

**VEER NARMAD SOUTH GUJARAT UNIVERSITY,
SURAT-7**

**Syllabus
of
F.Y. B.Sc. Medical Technology
(As per CBCS)
Effective from June - 2014**

F.Y. B.Sc. Semester – I

MT 01: Fundamentals of Medical Technology

Unit 1: Clinical Specimen: Collection, Processing ,Handling & transportation

- 1.1 Blood
- 1.2 Urine
- 1.3 Body Fluids – CSF, Pleural fluid, Synovial fluid, Peritoneal fluid & Pericardial fluid
- 1.4 Sputum
- 1.5 Throat & Mouth Specimen
- 1.6 Pus , Ulcer & Skin Specimen
- 1.7 Stool

Unit 2 : Laboratory Solutions and glasswares

- 2.1 Types of solutions
- 2.2 Preparations of solutions
- 2.3 Handling & Storage of solutions
- 2.4 Preservation of stock
- 2.5 Types of glasswares
- 2.6 Cleaning and calibration of glasswares
- 2.7 Maintenance & Record Keeping

Unit 3 : Quality Control in Clinical Laboratory

- 3.1 Common Terms used in Quality Control
- 3.2 Preanalytical, Analytical
- 3.3 Post Analytical Factors
- 3.4 Preparation of Quality Control Charts

Unit 4 : Statistics in Clinical Laboratory

- 4.1 Basics Terminologies (Biostatistics, Efficiency, Unit, Mean, Median, Mode, SD, CV, alpha error, beta error)
- 4.2 Standard deviation and Coefficient of Variation
- 4.3 Types of errors
 - 4.3.1 Standard errors of Mean
 - 4.3.2 Analytical errors
- 4.4 Method Selection using Statistical Equations

References :

- 1) Kanai L. Mukherjee, *Medical Laboratory Technology-A Procedure Manual for Routine Diagnostic Tests* ,Volume-1 ,Tata McGraw-Hill Pub Publishing Company Ltd.
- 2) A.Kolhatkar , J Ochei , *Medical Laboratory Science- Theory and Practice* ,Tata McGraw-Hill Pub
- 3) P. B. Godkar , D.P. Godkar, *Textbook of Medical Laboratory Technology*,2nd Edition, Bhalani Pub.
- 4) Monica cheesbrough, *District Laboratory Practice in Tropical Countries* ,Part 1, Cambridge Editions.

MT 02 : Basic laboratory Instruments and Equipments

Unit 1: Microscope

- 1.1 Introduction & terminologies
- 1.2 Components of microscope
- 1.3 Operation , Working Principle & Trouble shooting of microscope
- 1.4 Use , care & maintenance
- 1.5 Defects in lens system

Unit 2: Colorimeter & pH meter

- 2.1 Introduction : similarity and difference
- 2.2 Components & Basic Principle
- 2.3 Handling & maintenance
- 2.4 Calibration of instrument

Unit 3: Centrifuge

- 3.1 Introduction
- 3.2 Principle and Basic components
- 3.2 Operation, Care & maintenance
- 3.4 Calibration & Selection of centrifuge
- 3.5 Types of centrifuge

Unit 4: Other Laboratory Equipments

- 4.2 Laboratory Balance
- 4.3 Water Bath
- 4.4 Water Distillation

References :

- 1) Kanai L. Mukherjee, Medical *Laboratory Technology-A Procedure Manual for Routine Diagnostic Tests* ,Volume-1 ,Tata McGraw-Hill Pub Publishing Company Ltd.
- 2) A.Kolhatkar , J Ochei , *Medical Laboratory Science- Theory and Practice* ,Tata McGraw-Hill Pub
- 3) P. B. Godkar , D.P. Godkar, *Textbook of Medical Laboratory Technology*,2nd Edition, Bhalani Pub.
- 4) Monica cheesbrough, *District Laboratory Practice in Tropical Countries* ,Part 1, Cambridge Editions.

Practicals of Sem 1 – Medical Technology.

- 1) Collection ,Handling and Transport, Processing of different Specimen.
- 2) Study of Laboratory glassware & its calibration
- 3) Study of Laboratory reagents & its standardization
- 4) Study of Laboratory Instruments & equipments.
- 5) Study of First aid measures in Laboratory Hazards.
- 6) Sterilization by Autoclave & Hot air oven.
- 7) Measurement & Adjustment of pH.
- 8) Study of bacteria under light microscope
- 9) Study of bacteria by dark field microscopy.
- 10) Preparation of Molar Solutions (1 M HCl, 1 M H₂SO₄, 1 M NaOH, 1 M Na₂CO₃).
- 11) Preparation of Normal solutions
- 12) Preparation of percent solutions

References :

- 1) Kanai L. Mukherjee, *Medical Laboratory Technology-A Procedure Manual for Routine Diagnostic Tests* ,Volume-1 ,Tata McGraw-Hill Pub Publishing Company Ltd.
- 2) A.Kolhatkar , J Ochei , *Medical Laboratory Science- Theory and Practice* ,Tata McGraw-Hill Pub
- 3) P. B. Godkar , D.P. Godkar, *Textbook of Medical Laboratory Technology*,2nd Edition, Bhalani Pub.
- 4) Monica cheesbrough, *District Laboratory Practice in Tropical Countries* ,Part 1, Cambridge Editions.
- 5) Patel, R.J., and Patel,R.K.,(2000).*Experimental Microbiology, Volume 1&2*,Aditya Pub.

F.Y. B.Sc. Semester – II

MT 03 : Laboratory organization and techniques

Unit 1 : Organization of Clinical Laboratory

- 1.1 Introduction
- 1.2 Functional Components of Clinical Laboratories
- 1.3 Clinical Laboratory Set up
 - 1.3.1 Laboratory building and space
 - 1.3.2 Physical aspects of laboratory
- 1.4 Universal work precautions (UWP) for lab personnel (HIV)
- 1.5 Medico-legal aspects of clinical practice

Unit 2 : Laboratory Safety

- 2.1 Common causes of Laboratory Hazards
- 2.2 Types of laboratory hazards
- 2.3 Biomedical Waste –Classification , treatment & disposal
- 2.4 Biosafety Levels

Unit 3 : Sterilization techniques

- 3.1 Sterilization by heat (Hot air oven, Autoclave)
- 3.2 Sterilization by filtration (Membrane filter & HEPA)
- 3.3 Sterilization by radiation (Ionizing and Non- ionizing)
- 3.4 Sterilization by chemicals (Alcohol, Phenols, Aldehydes, Ethylene oxide)

Unit 4 : Disinfection

- 4.1 Ideal characteristic of ideal disinfectant
- 4.2 Mode of action
- 4.3 Selection of antimicrobial chemical agent
- 4.4 Evaluation of antimicrobial potency
 - 4.4.1 Tube- dilution technique
 - 4.4.2 Phenol-coefficient technique
 - 4.4.3 Agar plate technique

References :

- 1) Kanai L. Mukherjee, *Medical Laboratory Technology-A Procedure Manual for Routine Diagnostic Tests* ,Volume-1 ,Tata McGraw-Hill Pub Publishing Company Ltd.
- 2) A.Kolhatkar , J Ochei , *Medical Laboratory Science- Theory and Practice* ,Tata McGraw-Hill Pub
- 3) P. B. Godkar , D.P. Godkar, *Textbook of Medical Laboratory Technology*,2nd Edition, Bhalani Pub.
- 4) Monica cheesbrough, *District Laboratory Practice in Tropical Countries* ,Part 1, Cambridge Editions.
- 5) Ramnik Sood, *Medical laboratory technology, Methods and Interpretation* , Sixth edition, Jaypee publishers.

MT 04 : Introduction to microbial diversity

Unit 1 : Human and Microbial world

- 1.1 Origin of Microorganisms
- 1.2 Medical Microbiology and its development
- 1.3 Microbial World and its Classification

Unit 2 : Classification and Identification of Prokaryotes

- 2.1 Taxonomic Hierarchy
- 2.2 Phenotypic Characteristics of microorganisms
 - 2.2.1 Morphological features of microorganisms
 - 2.2.2 Physiological & Metabolic Characteristics of microorganisms
- 2.3 Genotypic Characteristics of microorganisms

Unit 3 : Eukaryotic microbes

- 3.1 Structure of Eukaryotic cell.
- 3.1 Fungi – Morphology and characteristics, Reproduction & Clinical Significance
- 3.2 Protozoa- Morphology and characteristics, Reproduction & Clinical Significance

Unit 4 : Atypical bacteria- Introduction, Morphology, Metabolism & cultivation, Pathogenic significance

- 4.1 Rickettsia
- 4.2 Chlamydia
- 4.3 Mycoplasma
- 4.4 Actinomycetes

References :

- 1) A.Kolhatkar , J Ochei , *Medical Laboratory Science- Theory and Practice* ,Tata McGraw-Hill Pub
- 2) Michael J. Pelczar, JR. E.C.S.Chan, Noel R. Krieg; *Microbiology*; Tata Mcgraw- Hill Edition Wiley, J., & Sherwood, L. (2007). *Prescott, Harley, and Klein's Microbiology*, 7 Ed., McGraw-Hill Pub.
- 3) Dr.H.A.Modi, *Elementary Microbiology, Fundamentals of Microbiology ,Volume-1*, Akta Prakashan , Nadiad.
- 4) Dr.H.A.Modi, *Elementary Microbiology, An Introduction to Microbiology ,Volume-2*, Akta Prakashan , Nadiad.

Practicals of Semester -2 Medical Technology

1. Study of Laboratory Organization
2. Preparation of Bacteriological media.
3. Preparation of Fungal media.
4. Study of Morphological Characteristics of Microorganisms: Size, shape, arrangement
5. Cultivation on slant, stab, plate and broth culture.
6. Observation of motility on semisolid and liquid media.
7. Diagnosis of Tuberculosis from sputum by Acid fast staining technique
8. Detection of Spirochaetes from dental caries by spirochaete staining technique
9. Detection of *Corynebacterium diphtheriae* by metachromatic granule staining technique
10. Detection of *Bacillus anthracis* by spore staining technique
11. Detection of *Streptococcus pneumoniae* by capsule staining technique.
12. Study of Fungi- *Aspergillus*, *Fusarium* & *Candida*
13. Cultivation of bacteriophages
14. Observation of clinical important protozoan

References :

- 1) Kanai L. Mukherjee, *Medical Laboratory Technology-A Procedure Manual for Routine Diagnostic Tests*, Volume-1, Tata McGraw-Hill Pub Publishing Company Ltd.
- 2) A.Kolhatkar, J Ochei, *Medical Laboratory Science- Theory and Practice*, Tata McGraw-Hill Pub
- 3) P. B. Godkar, D.P. Godkar, *Textbook of Medical Laboratory Technology*, 2nd Edition, Bhalani Pub.
- 4) Monica cheesbrough, *District Laboratory Practice in Tropical Countries*, Part 1, Cambridge Editions.
- 5) Patel R.J. and Patel R.K. ,(2000) *Experimental Microbiology, Volume-1 & 2*, Aditiya.

