop scientific temper in the students.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, exercises and viva-voce

RECOMMENDED BOOKS

1. Text Book of Physics for Class XI (Part-I, Part-II); N.C.E.R.T., Delhi
2. Applied Physics, Vol. I and Vol. II by Dr. HH Lal; TTTI Publications, Tata McGraw Hill, Delhi
3. Concepts in Physics by HC Verma, Vol. I&Vol.II
4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
5. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1.	12	15
2.	15	25
3.	10	15
4.	06	10
5.	12	20
6.	09	15
Total	64	100

1.4 APPLIED CHEMISTRY – I

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3 - 2

RATIONALE

The use of various chemicals and chemical products in diverse technical and engineering fields have repeatedly proved the importance of Applied Chemistry, which enhances its role to a new peak. On the other hand, ever increasing use of such materials will compel engineers, technocrats to acquire essential applied chemistry knowledge in order to select engineering materials, which not only suit them but also provide more environmental compatibility. This situation demands principles of Applied Chemistry in diploma-engineering courses. Principles of Applied Chemistry will enable budding engineers and technocrats to develop scientific temper and appreciate physical, chemical and engineering properties of materials. Hence the subject of Applied Chemistry.

LEARNING OUTCOMES

After undergoing this subject, the students will be able to:

- Classify matter based on state of aggregation
- Calculate percentage composition of chemical compounds.
- Substantiate the laws and principles on which structure of atom is established.
- Prepare solutions of required concentrations.
- Prepare pH and buffer solutions and understand their significance in industrial processes such as electrolysis, electrochemical machining of materials etc.
- Explain sources of water and various characteristics of water (quantitatively).
- Explain cause and factors which can adversely affecting natural water quality and remedial measures available for water purification to achieve water quality standards required for domestic, agricultural and industrial applications.
- Classify the substance based on the electric behaviour and apply these laws/principles efficiently in industrial electrochemical processes.
- Distinguish and construct electrochemical cells and electrolytic cells.

DETAILED CONTENTS

1. Basic Concept of Chemistry (06 periods)
 - 1.1 Physical Classification of matter –solids, liquids, gases.
 - 1.2 Chemical Classification of matter – element, compounds and mixtures
 - 1.3 Symbols of elements and valency, writing of chemical formulae of simple compounds.
 - 1.4 Calculation of percentage of elements in simple compounds using atomic and molecular masses (Atomic mass of elements should be provided)

2. Atomic Structure and Chemical Bonding (10 periods)
- 2.1 Fundamental particles- mass and charges of electrons, protons and neutrons with names of the scientists who discovered these fundamental particles.
 - 2.2 Bohr's model of atom. Successes and limitations of atomic theory (qualitative treatment only).
 - 2.3 Atomic number, atomic mass number isotopes and isobars.
 - 2.4 Chemical bonding and cause of bonding and types such as ionic bond in NaCl sigma (σ) and pi (π) covalent bonds in H_2 , HCl, Cl_2
 - 2.5 Metallic bonding- explanation with the help of electron gas (sea) model.
3. Solutions (06 periods)
- 3.1 Definition of solution, solute and solvent with examples
 - 3.2 Methods to express the concentration of solution- molarity (M), molality (m) and normality (N) and numericals based on calculation of M , m and N
 - 3.3 Introduction to pH of solution, simple numericals on pH and industrial applications of pH.
 - 3.4 Definition of buffer solution and industrial applications of buffers solutions.
4. Water (10 periods)
- 4.1 Water resources on Earth
 - 4.2 Classification of water – soft water and hard water, action of soap on hard water, types of hardness, causes of hardness, units of hardness – mg per litre (mgL^{-1}) and part per million (ppm) and simple numericals.
 - 4.3 Disadvantages caused by the use of hard water in domestic and boiler feed water.
 - 4.4 Removal of hardness -Permutit process and Ion-exchange process.
 - 4.5 Indian Water Quality standards as per WHO/BIS.
 - 4.6 Natural water sterilization by chlorine and UV radiation and reverse osmosis.
5. Electro Chemistry (08 periods)
- 5.1 Electronic concept of oxidation, reduction and redox reactions
 - 5.2 Definition of terms: electrolytes, non-electrolytes, conductors, insulators, semi-conductors with suitable examples
 - 5.3 Faraday's laws of electrolysis and simple numerical problems.
 - 5.4 Industrial Application of Electrolysis – Electroplating, electrolytic refining and electrometallurgy.
 - 5.5 Application of redox reactions in electrochemical cells – commercial dry cell (Primary), commercially used lead storage battery and lithium ion battery (Secondary cell).
6. Organic Chemistry (08 periods)
- 6.1 Tetra valency and catenation property of carbon to produce huge organic compounds.
 - 6.2 Classification of organic compounds on the basis of functional groups

- 6.3 Nomenclature of simple organic compounds in accordance with I.U.P.A.C. (compounds having six carbon atoms in a molecule belongs to alkanes (simple and with halo substitution), alkenes, alkynes, alcohols, aldehydes, ketones, carboxylic acids) (compounds containing more than one functional groups are excluded).

LIST OF PRACTICALS

1. Volumetric analysis and apparatus used in volumetric analysis
2. Preparation of standard solution of oxalic acid or potassium permanganate
3. To prepare N/20 oxalic acid/ potassium dichromate solution from given N/10 oxalic acid/ potassium dichromate solution.
4. To determine strength of given sodium hydroxide solution by titrating against standard oxalic acid solution using phenolphthalein indicator.
5. Electroplate the given strip of Fe/Cu with Cu/Ni
6. Estimation of total dissolved solids in given tap water
7. Determination of pH of given solution using pH meter
8. Estimation of total hardness of water using standard EDTA solution and using erichrome black-T (solochrome black-T) indicator and approximately neutral buffer solution (pH range 7-11)
9. Estimation of total alkalinity of given water sample by titrating it against standard sulphuric acid solution

INSTRUCTIONAL STRATEGY

Teachers may take help of various models and charts while imparting instructions to make the concept clear. Awareness of the contents should be done through examples using you-tubes and subsequent discussions. More emphasis should be laid on discussing and explaining practical applications of various chemical process and reactions. In addition, students should be encouraged or motivated to study those processes in more details, which may find practical application in their future professional career.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, exercises and viva-voce

RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuricose & J. Rajaram, Tata McGraw Hill, Publishing Company Limited, New Delhi.
2. Engineering Chemistry by P.C. Jain & Monika Jain, Dhanapat Rai Publishing Company, New Delhi.
3. Eagle's Applied Chemistry - I by S. C. Ahuja & G. H. Hugar, Eagle Prakashan, Jalandhar.
4. Engineering Chemistry – A Text Book by H. K. Chopra & A. Parmar, Narosa Publishing House, New Delhi.
5. Engineering Chemistry by Dr. Himanshu Pandey, Goel Publishing House, Meerut, India.

6. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

SUGGESTED DISTRIBUTION OF MARKS

Topics	Time Allotted (periods)	Marks Allotted (%)
1.	06	12
2.	10	22
3.	06	12
4.	10	22
5.	08	16
6.	08	16
Total	48	100

1.5 BASICS OF INFORMATION TECHNOLOGY

L T P
- -4

RATIONALE

Information technology has great influence on all aspects of life. Primary purpose of using computer is to make the life easier. Almost all work places and living environment are being computerized. The subject introduces the fundamentals of computer system for using various hardware and software components. 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 using MS Office/Open 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:

Explanation of Introductory part should be demonstrated with practical work. Following topics may be explained in the laboratory along with the practical exercises. There will not be any theory examination.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

- Identify Computer Hardware Components, Network Components and Peripherals.
- Explain the role of an Operating System.
- Install System and Application Software/Operating system.
- Explain the function of the system components including Processor, Motherboard and Input-output devices.
- Use Word Processing Software to prepare document.
- Use Spreadsheet Software to create workbooks and automate calculation.
- Use Presentation Software to create interactive presentation.
- Use of AutoCAD or Solidworks Software to create drawing sheet by using simple 2-D commands and editing features.
- Perform fundamental tasks common to most application software including print, save, edit, cut, copy, paste, format, spell and grammar check.
- Find and evaluate information on the Web.
- Install and use Antivirus.
- Safeguard against Online Frauds, threats and crimes.

TOPICS TO BE EXPLAINED THROUGH DEMONSTRATION

1. Basic Concepts of IT and Its Application

Information Technology concept and scope, applications of IT in office, Air and Railway Ticket reservation, Banks financial transactions, E-Commerce and E-Governance applications etc., Ethics of IT, concept of online frauds, threats of IT crimes.

2. Computer Hardware:

Block diagram of a computer, components of computer system, CPU, Memory, Input devices; keyboard, Scanner, mouse etc; Output devices; VDU, LCD, Printers etc. Primary and Secondary Memory: RAM, ROM, magnetic disks – tracks and sectors, optical disk (CD , DVD & Blue Ray Disk.), USB/Flash Drive/external disk.

3. Software Concepts:

System software, Application software, Virtualization software and Utility software, Introduction of Operating System, Installation of Window / linux, Features of OPEN OFFICE/MSOFFICE(MS Word, Excel, PowerPoint) .

4. Internet Concepts:

Basics of Networking – LAN, WAN, Wi-Fi technologies and sharing of printers and other resources, Concept of IP addresses,DNS, Introduction of internet, applications of internet like: e-mail and browsing, concept of search engine and safe searching. Various browsers like Internet explorer/Microsoft Edge, Mozilla Firefox, use of cookies and history, WWW (World Wide Web), hyperlinks, introduction to Anti-virus.

LIST OF PRACTICAL EXERCISES

1. Given a PC, name its various components and peripherals(Draw at least 5 figures yourself). List their functions . Identify and understand front panel and back panel connections of a Computer system
2. Installation of operating system viz. Windows/BOSS-LINUX, Software licenses and openware concepts.
3. Installation of I/O devices, printer's driver and installing application software
4. Features of Windows as an operating system
 - Start , Booting process(cold and hot booting)
 - Shut down and restore
 - Creating and operating on the icons , GUI concepts
 - Opening, closing and sizing the windows and working with windows interfacing elements (option buttons, checkbox, scroll etc.)
 - Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file and folders, file naming rules and conventions

- Changing settings like, date, time, colour (back ground and fore ground etc.)
- Using short cuts

5. Word Processing (MS Office/Open Office) –The teacher should teach them the relevant commands needed for the preparation of these. At least three of the following:

- Create a Business Letter and Personal Letter.
- Create a Company Letterhead.
- Create a Simple Newsletter with minimum three columns. Insert a Clip art in the newsletter.
- Create a Resume for a Job Application.
- Create the cover page of a Project Report(use Word Art, insert Picture Image).
- Prepare the class time table for your class.

6. Spread Sheet Processing (MS Office/Open Office)

The teacher should teach them the relevant commands needed for the preparation of these.

- Create a worksheet with five columns. Enter ten records and find the sum of all columns using autosum feature.
- You have a monthly income of Rs.20000. Your monthly expenditures are Rent- Rs 5500, Food- Rs. 3500, Electricity- Rs.220, Phone- Rs. 150, and Cable TV-Rs. 250. Prepare a worksheet with the Monthly Income, the Monthly Expenditures listed and summed, monthly savings amount (what's left over each month) calculated, and the amount saved per day (assuming 30 days in a month).
- Create a worksheet containing the pay details(containing Basic pay, DA, HRA ,Other Allowance , Deductions- PF,PT, Insurance, Gross and Net salary) of the employees using formulas. The pay sheet must pick different cell data automatically and calculate.
- Create a Simple Bar Chart to highlight the sales of a company for three different periods.
- Create a Pie Chart for a sample data and give legends.

7. PowerPoint Presentation (MS Office/Open Office)

The teacher should teach them the relevant commands needed for the preparation of these.

- Using presentation tool, Create a simple Presentation consisting of 4-5 slides about Input and Output Devices.
- Create a presentation about a book/novel containing Title, Author, Publisher and Contents.
- Create an automated (with timings & animation) Presentation with five slides about different Models of Computers. Use Presentation tool.

8. Introduction to AutoCAD

(02 A4-sheets)

Basic introduction and operational instructions of various commands in AutoCAD. Simple commands like *LINE, CIRCLE, arc, rectangle, polygons, ellipse, polyline, splines, text*, etc. along with editing commands *copy, mirror, offset, arrays, move, extend, break, trim, lengthen, chamfer, fillet*, etc., may be taught to draw some practical drawing sheets taken from the subject Engineering Drawing *. At least two sheets on AutoCAD should be made comprising of cube, cuboid, cone, pyramid, truncated cone and pyramid, sphere and combination of above solids.

***Auto CAD drawing will be evaluated internally by sessional marks. The same drawings can alternatively be drawn on CAD software like Solidworks, depending on the availability of software in the institute.**

9. Internet and its Applications

- Establishing an internet connection.
- Browsing and downloading of information from internet.
- Sending and receiving e-mail
 - Attaching a file with e-mail message
 - moving a message to a folder
- Using Open Course Ware, NPTEL, MIT, NCTEL

10. Functioning of Antivirus, firewall

- Installation and updation of an antivirus.
- How to scan and remove the virus.

INSTRUCTIONAL STRATEGY

Since this subject is practice oriented, the teacher should demonstrate the capabilities of computers to students while doing practical exercises. The students should be made familiar with computer parts, peripherals, connections and proficient in making use of MS Office/Open Office in addition to working on internet. The student should be made capable of working on computers independently.

MEANS OF ASSESSMENT

- Assignments and quiz/class practice exercise and presentations
- Software installation and operation,
- Viva-voce

RECOMMENDED BOOKS

1. Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
2. Information Technology for Management by Henery Lucas, Tata McGraw Hills, New Delhi
3. Computers Fundamentals Architecture and Organisation by B Ram, revised Edition, New Age International Publishers, New Delhi
4. Computers Today by SK Basandara, Galgotia publication Pvt Ltd. Daryaganj, New Delhi.
5. Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
6. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, 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 AnushkaWirasinha, Prentice Hall of India Pvt. Ltd., New Delhi
10. Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar
11. AutoCAD 2010: For Engineers & Designers by Prof. Sham Tickoo& D. Sarvanan; Wiley IndiaPvt. Ltd., Delhi.
12. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

RATIONALE

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

Note:

- i) First angle projection is to be followed
- ii) Minimum of 18 sheets to be prepared
- iii) Instructions relevant to various drawings may be given along with appropriate demonstrations, before assigning drawing practice to students
- iv) Students should be encouraged to use engineering graph book for free hand and orthographic projection practice.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

- Identify and use of different grades of pencils and other drafting instruments which are used in engineering field
- Draw free hand sketches of various kinds of objects.
- Utilize various types of lines used in engineering drawing.
- Read and apply different dimensioning methods on drawing of objects.
- Use different types of scales and their utilization in reading and reproducing drawings of objects and maps.
- Draw 2 - dimensional view of different objects viewed from different angles (orthographic views)
- Draw and interpret complete inner hidden details of an object which are otherwise not visible in normal view
- Generate isometric (3D) drawing from different 2D (orthographic) views/sketches
- Identify conventions for different engineering materials, symbols, sections of regular objects and general fittings used in Civil and Electrical household appliances

DETAILED CONTENTS

1. Introduction to Engineering Drawing (03 sheets)
 - 1.1 Definition of Engineering Drawing. Introduction to drawing instruments, materials, layout and sizes of drawing sheets and drawing boards, engineering graph book, different grades of pencils to be used.
 - 1.2 Different types of lines in Engineering drawing as per BIS specifications

- 1.3 Practice of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, circles, ellipses and parabola, hexagonal, pentagon with the help of drawing instruments.
- 1.4 Free hand sketches of various kind of objects.
2. Dimensioning Technique (01 sheet)
 - 2.1 Necessity of dimensioning, method and principles of dimensioning (mainly theoretical instructions)
 - 2.2 Dimensioning of overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered surfaces, holes, equally spaced on P.C.D., counter sunk holes, counter bored holes, cylindrical parts, narrow spaces and gaps, radii, curves and arches
3. Scales (02 sheets)
 - 3.1 Scales –their needs and importance (theoretical instructions), type of scales, definition of R.F. and length of scale.
 - 3.2 Construction of plain and diagonal scales.
4. Orthographic Projections (08 sheets)
 - 4.1 Theory of orthographic projections (Elaborate theoretical instructions)
 - 4.2 Projection of Points in different quadrant
 - 4.3 Projection of Straight Line (1st and 3rd angle)
 - 4.3.1 Line parallel to both the planes
 - 4.3.2 Line perpendicular to any one of the reference plane
 - 4.4 Three views of orthographic projection of different objects. (At least one sheet in 3rd angle)
 - 4.5 Identification of surfaces
5. Sectioning of Objects (03 sheets)
 - 5.1 Importance and salient features
 - 5.2 Description of full section, half section, partial or broken out sections, Offset sections, revolved sections and removed sections.
6. Isometric Views (02 sheets)
 - 6.1 Fundamentals of isometric projections and isometric scale.
 - 6.2 Isometric views of regular solids like cylinder and cone.

7. Common Symbols and Conventions used in Engineering (03 sheets)
- 7.1 Civil Engineering sanitary fitting symbols
 - 7.2 Electrical fitting symbols for domestic interior installations
 - 7.3 Safety symbols used in engineering works.

INSTRUCTIONAL STRATEGY

Teacher should show model of realia of the component/part whose drawing is to be made. Emphasis should be given on cleanliness, dimensioning and layout of sheet. Focus should be on proper selection of drawing instruments and their proper use. Students must use H grade pencils for the first few (10 sheets), till they are familiar with the proper thickness of all type of lines.

Relevant IT tools to be used to state that 3D solid modelling, which is to be taught at the starting point. Also how 2D views can be obtained from 3D solid modelling to 2D views rather than the conventional method of making the students visualize the 3D view of an object by mentally constructing it from the 2D views.

MEANS OF ASSESSMENT

- Drawing
- Assignments and quiz/class tests, mid-term and end-term written tests

RECOMMENDED BOOKS

1. A Text Book of Engineering Drawing by Surjit Singh; Dhanpat Rai & Co., Delhi
2. Engineering Drawing by PS Gill; SK Kataria & Sons, New Delhi
3. Elementary Engineering Drawing in First Angle Projection by ND Bhatt; Charotar Publishing House Pvt. Ltd., Anand
4. Engineering Drawing I & II by JS Layall; Eagle Parkashan, Jalandhar
5. Engineering Drawing I by DK Goel, GBD Publication.
6. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

<http://swayam.gov.in>

1.7 GENERAL WORKSHOP PRACTICE – I

(Common for Mechanical Engineering, Automobile Engineering and Civil Engineering)

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RATIONALE

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hands-on experience about use of different tools and basic manufacturing practices. This subject aims at developing general manual and machining skills in the students. In addition, the development of dignity of labour, safety at work place, team working and development of right attitude are the other objectives.

LEARNING OUTCOMES

After completing the course the students will be able to:

- Identify tools and equipment used and their respective functions.
- Identify different types of materials and their basic properties.
- Use and take measurements with the help of basic measuring tools/equipment.
- Select proper tools for a particular operation.
- Select materials, tools, and sequence of operations to make a job as per given specification/drawing.
- Prepare simple jobs independently and inspect the same.
- Follow safety procedures and precautionary measures.
- Use safety equipment and Personal Protection Equipment(PPE).

DETAILED CONTENTS (PRACTICAL EXERCISES)

Workshop Safety Induction Session:

First turn of each shop shall be dedicated to safety practices and the contribution of safety to quality. The safety aspects should be categorised into 3 categories

- PSS (Process Safety System)
- SSS (Safety Shutdown System)
- ESD (Emergency Shutdown) or Emergency Depressurisation System.

The following practices should be included:

- Use of PPE (Personal Protection Equipment)
- Use of Safety Equipment like fire extinguishers etc.)
- Paramedic teaching suite, First –Aid
- Reports to be prepared for the damages
- At the end of this session the student must sign “Student Safety Declaration form”.

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.

The following shops are included in the syllabus:

1. Welding Shop – I
2. Fitting Shop – I
3. Sheet Metal Shop – I
4. Electric Shop - I
5. Carpentry Shop – I
6. Smithy Shop – I
7. Painting Shop

1. WELDING SHOP – I

- 1.1 Introduction and importance of welding process as compared to other material joining processes. Specifications and type of ARC welding machines, parts identification, classification, selection and coding of electrodes, welding parameters, welding joints and welding positions. Common weldable Materials, safety precautions, use of PPEs, welding screens, Hazards and remedies during welding, Elementary symbolic representations, demo of types of welding defects.
- 1.2 Jobs to be prepared
 - Job I Practice of striking arc (Minimum 4 continuous beads on 100 mm long M.S. flat).
 - Job II Practice of depositing beads on plate at different current levels. (Minimum 4 beads on M.S. plate at four setting of current level and differentiating their characteristics).Types of joints and their edge preparations:
 - Job III Preparation of lap joint using arc welding process.
 - Job IV Preparation of butt joint using arc welding process. (100 mm long).
 - Job V Preparation of T Joint using arc welding (100mm x 6 mm M.S. Flat).

2. FITTING SHOP – I

- 2.1 Introduction and Practical Importance of fitting jobs
- 2.2 Basic deburring processes.
- 2.3 Introduction to fitting shop tools, marking and measuring devices/equipment.
- 2.4 Identification of materials. (Iron, Copper, Stainless Steel, Aluminium etc.)
- 2.5 Identification of various steel sections (flat, angle, channel, bar etc.).
- 2.6 Introduction to various fitting shop operations/processes (Hacksawing, Drilling, Chipping and Filing). Demonstration of wrong fitting practices causing damage to filed surfaces(outsized, out angled etc.) and tool/blade breakages.
- 2.7 Jobs to be prepared:
 - Job I Marking of job, use of marking tools and various types of files, use of tri square, surface plate, filing and use of measuring instruments. (zero error and least count of Vernier calliper, Micrometer and Vernier height gauge).
 - Job II Filing a rectangular/square piece to maintain dimensions within an accuracy of ± 0.5 mm.
 - Job III Making a cut-out from a square piece of MS flat using hand hacksaw and chipping.

3. SHEET METAL SHOP – I

- 3.1. Introduction and practical importance of sheet metal jobs, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material.
- 3.2. Introduction and demonstration of hand tools used in sheet metal shop.
- 3.3. Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. Shearing Machine, Bar Folder, Burring Machine, Turning Machine, Wiring Machine, Setting Down Machine, Forming Machine, Stake etc.
- 3.4. Introduction and demonstration of various raw materials used in sheet metal shop e.g. black-plain sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheet etc.
- 3.5. Study of various types of nuts, bolts, rivets, screws etc.
 - Job I Shearing practice on a sheet using hand shears.
 - Job II Prepare a seam joint of G.I. Sheet
 - Job III Practice on making Single(/double) riveted lap joint/Butt Joint.
 - Job IV Development of sheet for preparation of cubical container(300x150x25 mm)

4. ELECTRIC SHOP - I

- 4.1. Study, demonstration and identification of common electrical materials with standard ratings and specifications such as wires, cables, switches, MCB & ELCB, fuses, cleats, clamps and allied items, tools and accessories.
- 4.2. Study of electrical safety measures and protective devices.
 - Job I Identification of phase, Neutral and Earth wires for connection to domestic electrical appliances and their connections to three pin plugs. Difference between series and parallel wiring.
 - Job II Carrying out house wiring circuits using fuse, switches, sockets, ceiling rose etc. in batten or P.V.C. casing-caping. Demo of conduit wiring through junctions
 - Job III To prepare a three level Godown wiring circuit with PVC conduit wiring system.
- 4.3. Introduction to the construction of lead acid battery, its working and its specification parameters(maH, specific gravity), precautions while handling battery, Introduction to battery charger and its functioning. Types of charging
 - Job IV Installation of battery and connecting two or three batteries in series and parallel and its effect. Charging a battery and testing with hydrometer and cell tester
- 4.4. Introduction to solar energised lighting or water heater system and their defects.
 - Job V Installation of Solar cells, costing according to capacity

5. CARPENTRY SHOP - I

- 5.1 Introduction and industrial applications of carpentry jobs.
 - 5.1.1 Name and use of raw materials used in carpentry shop : wood & alternative materials(board, plywood)
 - 5.1.2 Names, uses, care, precautions and maintenance of hand tools such as different types of Saws, C-Clamp, Chisels, Mallets, Carpenter's vices, Marking gauges, Try-squares, Rulers and other commonly used tools and materials used in carpentry shop by segregating as cutting tools, supporting tools, holding tools , measuring tools etc.
 - 5.1.3 Specification of tools used in carpentry shop.
 - 5.1.4 Identification of different types of Timbers, their properties, uses & defects. Study of the joints in roofs, doors, windows and furniture available in Polytechnic
 - 5.1.5 Seasoning of wood and its need.
 - 5.1.6 Estimation of wood.
- 5.2 Practice
 - 5.2.1 Practices for Basic Carpentry Work
 - 5.2.2 Sawing practice using different types of saws
 - 5.2.3 Assembling jack plane — Planning practice including sharpening and blade adjustment of jack plane cutter
 - 5.2.4 Chiselling practice using different types of chisels including sharpening of chisel
 - 5.2.5 Making of different types of wooden pin and fixing methods. Marking measuring and inspection of jobs.
 - 5.2.6 Housekeeping practices and instructions.
- 5.3 Job Practice
 - Job I Marking, sawing, planning to size , chiselling and their practice
 - Job II Half Lap Joint (cross, L or T – any one)
 - Job III Mortise and Tenon joint (T-Joint)
 - Job IV Dove tail Joint (Half lap dovetail joint or Bridle Joint)

6. SMITHY SHOP - I

- 6.1 Introduction and industrial applications of smithy jobs.
 - 6.1.1 Purpose of Smithy shop
 - 6.1.2 Different types of Hearths used in Smithy shop, Types of fuel used and maximum temperature obtained
 - 6.1.3 Purpose, specifications, uses, care and maintenance of various tools and equipments used in hand forging by segregating as cutting tools, supporting tools, holding tools, measuring tools, punches etc.
 - 6.1.4 Types of raw materials used in Smithy shop
 - 6.1.5 Uses of Fire Bricks & Clays in Forging workshop.
- 6.2 Practice
 - 6.2.1 Practice of firing of hearth/Furnace, Cleaning of Clinkers and Temperature Control of Fire.

- 6.2.2 Practice on different basic Smithy/Forging operations such as Cutting, Upsetting, Drawing down, Setting down, Necking, Bending, Fullering, Swaging, Punching and Drifting
- a) Demonstration — Making cube, hexagonal cube, hexagonal bar from round bar
- 6.2.3 Practice of Simple Heat treatment processes like Tempering, Normalizing, and Hardening etc

Job Practice: Job Preparation

- Job I Making a cold / hot, hexagonal flat chisel including tempering of edges.
- Job II Production of utility goods e.g. hexagonal bolt / square shank boring tool, fan hook (long S-type) [Two jobs are to be done by the students].
- Job III To prepare a cube from a M.S. round by forging method.

7 PAINTING SHOP

Introduction to painting shop and its necessity. Different types of paints. Introduction of powder coating plant and spray painting with their uses.

Job I Preparation of surface before painting such as cleaning, sanding, applying putty, filling procedure and application of primer coat and painting steel item.

Job II Painting practice by brush on MS sheet

Job III Practice of dip painting

Job IV Practice of lettering: name plates / sign board

Job V Polishing and painting on wooden and metallic surfaces(furniture or utility of Polytechnic)

Job VI Practical demonstration of powder coating

Job VII Practical demonstration of spray painting on a utility object

MEANS OF ASSESSMENT

- Workshop jobs
- Report writing, presentation and viva voce

RECOMMENDED BOOKS

1. Workshop Technology I,II,III, by SK Hajra, Choudhary and AK Choudhary; Media Promoters and Publishers Pvt. Ltd. Mumbai.
2. Workshop Technology Vol. I, II, III by Manchanda; India Publishing House, Jalandhar.
3. Workshop Training Manual Vol. I, II by S.S. Ubhi; Katson Publishers, Ludhiana.
4. Manual on Workshop Practice by K Venkata Reddy; MacMillan India Ltd., New Delhi
5. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
6. Workshop Technology by B.S. Raghuwanshi; DhanpatRai and Co., New Delhi

7. Workshop Technology by HS Bawa; Tata McGraw Hill Publishers, New Delhi.
8. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

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