2.1 COMMUNICATING EFFECTIVELY IN ENGLISH
II SEMESTER SYLLABUS

LTP
3 - 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 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 achieving results and creating successful organizations. The goal of the ***Communicating Effectively in English*** 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.

II SEMESTER 48 hrs

1. LISTENING COMPREHENSION 4hrs

1.1 Locating Main Ideas in a Listening Excerpt
1.2 Note-taking

2. ORAL COMMUNICATION SKILLS 14 hrs

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

3. GRAMMAR AND USAGE **10hrs**

3.1 Prepositions
3.2 Pronouns
3.3 Determiners
3.4 Conjunctions
3.5 Question and Question Tag
3.6 Tenses (Simple Present, Simple Past)

*One chapter revising the topics discussed during the first semester. (Punctuation, Articles, Framing questions, Verbs, Word formation)

4. WRITING SKILLS **10hrs**

4.1 Writing Notice
4.2 Writing Circular
4.3 Writing a Memo
4.4 Agenda for a Meeting
4.5 Minutes of the Meeting
4.6 Telephonic Messages

* Writing a paragraph will be a continuous exercise through out the session. (Writing will be based on verbal stimuli, tables and graphs.)

5. READING SKILLS **10hrs**

5.1 Vocabulary Enhancement
5.2 Techniques of reading: Skimming, Scanning, Intensive and Extensive Reading

NOTE: The Reading Skills of the learners (along with vocabulary enhancement) will be through reading thematic articles/essays and/or stories.

CONTENTS

Reading Skills

Writing Skills

Grammar and Usage

2.2 APPLIED MATHEMATICS-II

LTP
41-

RATIONALE

Applied Mathematics forms the backbone of engineering discipline. Basic elements of differential calculus, integral calculus, differential equations and coordinate geometry have been included in the curriculum as foundation course and to provide base for continuing education to the students

DETAILED CONTENTS

1. Co-ordinate Geometry (18 hrs)

1.1 Area of a triangle, centroid and incentre of a triangle (given the vertices of a triangle), Simple problems on locus

1.2 Equation of straight line in various standard forms (without proof) with their transformation from one form to another, Angle between two lines and perpendicular distance formula (without proof)

1.3 Circle: General equation and its characteristics given:
- The center and radius
- Three points on it
- The co-ordinates of the end's of the diameter

1.4 Conics (parabola, ellipse and hyperbola), standard equation of conics (without proof), given the equation of conic to calculate foci, directrix, eccentricity, latus rectum, vertices and axis related to different conics Differential Calculus

2. Differential Calculus (22 hrs)

2.1 Concept of function, four standard limits

$\lim_{x\to a} (x^n - a^n)/(x-a)$, $\lim_{x\to 0} \sin x/x$, $\lim_{x\to 0} (a^x - 1)/x$, $\lim_{x\to 0} (1+x)^{1/x}$

2.2 Concepts of differentiation and its physical interpretation

- Differentiation by first principle of x^n, $(ax + b)^n$, Sin x, cos x, tan x, sec x,, cosec x and cot x, e^x, a^x, log x. Differentiation of a function of a function and explicit and implicit functions
- Differentiation of sum, product and quotient of different functions
- Logarithmic differentiation. Successive differentiation excluding n^{th} order

2.3 Application of derivatives for (a) rate measure (b) errors (c) real root by Newton's method (d) equation of tangent and normal (c) finding the maxima and minima of a function (simple engineering problems)

3. Integral Calculus (16 hrs)

3.1 Integration as inverse operation of differentiation

3.2 Simple integration by substitution, by parts and by partial fractions

3.3 Evaluation of definite integrals (simple problems) by explaining the general properties of definite integrals

3.4 Applications of integration for
- ¾ Simple problem on evaluation of area under a curve where limits are prescribed
- ¾ Calculation of volume of a solid formed by revolution of an area about axis (simple problems) where limits are prescribed
- ¾ To calculate average and root mean square value of a function
- ¾ Area by Trapezoidal Rule and Simpson's Rule

4. Differential Equations (8 hrs)

Solution of first order and first degree differential equation by
- ¾ Variable separation
- ¾ Homogeneous differential equation and reducible homogeneou differential equations
- ¾ Linear differential equations and reducible linear differential equations

RECOMMENDED BOOKS

1. Higher Engineering Mathematics by BS Grewal
2. Engineering Mathematics by BS Grewal
3. Engineering Mathematics vol. II by S Kohli and Others, IPH, Jalandhar
4. Engineering Mathematics by Ishan Publication
5. Applied Mathematics Vol. II by SS Sabharwal and Others; Eagle Parkashan, Jalandhar
6. Engineering Mathematics by IB Prasad
7. Applied Mathematics Vol. II by Dr RD Sharma
8. Advanced Engineering Mathematics by AB Mathur and VP Jagi; Khanna Publishers, Delhi
9. Higher Engineering Mathematics by BS Grewal; Khanna Publishers, Delhi
10. Engineering Mathematics by C Dass Chawla; Asian Publishers, New Delhi

2.3 ENGINEERING DRAWING – II

LTP
0-6

RATIONALE

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

Note:
1. 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 students

DETAILED CONTENTS

1. Detail and Assembly Drawing (2 sheets)

   1.1 Principle and utility of detail and assembly drawings

   1.2 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 Mortice and Tenen joint, Corner and Through halving joint, Closed Mortise and Tenon joint

2. Threads (3 sheets)

   2.1 Nomenclature of threads, types of threads (metric), single and multiple start threads

   2.2 Forms of various external thread sections such as V, square and acme threads, BA, BSW and Knuckle, Metric, Seller Thread, Buttress Threads

   2.3 Simplified conventions of left hand and right hand threads, both external and internal threads

3. Locking Devices (1 sheet)
   Lock nuts, castle nuts, split pin nuts, sawn nuts, slotted nut

4. Nuts and Bolts (3 sheets)
   Different views of hexagonal and square nuts; 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

5. Screws, Studs and Washers (1 sheet)

   5.1 Drawing various types of machine screws

   5.2 Drawing various types of studs and set screws

6. Keys and Cotters (3 sheets)

   6.1 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

   6.2 Cotter joints (i) sleeve and cotter joint (ii) gib and cotter joint (iii) knuckle joint (iv) Spigot and socket joint

7. Rivets and Riveted Joints (2 sheets)

   7.1 Types of structural and general purpose rivet heads

   7.2 Caulking and fullering of riveted joints

   7.3 Types of riveted joints – lap, butt (single riveted, double riveted lap joint, single cover plate and double cover plate), chain and zig – zag riveting

8. Welded Joints (1 sheet)

   8.1 Various conventions and symbols of welded joints (IS 696)

   8.2 Practical applications of welded joints say joints on steel frames, windows, doors and furniture

9. Couplings (2 sheets)

   9.1 Muff or Box coupling, half lap muff coupling

   9.2 Flange coupling (Protected and non-protected)

   9.3 Flexible coupling

10. Symbols and Conventions (2 sheets)

   10.1 Civil engineering sanitary fitting symbols

   10.2 Electrical fitting symbols for domestic interior installations

   10.3 Building plan drawing with electrical and civil engineering symbols

11. Development of Surfaces (3 sheets)

    11.1 Construction of geometrical figures such as square, pentongon, hexogon

    11.2 Development of surfaces of cylinder, square, pentagonal and hexazonal, Prism, Conc and Pyramid, Sequence pentagonal and hexa pyramid

12. Interpenetration of (2 sheets)

    12.1 Cylinder to cylinder

    12.2 Cylinder to cone

13. AUTO CAD

    13.1 Concept of AutoCAD, Tool bars in AutoCAD, coordinate system, snap, grid, and ortho mode

    13.2 Drawing commands – point, line, arc, circle, ellipse

    13.3 Editing commands – scale, erase, copy, stretch, lengthen and explode

    13.4 Dimensioning and placing text in drawing area

    13.5 Sectioning and hatching

    13.6 Inquiry for different parameters of drawing entity

Note: A minimum of 15 sheets should be prepared by each student

RECOMMENDED BOOKS

1. Elementary Engineering Drawing (in first angle projection) by ND Bhatt, Charotar Publishing House
2. A Text Book of Engineering Drawing by Surjit Singh Published by Dhanpat Rai and Co. Delhi
3. Engineering Drawing by PS Gill; published by SK kataria and Sons, New Delhi

2.5 POLYMER CHEMISTRY – II

RATIONALE

Basic knowledge of organic chemistry is the foundation on which the plastic technology is built up. Manufacturing of plastic raw materials and processing of plastic will never the desirable without the understanding of basic chemistry. This course has been designed to include some relevant topics from organic chemistry to understand various subsequent courses in polymers

DETAILED CONTENTS

1. Classifications and Nomenclature of Organic Compounds (4 hrs)

   Classification of organic compounds; IUPAC nomenclature of Alkanes,

   Alkenes
   and Alkeynes; IUPAC nomenclature of compounds containing various functional
   groups. IUPAC nomenclature of polyfunctional compounds. Nomenclature of Benzene derivatives. Bond line notations, writing the structure of a compound whose name is given. Some commonly used abbreviations. Names of simple alphatic compounds.

2. Structure and Shape(s) of Hydrocarbons (6 hrs)

   Alkanes (structure, isomerism, conformations). Stereo isomerism and

   chirality (Origin of chirality, optical, geometric, recemic mixture). Alkenes

   (Isomerism including cis, trans) Alkynes, Arenes (structure of Benzene,

   resonance structure, isomerism in arenas), alcohol, carboxylic acid

3. Organic Reaction Mechanism (6 hrs)

   Reactions and their mechanism; Thermodynamic and kinetic requirements

   of a reaction. Thermodynamic versus kinetic control of a reaction, Transition

   state theory. Free energy diagrams

4. Petrochemicals (10 hrs)
   Introduction, raw materials, petroleum refining, petrochemical Process technology; catalytic cracking, hydrocracking, alkylation and isomerisation

5. Industrial Chemicals (16

   hrs) Manufacture, properties and applications of Vinyl Chloride, Ethylene,

Propylene, Alkyl halides, Acrylonitrile, Styrene, Methy Methacrylate,

Ethylene Glycol, Terphthalic Acid, Phenol, Isocynates

6. Macromolecular Concept (6 hrs)

Macromolecular concept, secondary bonding in polymers. Stereo isomerism in polymers

LIST OF PRACTICALS

1. To determine specific gravity of three industrial chemicals using pyknometer
2. To determine boiling point of three industrialchemicals
3. To find out refractive index of three industrial chemicals
4. Determination of viscosity of three industrial chemicals
5. To determine the melting point of terphthalic acid
6. To determine the bulk density of terphthalic acid

Note: The industrial chemicals must be chosen from the chemicals as given in syllabus at Sr. No. 5. The values obtained practically should be compared with the standard values

RECOMMENDED BOOKS

1. Organic Chemistry by Marrison and Boyd
2. Organic Chemistry Vol. I by IL Finar
3. Text Book of Organic Chemistry by Lyod and Forguson
4. Organic Chemistry by Behl
5. Principles of Polymer Chemistry, Second Edition by A Ravve; Powell Publication, 1995

2.6 INTRODUCTION TO PLASTIC TECHNOLOGY

RATIONALE

This subject is designed to enable the student to acquire basic knowledge of plastics, their advantages, applications, classification, conversion, storage and recycling. The elementary acquired knowledge will help the students in understanding different processes in detail in later part of the course

DETAILED CONTENTS

1. Materials (6 hrs)

   Plastics as a material, their load bearing capacity, effect of temperature, sunlight, load/stress, humidity, oxidation etc. on plastics

2. Advantages (6 hrs)

   Advantages of using plastics in comparison with other conventional materials
   (wood, steel) such as reduction in weight by using specific weight concept, reduction in number of parts during construction, increased possibilities in number of shapes, new products, cost effectiveness and aesthetics. Reusability

3. Applications (8 hrs)

   Applications of plastics in various areas such as agriculture, packaging, electrical and electronics, automobile, construction, sports, medical, engineering and household etc

4. Conversions (16 hrs)

   Preliminary ideas of extrusion, injection molding, blow molding, rotational molding, compression and transfer molding taking examples of commonly used products made by each process

5. Storage (6 hrs)

   Storage and handling of plastics and chemicals used in plastic industry (such as resins, solvents, plasticisers, pigments etc). Problems such as flammability, toxic fumes, limitation of working under heat etc)

6. Recycling (6 hrs) Collection; Segregation. Recycling – primary, secondary and tertiary

RECOMMENDED BOOKS

1. Outlines of Polymer Technology by R Sinba

2. Polymer Science and Technoloy by Joel E Fried; Prentice Hall of India Publication, New Delhi 2000

3. Polymer Science and Technology by P Ghosh

4. Polymer Material – I and II Edition, Polymer Research Centre, Bangalore

5. Application of Polymers, CIPET

6. Plastic Technology by William J Patton, BBT Sons and Co Pvt Ltd Mumbai publication

2.7 ORIENTATION TO POLYMER ENGINEERING

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RATIONALE

The subject helps the student in appreciating the role of various subjects taught during the diploma programme and their application in the world of work. It will also expose to the students various field jobs where they can join later on. The course will also impart to the students elementary knowledge regarding units and conversions, concept of unit operations and unit processes and introduction to and classification of polymers.

DETAILED CONTENTS

1. Introduction to Polymers (4 hrs)

2. What is Polymer Engineering? Brief history of Polymer Engineering (5 hrs)

3. Concept of Unit processes and Unit operations in chemical industry (5 hrs)

4. Functions of Plastic Technologist, career opportunities for Plastic Technologists (4 hrs)

5. Scope of Polymer Engineering with respect to new emerging areas like membrane separations, conducting polymers and biomedical applications (8 hrs)

6. Classification of Polymers: Natural, semisynthetic, synthetic, linear, branched, cross linked; Thermoplastic, thermoset Commodity. Engineering, Speciality, Condensation, addition. Polymer blends and alloys; Plastics, elastomers, fibers. (10 hrs)

7. System of units and unit conversions involving process variables like pressure, temperature, viscosity, density, specific gravity, thermal conductivity (6 hrs)

8. Composition of mixtures and solutions; mass fractions, mole fractions, molarity, molality and normality (6 hrs)

RECOMMENDED BOOKS

1. Polymer Science and Technology by Joel E Fried, Prentice Hall of India publication, New Delhi, 2000
2. Polymer Material – I and II edition, Polymer Research Centre, Bangalore
3. Application of Polymers, CIPET
4. Materials Science of Polymers for engineers by Tim Osswald, Powell Publication
5. Principles of Polymer Engineering second edition by NG McCrum, CB Bucknall, C P Buckley, July 1998 published by Oxford University Press

2.8 GENERAL WORKSHOP PRACTICE – I & II

RATIONAL

Manual abilities to handle engineering materials with hand tools need to be developed in the students. They will be using different types of tools/equipment in different shops for fabrication purposes. Besides developing the necessary skills, the students will appreciate the importance of quality and safety measures.

DETAILED CONTENTS

Note: 1. 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.

2. The shops to be offered in I and II semester may be decided at polytechnic level

3. The students should be taken to various shops (not included in the curriculum) in the polytechnic in batches and should be given knowledge of the various machines/equipment. Such as machine shop, foundry shop, sheet metal shop, etc.

4. Students of Diploma in Chemical Engineering will undergo Shops 1 to 6 only

Following seven shops are being proposed:

1. **Carpentry shop**
2. **Fitting and plumbing shop**
3. **Welding shop**
4. **Paint shop**
5. **Forging and sheet metal shop**
6. **Electric shop**
7. **Electronics Shop**

1. Carpentry Shop

1.1 Introduction to various types of wood, carpentry tools - their identification with sketches. Different types of wood joints.

1.2 Simple operations viz. hand sawing, marking, planning

1.3 Introduction and sharpening of wood working tools and practice of proper adjustment of tools

1.4 Demonstration and use of wood working machines i.e. band saw, circular saw, rip saw, bow saw and trammels. Universal wood working machine and wood turning lathe

1.5 Making of various joints (Also draw the sketches of various wooden joints in the Practical Note Book)

a) Cross lap joint
b) T-lap joint
c) Corner lap joint
d) Mortise and tenon
joint e) Dovetail joint
f) Prepare a file handle or any utility items by wood turning lathe

2. Fitting and Plumbing Shop

2.1. Introduction to fitting shop, common materials used in fitting shop, description and demonstration of various types of work-holding devices and surface plate, V-block

2.2 Demonstration and use of simple operation of hack-sawing, demonstration of various types of blades and their uses

2.3 Demonstrate and use of all important fitting shop tools with the help of neat sketches (files, punch, hammer, scraper, taps and dyes etc.)

2.4 Introduction of chipping, demonstration on chipping and its applications.

Demonstration and function of chipping tools.

2.5 Description, demonstration and practice of simple operation of hack saw, straight and angular cutting.

2.6 Demonstrations, description and use of various types of blades - their uses and method of fitting the blade.

2.7 Introduction and use of measuring tools used in fitting shop like: Try square, Steel rule, Measuring Tape, Outside micrometer, Vernier Caliper and Vernier Height Gauge

2.8 Description, demonstration and practice of thread cutting using taps and dies

2.9 Plumbing: Descriptions and drawing of various plumbing shop tools, Safety precautions. Introduction and demonstration of pipe dies, Pipe holding devices, Demonstration and practice of Pipe Fittings such as Sockets, Elbow, Tee, Reducer, Nipple, Union coupling, plug, Bend, Float valves and Taps

Job: Cutting and filing practice on a square of 45 X 45 mm^2 from MS flat

Job: Angular cutting practice of 45^0 (on the above job)

Job: Preparation of stud (to cut external threads) with the help of dies (mm or BSW)

Job: Drilling, counter drilling and internal thread cutting with Taps

Job: H-Fitting in Mild steel (ms) square

Job: Pipe cutting practice and thread cutting on GI Pipe with pipe dies

3. Welding Shop

3.1 Introduction to welding, type of welding, common materials that can be welded, introduction to gas welding equipment, types of flame, adjustment of flame, applications of gas welding. Welding tools and safety precautions

3.2 Introduction to electric arc welding (AC and DC), practice in setting current and voltage for striking proper arc, precautions while using electric arc welding. Applications of arc welding. Introduction to polarity and their use

3.3 Introduction to brazing process, filler material and fluxes; applications of brazing. Use of solder. Introduction of soldering materials

3.4 Demonstrate and use of the different tools used in the welding shop with sketches. Hand shield, helmet, clipping hammer, gloves, welding lead, connectors, apron, goggles etc.

3.5 Demonstration of welding defects and Various types of joints and end preparation

Job: Preparation of cap joint by arc welding

Job: Preparation of Tee joint by arc welding

Job: Preparation of single V or double V butt joint by using Electric arc welding

Job: Brazing Practice. Use of Speltor (on MS sheet pieces) Job: Gas welding practice on worn-out and broken parts

4. Paint Shop

Introduction of painting shop and necessity. Different types of paints. Introduction of powder coating plant and their uses.

Job: Preparation of surface before painting such as cleaning, sanding, putty, procedure and application of primer coat, and painting steel item.
Job: Painting practice by brush on MS sheet
Job: Practice of dip painting
Job: Practice of lettering: Name plates / Sign board
Job: Polishing and painting on wooden and metallic surfaces
Job: Practical demonstration of powder coating

5. Forging and sheet metal shop

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

5.1 Forge a L hook or Ring from MS rod 6 mm φ

5.2 Forge a chisel and give an idea of hardening and tempering

5.3 Lap joint with forge welding

5.4 High Strength Steel (HSS) tools – forging of Lathe shaper tools like side-tools and V-shape tools

5.5 Making sheet metal joints

5.6 Making sheet metal trey or a funnel or a computer chassis

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

5.8 Prepare a lap riveting joint of sheet metal pieces

6. Electric Shop

6.1 Demonstration of tools commonly used in Electric Shop

6.2 Safety precautions , electric shock treatment

6.3 Demonstration of Common Electric material like: wires, fuses, ceiling roses, battens, cleats and allied items

6.4 Demonstration of Voltmeter, Ammeter, Multimeter and Energy meter

Job: Wiring practice in batten wiring, plastic casing-capping and conduit
Job: Control of one lamp by one switch Job: Control of one lamp by two switches Job: Control of one bell by one switch Job: Assemble a Tube light
Job: Dismantle, study, find out fault, repair the fault, assemble and test domestic appliances like electric iron, electric mixer, ceiling and table fan, tube-light, water heater (geyser) and desert cooler
Job: Laying out of complete wiring of a house (Single-phase and Three- phase)

7. Electronics Shop

7.1 Identification, familiarization, demonstration and use of the following electronic instruments:

a) Multi-meter digital
b) Single beam simple CRO , function of every knob on the front panel
c) Power supply , fixed voltage and variable voltage, single output as well as dual output.

7.2 Identification , familiarization and uses of commonly used tools; active and passive components; colour code and types of resistor and potentiometers

7.3 Cut, strip, join and insulate two lengths of wires/cables (repeat with different types of cables/ wires)

7.4 Demonstrate and practice the skill to remove components/wiresby unsoldering

7.5 Cut, bend, tin component, leads, inserts. Solder components e.g. resistor, capacitor, diodes, transistors on a PCB

7.6 Wiring of a small circuit on a PCB/tag strip involving laying, sleeving and use of identifier tags

7.7 Demonstrate the joining (or connecting) methods/mounting and dismantling method, as well as uses of the items mentioned below:

a) Various types of plugs, sockets, connectors suitable for general- purpose audio video use. Some of such connectors e.g. 2 and 3 pin mains plug and sockets, Banana plugs, sockets and

similar male and female connectors and terminal strips.

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

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

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