

SECOND SEMESTER

2.1 ENGLISH AND COMMUNICATION SKILLS – II

	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

Section A

FACETS OF LITERATURE

(22 Periods)

- 1.1 Fiction
 - 1.1.1 The Portrait of a Lady - Khushwant Singh
 - 1.1.2 The Doll's House – Katherine Mansfield
 - 1.1.3 The Refugees – Pearl S. Buck
- 1.2 Prose
 - 1.2.1 Of Truth – Francis Bacon
 - 1.2.2 Praises of Solitude – Samuel Johnson
 - 1.2.3 A Gentleman – John Henry Newman
- 1.3 Poems
 - 1.3.1 All The World's A Stage – W. Shakespeare
 - 1.3.2 A Solitary Reaper – William Wordsworth

Section B

2. READING SKILLS

(08 Periods)

Unseen comprehension passages (at least 3 passages).

3. WRITING SKILLS (16 Periods)
- 3.1 Writing Notice
 - 3.2 Writing Circular
 - 3.3 Writing a Memo
 - 3.4 Agenda for a Meeting
 - 3.5 Minutes of the Meeting
 - 3.6 Press release
 - 3.7 Telephonic Messages
 - 3.8 Paragraph writing:
Simple and Current Topics should be covered.
4. Correspondence (06 Periods)
- 4.1 Business Letters
 - 4.2 Personal Letters
5. Communication (12 Periods)
- 5.1 Media and Modes of Communication
 - 5.2 Channels of Communication
 - 5.3 Barriers to Communication
 - 5.4 Listening Skills
 - 5.5 Body language
 - 5.6 Humour in Communication

LIST OF PRACTICALS

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

1. LISTENING COMPREHENSION
- 1.1 Locating Main Ideas in a Listening Excerpt
 - 1.2 Note-taking
2. DEVELOPING ORAL COMMUNICATION SKILLS
- 2.1 Offering-Responding to Offers
 - 2.2 Requesting-Responding to Requests
 - 2.3 Congratulating
 - 2.4 Expressing Sympathy and Condolences
 - 2.5 Expressing Disappointments
 - 2.6 Asking Questions-Polite Responses
 - 2.7 Apologizing, Forgiving

- 2.8 Complaining
- 2.9 Persuading
- 2.10 Warning
- 2.11 Asking for and Giving Information
- 2.12 Giving Instructions
- 2.13 Getting and Giving Permission
- 2.14 Asking For and Giving Opinions
- 2.15 Group Discussion

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 & Martin; S. Chand & Company Ltd., Delhi.
3. Communication Techniques and Skills by R. K. Chadha; Dhanpat Rai Publications, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lectures and Tutorials (Periods)	Marks Allotted (%)
1	22	34
2	08	12
3	16	24
4	06	10
5	12	20
Total	64	100

2.2. APPLIED MATHEMATICS - II

	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 differential calculus, integral calculus, differential equations and statistics. 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. Differential Calculus (30 Periods)

1.1 Definition of function; Concept of limits.

$$\text{Lt } x \rightarrow a \frac{x^n - a^n}{x - a}$$

Four standard limits

$$\text{Lt } x \rightarrow 0 \frac{\sin x}{x}, \quad \text{Lt } x \rightarrow 0 \frac{a^x - 1}{x}, \quad \text{Lt } x \rightarrow 0 \frac{(1+x)^{1/x} - 1}{x}$$

1.2 Differentiation by definition of x^n , $\sin x$, $\cos x$, $\tan x$, e^x , $\log_a x$ only

1.3 Differentiation of sum, product and quotient of functions. Differentiation of function of a function.

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

1.5 Applications:

(a) Maxima and minima

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

2. Integral Calculus (25 Periods)

2.1 Integration as inverse operation of differentiation

2.2 Simple standard integrals and related problems

2.3 Simple integration by substitution, by parts and by partial fractions (for

linear factors only)

2.4 Properties of definite integrals

2.5 Evaluation of definite integrals (simple problems)-

$$\text{Evaluation of } \int_0^{\pi/2} \sin^n x \cdot dx, \int_0^{\pi/2} \cos^n x \cdot dx, \int_0^{\pi/2} \sin^m x \cos^n x \cdot dx$$

using formulae without proof (m and n being positive integers only)

2.6 Numerical integration by Simpson's Rule and Trapezoidal Rule (simple problems only)

3 Ordinary Differential Equations (10 Periods)

3.1. Definition, order, degree, linear and non-linear differential equations

3.2 Formation of differential equations (up to second order)

3.3. Solution of first order differential equations (a) Variable Separable (b) Homogeneous (c) Linear and (d) Exact.

4. Statistics (15Periods)

4.1 Measures of Central Tendency: Mean, Median, Mode

4.2 Measures of Dispersion: Mean deviation, Standard deviation

4.3 Co-efficient of rank correlation

RECOMMENDED BOOKS

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lectures and Tutorials (Periods)	Marks Allotted (%)
1	30	40
2	25	30
3	10	10
4	15	20
Total	80	100

2.3 APPLIED PHYSICS – II

	L	T	P
Periods/Week	3	2/2	2

RATIONALE

Applied physics includes the study of a large number of diverse topics related to things that go in the world around us. It aims to give an understanding of this world both by observation and prediction of the way in which objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology

DETAILED CONTENTS

1. Optics (10 Periods)
 - 1.1 Review of basic optics laws: reflection and refraction
 - 1.2 Refraction and refractive index, image formation in lenses, image magnification, lens formulae (thin lens only), power of lens, total internal reflection and their applications
 - 1.3 Simple and compound microscope, astronomical telescope, magnifying power and its calculation (in each case), Terrestrial and Galileo's telescope (Concept only) and their applications
2. Electrostatics (12 Periods)
 - 2.1 Coulombs law, unit of charge, electric potential and electric potential difference
 - 2.2 Electric field, electric field intensity, electric lines of force, electric flux Gauss's Law
 - 2.3 Applications of Gauss law in finding electric field of point charge, straight charged conductor, plane charged sheet and between two plane parallel charged sheets
 - 2.4 Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors, Dielectric and its effect on capacitance, and dielectric break down
 - 2.5 Application of electrostatics in electrostatic precipitator

3. DC Circuits (12 Periods)
- 3.1 Concept of electricity, current and its units, direct and alternating current, voltage, resistance and resistivity, potential difference and e.m.f., Concept and applications of potentiometer.
 - 3.2 Ohm's law and its applications, concept of resistance, conductance, specific resistance, effect of temperature on resistance, co-efficient of resistance, series and parallel combination of resistors, introduction to super conductivity.
 - 3.3 Kirchhoff's laws, Wheatstone bridge principle and its applications (Slide Wire Bridge)
 - 3.4 Heating effect of current and concept of electric power, energy and their units, related numerical problems
 - 3.5 Application of electricity in various equipments, advantages of electrical energy over other forms of energy
4. Electromagnetism (13 Periods)
- 4.1 Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and their units, Right hand thumb rule, magnetic lines of force due to straight conductor, circular coil and solenoid
 - 4.2 Force on a charge, moving in a uniform magnetic field (Lorentz force). Force on a current carrying straight conductor. Torque on a current carrying rectangular coil.
 - 4.3 Moving coil galvanometer conductor, its principle, construction and working, conversion of a galvanometer into ammeter and voltmeter.
 - 4.4 Electromagnetic induction, Faradays Laws, Lenz's Law.
 - 4.5 Applications of Electromagnetism
5. Semiconductor physics (07 Periods)
- 5.1 Energy bands, intrinsic and extrinsic semiconductors, p-n junction diode and its characteristics
 - 5.2 Diode as rectifier – half wave and full wave rectifier, semiconductor transistor pnp and npn (concept only)

6. Modern Physics (10 Periods)
- 6.1 Electro magnetic spectrum, photo electric effect and work function, X rays - properties, production and their applications in medicine and industries.
- 6.2 Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; lasers and its characteristics, population inversion, types of lasers, Helium- Neon and ruby lasers, their engineering and medical applications
- 6.3 Fibre optics: introduction to optical fiber materials, types, light propagation and applications in communication.

LIST OF PRACTICALS (To perform minimum eight experiments)

1. Conversion of Galvanometer into an Ammeter of given range.
2. Conversion of Galvanometer into Voltmeter of given range.
3. To verify ohm's laws by drawing a graph between voltage and current.
4. To verify laws of resistances in series and in parallel connection.
5. To draw characteristics of a pn junction diode and determine knee and break down voltages
6. Verification of Kirchhoff's Laws
7. Determination of resistivity by Wheatstone bridge
8. To determine the resistance of electronic components by multimeter
9. Determination of internal resistance of primary cell by using ammeter and voltmeter
10. To determine emf of primary cell using potentiometer and standard voltage source.

INSTRUCTIONAL STATREGY

Teacher may use various instructional media like models, charts and graphs while imparting instructions. The field application should be made clear before teaching the basics of waves, sound, light, electrostatics, dc circuits, electromagnetism, and semiconductor physics 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. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
3. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
4. Fundamentals of Physics by Resnick, Halliday and Walker, Asian Book Pvt. Ltd., New Delhi
5. Fundamentals of Optics by Francis A. Jenkins & Harvey E White, McGraw Hill International Editions, Physics Series
6. A Text Book of Optics, Subramanian and Brij Lal, S Chand & Co., New Delhi
7. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publishers
8. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
9. Applied Physics I & II by RA Banwait & R Dogra, Eagle Parkashan, Jalandhar
10. Applied Physics Vol II by Jasmer Kaur and Bhupinder Singh, Lords Publications, Jalandhar
11. Basic Electronics and Linear Circuits by NN Bhargava et al Tata Mc Graw Hill Publishers, New Delhi
12. Principles of Electronics by SK Sahdev, Dhanpat Rai and Co, New Delhi
13. Engineering Physics by Vanchna Singh and Sheetal Kumar, Cengage Learning India Pvt. Ltd. Patparganj, Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lectures and Tutorials (Periods)	Marks Allotted (%)
1.	10	15
2.	12	20
3.	12	20
4.	13	20
5.	07	10
6.	10	15
Total	64	100

2.4 APPLIED CHEMISTRY-II

	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. Metallurgy (12 Periods)
 - 1.1 A brief introduction of the terms: Metallurgy, mineral, ore, gangue or matrix, flux, slag, concentration (methods of concentrating the ores), roasting calcination and refining as applied in relation to various metallurgical operations
 - 1.2 Metallurgy of (i) Aluminium (ii) Iron
 - 1.3 Definition of an alloy, purposes of alloying, composition and uses of alloys like magnalium, duralumin, alnico, invar and stainless steel
2. Fuels (16 Periods)
 - 2.1 Definition of a 'Fuel', characteristics of a good fuel and classification of fuels with suitable examples
 - 2.2 Definition of Calorific value of a fuel and its determination for a solid fuel with the help of Bomb calorimeter with simple numerical problems.
 - 2.3 Merits of gaseous fuels over those of other varieties of fuels
 - 2.4 Manufacture, composition, properties and uses of (i) Water gas (ii) Oil gas (iii) Biogas (iv) Compressed Natural gas (CNG)
 - 2.5 Octane Number and Cetane Number
3. Corrosion (08 Periods)
 - 3.1 Meaning of the term 'corrosion' and its definition

- 3.2 Theories of corrosion i.e. (i) direct chemical action theory and (ii) electro chemical theory
- 3.3 Prevention of corrosion by
 - (a) Alloying
 - (b) Providing metallic coatings
 - (c). Sacrificial cathodic protections:
- 4 Lubricants (08 Periods)
 - 4.1 Definition of (i) lubricant (ii) lubrication
 - 4.2 Classification of lubricants
 - 4.3 Principles of lubrication
 - (i) fluid film lubrication
 - (ii) boundary lubrication
 - 4.4 Characteristics of a lubricant such as viscosity, viscosity index, volatility, oxidation, oiliness, acidity, emulsification, flash point, fire point and pour point.
 - 4.5 Importance of additives in lubricants
 - 4.6 Dewaxing and solvent refining of liquid lubricants
- 5 Cement and Glass (04 Periods)
 - 5.1 General introduction to cement and glass
 - 5.2 Manufacture of Cement
 - 5.3 Manufacture of ordinary glass and lead glass
- 6. Classification and Nomenclature of Organic Compounds (16 Periods)
 - 6.1 Classification of Organic Compounds, functional group, Homologus Series
 - 6.2 Physical and Chemical properties, and industrial use of Organic Compound
 - 6.3 IUPAC system of nomenclature of Carboxylic acid, Alcohols, Phenols, Aldehydes, Ketones and Amines (first six members of each series only).

LIST OF PRACTICALS

1. Gravimetric analysis and study of apparatus used there in
2. To determine the percentage composition of a mixture consisting of a volatile and a non-volatile substances
3. Estimate the amount of moisture in the given sample of coal
4. Esterification and ceric ammonium tests of alcohol
5. Sodium carbonate and Ester test of carboxylic acids
6. To determination the amount of copper in the given sample of copper sulphate with the help of N/20 sodium thiosulphate solution.
7. Detection of metal iron in the rust (solution of rust in concentrated HCL may be given)
8. Demonstration to determine calorific value of a solid fuel with the help of Bomb Calorimeter

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-II by SS Kumar; Tata McGraw Hill, Delhi
4. A Text Book of Applied Chemistry-II 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
9. Applied Chemistry-II by Dr. J K Sharma, Abhishek Publications, Sector 17-C, Chandigarh.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lectures and Tutorials (Periods)	Marks Allotted (%)
1	12	15
2	16	25
3	08	20
4	08	20
5	04	10
6.	16	10
Total	64	100

2.5 ENVIRONMENTAL SCIENCE

L T P
Periods/Week 3 - -

RATIONALE

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

DETAILED CONTENTS

1. Basics of ecology, eco system and sustainable development (03 Periods)
2. Conservation of land reforms, preservation of species, prevention of advancement of deserts and lowering of water table (04 Periods)
3. Sources of pollution - natural and man made, their effects on living and non-living organisms, Pollution of water - causes, effects of domestic wastes and industrial effluent on living and non-living organisms, Pollution of air-causes and effects of man, animal, vegetation and non-living organisms, Sources of noise pollution and its effects (18 Periods)
4. Solid waste management; classification of refuse material, types, sources and properties of solid wastes, abatement methods (06 Periods)
5. Mining, blasting, deforestation and their effects (03 Periods)
6. Legislation to control environment (04 Periods)
7. Environmental Impact Assessment (EIA), Elements for preparing EIA statements (04 Periods)
8. Current issues in environmental pollution and its control, role of non-conventional sources of energy in environmental protection (06 Periods)

RECOMMENDED BOOKS

1. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
2. Environmental Protection Law and Policy in India by Thakur Kailash; Deep and Deep Publications, New Delhi.
3. Environmental Engineering and Management by Suresh K Dhamija; SK Kataria and Sons, New Delhi.
4. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted for Lectures (Periods)	Marks Allotted (%)
1	03	6
2	04	10
3	18	40
4	06	12
5	03	04
6	04	08
7	04	08
8	06	12
Total	48	100

2.6 ENGINEERING DRAWING – II

L T P
Periods/Week - - 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

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

DETAILED CONTENTS

1. Section of Solids by Different Cutting Planes
2. Development of Surfaces (2 sheets)

Development of surfaces – cubes, prisms, (square, pentagonal and hexagonal), cylinders, pyramids (square, pentagonal, hexagonal) and cones
3. Detail and Assembly Drawing (2 sheets)
 - 3.1 Principle and utility of detail and assembly drawings
 - 3.2 Wooden joints i.e. corner mortice and tenon joint, Tee halving joint, Mitre faced corner joint, Tee bridle joint, Crossed wooden joint, Cogged joint, Dovetail joint, Through Mortise and Tenon joint
4. Threads (2 sheets)
 - 4.1 Nomenclature of threads, types of threads (metric), single and multiple start threads
 - 4.2 Forms of various external thread sections such as V, square and acme threads, BA, BSW and Knuckle, Metric, Seller Thread, Buttress Threads
 - 4.3 Simplified conventions of left hand and right hand threads, both external and internal threads
5. Locking Devices (1 sheet)

Lock nut, castle nut, split pin nut, sawn nut, slotted nut

6. Nuts and Bolts (3 sheets)
Different views of hexagonal and square nuts; Assembly of hexagonal headed, square headed, square headed with square neck, bolts with hexagonal and square nuts and washers. Foundations bolts – Rag bolt and Lewis bolt
7. Screws, Studs and Washers (1 sheet)
 - 7.1 Drawing various types of machine screws
 - 7.2 Drawing various types of studs and set screws
8. Keys and Cotters (2 sheets)
 - 8.1 Various types of keys and cotters and their practical application and preparation of drawing of various keys and cotters showing keys and cotters in position
 - 8.2 Cotter joints (i) gib and cotter joint (ii) knuckle joint
9. Rivets and Riveted Joints (2 sheets)
 - 9.1 Types of structural and general purposes rivet heads
 - 9.2 Caulking and fullering of riveted joints
 - 9.3 Types of riveted joints – lap, butt (single riveted, double riveted lap joint, single cover plate and double cover plate), chain and zig – zag riveting
10. Welded Joints (1 sheet)
 - 10.1 Various conventions and symbols of welded joints (IS 696)
 - 10.2 Practical applications of welded joints say joints on steel frames, windows, doors and furniture
11. Couplings (2 sheets)
 - 11.1 Muff or Box coupling, half lap muff coupling
 - 11.2 Flange coupling (Protected and non-protected)
 - 11.3 Flexible coupling
12. AutoCAD (for practicals and viva only)
 - 12.1 Practice on drawing commands, editing commands
 - 12.2 Practice on sectioning and hatching
 - 12.3 Practice on preparing simple drawings

RECOMMENDED BOOKS

- 1 Engineering Drawing by C M Verma, Takniki Parkashak, Roorkee.
- 2 Elementary Engineering Drawing 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, New Delhi
- 5 Machine Drawing by RB Gupta, Satya Prakashan, New Delhi.

Note:

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

2.7 GENERAL WORKSHOP PRACTICE - II

Periods/Weeks L T P
 - - 8

RATIONALE

Psychomotor skills are mastered through practice, an opportunity therefore, has been extended to students through this course to refine their skills in different trades. The basic skills developed during first semester will be refined during this course by doing higher order skills jobs. In addition to developing general manual and machining skills in the students, the objective of development of sense of dignity of labour, precision, safety at work places, team working and right attitude among the students will also be met.

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-II
2. Fitting and Plumbing Shop
3. Welding shop -II
4. Electric shop -II
5. Electronic shop-II or Machine Shop

Note:

1. The branches e.g. Civil Engineering, Mechanical Engineering, Mechanical (Automobile), Chemical Engineering, Chemical (R&P), Agriculture Engineering, Electrical Engineering and Automobile Engineering will do **Machine Shop** instead of Electronic shop- II
2. The branches e.g. Electronics and Communication Engineering, Computer Engineering and Information Technology will do **Electronic shop-II** instead of Machine shop.
3. The instructor is to first explain the introductory part given at the beginning under each shop followed by demonstration and practice by students.

1. **Carpentry and Painting Shop-II**

- 1.1 Introduction to joints, their relative advantages and uses.
Job I Preparation of dovetail joint and glued joint.
Job II Preparation of mitre joint
Job III Preparation of a lengthening Joint
Job IV Preparation of at least one utility job with and without lamination.

- 1.2 Demonstration of job showing use of rip saw, bow saw and tenon saw, method of sharpening various saws.
- 1.3 Demonstration of job on band saw and circular saw, chain and chisel, universal wood working machine, Saw re-sharpening machine, saw brazing unit.
- 1.4 Importance and need of polishing wooden items. Introduction to polishing materials.

Job V Polishing on wooden items.

2. Fitting and Plumbing Shop

- 2.1 Introduction to various types of threads (internal and external)-single start, multi-start, left hand and right hand threads.
- 2.2 Description and demonstration of various types of drills, taps and dies
Selection of dies for threading, selection of drills, taps and reamers for tapping operations.
Job I Making internal and external threads on a job by tapping and dieing operations (manually)
- 2.3 Precautions while drilling soft metals, e.g. copper, brass, aluminium etc.
Job II Drilling practice on soft metals such as aluminum, brass and copper
Job III Preparation of a job by filing on non-ferrous metal up to an accuracy of $\pm 0.2\text{mm}$
Job IV Preparation of job involving thread on GI pipe/ PVC pipe and fixing of different types of elbow, tee, union, socket, stopcock, taps etc

3. Welding Shop – II

- 3.1 Introduction to gas welding, spot welding and seam welding and welding techniques. Adjustments of different types of flames in gas welding, demonstration and precautions about handling welding equipment.
Job I Practice in handling gas welding equipment (Low pressure and High pressure) and welding and tacking practice on simple jobs.
- 3.2 Common welding joints generally made by gas welding.
Job II Preparation of butt joint by gas welding.
Job III Preparation of small cot frame from conduit pipe by gas welding.
Job IV Preparation of square pyramid from MS rods by welding (type of welding to be decided by students themselves).
Job V Exercise of preparing a job on spot/seam welding machine.
- 3.3 Demonstration and use of TIG and MIG welding equipment

4. Electric Shop – II

- 4.1 Importance and demonstration of three-phase wiring on three-phase panel with the help of a demonstrating panel.
Job I Laying out 3-phase wiring for an electric motor or any other 3-phase machine.
Job II Connecting single-phase energy meter and testing it. Reading and working out the power consumption and the cost of energy.

- Job III Checking continuity of connection (with tester and series lamp) location of faults with a multimeter) and their rectification in simple machines and/or other electric circuits fitted with earthing.
- Job IV Finding fault in simple electric machine and its rectification
- 4.2 Demonstration of dismantling, servicing and reassembling a table fan/ceiling fan/air cooler/mixer/electric iron, electric heater, geyser, electric oven, air conditioner etc.
- Job V Testing single phase/three phase electrical motor by using voltmeters, ammeter, clip-on meter, tachometer etc.
- Job VI Reversing the rotation of a motor.

5. Electronic Shop- II

- 5.1 Uses of the items mentioned below:
- a) Various types of single, multi-cored insulated screened wire and cables - power, audio video, co-axial, general purpose wires/cables
 - b) Various types of plugs, sockets, connectors suitable for general purpose audio and video use, 2 and 3 pin mains plugs and sockets, RF plugs and sockets.
Banana-plugs, and sockets, BNG, RCA, DIN, UHF, ear phone speaker connector, telephone jacks and similar male and female connectors and terminal strips.
 - c) Various types of switches such as normal/miniature toggle, slide, push button, piano key, rotary, micro switches, SPST, SPDT, DPST, DPDT, band selector, multi way master mains switch.
 - d) Various types of protective devices such as : wire fuse, cartridge fuse, slow acting/fast acting fuse, HRC fuse, thermal fuse, single/multiple circuit breakers, over and under current relays.
 - e) Materials: Conducting, insulating and magnetic materials.
 - f) Demonstration and uses of single beam simple cro, signal generator and function-generator
 - g) Regulated power supply-fixed and variable voltage, single output as well as dual output.
- 5.2 Identification and familiarization with active and passive components; types and colour code of resistor, capacitors and potentiometers (including VDR, LDR, and thermistor). Identification of components including diode, LED, transistor, LCD, UJT, FET, coils, relays, reed relays, transformers, linear and digital ICs, thyristors.
- 5.3 Demonstrate the following:
- To make perfect solder joints and soldering on PCBs
 - To remove components/wires by unsoldering
 - To assemble components on boards, chassis, tape strips
 - Various laying methods of cables
 - Exposure to modern soldering and de-soldering processes

- Field visits to relevant work-places
- Identification of active and passive components

1. Use of multimeter and testing of active and passive components.

Job I Cut, bend, tin components, leads, inserts and solder components (capacitor, diodes, transistor, IFT, ICs etc) on a PCB.

Job II Soldering practices

Job III Temperature controlled soldering station

Job IV De-soldering pump

Job V De-soldering strip/wik

Job VI De-solder, remove and clean all the components, wires from a given equipment, a PCB or a tag strip.

Job VII Wiring of a small circuit on a PCB/tag strip involving lacking, sleeving and use of identifier tags

OR

5 Machine Shop

Introduction to various machines used in machine shop

Job I: Exercise on simple turning

Job II: Exercise on taper turning

Job III: Marking and drilling practice on mild steel piece

Job IV: Marking and drilling practice on aluminium piece

Job V : Demonstration of various functions of CNC Machine

RECOMMENDED BOOKS

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Choudhary. 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; MacMillan India Ltd. New Delhi
4. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
5. Workshop Technoogy by B.S. Raghuwanshi, Dhanpat Rai and Co., New Delhi
6. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi