

I. INTRODUCTION

Diagnostics plays prominent role in the field of Medicine. Without proper diagnosis, proper conclusions regarding Medical treatment/ surgery can not be obtained. Similarly preparation of reagents of purest quality is also essential. Thus Medical Lab Technician Course is attaining importance. Clinical studies in the fields of Medicine, Pharamacutical Industries, Nutrition etc. also require the technicians.

The Medical Laboratory Technician Couse is designed to train man power to carry out medical laboratory technical work in various departmens in medical and pharmacy colleges, peripheral laboratories, research and diagnostic centres, to setup and run own clinical laboratory.

II. Objective's of the Course

1. To train the student to work in diagnostic labs.
2. To train the students to work in manufacturing units of diagnostic reagents.
3. To assist the qualified experts in these fields
4. Train the students to understand the organisation of Hospitals, Research Laboratories etc.
5. To train the students to attend to analytical work and R&D work in drug labs and pharmaceutical industries.

III. Skills to be provided

1. Handling of the Apparatus
2. Accurate measuring, weighing etc.
3. Cleaning of the apparatus
4. Accurate analysis
5. Accurate processing and storage of specimens
6. Accurate Reporting and storage of clinical data.
7. Clinical significance
8. Limitation of the Tests

IV. Job opportunities

A. Wage Employment

1. Laboratory Technicians in various departments in medical and Pharmacy colleges
2. Laboratory technician in various departments in diagnostic centers
3. Laboratory technician in hospitals of various sectors
4. Laboratory Technician in quality control R&D sectors of Drug Manufacturing units
5. Laboratory Technician in Clinical studies in various laboratories like
 - 1) National Institute of Nutrition
 - 2) Central Drug Research Laboratory
 - 3) Molecular Biology Labs

B. Self Employment

1. Setting of Diagnostic Labs
2. Preparation and sale of readymade reagent kits and media
3. Distribution of lab chemicals, glasswares, lab instruments and their spare parts etc.

V. SCHEME OF INSTRUCTION AND EXAMINATION

Ist YEAR

Part A	Theory		Practicals		Total	
	Periods	Marks	Periods	Marks	Periods	Marks
1. English	185	75	-	-	185	75
2. GFC	185	75	-	-	185	75
Part B						
3. Vocational Subjects						
Paper I-Biochemistry	160	50	160	50	320	100
Paper II-Microbiology & Pathology	160	50	160	50	320	100
Paper III-Anatomy & Physiology	160	50	160	50	320	100
4. On the job training	-	-	210	50	210	50
Total	840	300	690	200	1540	500

SCHEME OF INSTRUCTION AND EXAMINATION

IInd YEAR

Part A	Theory		Practicals		Total	
	Periods	Marks	Periods	Marks	Periods	Marks
1. Communication skills/english	185	75	-	-	185	75
2. GFC	125	50	60	25	185	75
Part B						
3. Vocational Subjects						
Paper I-Biochemistry	160	50	160	50	320	100
Paper II-Microbiology & Animal Care	160	50	160	50	320	100
Paper III- Pathology	160	50	160	50	320	100
4. On the job training	-	-	210	50	210	50
Total	790	275	750	225	1540	500

SCHEME OF INSTRUCTION PER WEEK FOR VOCATION COURSES

IST YEAR

Part A	Theory	Practicals	Total
1. Communication			
skills/english	6	-	6
2. GFC	4	2	6
Part B			
3. Vocational Subjects			
Paaper I-Biochemistry	5	5	10
Paper II-Microbiology & Pathology	5	5	10
Papaer III-Anatomy & Physiology	5	5	10
4. On the job training			
Total	25	17	42

SCHEME OF INSTRUCTION PER WEEK FOR VOCATION COURSES

IInd YEAR

Part A	Theory	Practicals	Total
1. Communication			
skills/english	6	-	6
2. GFC	4	2	6
Part B			
3. Vocational Subjects			
Paper I-Biochemistry	5	5	10
Paper II-Microbiology & Animal Care	5	5	10
Paper III- pathology	5	5	10
Total	25	17	42

VI. SYLLABUS

Ist YEAR

Part A

1. Communication Skills in English
2. General Foundation Course

Part B

3. Vocational Subjects
Paper I - Biochemistry
Paper II - Microbiology & Pathology
Paper III - Anatomy & Physiology

Part C

4. On the Job training

IInd YEAR

Part A

1. Communication Skills in English
2. General Foundation Course

Part B

3. Vocational Subjects
Paper I - Biochemistry
Paper II - Microbiology & Animal Care
Paper III - Pathology

Part C

4. On the job training

SYLLABUS
1st YEAR
BIO-CHEMISTRY
THEORY (160 Hrs)

1. Introduction to Bio-chemistry including code of ethics for Medical Lab technicians and Medical Lab Organisation.
2. Reception, Registration and bio-chemical parameters investigated
3. Glassware and plastic ware used in a bio-chemical laboratory
 - I. Glass ware :
 - a) Types of glass and composition
 - b) Types of glassware used, their identification, application and uses
 - c) Cleaning, drying, maintenance and storage of glassware
 - II. Plastic ware : Brief outline
4. Instrumental methods of Bio-chemical analysis :
 - I. Colorimetry :

Visual and photoelectric methods, instrumentation, principles and laws involved, construction, operation, care and maintenance, applications
 - II. Spectrophotometry :

Principle and theory, types, construction, and applications
5. Basic lab operations like -
 - I. Separation of Solids from liquids,
 - a) Centrifugation : Principle, Different types of Centrifuges care and maintenance, applications
 - b) Filtration using funnel
 - II. Weighing : Different types of balances used, care and maintenance.
 - III. Evaporation : IV) Distillation V) Refluxing VI) Drying different salts and dessiccation
6. Water, Chemicals and related substances
 - I. Purity of Chemicals
 - II. Corrosives.

- III. Hygroscopic Substances
- 7. Prevention, Safety and first aid in lab accidents.
- 8. Collection of specimens
 - I. Blood :
Types of Specimens, Collection, Precautions during collection, Processing and preservation.
 - II. Urine :
Types of Specimens, Collection of 24 hours urine and preservation
- 9. Urine biochemical parameters.
- 10. Units of measurements
- 11. Solutions
Types based on solute and solvent, Types based on method of expressing concentration, calculations
- 12. Carbohydrates and lipids
 - I. Carbohydrates :
Definition, Biological importance, classification, qualitative tests
 - II. Lipids :
Definition, Biological importance, Classification, Acid value, Iodine value, saponification value.
- 13. Amino acids and Proteins
Definition, Biological importance, Classification, Qualitative tests.
- 14. Diagnostic tests
Blood Sugar, Glucose tolerance test, Blood urea, Serum uric acid, Serum creatinine.
- 15. Vitamins and Minerals
 - I. Vitamins :
Water Soluble vitamins, Fat Soluble Vitamins, Sources, Daily requirements, Deficiency diseases
 - II. Minerals :
Sources, Daily requirements, Deficiency diseases

BIO-CHEMISTRY

Ist YEAR - PRACTICAL (160 Hrs)

1. Reception and registration
2. Collection of Capillary blood
3. Collection of Venous blood
4. Collection of arterial blood
5. Separation of Serum from clotted blood
6. Separation of plasma from blood
7. Preparation of protein free blood filtrate
8. Lab glass ware
 - a) Identification
 - b) Handling
 - c) Care and Maintenance
 - d) Uses
9. Lab instruments
 - a) Centrifuges
 - b) Balances
 - c) Photo Electric colorimeter
 - d) Spectrophotometer
10. Preparation of
 - a) Percentage solutions
 - b) Normal solutions
 - c) Molar solutions
11. Qualitative identification tests of sugars
12. Qualitative identification tests of proteins
13. Qualitative identification tests for amino acids
14. Quantitative determination of Blood sugar
15. Glucose Tolerance test
16. Quantitative determination of Blood urea
16. Quantitative determination of Serum creatinine
17. Quantitative determination of Urine Sugar.

1st YEAR PAPER II
MICROBIOLOGY & PATHOLOGY
(Theory)

Total Hours :160

Max.Marks : 50

- I. Historical introduction to Microbiology contribution of famous Scientist in the field of Microbiology in brief
 - a) Anatomy Van Lee wen Hook
 - b) Robert Koch
 - c) Edward Jenner
 - d) Louis Pasteur
 - e) Joseph Lister
- II. Microscopy
 - a) Principle working and maintenance of compound Microscope
 - b) Principle of Fluorescent Microscope, Electron Microscope, Dark Ground Microscope
- III. Sterilization and disinfection - classification and Methods of sterilization
 - 1) Principle and Methods of sterilization by heat
 - a) By Dry Heat, Flaming, Red Heat, Hot air oven, incineration
 - b) By Moist Heat-pasteurization, Inspissation, tyndalisation, autoclave
 - 2) Filtration Methods
 - 3) Ionising Radiation - Disinfection, Mode of action and uses of important chemical disinfectants - Phenol and Phenolic compounds, alcohols, halogens, dyes and acids and alkalis
 - 4) Gaseous Methods of sterilization.
- IV. Cleaning, drying & Sterilization of Glassware disposal of contaminated material i.e. clinical infective material inoculated culture media. Handling and Disposal of Biomedical waste.
- V. Morphology and classification of Bacteria Sp. of cell, capsule, flagella, spore, Anaerobic Methods of cultivation of Bacteria.

- VI. Methods of Collection of clinical specimen for Micro-Biological investigation (in detail) like sputum- pettroff's method of concentration, urine, swabs, stool, blood, CSF and aspirations
- VII. Processing of clinical specimen collected for Isolation and identification of organism
 - a) Preparation of direct smear and staining
 - b) Different Techniques of inoculation for isolation of bacteria
 - c) Hanging drop preparation and its use
 - d) Inoculation of various media for Bio-chemical reactions
- VIII. Composition and preparation of staining reagents and different methods of staining
 - a) simple staining
 - b) Gram Staining
 - c) Spore staining
 - d) Capsular staining
 - e) Zeihl Neelson staining
 - f) Albert staining
 - g) Negative staining
 - h) Flagellar staining
 - i) Flourescent staining
- IX. Culture Media - Classification of Media composition and preparation and uses.
 - a) Basal Media - Peptone water, Nutrient broth, glucose broth.
 - b) Enriched Media - Blood agar, Loefflers serum slope, chocolate agar
 - c) Enrichment Media - Selenites broth, tetrathionate broth Alkaline peptone water
 - d) Differential Media - Macconkeys Media
 - e) Selective Media - Lowenstcin Jenson Media, Potassium tellurite Media, TCBS, Wilson and Blair Media Deoxycholate citrate agar media

- f) Blood culture media - Glucose broth, Hartleys broth, bile broth
Sugar Media for Bio-chemical Reaction.

Robertson cooked Meat Media, Thioglycolate media, Media and Reagents for different Biochemical reaction i.e. Indole test, V.P. tests, M.R. test, citrate, urease, triple sugar Iron agar, Oxidase, catalase test, Nitrate reduction test, Phenyl alkaline deaminase test, glucose phosphate broth, gelatin liquifaction.

Sabourauds dextrose Agar, PDA.

PATHOLOGY

1. Urine - Analysis - Physical Examination - specific gravity PH, reaction, colour
Chemical Examination - Sugar Albumin, bile salts, bile Pigments etc.
Microscopic Sediment for RBC, WBC, Epitheleal cells, casts, crystals, parasites
Preparation of Reagents, procedure and principle of tests
2. Sputum Analysis - Physical Examination, Preparation and staining smear for Microscopic Examination
3. Semen Analysis- Physical Examination Microscopy - counting, motility, staining, Morphology, abnormal and normal forms.
4. Body Fluids - Differential count of Peritoneal, pericardial, pleural fluids and CSF, charging chamber, Identifying and counting the cells.
3. Haematology -
 - a. Collection of Blood -
Methods of collection veinpuncture, finger puncture and vacutainer methods, materials required procedures, precautions, uses of the sample and advantages of each methods. POCT (sample collection at bed side)
 - b. Preparation of anti coagulants -
Double oxalate, sodium citrate, EDTA, Heparin, action of each preparation, uses disadvantages, quantity required.

- c. RBC, WBC Count :
Methods (Microdilution and bulk dilution) Materials required, diluting fluids, preparation, procedures, advantages of each methods, precautions, formula for calculation and clinical significance.
- d. Platelet count :
Morphology and functions of platelets diluting fluids, procedure, formula for calculation and clinical significances
- e. Reticulocyte Count :
Methods (dry & wet) staining, diluting fluids, normal Morphology and values, clinical significance.
- f. Haemoglobin Estimation -
Materials, procedure, of Tallquist, sahlis, Alkali haldanis, cyanmeth aemoglobin and S.G. method, advantages and disadvantages and clinical significance
- g. Estimation of PCV -
Macro & Micro Method, procedure filling the tube, centrifuging and reading, advantages of each - normal values and clinical significance
Estimation of Erythrocyte indices - calculation and importance MCV, MCH, MCHC, RDW, color index.
- h. ESR -
Methods used, procedure, stages, factors affecting and clinical significance

1st YEAR PRACTICALS

PATHOLOGY

Blood Collection

Precaution and smearing techniques and labelling of the sample

Preparation of anticoagulants

RBC, WBC, & platelet count

ESR stands & ESR estimation

PCV & calculation of RBC indices

Hb estimation by different methods

Urine - Physical Examination & Chemical Examination

MICROBIOLOGY

Lab Instructions for Personal Safety precaution

Receipt and recording a specimen in the lab and dispatch of specimen

Cleaning and care of glassware, syringes, apparatus, preparation of pasteur Pipettes.

Handling and care of Microscope

Operation of Autoclave, Incubator, waterbath, seitzfilter

Preparation of various Media

Preparation of stains and smears

Methods of collection of microbiology specimen-and its importance and processing

ANATOMY PHYSIOLOGY
THEORY - IST YEAR MLT
PAPER - III

Hours : 160

Marks : 50

Detailed Syllabus

I. Basics in Anatomy

1. Introduction to Human Anatomy
2. Cell structure, properties of cell, tissues - epithelial, connective muscular, nervous
3. Digestive System and Hepato Biliary System
4. Respiratory System
5. Cardio vascular System
6. Lymphatic System
7. Bones and Joints
8. Nervous System
9. Endocrine System
10. Sense Organs
 Eye, ear, skin, nose, tongue
11. Excretory System
12. Reproductive System

Basics

1. Introduction to Human Physiology
2. Blood
3. Cardio vascular system
4. Lymphoid System
5. Digestive system
6. Respiratory system
7. Nervous system
8. Endocrine system
9. Excretory System
10. Reproductive system
11. Sense organs

ANATOMY AND PHYSIOLOGY PRACTICALS PAPER - III

Hours : 160

Max. Marks : 50

1. Human Skeleton

It includes -

- 1) Names of the Bones
- 2) Identification points
- 3) Surfaces

(Skull, scapula, clavicle, humerus, radius, ulna, carpal bones, meta carpal bones, Phalanges.

Innominate bone, Femur, patella tibia, fibula, tarsal bones, meta tarsal bones, Phalanges, Ribs-classification, vetebrae pieces, sternum.)

2. Human Organs

Brain, Stomach

Lungs, Intestines

Heart, Kidney

Liver, Uterus

Spleen, Fallopian tubes

3. Human slides

Epithelial Tissue

Connective Tissue

Muscular Tissue

Nervous Tissue

Liver

Kidney

Spleen

Pancreas

Lymphnodes

Skin

testes

Ovary

Uterus

Tonsil

Stomach layers

Small Intestine

Large Intestine

4. Blood Pressure

Estimation

5. T.P.R. (Temperature, pulse, respiration) Chart

6. TC, DLC, (TC - Total count RBC

Total count of WBC

DLC differential count of Leucocyts)

MLT IInd YEAR
THEORY SYLLABUS
BIO-CHEMISTRY (160 Hrs)

I. Instrumental methods of Bio-chemical analysis

- 1) Flame photometry : Principle, Theory, Construction of Flame Photometer, General and Clinical applications study of electrolytes using Flame photometer, Clinical importance of determination of electrolytes.
2. Fluorimetry : Fluorescence, Principle and theory, construction of Fluorimeter, General and Clinical applications
3. Nephelometry : Basic principle, instrumentation, general technique and clinical applications of Nephelometry.
4. Basic principles and application of Potentiometry

II. Separation Techniques

- 1) Chromatography : Definition, Basic principles, different types and their techniques, General and clinical applications
2. Electrophoresis : Definition and basic principle involved, different types, instrumentation, general and clinical applications, electrophoretic fractionation of serum proteins and lipo proteins.

III. Immuno assays - Definition, Basic Principles of immuno chemical reactions and immuno assays

- 1) Radio immuno assays
Introduction to radio activity, Radio Pharmaceuticals, Safety and precautions, Hormone assays,
- 2) Enzyme linked immuno essays, Description of instruments used in these essays.

IV. Metabolism :

- 1) Carbohydratemetabolism - Glycolysis and TCA Cycle,
- 2) Lipid metobolism - P - Oxidation of Fatty acids
- 3) Protein metabolism - Urea cycle

V. Titrimetric methods of Quantitative determination, preparation of various solutions used in titrimetric analysis.

VI. Liver function tests :

- 1) Basic concepts including normal and abnormal bilirubin metabolism
- 2) Classification
- 3) Serum bilirubin determination
- 4) Vandenberg test
- 5) Total proteins and A/G ratio
- 6) Enzyme estimations as LFT.

VII. Renal function tests :

- 1) Basic concepts and classification
- 2) Clearance tests
- 3) Concentration and dilution tests and
- 4) Urine examination in assessing kidney function

VIII. Gastric function tests :

- 1) Basic concepts and introduction
- 2) Techniques of different tests including tubeless gastric analysis

IX. Thyroid function tests :

- 1) Basic Concepts
- 2) Estimations of various thyroid hormones, their interpretations
- 3) Recent methods of thyroid function tests

X. Pancreatic function tests

- 1) Basic concepts and introduction
- 2) Various tests done and methods including serum amylase determination

XI. Clinical Enzymology :

- 1) Introduction and Basic Concepts of Enzymes, Coenzymes and Isoenzymes

- 2) Importance of Enzymes
- 3) Transaminases
- 4) Cardiac Enzymes
- 5) Acid Phosphatase
- 6) Alkaline Phosphatase

XII. Body Fluids :

- 1) Outlines of formations of different body fluids
- 2) Composition & analysis of CSF including
 - a) CSF Sugar estimation
 - b) CSF Proteins estimation
 - c) CSF Chlorides estimationincluding interpretation of results

XIII. Automation and usage of computers in Biochemical Analysis

XiV. Quality assurance in Bio - Chemical laboratory.

- a) Introduction and importance of quality assurance, General principle
- b) Internal and external quality control

XV. Diagnostic tests

- a) Lipid profile - Serum cholesterol, HDL Cholesterol
- b) Glycosylated haemoglobin
- c) Serum Calcium
- d) Inorganic Phosphate
- e) Analysis of hormone metabolites
- f) Blood gas analysis

**PRACTICAL SYLLABUS
BIO-CHEMISTRY
II YEAR**

- 1) Electrophoretic fractionation of serum proteins and lipo proteins.
- 2) Separation of amino acids and carbohydrates by paper chromatography.
- 3) Determination of plasma prothrombin time
- 4) Oral glucose tolerance test
- 5) Estimation of serum calcium and inorganic phosphate
- 6) Practice and use of automated pipettes
- 7) Turbidimetric method of determination of plasma fibrinogen
- 8) Estimation of HDL cholesterol
- 9) Determination of Urinary 17 ketosteroids and VMA
- 10) Determination of CPK, LDH, GGT and G6PD activities
- 11) Determination of urine proteins by turbidimetric method
- 12) CSF analysis - Pandy's test, Nonne - Apelt
- 13) Demonstration of working of Auto analysers
- 14) Training of Computer basics
- 15) Estimation of serum sodium and potassium by Flame photometry
- 16) Estimation of serum bicarbonate by titrimetric method.
- 17) Demonstration of RIA
- 18) Demonstration of enzyme linked immuno assays
- 19) Qualitative identification of urine sugars
- 20) Qualitative identification of urine proteins
- 21) Qualitative identification of urine BS & BP
- 22) Gastric juice analysis, demonstration of stimulation tests

- 23) Renal Calculi analysis
- 24) Biliary Calculi analysis
- 25) Demonstration of Ion selective electrodes
- 26) Practice of Liver functions tests, and interpretation
- 27) Practice of Renal functions tests, and interpretations
- 28) Practice of Thyroid function tests and interpretations
- 29) Practice and interpretation of cardiac profile and lipid profile
- 30) Practice of quality control measures

**MODEL QUESTION PAPER
THEORY
BIO CHEMISTRY -II YEAR (MLT)**

Time : 3 Hours

Max. Marks : 50

Section - A

Note : (i) Answer all the Questions

(ii) Each Question carries 2 marks

2 x 10 = 20

1. What are transaminases? Give examples.
2. Write the clinical applications of chromatography and electrophoresis.
3. Name different hormones assayed by RIA.
4. Write the principle of Flame photometry
5. Define a) Glycolysis, b) Urea cycle
6. Mention various clearance tests done to assess renal functioning
7. Give the principle of vandenberghtest
8. What is quality assurance? Explain internal qualitycontrol
9. Mention lipid profile tests
10. What are different types of autoanalysers used in a biochemical laboratory.

Section - B

Note : (i) Answer any five Questions

(ii) Each Question carries 6 marks

5 x 6 = 30

11. Write about determination of Glycosylated haemoglobin and its clinical importance
12. Write the mechanism of enzyme action. How do you classify enzymes?
13. Explain abnormal bilirubin metabolism
14. List out various gastric function tests. Write about tubeless gastric analysis

15. How do you determine serum amylase? Give the principle, requirements and method
16. Discuss about automation in a biochemical laboratory
17. Define Primary standard and secondary standard Classify different titrimetric methods
18. Explain basic principles of immunochemical reactions, Write about RIA of T4.

**MLT - IIND YEAR
THEORY PAPAER - II
MICRO BIOLOGY & ANIMAL CARE**

Total Hours : 160

Max. Marks : 50

- I. Normal Flora of Micro-organisms in the Human Body.**
- II. Introduction of Immunology -**
 - a) Brief outline of Immunity
 - b) What are antigens
 - c) What are antibodies
 - d) Different-types of antigen and antibody reaction their application in the diagnostic, agglutination, precipitation, complement fixation, Neutralisation, RIA.
 - e) Principle and Method of ELISA Tests.
- III. Collection and processing of faeces samples, concentration techniques of stool for Microscope Examination**

Parasitology - Morphology and Lab diagnosis of E-Histolytica, Gardia, Trichomonas, Plasmodium, Leshmania, Ankylostoma - deodenale, Ascaris Lumbricoidus, Taenia, E-Granulosus, Enterobius - Vermicularis, Dracunculus Medinensis, Wucharia Ban crofti
- IV. Antibiotic sensitivity test - Preparation of Antibiotic discs**
- V. Preservation Methods of Stock cultures and their importance and principle procedure.**

VI. Brief outline of Morphology cultural characteristics and lab diagnosis of imp. pathogens

- a) Gram Positive - staphylococcus, Streptococcus, Pneumococcus
- b) Gram Negative - Gonococci, Meningococci
- c) Gram Positive Bacilli - Coryn- Diphtheria, Myco-tuberculosis, Mycro-leprae, B. anthracis
- d) Gram Negative Bacilli - Enterbacteriaceae - E.Coli, Klebsiella, salmonella, shigella, Enterobacter, proteous.
- e) Anaerobic Bacterial, Bacteriodes, clostridium
- f) Vibrio cholera - Pseudomonas
- g) H.influenza - B. Pertusis
- h) Spirochaetes - Treponema, leptospira, Borrelia
- i) Actinomyces & Nocardia

VII. Bacteriological examination and water, milk & food.

VIII. Mycology -

Morphology cultural characteristics and lab diagnosis

- a) Candida
- b) Cryptococcus
- c) Dermatophyta
- d) Aspergillus
- e) Penicillium

IX. Virology -

Classification, General properties and cultivation and imp . pathogenic viruses such as Measles, Mumps, Influenza, polio, Hepatitis, Rabies, Herpes, Rubella, HIV, Dengue, and J.E.

X. Vaccines -

classification and uses

XI. Layout of Animal House

XII. General principles of animal care - feeding, breeding and handling of animal and disposal of animal waste

XIII. Anaesthesia for animals, Euthanasia, Rethins, and frog

XIV. Techniques of drawing a blood from animals

XV. Common disease of the lab animals preventive, aspects and disposal of animals and related Material

MLT - IInd YEAR

MICROBIOLOGY

PRACTICALS

Total Hours : 160

Max.Marks:50

1. Collection of clinical materials like blood, urine, stool, sputum, swabs etc.
2. Parasitology - collection, preservation and transportation of faecal material for examination of parasites. Concentration techniques of stool for ova and cyst. Wet preparation of faecal sample for ova and cyst.

Identification of ova and cyst in stool sample.
3. Procedure of techniques of sputum for AFB.
4. Procedure of skin clipping of Leprae Bacilli.
5. Identification of organisms with Biochemical reactions of common organism like - staphylococcus, E.coli - Klebsiella, shigella, Salmonilla, Proteus, Psudomonas.
6. Antibiotic Sensitivity tests
7. Preservation of stock culture
8. Bacteriology of water
9. Bacteriology of Milk
10. Bacteriology of food

Mycology

11. Collection of specimen for fungal examination like skin scrapings, swabs, CSF.
12. Fungal examination by wet preparation
13. Fungal culture

Serology

14. VDRL Tests
15. Preparation of widal Antigens & widal tests
16. Brucella Agglutination test
17. Weil felix test
18. Paul Bunnel test
19. RA test
20. CRP test
21. TPHA

Virology

22. ELISA test
23. Western blot test
24. Incubation of fertile eggs and inoculation by various routes
25. Model layout of Animal House.
26. Feeding, breeding and handling of Animals
27. Techniques of drawing of blood from animals
28. Anesthesia for animals
29. Common diseases of the lab animals - and preventive aspects.

MLT - IIND YEAR
PAPER - III - THEORY
PATHOLOGY

Total Hours : 160

Max.Marks : 50

- I. Preparation of Blood smear examination -
Making ideal films - slide method, cover glass method and staining,
Morphology of RBC, WBC, Platelets and Haemoparasites.
Differential Leucocyte Count - counting and identification of cells
- Normal values, Morphology, procedure for smears and staining
clinical significance and limitation.
Absolute Eosinophil count - Materials, diluting fluid, procedure,
identifying and counting the cells.
- II. Special stains on peripheral blood smear and bonemarrow smears-
Ramanoskys stains, Leishman, Gemsa, wrights, Myeloperoxidase
stain, PAS (Periodic Acid Schiff) - Preparation, method and
selection of stain, Buffer Solution.
Bone Marrow Smear - Preparing smears, without crush artefacts
staining and clinical significance.
- III. Identification of Hemoparasites - Malarial Parasite, Microfilaria,
Leishman making thick and thin films procedure and identification
of parasite.
- IV. Sickle Cell Preparation - Principle, procedure and Methods,
Materials, clinical significance
- V. Osmotic fragility test - Methods used, materials procedure,
observation reporting, normal values, factors affecting,
interpretation.
- VI. Coagulation Tests
 - a) Bleeding time - methods, dukes, Ivy's procedure Normal value,
clinical significance
 - b) Clotting time - methods, Lee & White, procedure materials,
normal values, factors affecting coagulation clinical significance

- c) Prothrombin time (PT)
- d) APTT - in Detail
- VII. L.E. cell Test - Principle, procedure, materials reprotng, clinical significance and titration.
Buffy coat preparation - LE Cell Test, Microfilaria Abnormal cells.
- VIII. Basics of coulter counter
- IX. Autopsy - Aims & methods of performing Autopsy cleaning, suturing and retaning the body. Cleaning autopsy instruments, tables and rooms, preservation of organs.
Processing and preparation of Histopathology.
- X. Histopathology -
 - 1) Biopsy
 - 2) Processing of tissue
 - a) Fixation
 - b) Dehydration
 - c) Clearing
 - d) Impregnation
 - e) Mounting
 - f) Declacification of Bone
 - g) Routine Paraffin staining
 - h) Immuno histochemists
 - 3. Microtomes and Knifes
- XI. Musuem Techniques
 - Labelling & storage of specimens
 - Methods of color maintenance
 - Presentation of specimen
 - Mounting labelling and cataloging the specimen
 - Maintenance and cleanliness of the Museum
 - Disposal of waste, safety in the lab

XII. Immuno Haematology and Blood Banking

i) Introduction

2) Human blood group antigens, their inheritance and antihodies

3) ABO Blood group systems

4) RH Blood group system

5) Techniques of grouping and cross matching

6) Blood collection, Preservation and maintaining of Records

7) Coombs Test - a) direct b) indirect

IInd YEAR PATHOLOGY PRACTICAL

- I. Automatic Tissue Processer
- Microtome & Knives
- Centrifuge
- Hot air oven & Incubator
- Bism beaker, stop watch
- Glass Makers
- Simple balance & colorimeter
- Water bath - for tissue flotation
- Knowledge
- Maintenance & cleaning
- Care about tissue equipment

II. Maintenance & preservation of

- Cytology slides
- M.P. blocks & slides
- Histopathology specimens and process
- Preparation of form section material

III. Glass ware

- Microslides & coverstips
- Sample collection bottles
- Micropathology
- Cytology.

IV. Immuno Haematology & blood banking

- ABO blood grouping techniques
- RH Factor
- Coombs test - Direct & indirect methods

V. Histopathology

1. Fixation of biopsy tissue
2. Processing of tissue
 - Fixation
 - Dehydration
 - Clearing
 - Impregnation
 - Mounting
 - Decalcification
3. Mounting of museum specimens

VI. Cytology

- Fixations used
 - Fluid preparation for cytological exam
 - Slide preparation and staining
 - Pap staining
 - Mounting and preservation
- VII. Sickle Cell Preparation
- VIII. Bone Marrow Smears Preparation & Staining
- IX. Cougulation Test, BT, CT.

Recommended Books

1. Ramnik sood
2. Mukerjee 3 volumes
3. Talib
4. Praful Godkar
5. WHO Lab Manual

VII. List of Equipments

Biochemistry	1
1. Hot Plate	1
2. Gas Cylinder with Burner	1
3. Spirit lamps	15
4. Hand Centrifuges	5
5. Electrical Centrifuges	1
6. Refrigerator 165 lit.	1
7. Colorimeter	1
8. Hot air oven	1
9. Water bath	1
10. Analytical Balance	5
11. Physical Balance	2
12. Typewriter	
13. Flame photometer	1
14. Spectro Photometer	
15. Flourimeter	1
17. P ^H Meter	
18. Incubator	1
19. Electrophoresis apparatus	1
20. Computer	1
21. Semi auto analyser	1

Glassware

1. Test tubes	
18 x 150 mm -	100
15 x 150 mm -	100
15 x 125 mm -	100
2. Centrifuge tubes	

	16 x 100 mm -	200
3.	Fol in sugar tube	30
4.	Beaker-glass and polypropylene 250 ml	5
5.	Pipettes	
	a) Volumetric-capacity	
	2 ml -	6 Nos
	5 ml -	5 Nos
	10 ml -	6 Nos
	20 ml -	5 Nos
	25 ml -	5 Nos
	b) Serological blow out type	
	1 ml 1/100 -	10 nos.
	2 ml 1/100 -	10 nos.
	5 ml 1/100 -	10 nos.
	1.10 ml 1/10ml -	5 nos.
	2 ml 1/10 ml -	5 nos.
	0.1 ml 1/100 ml -	5 nos.
	0.2 ml 1/100 -	5 nos.
	c) Ostwald pipettes	
	0.1 ml -	4 Nos.
	0.2 ml -	4 nos.
	0.5 ml -	4
6.	Burettes	
	25 ml -	4
	50 ml -	4
7.	Reagent Bottles	
	60 ml -	10 nos.
	120 ml -	10 nos.
	250 ml -	20 nos.

	500 ml -	5 nos.
	100 ml -	5
8.	Dropper bottles 30 ml	5 nos.
9.	Watch glass (Assorted sizes)	- 6 Nos
10.	Volumetric Flasks	
	25 ml -	6 nos.
	50 ml -	6 nos.
	100 ml -	10 nos.
	250 ml -	10 nos.
	500 ml -	10 nos.
	1000 ml -	5 nos.
11.	Stoppered graduated Test Tubes	
	15 ml -	10 nos.
	40 ml -	10 nos.
	50 ml -	10 nos.
12.	Distillation assembly (glass)	
	Complete set	1
13.	Condensor	1
14.	Round Bottom	
	flask 500 ml -	1 no.
	1000 ml -	1 no.
15.	Filter Paper - Ordinary -	1 Ream
16.	Whatman Filter Paper 46x57 cm	No 1 - 20 sheet No 2 - 10 sheets
17.	Cotton (absorbant)	5 Rolls
18.	Glass slides	5 boxes
19.	Plastic Wash bottles	50 ml. 10 nos.
20.	Mortar/Pestle -	2 nos.

Microbiology

1.	Student Microscope -	5
2.	Centrifuge -	2
3.	Refrigerator -	1
4.	Autoclave -	1
5.	Hot air oven -	1
6.	Incubator -	1
7.	Inspissator -	1
8.	Deioniser -	1
9.	Distil water plant -	1
10.	Pipette washer -	1
11.	Anaerobic Jar -	1
12.	Vaccum Pump -	1
13.	Analytical Balance -	1
14.	Water Bath -	1
15.	VDRL Rotator -	1
16.	Electrophoresis apparatus -	1
17.	Petri dishes -	100 x 17 - 100 nos
18.	Test Tubers -	150 x 19 -100 100 x 12 -100
19.	Pipettes	
	10 ml -	10 nos.
	5 ml -	10 nos.
	1 ml -	10 nos.
20.	Wash bottles -	5
21.	Spatulas -	12
22.	Reagent bottles -	10
23.	Measuring Cylinders 50 ml -	5

Pathology

1.	Microscope	1
2.	Hot air oven	1
3.	Incubator	1
4.	Centrifuge	1
5.	Blood cell counter	2
6.	Water Bath	1
7.	Chemical Balance	1
8.	Hot plate	1
9.	Stopwatch	1
10.	Haemometer	5
11.	Haemocytometer	5
12.	ESR stand	5
13.	ESR Tubes	5
14.	Mortor and Pestle	2
15.	Urinometer	2
16.	Spiritlamp	2
17.	Syringe	
	20 ml -	10
	10 ml -	10
	5 ml -	5
	2 ml -	2
18.	Beaker	
	100 ml -	5
	250 ml -	5

VIII. A.Collaborating Institutions for Curriculum transaction

1. All Hospitals
2. All Medical Colleges
3. All the national laboratories
4. Regional Research Laboratories
5. University Departments
6. Pharmaceutical Companies and Education Institutes

B. On the Job Training Centres

1. Government Head Quarters Hospital
2. PHCs
3. Dispensaries
4. Medical colleges
5. Private Hospitals
6. Private labs

IX. Qualification of Lecturers

1. MBBS
2. MBS Hom/BHMS
3. B. Pharmacy
4. M.Sc. Microbiology/Biochemistry/MLT

X. Vertical Mobilities

A) With Bridge Course

- 1) B.SC (BZC)
- 2) Courses through EAMCET

B) Without Bridge Course

- 1) B.Sc. MLT
- 2) B.Sc. Microbiology
- 3) B.Sc. Biochemistry
- 4) B.Sc. Biotechnology
- 5) M.Sc. MLT/Biochemistry/Microbiology/Biotechnology
(at P.G. level)

XIII. REFERENCE BOOKS

1. Praful-Godkar - Text Book of Medical Lab Technology
2. Ramnik Sood - Text Book of Medical Lab Technology
3. K.M. Samuel - Manual for Medical Lab Technology
4. Harold Varley - Practical Clinical Biochemistry
5. Lehninger - Textbook of Biochemistry
6. Rama Rao - Textbook of Biochemistry
7. C.C. Chatterjee - Human Physiology
8. Chowrasia - Human Anatomy
9. Anantha Narayan - Text Book of Microbiology
10. Toratora - Anatomy & Physiology
11. Indesten Singh - Histology
12. Chaurasia - Gross Anatomy

VOCATIONAL CURRICULUM-2005

(With effect from the Academic Year 2005-2006)

CURRICULUM OF INTERMEDIATE VOCATIONAL

COURSE IN

MEDICAL LAB TECHNICIAN



**STATE INSTITUTE OF VOCATIONAL
EDUCATION &**

**BOARD OF INTERMEDIATE EDUCATION A.P.
Nampally, Hyderabad**

FOREWORD

The National Policy on Education (1986) while proposing educational reorganization, placed high priority on the programme of vocationalisation of education. It emphasized that well planned, systematic and rigorously implemented vocational education will create a distinct stream to prepare students for identified occupations encompassing several areas of activity. The primary aim of vocational courses was to cut across several occupational fields and prepare students with employable skills in organized sectors and self employment. Vocationalisation through re-orientation of educational strategies focused on creating a talent pool of skilled youth who are trained in courses relevant to the market and emerging needs of the various sections of the economy.

Inspired by this vision of the National Policy, the Government of Andhra Pradesh introduced Vocational Education at +2 level with an aim to diversify a sizeable segment of students at the senior secondary stage to the world of work. The State Government aimed at reducing the pressures on higher education through empowering youth by harnessing their capabilities. The requirement of skilled manpower industry is being fulfilled by charting a student's career with right options based on aptitude and talent. An right alternative to medical and engineering courses is envisaged in vocationalisation of education in the State.

In view of the changing needs of the students and growing demand for a spectrum of skill competencies in the economy, the Board of Intermediate Education has reviewed the curriculum of Vocational Courses in order to re-orient them based on their viability and practicability. The revised curriculum for Vocational Courses at Intermediate Level will come into effect from the Academic Year 2005-06 1st Year and from Academic Year 2006-07 for 2nd Year students.

I am confident that the revised curriculum will attract more and more students into vocational stream and help them train in need-based, productive courses leading to gainful employment.



SHASHANK GOEL

Secretary, BIE

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