



**BSS DIPLOMA IN COMPUTER APPLICATION AND
MEDICAL LABORATORY TECHNOLOGY ASSISTANT**





**BSS DIPLOMA IN COMPUTER APPLICATION
AND MEDICAL LABORATORY TECHNOLOGY ASSISTANT
ONE YEAR**

PAPER I	FUNDAMENTALS OF COMPUTER AND OPERATING SYSTEM
PAPER II	PC SOFTWARE PACKAGES (MS WORD, EXCEL & POWER POINT)
PAPER III	INTERNET AND WEB TECHNOLOGY USING PHOTOSHOP AND HTML
PAPER IV	PROGRAMMING IN C AND WEB PROGRAMMING USING PHP AND MYSQL
PAPER V	COMMUNICATIVE ENGLISH
PAPER VI	ANATOMY & PHYSIOLOGY
PAPER VII	CLINICAL BIOCHEMISTRY & CLINICAL PATHOLOGY
PAPER VIII	CLINICAL MICROBIOLOGY & PARASITOLOGY
PAPER IX	HAEMATOLOGY, BLOOD BANKING & HISTO PATHOLOGY



PAPER-I

FUNDAMENTALS OF COMPUTER AND OPERATING SYSTEM

1. INTRODUCTION
Computer, Hardware, Software, System software, Application software.
2. PROGRAMMING LANGUAGES
Brief description about programming languages: What is computer language, Its use.
3. ORGANISATION OF A DIGITAL COMPUTER
Input unit, Output unit, Central Processing unit, Memory
5. OPERATING SYSTEM
Introduction, Basics of MS Windows

PAPER-II

PC SOFTWARE PACKAGES (WORD, EXCEL, POWERPOINT)

UNIT-I : MS-Word: - (18 Hrs)

Introduction to Word Processing, Introduction to MS-Word: Creating, Saving, and Opening document in word, Toolbars, Rulers, Menus, keyboard shortcuts. Editing a Document- Moving, scrolling in a document, opening multi document windows, editing text – selecting, inserting, copying, deleting, moving text etc. Previewing documents, printing documents. Formatting Documents: Paragraph formats, aligning text and paragraph, Borders & Shading, header & Footer, Bullets,



numbering. Find & Replace, Inserting – Page Numbers, pictures, Symbols etc. Creation & working with tables.

UNIT-II: MS-Excel (12 Hrs)

Worksheet basics, creating worksheet, entering data into worksheet. Saving & quitting from worksheet. Opening & Moving around in an existing worksheet. Toolbars and Menus, keyboard shortcuts. Basic formulas - Auto sum, Average etc. Changing – alignment, Character Styles, Column width, date format, borders & colors, currency sign. Previewing & printing worksheet – page setting, print titles, adjustment Margins, page break, headers and footers.

UNIT – III: MS-PowerPoint (6 Hrs)

Creating a New Presentation, Working with Presentation, Slides & its different views, Inserting, Deleting and copying of slides, Adding Graphics, Working with PowerPoint designing & presentation of a slide show.

PAPER-III

INTERNET AND WEB TECHNOLOGY USING PHOTOSHOP AND HTML

- Introduction to Internet, Browsers. E-mail.
- What is Photoshop, The Photoshop Workspace, The Menu Bar, The Drawing Canvas, The Tool Box, The Palettes, Drawing Things on the Canvas, Choosing a Color, Defining the Brush, The Pencil Tool, The Line Tool, The Text Tool, The Paint Bucket Tool, The Gradient Tool, Modifying Things on



the Canvas, The Eraser Tool, The Eye Dropper Tool, The Marquee Tool, The Lasso Tool, The Magic Wand Tool, The Move Tool, The Crop Tool, Layers.

- Introduction of different Web Technology: Introduction, HTML Elements, HTML Attributes, HTML Headings, HTML Paragraphs, HTML Formatting, HTML Fonts, HTML Styles, HTML Links, HTML Images, HTML Lists, HTML Colors.

PAPER- IV

PROGRAMMING IN C AND WEB PROGRAMMING USING PHP

Introduction to Programming

Introduction to C Language: The C character set, identifiers and keywords, data types, variable naming rules, Declaration variables

Operators and expressions: Arithmetic operators, unary operator, relational and logical operator, assignment operators, the conditional operator.

Data input and output: Single character input, single character output, scanf, printf, puts gets functions

Control statement: Branching: if else statement, Loops: for loop (printing numbers from 1 to 10).

PHP Basics- Syntax, Operators, Variables, strings in PHP, String handling functions, Date function.

Control Structures and Arrays: if statement, if else statement. Loops: for loop



PAPER -V

COMMUNICATIVE ENGLISH

Unit : I

- What is Grammar?
- The Capital Letter
- Nouns: Common Nouns, Proper Nouns, Singular Nouns, Plural Nouns, Collective Nouns, Masculine and Feminine Nouns.
- Pronouns: Personal Pronouns, Reflexive Pronouns, Interrogative Pronouns, Demonstrative Pronouns
- Adjectives: Adjective Endings, Kinds of Adjectives, Comparison of Adjectives
- Determiners: The Articles, Demonstrative Determiners, Interrogative Determiners, Possessive Determiners.
- Verbs and Tenses: The Simple Present Tense, Am, Is and Are, The Present Progressive Tense, Have and Has, The Present Perfect Tense, The Simple Past Tense, Regular and Irregular Verbs, Was and Were, The Past Progressive Tense,
- The Future Tense, Can and Could, May and Might, Do, Does and Did, Would and Should
- Subject-Verb Agreement
- Adverbs
- Prepositions
- Conjunctions
- Interjections



- Sentences: What is a Sentence?, Kinds of Sentences, The Imperative, The Subject and the Object, Direct and Indirect Objects, Positive and Negative Sentences, Questions
- Punctuation: Period, Comma, Exclamation Point, Question Mark, Apostrophe

Unit : II

- Classified Vocabulary
- Disease & Body condition, building & parts-tools-welfare-household
- Articles, Ornaments jewels customs, eatables flowers, fruits vegetables.

Unit – III

- Cloze Passage – Hints Development
- Phonetic Symbols

Unit - IV

- Etiquettes & Manners
- Letter writing formal & Informal letter

Unit – V

- Bio-data, Cover letter, CV, Resume
- Group Discussion
- Application for job, job description
- Letter of application & Resignation



PAPER VI

ANATOMY & PHYSIOLOGY

Introduction to anatomy

Scope of Anatomy and Physiology - Definitions and Terminology and Physiology- Structure and function of human cell - Elementary tissues of human body- Brief account on Composition of Blood - functions of blood elements - Blood Group and coagulation of blood.

Body defense Mechanism: innate immunity, Acquired immunity

Body as a whole: Skull, Thorax, Abdomen

Cardio Vascular System

Structure and functions of the heart, arterial and venous system, brief account on common cardiovascular disorders

Respiratory System

Parts of respiratory system and their functions, Physiology of Respiration

Digestive System

names and various parts of digestive system-Liver, Gall Bladder, Pancreas, Buccal Cavity, Pharynx, Oesophagus, Stomach, intestine etc.-physiology of digestion and absorption

Urinary System

parts of urinary system and its function-structure and function of kidneys-physiology of urine formation - pathophysiology of renal system and edema

Reproductive System

physiology and anatomy of Male & Female reproductive system-Prostate & Uterus & Ovaries etc



Musculoskeletal System

Classification of bones & joints, structure of skeleton –structure of skeletal muscle, smooth muscle and cardiac muscle – physiology of muscle contraction

Nervous System

various parts of nervous system- Brain and its parts –functions of nervous system - Spinal Cord & Nerves

Ear, Nose, Throat and Eye

Elementary knowledge of structure and functions of organs of taste, smell, hearing, vision

Endocrine System

Endocrine glands, their hormones and functions-Thyroid, Parathyroid, Suprarenal, pituitary and Thymus

Haemopoietic and Lymphatic System

lymph glands & lymph vessels & lymph gland locations

The Skin

Structure and functions of skin

Surface Anatomy & Surface Markings of Human Body

Ageing: Changes in system due to ageing, Resistance to infection



PAPER VII

CLINICAL BIO CHEMISTRY & CLINICAL PATHOLOGY

I. BASIC CHEMISTRY

- | | |
|-----------------------|----------------------------|
| 1. Introduction | 12. valency |
| 2. Substance | 13. symbol |
| 3. Matter | 14. formula |
| 4. Atom | 15. Equation |
| 5. Element | 16. Balencing the equation |
| 6. Molecule | 17. Radicles |
| 7. Compound | 18. Acid, base and salts |
| 8. Mixture | 19. Ionisation |
| 9. Atomic Weight | 20. Indicator |
| 10. Molcular Weight | 21. Titration |
| 11. Equivalent weight | 22. Quality control |

Specimen Collection: Types of Specimens, Method of specimen collection (Blood, serum, Urine and others), Pre-analytical & analytical variables, Collection, Separation, preservation and transport of the biological specimens, anticoagulants.

Laboratory hazards, Laboratory safety procedures, Laboratory waste disposal.

Clinical laboratory instrumentation

Organization of the clinical laboratory: Functional components of clinical laboratory, Medical Ethics of laboratory Technician, Basic need of a clinical laboratory



Safety Regulations First Aid and Clinical Records

Basic causes of Accidents

Common types of Laboratory accidents: Physical Injury, Electric shock, Exposure of dangerous chemicals, Poisoning with strong acids and alkali, Eye accident, Skin puncture by broken glass

Safety requirements of the laboratory

First aid in laboratory accidents

Clinical laboratory Records: Requisition and reporting of results, Laboratory register, Record book in each section, Stock Register management.

Personal care: General Health care, Care in the laboratory, Protective inoculations

Introduction to laboratory Equipments and Basic operation:

- a) Identification and use of common laboratory glassware
- b) Care and cleaning of glassware and Equipment
- c) Basic Principles and operations of Following Instruments

- 1-Microscope
- 2- Centrifuge
- 3- Hot Air Oven
- 4- Autoclave
- 5- Colorimeter
- 6- Urinometer
- 7- Incubator
- 8- Microtome
- 9- Histokinette
- 10- Cryostat
- 11- Koch's steamer
- 12- Water bath
- 13- Spectrometer



- 14- VDRL Rotator
- 15- Auto analyser semi & Full
- 16. Sterilizer
- 17. Refrigerator
- 18- Heamoglobinometer
- 19- Thermometer
- 20-Heamocytometer
- 21- Common balance
- 22- Cell Counter
- 23-Micropipette
- 24-Glucometer
- 25-Needle burner

Sterilization Process:

- | | |
|--------------------|--|
| Physical methods | - Dryheat , Moist heat, Flaming, Autoclaving |
| Chemical Methods | - Phynol, Formal dehyde |
| Mechanical methods | - filtration |

Units and measurements

1. Weight 2- Volume 3- Length

Reagent Solution

- 1. Stock reagent Solution
- 2. working reagent solution
- 3. saturated Solution
- 4. w/v Solution
- 5. v/v Solution
- 6. Molar Solution
- 7. Normal Solution
- 8. Percent Solution
- 9. Part dilution



Preparation of the Following reagents

1. IN HCL
2. 0.1 HCL from IN HCL
3. IN NaoH
4. 3.8% sodium citrate
5. IN Na₂CO₃
6. 70% alcohol from 95 % alcohol

Temperature-Units and conversation

II.CLINICAL PATHOLOGY

Introduction

Reception of patients, noting carefully the test advised, phlebotomy and aftercare of patients.

The Microscope – different types, parts of microscope, cleaning & care.

Examination of Urine – Formation of urine Physical examination – Colour, transparency, pH and Sp gravity. Chemical examination - Protein, Sugar, Ketone bodies, Bile pigment/salt, Chyle, Blood-Benzidine Test. Microscopical examination –

Cells (RBC, WBC, Epith), casts, crystals, Detection of microalbumin& 24 hours urine protein estimation.

Random urine collection, 24 hrs urine collection and its preservatives

HCG In urine

Sputum collection and examination

Pus, Throat swab collection and examination



Semen: Examinations of Semen – Physical Characters, sperm Count, Motility, Viability and Morphology sperm other tells in semen.

Body Fluids: Examination of Body Fluids – CSF, Pleural, Peritoneal & pericardial fluid, Bronchoalveolar lavage fluid, Hydatid Cyst Fluid and joint Fluid

Transportation of Different Clinical Materials to distant laboratories

VIII. BIOCHEMISTRY

A- 1. Introduction

- a. Basic physiology and Biochemistry of the body
- b. 1-Hormones, 2- Enzymes, 3- Synthesis, 4- Lipids, 5-ATP 6-Anabolism 7- Catabolism
- c. 1- Carbohydrate Metabolism, 2- Pigment Metabolism, 3- Lipid metabolism

B- Biochemical Assays

1. Determination of Blood glucose

- a. O. Toluidine method,
- b. Folin-wu method
- c. GOD POD method

2. GTT

- a. Normal
- b. Hyperglycemia
- c. Hypoglycemia
- d. Abnormal GTT

3. G.C.T : Glucose Challenging test

4. Blood Urea:

- a. DAM Method
- b. Berthelot (Enzymatic) method



5. Serum Creatinine – Alkaline picrate method
6. S-Cholesterol - Wiberg method, Enzymatic method
7. S- Bilirubin – Malloy and evelyn method
8. Determination of Protein I- (Biuret method)
9. Determination of Albumin (BCG method)
10. S-uric Acid
11. Phosphotungstate acid method 2- Enzymatic method

C- ENZYME ASSAYS

1. Serum Amylase
2. Serum lipase
3. Alkaline Phosphatase
4. Acid phosphatase and prostatic fraction
5. SGOT or AST
6. SGPT or ALT

Acid, Base, Buffer (Definition, example, pK, pH, Henderson-Hasselbach's equation) Principles of Photometry, (Lambert-Beer's Law, Flame photometry, Spectrometry, Reflectance Fluorometry.)

Ion selective electrodes. (Nernst equation, pH electrode, Sodium, Potassium electrode, PCO₂ electrode)

Radioactivity (Types) of radioactive decay with examples, Radioactive half life, Units of radioactivity application of radioisotope in clinical chemistry)

Electrophoresis. (Principle, types, application in clinical biochemistry, Serum & Hemoglobin electrophoresis)

Detection of Drugs & Toxic substances. (Principles of Chromatography, paper & thin layer Chromatography, their application in detection of drugs & toxic substances)



PAPER VIII

CLINICAL MICROBIOLOGY AND PARASITOLOGY

Introduction, Classification of bacteria

Physiology and growth requirements

Sterilizations – principles & different methods adopted.

Preparation of culture media

Bacterial staining – Gram/Ziehl Neelsen/others

Methods of colony count & morphological identification of bacteria by colony characters, staining & motility tests. Methods of colony count & morphological identification of bacteria by colony characters, staining & motility tests.

Biochemical tests and interpretation.

Final identification of bacteria with High-titre sera

Antibiotic sensitivity tests.

The microbial world and the structure of microbes.

Collection of specimens for microbiological examination.

Methods of inoculation of culture media from different samples.

Basic concept of individual Bacteria.

Laboratory diagnosis of pyogenic infection.

Laboratory diagnosis of Leprosy.

Laboratory diagnosis of URTI.

Laboratory diagnosis of LRTI

Laboratory diagnosis of Enteric fever.

Laboratory diagnosis of Bacillary dysentery.

Laboratory diagnosis of Urinary tract infection



Laboratory diagnosis of Meningitis.

Antigens & Antibodies – definition, types, preparation & preservation

Types of Antigen and Antibody reactions.

Sore throat, diarrhoea, acute pyogenic meningitis, Food poisoning and others

Mycology

Virology

Parasitology

Introduction, Classification of parasites, host, Mechanism of disease production by parasites

Classification of the pathogenic Protozoa

Overview of Amoebae- *E.histolytica*, *Entamoeba coli*, *Giardia lamblia*, *Giardia intestinalis*

Malaria parasite, Life cycle and Morphology- human plasmodia- pathogenesis diagnosis

Flukes- Blood flukes & Lung flukes - Morphology and life cycle pathogenicity- Diagnosis treatment.

Nematodes- Hook worms/ Round worms- Morphology and Life cycle, pathogenesis- Diagnosis and treatment.

Filaria- Different human species- distribution- Morphology and Life cycle- pathogenesis- clinical manifestations Diagnosis

Diagnostic methods in parasitology- Examination of faeces, Wet mount, blood smears, concentration method, sedimentation methods- egg count- culture methods- Animal inoculation- xenodiagnosis- Immunological diagnosis.



PAPER IX

HEAMATOLOGY, BLOOD BANKING AND HISTOPATHOLOGY

HEAMATOLOGY

Introduction

Blood and its components

Functions of blood and its cellular elements

Haemopoiesis

- a. Erythropoiesis
- b. Leukopoiesis
- c. Thrombopoiesis

Anti coagulants – Composition, amount, mechanism of action and methods of preparation of different types of vials.

ROUTINE HEAMATOLOGICAL TESTS

Determination of Haemoglobin estimation

- a. Acid Hematin or sahlis method
- b. Talliquist method
- c. Drabkins method
- d. Sources of error and clinical Significance

Determination of Haematocrit(PCV)

- a. Micro haematocrit
- b. Macro haematocrit method
- c. Sources of error and clinical significance

Determination of TRBC

- a. Microdilution method
- b. Macrodilution method



- c. Physiological Factors modifying the RBC count in Blood
- d. Sources of error and clinical Significance

RBC Indices or Wintrobe's constants

- a. MCV
- b. MCH
- c. MCHC
- d. CI
- e. MCAT

Determination of total WBC Count

- a. Microdilution method
- b. Macrodilution method
- c. Correction of WBC Count in Presenc of NRBC
- d. Sources of error and clinical significance

Determination of ESR

- a. Westergren's method
- b. Wintrobe's method
- c. Micro method by centrifuging
- d. Sources of error and clinical significance

Determination of absolute Eosinophil count

- a. Direct method
- b. Indirect method
- c. Sources of error and clinical Significances

Determination of Platelet count

- a. Direct method
- b. Indirect method
- c. Sources of error and clinical Significances



Determination of Reticulocyte count

- a.Preparation of stain (BCB)
- b.Staining Procedure
- c.Method of calculation
- d.Sources of errors and clinical Significances

Calculation of different red cell indices (Haemogram)

Basic principles of semi or automated blood cell counters & HPLC

Study of Blood smear(pss) for differential count and cell morphology

1. Preparation and Procedure for Following stain
 - a.Leishman's Stain
 - b.Giemsa stain
 - c.Wrights stain
 - d.Fields Stain
2. Preparation of blood smear
3. Examination of stained smear
4. Morphology of neutrophils, Eosinophils, Basophils band form , Lymphocyte and Monocyte

Bone marrow aspiration methods and staining & preparation of Tray for Bone Marrow aspiration and biopsy.

Differential leucocyte count (peripheral smear study)

Basic tests for coagulopathy – BT, CT, P time, APTT



Some special test – LE cell test, RBC Osmotic fragility & Foetal Hb%

Anemia's : Basic and Classification of Anemia's

- a. Iron deficiency anemia (Hypo, Micro)
- b. Megaloblastic anemia (Hyper, Macro)
- c. Aplastic anemia (pancytopenia)
- d. Sickle cell anemia
- e. Thalassemia
- f. Hemolytic anemia

Leukemia's : Basic determination and Classification

- a. Acute myeloid Leukemia (AML)
- b. Acute Lymphocytic Leukemia (ALL)
- c. Chronic myeloid Leukemia (CML)
- d. Chronic lymphatic Leukemia (CLL)

Basic Concepts of Hemorrhagic Disorder

Basic quality control methods and Laboratory accreditation.

BLOOD BANKING

1. Blood Group (ABO & RH) – methods of grouping & reserve grouping
2. Basic blood banking procedures – collection of blood, anticoagulants used cross matching, different screening tests including Coomb's Test for use and how to serve a requisition. Preparation of red cell suspension.
3. Blood transfusion & hazards.
4. Detect the time when to discard blood in Blood bank.
5. Computerized record keeping of Blood Bank



HISTOPATHOLOGY

Basic concepts of different mammalian tissues and their histological structure.

Different human organs and their gross and histological structure and functions.

Receiving of biopsy specimens at laboratory (Clinical notes/fixatives)

Fixation of tissue-different fixatives and their mode of action.

Methods of decalcification

Processing of tissues-protocol for manual & automated tissue processors, paraffin embedding & preparation of blocks, preparation of reagents, different techniques & application and frozen section/cryostat.

Use of Microtomes, selection and maintenance of knives-Honing and stropping technique of section cutting & mounting on slides.

Staining of tissue sections, preparation of different stains, staining methods for Haematoxylin & Eosin, Reticulin, PAS, VanGieson, Massion's trichrome, Lipid & Mucin stains & Perl's stain.

Preservation of specimens and mounting of museum specimens. Preparation of cytosmear and H&E, Papanicolaou & MGG staining of different body fluids.

Fine Needle Aspiration cytology & exfoliative cytology & Buccal Smear examination.

Cytochemistry & immunohistochemistry.

Sex determination

Cytospin and cell block preparation.

PAP smear examination



Reference Book

1. Hand book of Medical Laboratory Tehnology (Text Book VHSC) Complied by : Minikumari, Rema.V.L, Dileep.R.K
2. Clinical Notes on Medical Lab Technology – C.M.Samuel
3. Hand Book on Medical Laboratory Technology, Velloor Medical College
4. Clinical Lab Techniques
5. Essentials of Medical Microbiology - Apurba Sankar Sastry, Sandhya Bhat.K
6. A handbook of Medical Laboratory Technology V.H.Talib
7. Medical Laboratory Technology - Ramnik Sood



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PAPER IX	CLINICAL PATHOLOGY & HAEMATOLOGY



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- Punctuation: Period, Comma, Exclamation Point, Question Mark, Apostrophe

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- Classified Vocabulary
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- Articles, Ornaments jewels customs, eatables flowers, fruits vegetables.

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Body as a whole: Skull, Thorax, Abdomen

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Respiratory System

parts of respiratory system and their functions, Physiology of
Respiration

Digestive System

names and various parts of digestive system-Liver, Gall Bladder,
Pancreas, Buccal Cavity, Pharynx, Oesophagus, Stomach,
intestine etc.-physiology of digestion and absorption

Urinary System

parts of urinary system and its function-structure and function of
kidneys-physiology of urine formation - pathophysiology of renal
system and edema

Reproductive System

physiology and anatomy of Male & Female reproductive system-
Prostate & Uterus & Ovaries etc

Musculoskeletal System

Classification of bones & joints, structure of skeleton –structure of
skeletal muscle –smooth muscle and cardiac muscle- physiology
of muscle contraction

Nervous System

various parts of nervous system- Brain and its parts –functions of
nervous system - Spinal Cord & Nerves



Ear, Nose, Throat and Eye

Elementary knowledge of structure and functions of organs of taste, smell, hearing, vision

Endocrine System

Endocrine glands, their hormones and functions-Thyroid, Parathyroid, Suprarenal, Pituitary, pituitary and Thymus

Haemopoietic and Lymphatic System

lymph glands and lymph vessels & lymph gland locations

The Skin

Structure and functions of skin

Surface Anatomy & Surface Markings of Human Body

Ageing: Changes in system due to ageing, Resistance to infection

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CLINICAL BIO CHEMISTRY -I

BASIC CHEMISTRY

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Basic causes of Accidents

Common types of Laboratory accidents: Physical Injury, Electric shock, Exposure of dangerous chemicals, Poisoning with strong acids and alkali, Eye accident, Skin puncture by broken glass

Safety requirements of the laboratory

First aid in laboratory accidents

Clinical laboratory Records: Requisition and reporting of results, Laboratory register, Record book in each section, Stock Register management.

Personal care: General Health care, Care in the laboratory, Protective inoculations

Introduction to laboratory Equipments and Basic operation:

- a) Identification and use of common laboratory glassware
- b) Care and cleaning of glassware and Equipment
- c) Basic Principles and operations of Following Instruments

1-Microscope

2- Centrifuge

3- Hot Air Oven

4- Autoclave

5- Calorimeter



- 6-Urinometer
- 7- Incubator
- 8- Microtome
- 9-Histokinettee
- 10-Cryostat
- 11- koches steamer
- 12- Water bath
- 13-Spectrometer
- 14- VDRL Rotator
- 15- Auto analyser semi & Full
- 16. Sterilizer
- 17. Refrigerator
- 18- Heamoglobinometer
- 19- Thermometer
- 20-Heamocytometer
- 21- Common balance
- 22- Cell Counter
- 23- Micropipette
- 24-Glucometer
- 25-Needle burner

Sterilization Process:

Physical methods- Dryheat , Moist heat, Flaming, Autoclaving

Chemical Methods- Phynol, Formal dehyde

Mechanical methods- filtration

Units and measurements

- 1. Weight 2- Volume 3- Length

Reagent Solution

- 1. Stock reagent Solution
- 2. working reagent solution
- 3. saturated Solution
- 4. w/v Solution
- 5. v/v Solution



6. Molar Solution
7. Normal Solution
8. Percent Solution
9. Part dilution

Preparation of the Following reagents

1. IN HCL
2. 0.1 HCL from IN HCL
3. IN NaoH
4. 3.8% sodium citrate
5. IN Na₂CO₃
6. 70% alcohol from 95 % alcohol

Temperature-Unit and conversation

BIOCHEMISTRY

A- 1. Introduction

- a. Basic physiology and Biochemistry of the body
- b. 1. Hormones, 2. Enzymes, 3. Synthesis, 4. Lipids, 5. ATP 6. Anabolism 7. Catabolism
- c. 1. Carbohydrate Metabolism 2. Pigment Metabolism, 3. Lipid metabolism

B- Biochemical Assays

1. Determination of Blood glucose
 - a. O. Toluidine method,
 - b. Folin-wu method
 - c. GOD POD method
2. GTT
 - a. Normal
 - b. Hyperglycemia
 - c. Hypoglycemia
 - d. Abnormal GTT



3. G.C.T : Glucose Challenging test
4. Blood Urea:
 - a. DAM Method
 - b. Berthelot (Enzymatic) method
5. Serum Creatinine – Alkaline picrate method
6. S-Cholesterol - Wiberg method, Enzymatic method
7. S- Bilirubin – Malloy and evelyn method
8. Determination of Protein I- (Biuret method)
9. Determination of Albumin (BCG method)
10. S-uric Acid
11. Phosphotungstate acid method
12. Enzymatic method

C- ENZYME ASSAYS

1. Serum Amylase
2. Serum Lipase
3. Alkaline Phosphatase
4. Acid phosphatase and prostatic fraction
5. SGOT or AST
6. SGPT or ALT

Acid, Base, Buffer (Definition, example, pK, pH, Handerson-Hasselbach's equation) Principles of Photometry, (Lambert-Beer's Law, Flamephotometry, Spectrometry, Reflectance Fluorometry.)

Ion selective electrodes. (Nernst equation, pH electrode, Sodium, Potassium electrode, PCO₂ electrode)



Radioactivity (Types) of radioactive decay with examples, Radioactive half life, Units of radioactivity application of radioisotope in clinical chemistry)

Electrophoresis. (Principle, types, application in clinical biochemistry, Serum & Hemoglobin electrophoresis)

Detection of Drugs & Toxic substances. (Principles of Chromatography, paper & thin layer Chromatography, their application in detection of drugs & toxic substances

PAPER VIII

CLINICAL MICROBIOLOGY AND PARASITOLOGY

Introduction, Classification of bacterias

Physiology and growth requirements

Sterilizations – principles & different methods adopted.

Preparation of culture media

Bacterial staining – Gram/Ziehl Neelsen/others

Methods of colony count & morphological identification of bacteria by colony characters, staining & motility tests. Methods of colony count & morphological identification of bacteria by colony characters, staining & motility tests.

Biochemical tests and interpretation.

Final identification of bacteria with High-titre sera

Antibiotic sensitivity tests.

The microbial world and the structure of microbes.

Collection of specimens for microbiological examination.

Methods of inoculation of culture media from different samples.



Basic concept of individual Bacteria.

Laboratory diagnosis of pyogenic infection.

Laboratory diagnosis of Leprosy.

Laboratory diagnosis of URTI.

Laboratory diagnosis of LRTI

Laboratory diagnosis of Enteric fever.

Laboratory diagnosis of Bacillary dysentery.

Laboratory diagnosis of Urinary tract infection

Laboratory diagnosis of Meningitis.

Antigens & Antibodies – definition, types, preparation & preservation

Types of Antigen and Antibody reactions.

Sore throat, diarrhoea, acute pyogenic meningitis, Food poisoning and others

Mycology

Virology

Parasitology

Introduction, Classification of parasites, host, Mechanism of disease production by parasites

Classification of the pathogenic Protozoa

Overview of Amoebae- E.histolytica, Entamoeba Coli, Giardia lamblia, Glardia Intestinalis

Malaria parasite, Life cycle and Morphology- human plasmodia- pathogenesis diagnosis

Flukes- Blood flukes & Lung flukes - Morphology and life cycle pathogenicity- Diagnosis treatment.



Nematodes- Hook worms/ Round worms- Morphology and Life cycle, pathogenesis- Diagnosis and treatment.

Filaria- Different human species- distribution- Morphology and Life cycle- pathogenesis- clinical manifestationsDiagnosis

Diagnostic methods in parasitology- Examination of faeces, Wet mount, blood smears, concentration method, sedimentation methods- egg count- culture methods- Animal inoculation- xenodiagnosis- Immunological diagnosis.

PAPER IX

CLINICAL PATHOLOGY & HEMATOLOGY

CLINICAL PATHOLOGY

Introduction

Reception of patients, noting carefully the test advised, phlebotomy and aftercare of patients.

The Microscope – different types, parts of microscope, cleaning & care.

Examination of Urine – Formation of urine Physical examination – Colour, transparency, pH and Sp gravity. Chemical examination - Protein, Sugar, Ketone bodies, Bile pigment/salt, Chyle, Blood-Benzidine Test, Microscopical examination – Cells (RBC, WBC, Epith), casts, crystals, Detection of microalbumin& 24 hours urine protein estimation.

Random urine collection, 24 hrs urine collection and itspreservatives

HCG in urine

Sputum collection and examination



Pus, Throat swab collection and examination

Semen: Examinations of Semen – Physical Characters, Sperm Count, Motility, Viability and Morphology of sperm, other tells in semen.

Body Fluids: Examination of Body Fluids – CSF, Pleural, Peritoneal & pericardial fluid, Bronchoalveolar lavage fluid, Hydatid Cyst Fluid and joint Fluid

Transportation of Different Clinical Materials to distant laboratories

HEAMATOLOGY

Introduction

Blood and its components

Functions of blood and its cellular elements

Haemopoiesis

- a. Erythropoiesis
- b. Leukopoiesis
- c. Thrombopoiesis

Anti coagulants – Composition, amount, mechanism of action and methods of preparation of different types of vials.

ROUTINE HEAMATOLOGICAL TESTS

Determination of Heamoglobin estimation

- a. Acid Hematin or sahlis method
- b. Talliquist method
- c. Drabkins method
- d. Sources of error and clinical Significance



Determination of Haematocrit(PCV)

- a. Micro haematocrit
- b. Macro haematocrit method
- c. Sources of error and clinical significance

Determination of TRBC

- a. Microdilution method
- b. Macrodilution method
- c. Physiological Factors modifying the RBC count in Blood
- d. Sources of error and clinical Significance

RBC Indices or Wintrobe's constants

- a. MCV
- b. MCH
- c. MCHC
- d. CI
- e. MCAT

Determination of total WBC Count

- a. Microdilution method
- b. Macrodilution method
- c. Correction of WBC Count in Presenc of NRBC
- d. Sources of error and clinical significance

Determination of ESR

- a. Westergren's method
- b. Wintrobe's method
- c. Micro method by centrifuging
- d. Sources of error and clinical significance

Determination of absolute Eosinophil count

- a. Direct method
- b. Indirect method
- c. Sources of error and clinical Significances



Determination of Platelet count

- a. Direct method
- b. Indirect method
- c. Sources of error and clinical Significances

Determination of Reticulocyte count

- a. Preparation of stain (BCB)
- b. Staining Procedure
- c. Method of calculation
- d. Sources of errors and clinical Significances

Calculation of different red cell indices (Haemogram)

Basic principles of semi or automated blood cell counters & HPLC

Study of Blood smear(pss) for differential count and cell morphology

1. Preparation and Procedure for Following stain
 - a. Leishman's Stain
 - b. Giemsa stain
 - c. Wrights stain
 - d. Fields Stain
2. Preparation of blood smear
3. Examination of stained smear
4. Morphology of neutrophils, Eosinophils, Basophils band form , Lymphocyte and Monocyte

Bone marrow aspiration methods and staining & preparation of Tray for Bone Marrow aspiration and biopsy.

Differential leucocyte count (peripheral smear study)

Basic tests for coagulopathy – BT, CT, P time, APTT



Some special test – LE cell test, RBC Osmotic fragility & Foetal Hb%

Anemia's : Basic and Classification of Anemia's

- a. Iron deficiency anemia (Hypo, Micro)
- b. Megaloblastic anemia (Hyper, Macro)
- c. Aplastic anemia (pancytopenia)
- d. Sickle cell anemia
- e. Thalassemia
- f. Hemolytic anemia

Leukemia's : Basic determination and Classification

- a. Acute myeloid Leukemia (AML)
- b. Acute Lymphocytic Leukemia (ALL)
- c. Chronic myeloid Leukemia (CML)
- d. Chronic lymphatic Leukemia (CLL)

Basic Concepts of Hemorrhagic Disorder

Basic quality control methods and Laboratory accreditation.



**BSS DIPLOMA IN COMPUTER APPLICATION
AND MEDICAL LABORATORY TECHNOLOGY ASSISTANT**

Two Year (Final Year)

PAPER I	CLINICAL BIOCHEMISTRY - II
PAPER II	HISTOPATHOLOGY AND BLOOD BANKING
PAPER III	CLINICAL MICROBIOLOGY - II

PAPER I

CLINICAL BIOCHEMISTRY II

Definition of Antigen & Antibody, Antigen-Antibody reaction, Detection of Antigen-Antibody Reactions (ELISA, RIA)

Clinical Enzymology. (Definition of enzyme, classification with examples, types of enzyme-substrate reactions, assay of enzymes. End point & Kinetic, clinical importance of enzymes, isoenzymes.)

Disorders of Carbohydrate metabolism & their detection. (Method of measurement of glucose in plasma & urine, ADA classification of Diabetes Mellitus, Glucose Tolerance Test, Detection of gestational diabetes, Glycosylated hemoglobin, self monitoring of blood glucose).
Nutritional disorders & their detection.

Liver Function Tests. (Over view of anatomy & physiology of Liver, bilirubin metabolism, jaundice & its biochemical diagnosis).



Renal Function Tests. (Overview of anatomy & physiology of Kidney, Clearance Tests, other biochemical tests for detection of the renal function i.e. Serum creatinine, urea, sodium, potassium, urinary micro albumin and 24 hours protein estimation in urine, urinary osmolality)

Disorders of Cardiovascular system & their laboratory detection. (Disorders of Cholesterol metabolism measurement of plasma lipoproteins, Cardiac enzymes.)
Thyroid Function Tests.

Pancreatic & Gastrointestinal Function Tests. (Faecal fat, Hyperamylasemia, D-Xylose absorption Test)
Disorders of joints & their detection.

Basic concept of laboratory automation. (Configuration of clinical laboratory analyzers).

Basic concept of laboratory statistics. (Reference value, mean, median, mode, standard deviation, coefficient of variation.)

Basic concept of quality control in clinical biochemistry laboratory. (Control material, Leavy Jennings Plot.)

PAPER II

HISTOPATHOLOGY & BLOOD BANKING

Basic concepts of different mammalian tissues and their histological structure.

Different human organs and their gross and histological structure and functions.

Receiving of biopsy specimens at laboratory (Clinical notes/fixatives)



Fixation of tissue-different fixatives and their mode of action.
Methods of decalcification

Processing of tissues-protocol for manual & automated tissue processors, paraffin embedding & preparation of blocks, preparation of reagents, different techniques & application and frozen section/cryostat.

Use of Microtomes, selection and maintenance of knives-Honing and stropping technique of section cutting & mounting on slides.

Staining of tissue sections, preparation of different stains, staining methods for Haematoxylin & Eosin, Reticulin, PAS, VanGieson, Massion's trichrome, Lipid & Mucin stains & Perl's stain.

Preservation of specimens and mounting of museum specimens. Preparation of cytosmear and H&E, Papanicolaou & MGG staining of different body fluids.

Fine Needle Aspiration cytology & exfoliative cytology & Buccal Smear examination.

Cytochemistry & immunohistochemistry.

Sex determination

Cytospin and cell block preparation.

PAP smear examination

BLOOD BANKING

1. Blood Group (ABO & RH) – methods of grouping & reserve grouping
2. Basic blood banking procedures – collection of blood, anticoagulants used cross matching, different screening tests including Coomb's Test for use and how to serve a requisition. Preparation of red cell suspension.



3. Blood transfusion & hazards.
4. Detect the time when to discard blood in Blood bank.
5. Computerized record keeping of Blood Bank

PAPER -III

CLINICAL MICROBIOLOGY - II

Diagnostic serological methods – Agglutination & Flocculation, Latex agglutination tests – to be performed by the students, Elisa testing & RIA – principles and demonstration and interpretation of results of - Widal Test, VDRL Test, Aldehyde Test, ASO Titre, Rheumatoid factor, C-reactive protein, HBsAg, Anti HCV, Anti HIV.

Basic knowledge on Protozoa and helminths.

General & Systemic Mycology

Demonstration of Fungus in Laboratory

Common laboratory animals – Food, Handling, Housing, Breeding.

Care of normal and experimental animals

Sacrifice, postmortem and disposal.

Laboratory diagnosis of Malaria, Protozoal dysentery, Kalazar, Hook worm infection, Ascariasis, Filariasis, Taeniasis, hepatitis, Viral diarrhea, HIV/AIDS, Candidiasis, Cryptococcal meningitis.

Biosafety measures.

Examination of stool and culture

Quality Control



General & Systemic Virology
Diagnostic Virology
Culture and sensitivity

Reference Book

1. Hand book of Medical Laboratory Tehnology
(Text Book VHSC)
Complied by : Minikumari, Rema.V.L, Dileep.R.K
2. Clinical Notes on Medical Lab Technology – C.M.Samuel
3. Hand Book on Medical Laboratory Technology, Velloor
Medical College
4. Clinical Lab Techniques
5. Essentials of Medical Microbiology -
Apurba Sankar Sastry, Sandhya Bhat.K
6. A handbook of Medical Laboratory Technology V.H.Talib
7. Medical Laboratory Technology - Ramnik Sood