

1.1 COMMUNICATION SKILLS – I

L T P
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 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 Hrs)
 - 1.1 Verbal and Non-verbal Communication
 - 1.2 Process of Communication
 - 1.3 Barriers to Communication; Overcoming Strategies
 - 1.4 Listening and Speaking Skills and Sub-Skills
(All topics should be in detail)

2. Grammar and Usage (12 Hrs)
 - 2.1 Punctuation
 - 2.2 Articles-a, an, the
 - 2.3 Framing Questions
 - 2.4 Verbs-Classification: Main Verb, Auxiliary Verb, Transitive and Intransitive Verbs
 - 2.5 Word Formation

3. Writing Skills (10 Hrs)
 - 3.1 Writing Paragraphs
 - 3.2 Picture Composition

4. Reading Skills (14 Hrs)
Unseen comprehension passages (at least 5 passages).

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

INSTRUCTIONAL STRATEGY

Looking into the present day needs of effective communication in every field, it is imperative to develop necessary competencies in students by giving practical tips and emphasis on grammar, vocabulary and its usage in addition to practical exercises. The teacher should give report writing assignments, projects etc. while teaching this subject.

LIST OF RECOMMENDED 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 (Hrs)	Marks Allotted (%)
1	12	25
2	12	25
3	10	20
4	14	30
Total	48	100

1.2 BASIC CHEMISTRY

L T P

3 - 2

RATIONALE

The role of chemistry and chemical products in every field of life is expanding greatly. Now a days various products of chemical industries are playing important role in the medical field and the number of such products is increasing. Chemistry is one of the important subjects for diploma students in Medical Lab. Technology for developing in them scientific temperament and understanding other subjects in their profession Efforts should be made to teach the subject through demonstration and with the active involvement of students.

DETAILED CONTENTS

1. Basic concepts (08 hrs)
 - 1.1 S.I.units of pressure, volume, temperature, density, specific gravity
 - 1.2 Matter, element, compound and mixtures, atom, molecule, ion, symbols and formulae (recapitulation only)
 - 1.3 Atomic mass (A), molar mass, mole concept and its applications.
 - 1.4 Solution, strength of solutions, molarity (M), molality (m), normality (N), mass fraction, mole fraction and parts per million.

2. Atomic structure and Chemical Bonding (08 hrs)
 - 2.1 Fundamental particles i.e. electron, proton and neutron (their masses and charges)
 - 2.2 Heisenberg's uncertainty principle
 - 2.3 Brief idea of modern concept of atom, quantum numbers (significance only), definition of shells, sub shells and orbitals. Difference between orbit and orbital shapes of S and p orbitals only.
 - 2.4 Modern periodic law, periodic table, periods and groups.
 - 2.5 Definition and types of Ionic bond, covalent bond, orbital concept of covalent bonding, valence bond theory.

3. Water (09 hrs)
 - 3.1 Sources of water
 - 3.2 Hard and soft water, types of hardness, action of soap on hard water
 - 3.3 Disadvantages of hard water in domestic and industrial uses
 - 3.4 Qualities of drinking water and purification of available water for drinking purposes

4. Equilibrium, Acids and Bases. (09 hrs)
- 4.1 Equilibrium state, equilibrium constant
 - 4.2 Ionization of electrolyte in aqueous solution, ionic equilibrium, degree of ionization, self-ionization of water and ionic product of water (K_w)
 - 4.3 Concept of pH and pH scale
 - 4.4 Various concept of acids/bases; strong acids/bases, weak acids/bases, dissociation constants of acids/bases. Neutralization, acid base titration, choice of indicators for acid base titration
 - 4.5 Hydrolysis of salts, common ion effect, buffer solutions (acidic and basic), Buffering action of a buffer solution, applications of buffers
5. Electrochemistry. (09 hrs)
- 5.1 Electronic concept of oxidation, reduction and redox reactions
 - 5.2 Electrolytes and non electrolytes
 - 5.3 Conductors and their types.
 - 5.4 Electrolysis
 - 5.5 Applications of electrolysis
6. Surfaces and Colloids (05 hrs)
- 6.1 Adsorption and its types
 - 6.2 Applications of adsorption
 - 6.3 Colloidal state and types of colloids
 - 6.4 Preparation and purification of colloids in brief
 - 6.5 Gels and solution, emulsions
 - 6.6 Cleaning action of soaps

LIST OF PRACTICALS

1. Preparation of standard solutions.
2. To prepare $\frac{N}{10}$ Sodium carbonate
3. To prepare $\frac{M}{10}$ oxalic acid solution
4. To prepare 5N HCl from given 12 N HCl, $\frac{N}{10}$ HCl
5. To determine strength of given solution of sodium hydroxide by titrating against standard solution of oxalic acid using phenolphthalein indicator.
6. To determine strength of given solution of sulphuric acid by titrating against standard solution of sodium carbonate using methyl orange indicator.

7. Preparation of 20% H₂SO₄ solution.
8. Preparation of 10% KOH solution.
9. Preparation of 1% Ammonium Oxalate from 10% solution.
10. To prepare colloidal solution of starch.

INSTRUCTIONAL STRATEGY

Teacher may take help of various models and charts while giving instructions to make the concepts clear. More stress may be laid on practical applications of various chemical processes and reactions. In addition, students should be encouraged to study those processes in details, which may find practical applications in their future life.

RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuricose And J. Rajaram, Tata McGraw Hill, Publishing Company Limited, New Delhi.
2. Engineering Chemistry by P.C.Jain and Monika Jain, Dhanapat Rai Publishing Company New Delhi.
3. Engineering Chemistry by Shashi Chawla.
4. Progressive Applied Chemistry – I by Dr. G.H. Hugar Eagle Prakashan Jalandhar

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	15
2	08	15
3	09	20
4	09	20
5	09	20
6	05	10
Total	48	100

1.3 ANATOMY AND PHYSIOLOGY - I

L T P
3 - 2

RATIONALE

The students are supposed to have basic knowledge of structure of body, their anatomical parts, physiological functions. After studying this subject, the students shall be able to understand various parts of body and their anatomical positions along with functions.

DETAILED CONTENTS

1. Introduction to human body, anatomy and physiology definition, structure and functions of animal cell. (04 hrs)
2. Elementary tissues of body and their classification along with brief description (06 hrs)
3. Skin (Structure and functions) (04 hrs)
4. Skeletal system (06 hrs)
 - 4.1 The skeleton, important bones and their brief description
 - 4.2 Articulation of bones – joints
5. Digestive system (14 hrs)
 - 5.1 Various organs of digestion and their functions (stomach, small intestine) and accessory organs (liver, pancreas and salivary glands)
 - 5.2 Process of digestion of food
 - 5.3 Absorption and assimilation of food
 - 5.4 Vitamins and minerals
6. Respiratory system (07 hrs)
 - 6.1 Organs of respiration and their histology
 - 6.2 Respiration (definition and mechanism)
 - 6.3 Gas exchange in the lungs
 - 6.4 Regulation of respiration
 - 6.5 Basal metabolic rate
7. Excretory System (07 hrs)
 - 7.1 Organs of excretion (kidneys, ureter, bladder)
 - 7.2 Formation of urine and its composition
 - 7.3 Structure of nephron

LIST OF PRACTICALS

1. Study of various parts of body through demonstration
2. Study of tissues of body through demonstration
3. Study of various parts of skin (demonstration from models)
4. Study of various bones and joints through demonstration
5. Study of parts of digestive system through demonstration
6. Study of parts of respiratory system through demonstration
7. Study of parts of excretory system through demonstration

RECOMMENDED BOOKS

1. Basic Anatomy and Physiology by N Muruges; Sathya Publishers, Madurai
2. Ross and Wilson Anatomy and Physiology by Anne Waugh and Kathleen JW Wilson; Curchill Living Stone; London
3. Anatomy and Physiology by Pears; JP Brothers, New Delhi
4. Anatomy and Physiology by Sears; ELBS, London

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	04	06
2	06	12
3	04	06
4	06	12
5	14	34
6	07	15
7	07	15
Total	48	100

1.4 CLINICAL MICROBIOLOGY- I (General Microbiology)

L T P
3 - 4

RATIONALE

The students undergoing training of medical laboratory technology are given the knowledge of basic morphological features of bacteria, their staining characters, sterilization methods, preparation of culture media, biochemical test for identification of bacteria and their anti-microbial sensitivity tests. They are also taught safety measures in microbiology.

DETAILED CONTENTS

1. Microbiology- Introduction, history, importance of microbiology (02 hrs)
2. Anatomical structure of a bacterial cell including spores, flagella and capsules (4 hrs)
3. Bacterial growth curve and bacterial nutrition (02 hrs)
4. Morphological Classification of bacteria (02 hrs)
5. Microscopy - principle and care, working of compound microscope (04 hrs)
Principle of (i) dark field microscope (ii) fluorescent microscope
(iii) phase contrast microscope and (iv) electron microscope
6. Sterilization (06 hrs)
 - Introduction
 - By dry heat,
 - Moist heat,
 - Autoclave & hot air oven- their structure, functioning, controls and sterilization indicators,
 - By filtration
7. Antiseptics and disinfectants- Introduction, types, use of disinfectants and antiseptics (04 hrs)
8. Bacterial culture and culture techniques (04 hrs)

Inoculations of culture media, aerobic culture, isolation of pure and mixed cultures..
9. Culture media (06 hrs)

Ideal culture media and its types (Liquid and Solid media, Defined and Synthetic media, Basal, Enriched, Selective, Enrichment, Indicator, and Transport media)

10. Staining techniques (06 hrs)
 Methods of smear preparation, Procedure of Gram stain, Ziehl-Neelson's (Z-N) stain, Albert Stain
11. Identification & characteristics of bacteria by (06 hrs)
- i) Microscopic examination
 - ii) Colony characteristics
 - iii) Motility demonstration methods
 - iv) Biochemicals such as –
 - a) Carbohydrate utilization tests (Glucose, Lactose, Sugar, Manitol)
 - b) Catalase, Oxidase, Coagulase
 - c) Indole
 - d) MR & VP
 - e) Citrate utilization
12. Antibiotic sensitivity (02 hrs)
 - Disc Diffusion method – principle, procedure and precautions

LIST OF PRACTICALS

1. Demonstration of safety rules (universal precautions) in a microbiology laboratory
2. Preparation of cleaning agents and techniques of cleaning of glass and plastic ware.
3. Sterilization by autoclave and hot air oven
4. Sterilization by filtration (Seitz)
5. Handling and use of compound microscope
6. Staining techniques: Gram, Albert's, Ziehl – Neelson's
7. Demonstration of motility (Hanging drop method)
8. Preparation and sterilization of various culture media (Nutrient agar, Nutrient broth, Blood agar, Chocolate agar, Mac-Conkey agar, Lowenstein-Jensen Media
9. Cultivation of Bacteria- Aerobic.
10. Antimicrobial susceptibility testing by Stokes disc diffusion method
11. Biochemical testing (Carbohydrate utilization tests, Catalase, Oxidase, Coagulase, Indole, MR & VP, Citrate.

RECOMMENDED BOOKS

1. Textbook of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
2. Practical Book of Medical Microbiology by Satish Gupta; JP Brothers, New Delhi
3. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworth – Heinemann; Oxford
4. Textbook of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House, Mumbai
5. Medical Laboratory Technology by Kanai Lal Mukherjee; Tata McGraw Hill, New Delhi

6. Medical Laboratory Manual for Tropical Countries Vol. I and II by Monica Cheesbrough; Cambridge University Press; UK
7. Text Book of Microbiology by Ananthanarayan and Paniker; Orient Longman, Hyderabad
8. Text book of Medical Microbiology by Cruickshank Vol. I and II

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	02	04
2	04	08
3	02	04
4	02	04
5	04	09
6	06	14
7	04	09
8	04	08
9	06	12
10	06	12
11	06	12
12	02	04
Total	48	100

1.5 HAEMATOLOGY - I

L T P
3 - 4

RATIONALE

The training in haematology is imparted to enable the students to know the principle of tests, methodology of routine as well as advanced procedures being carried out in the laboratory by using routine as well as sophisticated instruments. Stress is also given in use of safety measures in the laboratory

DETAILED CONTENTS

Theory

1. Introduction to haematology (06 hrs)
 - 1.1 Various glassware/plasticware used in haematology labs.(Hb tube, Hb pipette, RBC pipette, WBC pipette)
2. Apparatus and Instruments used in hematology lab. (08 hrs)
 - 2.1. Water bath
 - 2.2. Blood cell counter
 - 2.3. Blood Mixer
 - 2.4. Centrifuge
3. Haemopoiesis (09 hrs)
 - 3.1 Erythropoiesis, leucopoiesis, thrombopoiesis
 - 3.2 Definition, composition and functions of blood
4. Anticoagulants (05 hrs)

Definition and various types of anticoagulants alongwith their mode of action and their preparation with merits and demerits of each
- 5 Collection and preservation of blood (08 hrs)
 - 5.1 Collection of blood; venous and capillary
 - 5.2 Various equipment used for collection of blood samples
 - 5.3. Safety measures at the time of sampling and collection
 - 5.4 Preservation of processed blood samples in hematology

- 6 Diluting fluid (Hb, TLC, Platelets, RBC count) (04 hrs)
 - Uses, preparation and composition.
7. Romanowsky stains (08 hrs)
- 7.1. Theory and preparation
 7.2. Choice of slide and spreader and preparation of blood film
 7.3. Characteristics of good film preparation
 7.4. Staining procedure
 7.5. Effects of pH on staining

LIST OF PRACTICALS

1. Demonstration of various parts of centrifuge; its functioning and care
2. Demonstration of various parts of microscope its functioning and care
3. Preparation of various anticoagulants
4. Collection of venous and capillary blood
5. Preparation of the stains and other reagents
6. Preparation of peripheral blood film (PBF)
7. To stain a peripheral blood film by Romanowsky stain

RECOMMENDED BOOKS

1. Medical Laboratory Technology Vol. 1 by KL Mukherjee; Tata McGraw Hill Publishers, New Delhi
2. An Introduction to Medical Laboratory Technology by FJ Baker; Butterworth Heinmann, Oxford
3. Medical Laboratory Manual for Tropical Countries by Monica Cheesbrough; Cambridge University Press, UK
4. Textbook of Medical Laboratory Technology by Praful B Godkar; Bhalani Publishing House, Mumbai
5. Practical Haematology by JV Decei; ELBS with Curchill Living Stone; UK
6. Medical Laboratory Science Theory and Practical by J Ochei and A Kolhatkar, Tata McGraw Hill Publishing Company Ltd., New Delhi 2000 Ed.
7. Medical Lab. Technology by Satish Gupte, JP Publishers

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	06	10
2	08	16
3	09	24
4	05	10
5	08	16
6	04	08
7	08	16
Total	48	100

1.6 CLINICAL BIOCHEMISTRY - I

L T P
3 - 4

RATIONALE

The students are imparted basic training of theoretical and practical aspects in the field of clinical biochemistry. The students are made to learn the technique of collection of clinical samples and their processing along with recording of data. The student will also obtain the basic knowledge of chemistry and metabolism of various metabolites which are routinely estimated in different diseases so that a clear understanding of the different tests is obtained. The students are also given basic training in safety measures, quality control and automation

DETAILED CONTENTS

1. Introduction to biochemistry (04 hrs)
 - 1.1 Definition
 - 1.2 Importance of biochemistry
 - 1.3 SI Units and their use
 - 1.4 Volumetric apparatus and their calibration
2. Cleaning and storage of laboratory, glass and plastic ware (08 hrs)
 - 2.1 Cleaning and care of laboratory glass and plastic ware
 - 2.2 Different cleaning agents (soaps, detergents, chromic acid)
 - 2.3 Methods of cleaning and storage
3. Important instruments; principle, working, handling and care of (22 hrs)
 - 3.1 Balance (Analytical, electrical/electronic)
 - 3.2 Centrifuge
 - 3.3 Colorimeter
 - 3.4 Spectrophotometer
 - 3.5 Ion selective electrodes, concept of flame photometer
 - 3.6 Glucometer
 - 3.7 Distillation Plant/Deionizer apparatus
4. Blood fractions (10 hrs)
 - 4.1 Separation of Serum
 - 4.2 Separation of Plasma
 - 4.3 Different protein precipitating reagents
 - 4.4 Preparation of protein free filtrate (PFF)
5. Collection and preservation of clinical specimens for bio-chemical analysis of: (04 hrs)
 - Blood
 - Urine
 - Stool
 - Other Body Fluids

LIST OF PRACTICALS

1. Cleaning of glass ware
2. Handling and maintenance of Balance, Centrifuge, Colorimeter, Ion Selective electrode and glucometer , distillation plant/deionizer
3. Collection of blood by various methods including vacutainer system
4. Separation of serum and plasma
5. Preparation of different protein precipitating agents, PFF preparation

RECOMMENDED BOOKS

1. A Procedure Manual for Routine Diagnostic Tests Vol. I by KL Mukherjee; Tata McGraw Hill Publishers, New Delhi
2. Biochemistry Estimations by F.J.Baker

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time allotted (Hrs)	Marks Allotted (%)
1	04	08
2	08	16
3	22	48
4	10	20
5	04	08
Total	48	100