



CURRICULUM  
FOR  
DIPLOMA PROGRAMME IN  
ALL ENGINEERING BRANCH



FOR UTTARAKHAND  
**(First Semester Only)**



**Prepared by:**

**Curriculum Development Centre  
National Institute of Technical Teachers' Training  
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SECTOR 26, CHANDIGARH 160 019**

**Approved by:**

**UTTARAKHAND BOARD OF TECHNICAL EDUCATION  
ROORKEE  
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## STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN ALL ENGINEERING BRANCHES

### FIRST SEMESTER

Sr. No	Subject	L	T	P	T O T	EVALUATION SCHEME						Total Marks
						Internal Assessment		External Assessment (Examination)				
						Hrs/Week		Theory		Practical		
						Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs	
1.1	English and Communication Skills –I *	3	2/2	2	6	20	30	50	2.5	50	3	150
1.2	Applied Mathematics-I*	3	4/2	-	5	50	-	100	2.5	-	-	150
1.3	Applied Physics – I *	3	2/2	2	6	20	30	50	2.5	50	3	150
1.4	Applied Chemistry – I *	3	2/2	2	6	20	30	50	2.5	50	3	150
1.5	Basics of Information Technology *	2	-	3	5	10	10	50	2.5	30	3	100
1.6	Engineering Drawing-I *	-	-	8	8	-	50	100	3.0	-	-	150
1.7	General Workshop Practice – I *	-	-	8	8	-	50	-	-	50	4	100
Disc/Game/SCA/NCC/NSS#		-	-	4	4	-	-	-	-	25	-	25
Industrial Exposure (Assessment at Inst. Level)+		-	-	-	0	-	-	-	-	25	-	25
<b>Total</b>		<b>14</b>	<b>5</b>	<b>29</b>	<b>48</b>	<b>120</b>	<b>200</b>	<b>400</b>	<b>-</b>	<b>280</b>	<b>-</b>	<b>1000</b>

\* Common with other Engineering diploma programmes.

# Student Centered Activities will comprise of various co-curricular activities like games, hobby clubs, seminars, declamation contests, extension lectures, NCC, NSS and cultural activities etc.

+ Industrial visit compulsory at minimum 2 Industries or Department.

Note: 1- Each period will be 50 minutes. 2- Each session will be of 16 weeks. 3- Effective teaching will be at least 12.5 weeks.

**2. DETAILED CONTENTS  
OF  
VARIOUS SUBJECTS**

# **FIRST SEMESTER**

## 1.1 ENGLISH AND COMMUNICATION SKILLS – I

	L	T	P
Periods/Week	3	2/2	2

### RATIONALE

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

### DETAILED CONTENTS

1. COMMUNICATION SKILLS (12 Periods)
  - 1.1 Introduction and Process of Communication
  - 1.2 Objectives of Communication
  - 1.3 Verbal and Non-verbal Communication
  - 1.4 Process of Communication
  - 1.5 Barriers to Communication; Overcoming Strategies
  - 1.6 Listening and Speaking Skills and Sub-Skills  
(All topics should be in detail)
  
2. GRAMMAR AND USAGE (08 Periods)
  - 2.1 Syntax (Parts of speech)
  
3. WRITING SKILLS (10 Periods)
  - 3.1 Writing Paragraphs
  - 3.2 Picture Composition
  - 3.3 Developing writing skills based on some audio-visual stimulus

4. READING COMPREHENSION SKILLS (10 Periods)  
Unseen comprehension passages (at least 3 passages of literary, scientific, data interpretation).
5. FACETS OF LITERATURE (24 Periods)
- 5.1 Fiction
- 5.1.1 Homecoming – R.N. Tagore  
5.1.2 The Selfish Giant - Oscar Wilde  
5.1.3 The Missing Mail – R K Laxman
- 5.2 Prose
- 5.2.1 Of Studies – Francis Bacon  
5.2.2 Art of Conversation – Richard Steel  
5.2.3 Democracy – Dr. Radhakrishnan
- 5.3 Poems
- 5.3.1 Ozymandias – P.B. Shelley  
5.3.2 Daffodils – William Wordsworth  
5.3.3 Stopping by Woods on a Snowy Evening – Robert Frost

## LIST OF PRACTICALS

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

### DEVELOPING ORAL COMMUNICATION SKILLS

- Greeting, Starting a Conversation
- Introducing Oneself
- Introducing Others
- Leave Taking
- Thanking, Wishing Well
- Talking about Oneself
- Talking about Likes and Dislikes
- Mock Interview

### **LIST OF REFERENCE BOOKS**

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

### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted for Lectures and Tutorials (Periods)</b>	<b>Marks Allotted (%)</b>
<b>1</b>	<b>12</b>	<b>20</b>
<b>2</b>	<b>08</b>	<b>12</b>
<b>3</b>	<b>10</b>	<b>16</b>
<b>4</b>	<b>10</b>	<b>16</b>
<b>5</b>	<b>24</b>	<b>36</b>
<b>Total</b>	<b>64</b>	<b>100</b>



## 1.2 APPLIED MATHEMATICS - I

	L	T	P
Periods/Week	3	4/2	-

### RATIONALE

Applied Mathematics forms the backbone of engineering students. The curriculum of mathematics has undergone changes from time to time in accordance with growth of subject. Diploma in Engineering is a launching stage where the students learn the basics of engineering. The revised syllabus has been designed keeping in view the emerging needs of all categories of students. Great emphasis has been laid on application of various contents like algebra, complex numbers, trigonometry and coordinate geometry. This course will develop analytical abilities to make exact calculations and provide continuing educational base to the students.

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

### DETAILED CONTENTS

#### 1. Algebra (30 Periods)

- 1.1 Series: A.P. and G.P.,  $n$ th term of AP and GP, , sum to  $n$ th term, Value of  ${}^n P_r$  and  ${}^n C_r$ .
- 1.2 Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof)
- 1.3 Partial fractions (linear factors, repeated linear factors, non-reducible quadratic factors only)
- 1.4 Determinants and Matrices – expansion of determinants (upto third order), properties of determinants, solution of equations (up to 3 unknowns) by Cramer's rule. Definition of matrix, addition, subtraction, multiplication of matrices (up to third order), minors and co-factors, inverse of a matrix by adjoint method (up to second order)
- 1.5 Scalar and vector product of two /three vectors

#### 2. Trigonometry (20 Periods)

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. Complex numbers (10 Periods)

Definition of complex numbers, real and imaginary parts of a complex number, polar and Cartesian form and their inter-conversion, conjugate of a complex number, modulus and argument of a complex number, addition, subtraction, multiplication and division of a complex number. De-Moiver's Theorem (simple problems)

4. Co-ordinate Geometry (20 Periods)

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

4.2 General equation of a circle and its characteristics. To find the equation of a circle, given:

- \* Centre and radius
- \* Three points lying on it
- \* Coordinates of end points of a diameter

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

### RECOMMENDED BOOKS

1. Applied Mathematics by Dr. RD Sharma, Dhanpat Rai Publications, Delhi
2. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
3. Applied Mathematics-I (Hindi) by Dr. Kailash Sinha, Nav Bharat Publication, Meerut.
4. Engineering Mathematics by Vol. I & II by S Kohli, IPH, Jalandhar
5. Applied Mathematics, Vol. I & II by SS Sabharwal and Sunita Jain, Eagle Parkashan, Jalandhar

### SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lectures and Tutorials (Periods)	Marks Allotted (%)
1	30	40
2	20	25
3	10	10
4	20	25
<b>Total</b>	<b>80</b>	<b>100</b>

### 1.3 APPLIED PHYSICS – I

	L	T	P
Periods/Week	3	2/2	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.**

#### DETAILED CONTENTS

##### 1. Units and Dimensions (8 Periods)

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

##### 2. Force and Motion (12 Periods)

- 2.1 Concept of Scalar and Vector quantities – examples, types of vectors.
- 2.2 Resolution and Composition of vectors, Vector multiplication (scalar product and vector product of vectors), addition of vectors (Parallelogram law)
- 2.3 Force: Newton's laws of motion, linear momentum and conservation of linear momentum, impulse and its application, simple numerical problem in brake system of vehicles and trains etc.
- 2.4 Friction: Types of friction and its application.

- 2.5 Circular motion: Angular displacement, angular velocity and angular acceleration
  - 2.6 Relation between linear and angular variables (velocity and acceleration)
  - 2.7 Centripetal force (derivation) and centrifugal force with application such as banking of roads and bending of cyclists
  - 2.8 Application of various forces in lifts
- 3 Rotational Motion ( 6 Periods)
- 3.1 Concept of translatory and rotating motion with examples
  - 3.2 Definitions of torque, angular momentum and their relationship
  - 3.3 Conservation of angular momentum (qualitative) and its examples
  - 3.4 Moment of inertia and its physical significance, radius of gyration, Theorems of parallel and perpendicular axes (statements), Moment of inertia of rod, disc, ring and sphere (Formulae only).
  - 3.5 Application of rotational motions in transport vehicles, trains and aero plane turbine/engine.
- 4 Work, Power and Energy (8 Periods)
- 4.1 Work: definition and its SI units
  - 4.2 Work done in moving an object on horizontal and inclined plane (incorporating frictional forces) with its application
  - 4.3 Power: definition and its SI units, calculation of power with numerical problems
  - 4.4 Energy: Definition and its SI units: Kinetic energy and Potential energy with examples and their derivation
  - 4.5 Principle of conservation of mechanical energy (for freely falling bodies), transformation of energy from one form to another with its application
- 5 Properties of Matter (10 Periods)
- 5.1 Elasticity: definition of stress and strain, different types of modulus of elasticity, stress – strain diagram, Hooke’s law with its applications
  - 5.2 Pressure: definition, its units, atmospheric pressure, gauge pressure, absolute pressure, Fortin’s Barometer and its applications
  - 5.3 Surface tension: concept, its units, angle of contact, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension
  - 5.4 Viscosity and coefficient of viscosity: Stoke’s Law and derivation of terminal velocity, effect of temperature on viscosity.

- 6 Thermometry (10 Periods)
- 6.1 Difference between heat and temperature
  - 6.2 Principles of measurement of temperature and different scales of temperature and their relationship
  - 6.3 Types of thermometers (Concept only)
  - 6.4 Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them
  - 6.5 Modes of transfer of heat (Conduction, convection and radiation with examples)
  - 6.6 Co-efficient of thermal conductivity
  - 6.7 Engineering Application of conduction, convection and radiations
7. Waves and Vibrations (10 Periods)
- 7.1 Simple Harmonic Motion(SHM): definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M. Equation of simple harmonic progressive wave
  - 7.2 Wave motion: transverse and longitudinal wave motion with examples, sound and light waves, velocity, frequency and wave length of a wave (relationship  $v = n\lambda$ ) and their applications
  - 7.3 Free, forced and resonant vibrations with examples
  - 7.4 Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications
  - 7.5 Ultrasonics – production (magnetostriction and piezoelectric methods) and their engineering and medical applications

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

1. To find the diameter of wire using a screw gauge
2. To find volume of solid cylinder and hollow cylinder using a vernier calipers
3. To determine the thickness of glass strip and radius of curvature using a spherometer
4. To verify parallelogram law of forces
5. To find the time period of a simple pendulum and determine the length of second's pendulum.
6. To find the velocity of sound by using resonance apparatus at room temperature.
7. To determine the viscosity of glycerin by Stoke's method
8. To determine the coefficient of friction on horizontal plane.

9. To determine the Young's Modulus by Searles apparatus
10. To determine force Constant of spring using Hooke's Law

### **INSTRUCTIONAL STRATEGY**

Teacher may use various teaching aids like models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. 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.

### **RECOMMENDED BOOKS**

1. Text Book of Physics for Class XI (Part-I, Part-II) N.C.E.R.T
2. Text Book of Physics for Class XII (Part-I, Part-II) N.C.E.R.T
3. Applied Physics Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, New Delhi
4. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
5. Berkeley Physics Course, Vol. I, II & III, Tata McGraw Hill, Delhi
6. Comprehensive Practical Physics, Vol. I & II, JN Jaiswal, Laxmi Publishers
7. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
8. Applied Physics I & II by RA Banwait & R Dogra, Eagle Parkashan, Jalandhar
9. Applied Physics by Jasmer Kaur and Bhupinder Singh, Lords Publications, Jalandhar
10. Engineering Physics by Vanchna Singh and Sheetal Kumar, Cengage Learning India Pvt. Ltd. Patparganj, Delhi

### SUGGESTED DISTRIBUTION OF MARKS

<b>Topic No.</b>	<b>Time Allotted for Lectures and Tutorials (Periods)</b>	<b>Marks Allotted (%)</b>
1	08	15
2	12	20
3	06	10
4	08	10
5	10	15
6	10	15
7	10	15
<b>Total</b>	<b>64</b>	<b>100</b>

## 1.4 APPLIED CHEMISTRY - I

	L	T	P
Periods/Week	3	2/2	2

### 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 (08 Periods)
  - 1.1 Definition of chemistry and its importance
  - 1.2 Definition of matter, element, compound and mixtures, atom, molecule, ion, symbol, formula, valency and chemical equation.
  - 1.3 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
  - 1.4 Essentials of a chemical equation, balancing of a chemical equation by hit and trial method
  
2. Atomic Structure and Chemical Bonding (08 Periods)
  - 2.1 Fundamental particles i.e. electron, proton and neutron, their characteristics (discovery is not included)
  - 2.2 Electronic concept of valency
  - 2.3 Elementary account of electrovalent, covalent and coordinate bond formation on the basis of the electronic concept of valency giving suitable examples to each
  - 2.4 Hydrogen bonding and its effect on physical properties of the compounds
  - 2.5 Electronic configuration of elements (up to  $Z = 30$ ) with special reference to Aufbau principle



3. Water (16 Periods)
- 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 and priming 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 (12 Periods)
- 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 including simple numerical problems.
- 5 Electrolysis (12 Periods)
- 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

(08 Periods)

- 6.1 General concept of pollution and pollutants
- 6.2 Types and control of pollution like air, water, noise and soil pollution
- 6.3 General idea of ozone depletion, global warming

### 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  $\text{CO}_3^{2-}$ ,  $\text{SO}_4^{2-}$ ,  $\text{NO}_3^-$ ,  $\text{CH}_3\text{COO}^-$ ,  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$
  - b) Basic Radicals  $\text{NH}_4^+$ ,  $\text{Pb}^+$ ,  $\text{Cu}^{++}$ ,  $\text{Cd}^{++}$ ,  $\text{As}^{+++}$ ,  $\text{Sb}^{+++}$ ,  $\text{Sn}^{++}$ ,  $\text{Al}^{+++}$ ,  $\text{Fe}^{+++}$ ,  $\text{Cr}^{+++}$ ,  $\text{Mn}^{++}$ ,  $\text{Ni}^{++}$ ,  $\text{Co}^{++}$ ,  $\text{Zn}^{++}$ ,  $\text{Ba}^{++}$ ,  $\text{Sn}^{++}$ ,  $\text{Ca}^{++}$  and  $\text{Mg}^{++}$ ,
4. Determine the degree of temporary hardness of water by O'Heher's method
5. Estimation of total alkalinity of water volumetrically
6. Determine pH of a given sample by using pH meter
7. Determination of solubility of a solid at room temperature
8. Demonstration – Application of  $\text{FeCl}_3$  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
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

<b>Topic No.</b>	<b>Time Allotted for Lectures and Tutorials (Periods)</b>	<b>Marks Allotted (%)</b>
1	8	15
2	8	20
3	16	20
4	12	15
5	12	15
6	8	15
<b>Total</b>	<b>64</b>	<b>100</b>

## 1.5 BASICS OF INFORMATION TECHNOLOGY

Periods/Weeks      L   T   P  
                                 2   -   3

### RATIONALE

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

### DETAILED CONTENTS

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

### 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
  - c) How to view the slide show?
    - Viewing the presentation using slide navigator
    - Slide transition
    - Animation effects etc.
10. Internet and its Applications
- a) Log-in to internet
  - b) Navigation for information seeking on internet
  - c) Browsing and down loading of information from internet

d) Sending and receiving e-mail

- Creating a message
- Creating an address book
- Attaching a file with e-mail message
- Receiving a message
- Deleting a message

## **INSTRUCTIONAL STRATEGY**

Since this is an introductory computer related subject, the teacher should demonstrate and explain computer and its peripherals in the laboratory. The theory may be dovetailed with practical exercises for better understanding. The students may be encouraged to work independently on computer to gain confidence.

## **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

### SUGGESTED DISTRIBUTION OF MARKS

<b>S. No</b>	<b>Time Allotted for Lectures (Periods)</b>	<b>Marks Allotted (%)</b>
1	02	10
2	04	15
3	04	10
4	04	15
5.	04	10
6	04	10
7	05	15
8	05	15
<b>Total</b>	<b>32</b>	<b>100</b>



## 1.6 ENGINEERING DRAWING – I

L T P  
Periods/Weeks - - 8

### RATIONALE

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

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

### DETAILED CONTENTS

1. Drawing Office Practice, Lines & Lettering (2 Sheets)
  - 1.1 Drawing instruments
  - 1.2 Sizes and layout of standard drawing sheets and drawing boards
  - 1.3 Different types of lines in engineering drawing as per BIS specifications
  - 1.4 Free hand lettering (alphabet and numerals) lower case and upper case, single stroke vertical 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. Dimensioning (2 Sheets)
  - 2.1 Necessity of dimensioning, Types of dimensioning (chain, parallel and progressive dimensioning, size and location dimensioning)  
Methods of placing dimensioning (Aligned and unidirectional system), use of leader lines. General principles of dimensioning.
  - 2.2 Dimensioning of overall sizes, circles, thread holes, chamfered surfaces, angles, tapered surface holes equally spaced on PCD, counter sunk hole counter bored holes, cylindrical parts, narrow space and gaps, radii, curves and arches.
3. 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 Intersecting Arcs method)
  - 3.3 Parabola (rectangle and tangent method), cycloid

4. Scale (2 sheets)
  - 4.1 Scale – their need and importance, Definition of representative fraction (R.F), find RF of given scale
  - 4.2 Construction of plain and diagonal scales
  
5. Principle of Projections (7 sheets)
  - 5.1 Principle of orthographic projection and introduction to first angle projection and third angle projection
  - 5.2 Projection of points situated in different quadrants (1 Sheet)
  - 5.3 Projection of lines, Lines inclined to one plane and parallel to the other and vice versa (1<sup>st</sup> & 3<sup>rd</sup> quadrants); Line inclined to both reference planes (HP and VP) (1 Sheet)
  - 5.4 Projection of Planes: Planes perpendicular and parallel to either of the planes; planes perpendicular to one plane and inclined to the other or vice versa (1<sup>st</sup> & 3<sup>rd</sup> quadrants) (1 Sheet)
  - 5.5 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
  - 5.6 Drawing 3 orthographic views of given objects (3 sheets, at least one sheet in 3<sup>rd</sup> Angle Projection)
  - 5.7 Identification of surfaces on drawn orthographic views from isometric object drawn (1 Sheet)
  
6. Sectional Views (1 sheet)
  - 6.1 Need for sectional views –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 of combination of regular solids like cylinder, cone, cube, prism and pyramid
  
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

## **RECOMMENDED BOOKS**

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

## 1.7 GENERAL WORKSHOP PRACTICE – I

L T P  
Periods/Week - - 8

### RATIONALE

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

### DETAILED CONTENTS (PRACTICALS)

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

**Note:**

1. The branches e.g. Civil Engineering, Electrical Engineering and Automobile Engineering, will do **Smithy Shop** instead of Electronic Shop- I
2. The branches e.g. Electronics and Communication Engineering, Computer Engineering and Information Technology will do **Electronic Shop-I** instead of Smithy Shop.

## 1. Carpentry and Painting Shop -I

- 1.1 Introduction to various types of wood such as Deodar, Kail, Partal, Teak, Mango, Sheesham, etc. (Demonstration and their identification).
- 1.2 Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed.  
Job I Marking, sawing, planning and chiseling & their practice (size should be mentioned)
- 1.3 Introduction to various types of wooden joints, their relative advantages and uses.  
Job II Preparation of half lap joint  
Job III Preparation of Mortise and Tenon Joint
- 1.4 Demonstration of various methods of painting wooden items.  
Job IV Preparation of wooden surface before painting including primer coating  
Job V Painting Practice by brush/spray  
Job VI Preparation of surface, before Painting such as cleaning, sanding, putty. Procedure and application of primer code and painting steel items.
- 1.5 Safety precautions in carpentry shop

## 2. Fitting Shop

- 2.1 Introduction to fitting shop tools, common materials used in fitting shop, Identification of materials. Such as Steel, Brass, Copper, Aluminium etc. Identification of various sections of steel such as Flat, Angle, Tee, Channel, Bar Girder, Square, Z-Section, etc.
- 2.2 Description and demonstration of various types of work benches, holding devices and files. Precautions while filing.
- 2.3 Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.  
  
Job I Marking of job, use of marking tools and measuring instruments.  
Job II Filing a dimensioned rectangular or square piece of an accuracy of  $\pm 0.5\text{mm}$   
Job III Filing practice (production of flat surfaces). Checking by straight edge.  
  
Job IV Making a cutout from a square piece of MS Flat using hand hacksaw.
- 2.4 Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, combination set. Handling of measuring instruments, checking of zero error, finding of least count (all gauges including dial gauge).

### **3. Welding Shop – I**

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

### **4. Electric Shop – I**

- 4.1 Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, ceiling roses, PVC Conduits, PVC Channels and allied items, tools along with electrical instruments such as voltmeter, ammeter and multimeter.
- 4.2 Study of electrical safety measures and demonstration about use of protective devices such as fuses, MCBs, ELCBs and relays including earthing.
  - Job I Identification of phase, neutral and earth of domestic appliances and their connection to two pin/three pin plugs.
  - Job II Preparation of a house wiring circuit on wooden board using fuse, switches, socket, holder, ceiling rose etc. in PVC conduit and PVC casing and capping wiring system.
- 4.3 Study of common electrical appliances such as electric iron, electric kettle, ceiling fan, table fan, electric mixer, electric Geyser, gas geyser, desert cooler, refrigerator, water purifier
- 4.4 Introduction to lead-acid battery, identification of parts and its working.
  - Job III Installation of inverter with battery and to connect two or more batteries in series and in parallel (knowledge of a.c. and d.c.)
  - Job IV Charging of a battery and testing it with the help of hydrometer and cell tester

## 5. Smithy Shop

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

**OR**

## 5. Electronic Shop – I

- 5.1 Identification and familiarization with the following tools used in electronic shop: Such as Tweezers, Screw drivers (different sizes), Insulated Pliers, Cutter, Sniper, Philips Screw Driver (Star Screw Driver), L- Keys, Soldering Iron, soldering wire, flux . Their demonstration and uses.
- 5.2 Identification and familiarization with Multimeter (analog and digital)
  - Job I Practice in the use of above mentioned tools and instruments. For this a small experimental set up may be done
- 5.3 Various types of protective devices such as : wire fuse, cartridge fuse etc. ,
- 5.4 Identification and familiarization with ear phone speaker connector, telephone jacks and similar male and female connectors (audio, video)
- 5.5 Safety precautions to be observed in the electronic shop
- 5.6 Identification and familiarization with soldering and desoldering practice
- 5.7 Introduction to thimbles and crimping tools

**NOTE: Demonstration boards for the electronics components such as resistor, capacitor, diodes, transistors, FETs, IFT Coils, ICs should be made.**

- Job II Cut, strip, join an insulated wire with the help of soldering iron (repeat with different types of wires)
- Job III Cut, strip, connect/solder/crimp different kinds of wires/ cables (including co-axial and shielded cable) to different types of power/general purpose/audio video/telephone plugs, sockets, jacks, terminals, binding posts, terminal strips, connectors. The tasks should include making complete recording/playback/ antenna/ speaker leads for common electronic products such as Radio, TV, CD players, VCD/DVD players, cassette recorder and players, Hi-Fi equipment, hand- set, microphone

## 6. Sheet Metal Shop

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

- 6.1 Introduction and demonstration of hand tools used in sheet metal shop.
- 6.2 Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. shearing machine, bar folder, burring machine, power press, sheet bending machine.
- 6.3 Introduction and demonstration of various raw materials used in sheet metal shop e.g. M.S. sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheets etc.
- 6.4 Study of various types of rivets, steel screw etc.

Job I Shearing practice on a sheet using hand shears.

- a) Practice on making single riveted lap joint/double riveted lap Joint.
- b) Practice on making single cover plate chain type, seam joint and riveted butt joint

### RECOMMENDED BOOKS

- 1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay
- 2. Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.
- 3. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi
- 4. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
- 5. Workshop Technology by B.S. Raghuwanshi, Dhanpat Rai and Co., New Delhi
- 6. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi.