

MT – 11 Medical Microbiology- 1

Unit 1 Human-microbe interactions

- 1.1 Microorganisms and human body: Normal micro biota
- 1.2 Infection and disease: Koch's Postulates, virulence factors,
- 1.3 Establishment of Infection or disease.
- 1.4 Epidemiology : Terminologies and Tools
- 1.5 Epidemiological analysis of diseases.
- 1.6 Nosocomial infections : Source, Surveillance, Prevention, Control
- 1.7 Emerging and Reemerging diseases.

Unit 2 Antimicrobial chemotherapy

- 2.1 Development of chemotherapy
- 2.2 Characteristic of antimicrobial agents
- 2.3 Mechanism of action of antimicrobial agents
- 2.4 Drug resistance
- 2.5 Antifungal, Antiviral and Antiparasitic drugs
- 2.6 Antibiotic sensitivity tests
- 2.7 Non- Therapeutic use of antimicrobial agent

Unit 3 Diseases of respiratory tract

- 3.1 Pharyngitis and tonsillitis
- 3.2 Diphtheria
- 3.3 Pertussis
- 3.4 Tuberculosis
- 3.5 Pneumonia
- 3.6 Q fever
- 3.7 Common cold
- 3.8 Influenza

Unit 4 Diseases of Gastrointestinal Tract

- 4.1 Bacterial food poisoning
- 4.2 Enteric fever - Typhoid and paratyphoid
- 4.3 Bacillary and Amoebic dysentery
- 4.4 Cholera
- 4.5 Traveler's diarrhoea
- 4.6 Pseudomembranous colitis
- 4.7 Helicobacter infection
- 4.8 Hepatitis

References :

- ❖ Collee, J.G., Fraser, A.G., Marmion, B.P. and Simmins, A. 1996, Mackie & McCartney *Practical Medical Microbiology*, 14 ed. Churchill Livingstone
- ❖ Greenwood, D., Slack R., Peutherer, J. 1998, *Medical Microbiology; A guide to Microbial Infections: Pathogenesis, Immunity, Laboratory Diagnosis and Control*, 15ed. ELST with Churchill Livingstone.
- ❖ Pelczar, Chan, R., *Microbiology*, 4th ed., Tata McGraw Hill Publishing Co. Ltd.
- ❖ Murray, Baron, Pfaller, Tenover, Tenover, Tenover, Yolken, *Manual of Clinical Microbiology*, 6th ed., American Society for Microbiology.
- ❖ Konemam E. W., *Color Atlas and Textbook of Diagnostic Microbiology*, 5th ed., Lippincott.

MT-12 CLINICAL PATHOLOGY

UNIT : 1 Urine Analysis

- 1.1 Formation, Composition, Collection & Preservation of Urine
- 1.1 Routine Urine Analysis
- 1.2 Automated Urine Analysis & Reagent Strip Method
- 1.3 Stone analysis, Pregnancy Test & Special Urine testing procedures
- 1.4 Screening test for inherited metabolic diseases & other tests

UNIT : 2 Examination of Faeces

- 2.1 Collection, Preservation of Specimen
- 2.2 Indication of Stool analysis
- 2.3 Routine Physical, Chemical & microscopic examination
- 2.4 Concentration Techniques

UNIT : 3 Semen Analysis

- 3.1 Formation, Composition, Collection & indications of Semen specimen
- 3.2 Routine Physical, Chemical & Microscopic Examination
- 3.3 Sperm Function Tests
- 3.4 Automated Semen Analysis
- 3.5 Sperm Banking

UNIT : 4 Body Fluids

- 4.1 Cerebrospinal Fluid: Indication, Formation, Collection

technique, Composition, Physical, Chemical, Microscopic & microbiological examination, Clinical Findings in various diseases.

- 4.2 Synovial Fluid: Indication, Formation, Collection, Physical, Chemical, Microscopic examination, Clinical finding in various diseases .
- 4.3 Pleural, Peritoneal (Ascitic) & Pericardial Fluid : Indications, Collection, Physical, Chemical, Microscopic examination with Immunologic & microbiological tests, transudate & exudates.
- 4.4 Gastric analysis: Indications, Collection, Composition, Physical, Chemical & microscopic examination
- 4.5 Sputum analysis: Collection, Indication, Routine Sputum analysis & clinical Significance.

References :

- ❖ John Bernard Henry , Clinical Diagnosis and Management by Lab. Methods, 20th Ed., W.B. Saunders Co.
- ❖ P.B. Godkar, Textbook of Medical Laboratory Technology Bhalani Publishers, Mumbai, (Latest Edition).
- ❖ Ramnik Sood , Medical Laboratory Technology, Jaypee Brothers, Latest

MT- 13 Clinical Biochemistry and Enzymology

Unit 1 INVESTIGATION OF DISORDERS OF CARBOHYDRATE METABOLISM.

- 1.1 Metabolism of glucose.
- 1.2 Regulation of blood glucose.
- 1.3 Blood sugar level and clinical significance
- 1.4 Types of diabetes
- 1.5 Diabetes mellitus
- 1.6 Glycosuria
- 1.7 GTT & Glycosylated Haemoglobin.

Unit 2 PLASMA LIPIDS AND LIPOPROTEINS

- 2.1 Types of lipids present in plasma
- 2.2 Oxidation of FA and cholesterol metabolism.
- 2.3 Factors influencing cholesterol level in blood

- 2.4 Pathological variations of serum cholesterol
- 2.5 Lipoproteins : Classification and estimation methods
- 2.6 Lipoprotein metabolism
- 2.7 Clinical disorders of Lipoprotein metabolism
- 2.8 Atherosclerosis

Unit 3 PROTEINS IN HEALTH AND DISEASE

- 3.1 Plasma proteins : Different types of plasma proteins, Separation and Estimation
- 3.2 Characteristics of Plasma proteins.
- 3.3 Other proteins of clinical significance
- 3.4 Functions of plasmaproteins
- 3.5 Significance of A/G ratio
- 3.6 Electrophoretic pattern of protein fractions in health and disease.
- 3.7 Genetic deficiencies of Plasma Proteins.

Unit 4 PLASMA ENZYMES AND DIAGNOSTIC UTILITY

- 4.1 An introduction to clinical enzymology
- 4.2 Serum enzymes in - Heart disease, Liver disease, GI tract disease, Muscle and bone disease, malignancies.
- 4.3 Isoenzymes : Separation methods and diagnostic importance

References :

- ❖ Alex Kaplan, Lavernfl Szabo, Lee & Febiger Clinical Chemistry Interpretation and Results.
- ❖ S. Ramkrishnan, K.G. Prasannan & S. Rajan, Textbook of Medical Biochemistry, 1ed, Orient Longman.
- ❖ K.L.Mukherjee, 1997, Medical Laboratory Technology, Vol.I,II & III, Tata McGrawHill.
- ❖ Ramnik Sood , Medical Laboratory Technology (Methods & Interpretation), 5ed, Jaypee Brother.
- ❖ Harold Varley, 1990, Practical Clinical Biochemistry ,Indian Edition, Anold Heinemann.
- ❖ Tietz ,Textbook of Clinical Chemistry, 3e, Bartis & Ashwood, W.B. Saunders Co.
- ❖ N.W. Tietz , Fundamental of Clinical Chemistry, 4ed. W.B. Saunders Co.
- ❖ Clinical Chemistry, 3e, Kaplan & Psce, The C.V. Mosbey Co.
- ❖ Keith Wilson & John Walker, Practical Biochemistry: Principles & Technique, 5ed, Cambridge University Press.

MT- 14 Haematology

Unit- 1 Haemoglobin

- 1.1 Types of Blood collection and storage.
- 1.2 Structure of Haemoglobin Molecule
- 1.3 Types and derivatives of Haemoglobin
- 1.4 Estimation of Haemoglobin
- 1.5 Abnormalities of Haemoglobin Molecule

Unit-2 Red Blood Cells, White Blood Cells and Platelets

- 2.1 Normal Erythropoiesis
- 2.2 Total R.B.C. counting
- 2.3 Morphological abnormalities of R.B.C. & its significance
- 2.4 Normal Leucopoiesis
- 2.5 Normal W.B.C. count
- 2.6 Morphological abnormalities of W.B.C & its significance
- 2.7 Normal Platelet count and methods
- 2.8 Formation and functions of Platelets

Unit-3 Peripheral Smear Study

- 3.1 Preparation of Peripheral Smear
- 3.2 Staining techniques of Peripheral Smear
- 3.3 Examination of Peripheral smear
- 3.4 Normal and Abnormal Differential Count
- 3.5 Causes of Leucocytosis and Leucopenia.

Unit-4 Anaemias and Leukaemias

- 4.1 Definition and Classification of Anaemias
- 4.2 E.S.R and Blood Indices
- 4.3 Iron deficiency and vitamin-B12 deficiency Anaemias
- 4.4 Sickle Cell Anaemia and Thalassemias
- 4.5 G6PD deficiency Anaemia
- 4.6 Definition and Classification of Leukaemias
- 4.7 Cytochemical reactions in diagnosis of different types of Leukaemias

References :

- ❖ Hoffman , 1995, Haematology, 2nd ed, NMS Hematology US Edition.
- ❖ C.M. Zmijewski, Immunohaematology, Printece Hall of India.
- ❖ Haematologicals Laboratory Methods, Edited by E. Merk.
- ❖ M.M. Wintrobe, Clinical Haematology, Kothari's Indian Edition.
- ❖ J. A. Dacie & S. M. Lewis ,Practical Haematology, The English Language book Society, 8 ed, ELBS.
- ❖ Bharucha, Meyerm Moody, Carman, Vellore., Hand Book of Medical Laboratory Technology

MT 15 Clinical Laboratory Instrumentation

Unit 1 Microscopy

- 1.1 Introduction , types, defects in lens system, use and care.
- 1.2 Dark field microscopy
- 1.3 Phase contrast microscopy
- 1.4 Fluorescence microscopy
- 1.5 Electron microscopy- SEM & TEM
- 1.6 Confocal microscopy

Unit 2 Photometric instruments

- 2.1 Introduction : Beers – Lamberts law
- 2.2 Colorimeter : Types, Principle, basic components and their functions, operation, uses, blank Setting
- 2.3 Spectrophotometer : Types, Principle, basic components and their functions, operation, uses, blank setting

Unit 3 Chromatography

- 3.1 Introduction and types
- 3.2 Paper chromatography
- 3.3 Ion exchange chromatography
- 3.4 TLC, GLC, HPLC

Unit 4 Electrophoresis

- 4.1 Introduction,classification,principle and components
- 4.2 Supporting medium : Agarose gel, polyacrylamide
- 4.3 Electrophoretic techniques : SDS PAGE, Native PAGE, 2 D Gel electrophoresis, IEF, Gradient gel and Agarose gel electrophoresis.

References :

- ❖ S. Koog, Holler & Nieman, Principles of Instrumental Analysis , 5th edition, Saunders College Pub.
- ❖ P. Ashokan , Analytical Biochemistry : (Biochemical Technique), Chinnama Pub., Nelvisharani, Vellor.
- ❖ B.K.Sharma, 1997-98. Instrumental Methods of Chemical Analysis (Analytical Chemistry), Goel Publishing House .
- ❖ Chetwal & Anand, Instrumental Methods of Chemical Analysis, Himalaya Publishing House.

MT- 16 Laboratory management

Unit 1 Laboratory management

- 1.1 Introduction
- 1.2 Theories of Management
- 1.3 Functions of manager
- 1.4 Personnel management in clinical Laboratory
- 1.5 Financial management in clinical Laboratory
- 1.6 Material management in clinical laboratory

Unit 2 Laboratory organization

- 2.1 General principles
- 2.2 Staffing, job description and job specification
- 2.3 Personnel records
- 2.4 Use of computer in Clinical laboratory

Unit 3 Laboratory planning

- 3.1 General principles of planning
- 3.2 Laboratory goals
- 3.3 Common area, design aspect and space requirements.

Unit 4 Laboratory Quality Assurance

- 4.1 Quality control and Regualtions in individual laboratories
- 4.2 Laboratory safety and Medicolegal concerns.
- 4.3 Collection,Storage and transportation of Specimens
- 4.4 Analyzing and Reporting of data
- 4.5 Responsibility and morality while reporting results
- 4.6 Accrediting agencies of Clinical laboratory.

References :

- ❖ Murray, Baron, Pfaller, Tenover, Tenover, Manual of Clinical Microbiology, 6th ed. ., American Society for Microbiology.
- ❖ Konemam E. W, *Color Atlas and Textbook of Diagnostic Microbiology*, 5th ed., Lippincott John Bernard Henry, Clinical Diagnosis and Management by Lab. Methods, 20th Ed., W.B. Saunders Co.
- ❖ P.B. Godkar, Textbook of Medical Laboratory Technology Bhalani Publishers, Mumbai, (Latest Edition) .
K.L. Mukherjee, Medical laboratory Technology, Vol.I,II & III, Tata McaGraw Hill, Latest Edition.

SEMESTER – 5

Medical Technology Practicals

1. Collection, handling and transport of clinical specimens for bacteriological analysis.
2. Diagnostic problems
3. Rapid identification of enteric pathogens by API 20E system (Demonstration)
4. Antimicrobial susceptibility test and determination of MIC.
5. Urine analysis – Physical, Chemical, Microscopic
6. Stool analysis - Physical, Chemical, Microscopic, Microbiologic & Concentration Technique
7. CSF analysis – Physical, Chemical, Microscopic, Microbiologic
8. Sputum analysis – Physical Microscopic & Microbiologic – AFB – Direct Concentration Technique.
9. Semen analysis – Physical, Chemical, Microscopic.
10. Body fluid – Pleural, Peritoneal, synovial – Physical, Chemical, Microscopic.

11. Qualitative analysis of biochemicals of body fluids
12. Estimation of blood sugar; Chemical methods and Enzymatic methods. Glucose Tolerance Test. Serum Urea and Blood Urea Nitrogen (BUN) ; Chemical Methods and Enzymatic methods, Serum Creatinine and urinary creatinine; Jaffe's method and Modified Jaffe's method ,Serum Uric acid; Chemical Methods and Enzymatic methods
13. Serum Cholesterol and HDL Cholesterol; Chemical methods and Enzymatic methods
14. Serum Triacylglycerols (TG); Chemical methods and Enzymatic methods
15. Serum Lipoproteins & proteins; Chemical methods
16. Serum Total Proteins - Biuret method
17. Serum Albumin - Bromocresol green method
18. Serum Calcium - Chemical methods
19. Serum Phosphorus
20. Serum Iron and TIBC (Total Iron Binding Capacity)
21. Serum Sodium, Potassium and Chloride; Chemical methods, Using Flame Photometer
22. Serum Bicarbonate; Chemical method
23. Serum Total Bilirubin and Direct bilirubin; Malloy and Evelyn method
24. Serum Enzymes: Alanine transaminase, Aspartate transaminase, Alkaline Phosphatase, Acid Phosphatase, Amylase, Lactate Dehydrogenase and its isoenzymes; Chemical and Kinetic methods
25. Screening tests using various strips (Demonstration)
26. Blood gas analyzer and analysis of urinary and bile stones (Demonstration)
27. Anticoagulant preparation in haematology laboratory.
28. Methods of blood collection
29. Haemoglobin estimation by Sahil's and by Cyanmethaemoglobin method
30. Complete blood cell count
31. Peripheral smear study
32. E.S.R. and packed cell volume
33. Sickling test
34. Reticulocyte count
35. Absolute eosinophil count

36. G6PD deficiency test
37. Test for bleeding and clotting time
38. Test for Prothrombin Time

References :

- ❖ Ranjan Chawla, Practical Clinical Biochemistry: Methods and Interpretation, 2e, Jaypee Brothers.
- ❖ Chitra Bharucha, Carmann, Mody 1987, Handbook of Medical Laboratory Technology, A.H. Press, Vellore.
- ❖ Dacie & Lewis, Practical Haematology, 8e The English Language Book Society,
 - ELBS
- ❖ Chakraborty & Bhattacharya, Handbook of Clinical Pathology, Academic Publisher.
- ❖ WHO, 1991 , Basic Laboratory Methods in Medical Parasitology.
- ❖ Dacie & S.M. Lewis , Practical Haematology, J. A., The English Language Book Society, 8th ed., ELBS.
- ❖ Ramphael , Lynch's Medical laboratory Technology, 3e, W.B. Saunders Co.
- ❖ J Ochei & A. Kolhatkar, Medical Laboratory Science: Theory & Practice, Tata McGraw Hill Pub.