

2.1 COMMUNICATION SKILLS - II

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3 - 2

RATIONALE

Language is the most commonly used and effective medium of self-expression in all spheres of human life – personal, social and professional. A student must have a fair knowledge of English language and be able to pursue the present course of study and handle the future jobs in industry. The objective of this course is to assist the diploma holders to acquire proficiency, both in spoken (oral) and written language. At the end of the course, the student will be able to develop comprehension, improve vocabulary, develop grammatical ability, enhance writing skills, correspond with others, enhance skills in spoken English.

DETAILED CONTENTS

1. Prose Text Book (12 hrs)

The following six chapters of A Book of English for Polytechnics – Prose Selection, Published by MacMillan India Ltd., on behalf of Technical Teachers' Training Institute, Chandigarh

- a) Uncle Podger Hangs a Picture
- b) Subash Chandra Bose
- c) A Pair of Mustachios
- d) Guru Gobind Singh
- e) With The Photographer
- f) Sir Jagdish Chandra Bose

There will be one general question from one of these six chapters.

2. Precise writing (selected from the prescribed 6 chapters of Prose Text Book) (4 hrs)

3. Grammar (2 hrs)
Antonyms change of words into different parts of speech

4. Correspondence (10 hrs)

- a) Business letters such as:
 - Registration as supplier
 - Floating quotations and tenders
 - Quarry for product specification, price and other details etc from a firm/Company
 - Covering letter for quoting prices against a quotation/tender
 - Placing supply order

- b) Personal letters such as:
- Application for leave and extension of leave
 - Application for seeking a job/employment
 - Conveying congratulation messages to a relative/friend/colleague on different occasions
 - Conveying condolence message to a relative/friend/colleague
 - Request letter to guardian for sending money for excursion/study tour
 - Letter to your brother/sister/friend describing your first day experience in the polytechnic
- c) Official letters such as:
- Letter to editor for placing an advertisement in the newspaper for purchase/selling of goods
 - Letter to Municipal Commissioner for improving water supply/sanitation system in your locality
 - Letter to General Manager, Telephone Department for restoring a dead telephone/shifting a telephone
 - Letter to State Electricity Board for repair of street lighting/correction of bills etc.
 - Letter to the supplier for rectifying or replacing a defective machinery/item of purchase
 - Letter to Registrar, State Board of Technical Education for allowing to improve grades/marks in diploma examination
5. Report Writing (2 hrs)
- Drafting a technical report of a visit to a factory, construction site, modern office, etc.
 - Report writing on current general themes/topics related to economy, industry, social issues
 - Elements of periodical progress report
6. Inspection Note (2 hrs)
- Write an inspection note after inspecting technical/industrial goods
 - Write an inspection note after visiting a construction site or production shop
7. Writing “Preface” and “acknowledgement” of a project report (2 hrs)

8. A paragraph on current topics/themes (2 hrs)
- Technology
 - Science
 - Economy
 - Politics
 - Social
 - General
9. Vocabulary (2 hrs)
- words, idioms, phrases, antonyms and synonyms
 - Translation of 100 most popular administrative terms from English to Hindi and from Hindi to English
10. Drafting (4 hrs)
- Press notes
 - Memos/circulars
 - Notices (lost and found: obituary/auction, etc)
 - Telegrams
 - Press releases
 - Agenda and minutes of the meeting
 - Personal resume/curriculum vitae
11. Communication Techniques (6 hrs)
- Importance of communication
 - Types of communication – verbal and non-verbal
 - One way and two way communication
 - Process of communication – horizontal, vertical, upward, downward
 - Essentials of good communication
 - Level of communication – inter and intra personal, group to person, group to group
 - Methods of effective oral, written and non-verbal communication, Horizons – tone, frequency, rate, volume, depth
 - Barrier to communication and over coming barriers
 - Listening skill
 - Use of audio visual aids for effective communication

LIST OF PRACTICALS

1. Presentation of Technical Report, using Audio-visual aids
2. Preparation and Presentation on a Seminar of a given topic/theme using power-point
3. Telephonic conversation – Conveying and Receiving

4. Mock Exercises for an interview for a job/employment
5. Listening comprehension from a radio/cassette talk in English
6. Extempore speech
7. Oral presentation with stress on proper body language, voice modulation

Note: For reading comprehension, listening comprehension and effective speaking skills, English Language Laboratory Manual and Workbook published by State Board of Technical Education, Hyderabad (AP) may be used along with text book

RECOMMENDED BOOKS

1. Essentials of Business Communication by Pal and Rorualling; Sultan Chand and Sons
2. The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India
3. New Design English Grammar, Reading and Writing Skills by AL Kohli (Course A and course B), Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
4. New Design English Reading and Advanced Writing Skills for Class XI and XII by MK Kohli and AL Kohli; Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
5. A Practical English Grammar by Thomson and Marlinet
6. Spoken English by V Sasikumar and PV Dhamija; Tata McGraw Hill
7. English Conversation Practice by Grount Taylor; Tata McGraw Hill
8. Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi
9. Business Correspondence and Report Writing by RC Sharma and Krishna Mohan; Tata McGraw Hill Publishing Company Ltd. New Delhi
10. Communication Skills by Ms. R Datta Roy and KK Dhir, Vishal Publication, Jalandhar

2.2 APPLIED MATHEMATICS – II

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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

$$\lim_{x \rightarrow a} (x^n - a^n) / (x - a), \lim_{x \rightarrow 0} \sin x/x, \lim_{x \rightarrow 0} (a^x - 1)/x, \lim_{x \rightarrow 0} (1+x)^{1/x}$$
 - 2.2 Concepts of differentiation and its physical interpretation
 - Differentiation by first principle of x^n , $(ax + b)^n$, $\sin x$, $\cos x$, $\tan x$, $\sec x$, $\operatorname{cosec} x$ 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 (e) 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
- Simple problem on evaluation of area under a curve where limits are prescribed
 - Calculation of volume of a solid formed by revolution of an area about axis (simple problems) where limits are prescribed
 - To calculate average and root mean square value of a function
 - Area by Trapezoidal Rule and Simpson's Rule
4. Differential Equations (8 hrs)
- Solution of first order and first degree differential equation by
- Variable separation
 - Homogeneous differential equation and reducible homogeneous differential equations
 - 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 APPLIED CHEMISTRY-II

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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 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 (8 hrs)
 - 1.1 A brief introduction of the terms: Metallurgy (types), 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 with their physical and chemical properties
 - 1.3 Definition of an alloy, purposes of alloying, composition, properties and uses of alloys-brass, bronze, monel metal, magnalium, duralumin, alnico and invar
2. Fuels (10 hrs)
 - 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 determination of calorific value of a liquid fuel with the help of Bomb calorimeter. Simple numerical problems based upon Bomb-calorimeter method of finding the Calorific values
 - 2.3 Brief description of 'Proximate' and 'Ultimate' analysis of a fuel. Importance of conducting the proximate and ultimate analysis of a fuel

- 2.4 Qualities of a good fuel and merits of gaseous fuels over those of other varieties of fuels
- 2.5 Manufacture, composition, properties and uses of (i) Water gas (ii) Oil gas (iii) Biogas
- 3 Corrosion (3 hrs)
- 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
1. (a) Alloying
 - (b) Providing metallic coatings
 2. Cathodic protections:
 - (a) Sacrificial
 - (b) Impressed voltage method
- 4 Lubricants (4 hrs)
- 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
 - (iii) extreme pressure lubrication
- 4.4 Characteristics of a lubricant such as viscosity, viscosity index, volatility oiliness, acidity, emulsification, flash point and fire point and pour point.
- 5 Cement and Glass (2 hrs)
- 5.1 Manufacture of Portland Cement
- 5.2 Manufacture of ordinary glass and lead glass
6. Classification and Nomenclature of Organic Compounds (5 hrs)
- Classification of Organic Compounds, functional group, Homologus Series, Nomenclature, Physical and Chemical properties, and industrial use of Organic

Compounds, IUPAC system of nomenclature of Carboxylic acid, Alcohols, Phenols, Aldehydes, Ketones and Amines.

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. Determine the viscosity of a given oil with the help of “Redwood viscometer”
4. Determine the flash point of the given oil with the help of Abel’s Flash Point Apparatus
5. Estimate the amount of moisture in the given sample of coal
6. Estimate the amount of ash in the given sample of coal
7. Electroplate the given strip of Cu with Ni
8. Confirmation test of alcohol, aldehydes, carboxylic acid, amine
9. Determination of copper in the given brass solution, or sample of blue vitriol volumetrically
10. Detection of metal iron in the rust (solution of rust in concentrated HCL may be given)

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

2.4 ENGINEERING DRAWING – II

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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. 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 Tenon 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, pentagon, hexagon
 - 11.2 Development of surfaces of cylinder, square, pentagonal and hexagonal, Prism, Cone and Pyramid, Section pentagonal and hexagonal 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

2.6 ENGINEERING MATERIALS

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RATIONALE

The knowledge of engineering materials is essential for Chemical Engineering discipline. The knowledge of mechanical, electrical, thermal and chemical properties of a material is necessary to make a proper selection of the material for process equipment. Effect of surrounding materials, failure under service conditions etc also affect the material selection

DETAILED CONTENTS

1. Importance of consideration of engineering materials (4 hrs)
2. Different types of engineering materials in use in chemical industries (6 hrs)
3. Properties expected for use of engineering materials in chemical industries (6 hrs)
4. Classification of engineering materials (18 hrs)
 - 4.1 Metallic Materials
 - 4.1.1 Ferrous Metals
Important varieties of iron ores, cast iron; types, properties and uses of cast iron, pig iron: types of pig iron. Wrought iron: properties and uses of wrought iron; Steel: factors affecting physical properties of steel and uses of steel (no manufacturing process)
 - 4.1.2 Non-ferrous Metals
Aluminium, cobalt, copper, lead, magnesium, nickel, tin and zinc, their properties and uses
 - 4.1.3 Various alloys of aluminium, copper, magnesium, nickel and steel
 - 4.2 Non-metallic materials
 - 4.2.1 Polymers
Nylon – 66, nylon – 6, polyesters, polycarbonates, polyurathenes, PVC, Polypropylene, rubber

4.2.2 Ceramics

Definition of ceramic, clays, properties of clay, earthen wares and stone wares, uses of stonewares

Definition of refractory, classification of refractories, properties of refractories, common refractory bricks, fire clay bricks, dolomite bricks, high alumina bricks and carbon bricks

4.2.3 Glass

Definition, classification, composition, types and properties of glass

5. Mechanical, thermal and electrical properties (10 hrs)

Tensile strength, compressive strength, shear strength, ductility and malleability, methods of improving strength; specific heat, glass transition temperature, crystalline melting temperature, thermal conductivity, dielectric strength, dielectric constant, power loss and electrical diffusivity

6. Specification of materials according to BIS (4 hrs)

RECOMMENDED BOOKS

1. Materials in Industry by WJ Patton; Prentice Hall Publication
2. Introduction to Engineering Materials by Aggarwal; Tata McGraw Hill Publication
3. Material Science by Narula; Tata McGraw Hill Publication
4. Elements of Metallurgy by HS Bawa; Tata McGraw Hill Publication

2.7 INTRODUCTION TO CHEMICAL ENGINEERING

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RATIONALE

It is an introductory subject to be given to students opting for chemical engineering. It will expose to the students various areas to be covered in this course and various field jobs where they can join later on. The course will also impart to the students elementary knowledge regarding units and conversions. This knowledge is essentially required for supervisors.

DETAILED CONTENTS

1. What is chemical engineering? Brief history of chemical engineering (4 hrs)
2. Concept of unit operations and unit process in chemical engineering (4 hrs)
3. Functions of a chemical engineers, career opportunities for chemical engineers (3 hrs)
4. Scope of chemical engineering with respect to the new emerging areas in the field of chemical engineering like environmental engineering, bio-chemical and bio-medical engineering, membrane separation techniques, polymer science and engineering (5 hrs)
5. Systems of units and unit conversions involving process variables like pressure, temperature, viscosity, density, specific gravity, thermal conductivity (6 hrs)
6. Composition of mixtures and solutions; mass fractions, mole fractions, molarity, molality and normality (6 hrs)
7. Flow sheet, need and utility of studying a process with the help of flow sheet, symbols (8 hrs)
8. One case study say Urea Plant to show different unit operations and processes in conjunction thereby telling relevance of different subjects to be studied in chemical engineering (12 hrs)

RECOMMENDED BOOKS

1. Introduction to Chemical Engineering by Little John, CE and Meenaglum CM; McGraw Hill
2. Introduction to Chemical Engineering by Anderson LB; McGraw Hill Publication

3. Basic Principles of Chemical Engineering by Shaheen El; Joplin, Missouri, USA
4. Elementary Principles of Chemical Processes Second Edition by Felder RM and Fousseau RW; John Wiley and Sons
5. Basic Principles and Calculations of Chemical Engineering by Himmelbleu DM; Prentice Hall
6. Unit Operations of Chemical Engineering by McCabe and Smith, McGraw Hill Publication
7. Elementary Chemical Engineering by Peter, McGraw Hill Publication