VOCATIONAL CURRICULUM - 2020

Medical Lab Technician

State Institute of Vocational Education

O/o the Commissioner of Intermediate Education,
Telangana State, Hyderabad

&

Board of Intermediate Education

Telangana State, Hyderabad

Dr. A.Ashok I.A.S
COMMISSIONER

500001

INTERMEDIATE EDCATION
Government of Telangana
Nampally, Hyderabad-

Phone: 040-24655915

Fore word

In any developing society with a booming population, Vocational Education occupies an important position for generating large scale employment opportunities. Viewed in this context the importance of Vocational Education for our country cannot be over emphasized. Vocationalization of Secondary Education was introduced in 1988 at the Intermediate level. Recently, the Government of India has developed a National Skills Qualification Framework for establishing a clear path for vocational education from the school level to the highest level. The Department of Intermediate Education has recently framed a new curriculum to bring greater value to the system of vocational education. The primary aim of this reform is to prepare the students with employable skills for absorption in organized sectors and in few cases, even for self-employment.

State Institute of vocational education and Board of Intermediate Education, Telangana have reviewed the curriculum of vocational courses in order to reorient them for their practical approach. Greater emphasis is now being placed on Laboratory work and on the job training.

Simultaneously, The State Institute of Vocational Education and the department of Intermediate Education are presently making efforts to upgrade the quality of infrastructure in the colleges to meet the challenges of the changed curriculum. I am confident that the revised curriculum and the new text books would prove to be beneficial to the students in the vocational stream and help them train in need based productive courses leading to gainful employment.

Commissioner of Intermediate Education
Government of Telangana

MEDICAL LAB TECHNOLOGY

I Introduction

Diagnostics play an important and vital role in the field of medicine. Without the aid of proper diagnostics, accurate conclusions cannot be drawn and suitable medical or surgical treatment cannot be given. Preparation of reagents of the purest quality also needs special attention and care. Thus Medical Lab Technology Courses is gaining greater importance. Clinical advances & studies in the fields of medicine, surgery, Pharmaceutical industries and nutrition also require technicians.

The Medical Laboratory Technician course is designed to train man power to effectively carry out medical Laboratory Technical work in various departments of medical, dental, pharmacy colleges, peripheral laboratories, research and diagnostic centers and also to set up and run own clinical laboratories.

II.Objectives of the Course

- To train the students to work in diagnostic labs.
- To train the students to work in manufacturing units of diagnostic regents.
- To train the students to assist the qualified experts in these fields.
- To train the students to understand the organization of Hospitals, Research Laboratories etc.
- To train the students to attend to analytical work and Research & Development [R&D] work in drug labs and pharmaceutical industries.
- To Train the student to attend basic Emergency, diagnostic requirement to the patient in Day and night Duties.

III.Skills to be provided.

GENERAL SKILLS FOR FIRST YEAR MLT STUDENTS

- Identification of patient.
- Giving instructions to patients for 24 hour urine sample collection.
- Giving instructions to patients for GTT.
- Giving instructions to patients for semen sample collection.
- Giving instructions to patients for sputum sample collection.
- Giving instructions to patients for urine sample collection for culture.
- Collecting proper history relevant to the test.
- Preparation of patient for Phlebotomy.
- Technique of phlebotomy.
- Collecting sample in appropriate container.(Sample Collection)
- Preparing the sample for processing.
- Preservation and storage of specimen.
- Accurately processing of specimens.
- Appropriately discarding the specimens.
- Reception and registration of the sample
- Entering the report in register and dispatch of report..

- Handling of the Apparatus.
- Accurately measuring, weighing etc.
- Maintaining the electronic balance.
- Cleaning and sterilization of the apparatus.
- Disposal of Lab waste.
- Know Limitation of the Tests.

SKILLS IN PATHOLOGY FOR FIRST YEAR MLT STUDENTS

- Preparing the anticoagulants
- Preparing the Leishman's stain.
- Preparing peripheral blood smear.
- Staining of peripheral blood smear.
- Preparing and staining thick smear .
- Estimation of haemoglobin by Sahli's method and by photoelectric method.
- Estimation of ESR
- Estimation of PCV by Micro and Macro Methods.
- Physical examination of Urine.
- Chemical Examination of urine for sugars-manual method/strip method.
- Chemical Examination of urine for Ketone bodies-manual method/strip method.
- Chemical Examination of urine for Protiens-manual method/strip method.
- Chemical Examination of urine for blood-manual method/strip method.
- Chemical Examination of urine for bile salts -manual method/strip method.
- Chemical Examination of urine for bile pigments -manual method/strip method.
- Preparing wet smear for urine microscopy.
- Preparing processing the blood sample for reticulocyte count by wet and dry method.
- Charging the improved Neubauer chamber
- WBC Count by manual method.
- Platelet Count by manual method.
- Processing of body fluids for cell count.
- Processing of semen for sperm count.
- Coagulation Tests- Bleeding time, Clotting time, Prothrombin time [PT]& APTT
- Absolute Eosinophil count- Materials required, diluting fluids, procedure,
- Sickle cell preparation.
- Screening of blood donor.

SKILLS IN PATHOLOGY FOR SECOND YEAR MLT STUDENTS

- Performing Coombs Test – a) Direct b) indirect
- Staining of Cytological smears.
- Setting up of tray for bone marrow aspiration
- Preparing bone marrow smears – methods- Imprints smears, crush smears.
- Staining of bone marrow smear.
- Buffy coat preparation.
- Techniques of grouping and cross matching

- Receiving and preserving histopathology specimens.
- Maintaining the registers-receiving register, grossing register, slide register, report issue register.
- Taking the consent for investigation.
- Counseling of patient before and after test.
- Maintaining haematologyanalyser.
- Processing the sample in haematologyanalyser.
- Fixation of Histopathology specimen.
- Preparing the specimen for grossing.
- Processing of histopathology specimen manual and automated method.
- Paraffin embedding and block making
- Trimming of blocks
- Tissue section cutting.
- H&E Staining of tissue sections
- H&E Staining cytology slides.
- Mounting of slides
- Maintaining microtome and tissue processor and tissue floatation bath.
- Sharpening of microtome knife.
- Staining of histopathology sections.
- Fixatives for cytology specimens.
- Processing fluid sample for cytology.
- Preparing tray for FNAC and guided aspiration.
- PAP stain preparation and staining of smears.
- Maintenance & Preservation of cytology slides, histopathology blocks & slides.

SKILLS IN BIO-CHEMISRY FOR FIRST YEAR MLT STUDENTS

- Carefull Study of the requisition for the tests.
- Should learn to talk to patient politely and prepare them for blood drawing.
- Ability to identify the patient sample, and labeling and entry into the register.
- Transport of Sample to the Appropriate table for processing
- Should be able to handle the instruments with adequate care.
- Should be able to assist the senior technician in the lab.
- Should be able to dispose the Bio medical waste.
- Dispatch of the reports.

SKILLS IN BIO-CHEMISRY FORSECOND YEAR MLT STUDENTS

- Should be able to do estimations individually.(With Manual Procedures, Semi Auto Analyzers and Fully auto analyzer)
- Should be able to handle Semiauto analyzers.
- Should be able to handle automated pipettes.

SKILLS IN MICROBIOLOGY FOR FIRST YEAR MLT STUDENTS

- Reception area and its quality control.

- Cleaning and maintenance of equipment, glassware.
- Preparation of stains, culture media and sugar Medias.
- Disposal of lab waste

SKILLS IN MICROBIOLOGY FOR SECOND YEAR MLT STUDENTS

- Preparation of direct smears and staining of smears.
- Techniques of inoculation on media and biochemical sugars for the isolation of bacteria.
- Stool concentration techniques and microscopy of stool.
- Serological tests.
- Antibiotic sensitivity tests.
- Maintenance of stock cultures.
- Mycology processing

IV. Job Opportunities.

A. Wage Employment

1.Laboratory technicians in various departments in diagnostic centers.
2.Laboratory technicians in hospitals of various sectors.
3.Laboratory technicians in various departments in medical and pharmacy Colleges.
4.Laboratory Technicians in Clinical studies in various laboratories like
   i) National Institute of Nutrition.
   ii) Central Drug Research Laboratory
   iii) Molecular Biology Labs.
5.Laboratory Technicians in Quality Control, R&D Sectors of Drug Manufacturing units.

B. Self Employment

1. Preparation and sale of readymade reagent kits and media.
2. Distribution of Lab Chemicals, Glassware, Lab Instruments and their spare parts etc.

V. SCHEME OF INSTRUCTION AND EXAMINATION

ANNUAL SCHEME OF INSTRUCTION AND EXAMINATION

MEDICAL LAB TECHNICIAN

FIRST YEAR

Part-A		Theory		Practicals		Total	
		Periods	**Marks**	**Periods**	**Marks**	**Periods**	**Marks**
1.	English	150	50	-	-	150	50
2.	General Foundation course	150	50	-	-	150	50
Part-B							
3.	**Paper-1** Bio-Chemistry -I	135	50	135	50	270	100
4.	**Paper-II** Microbiology & Pathology	135	50	135	50	270	100
5.	**Paper-III** Anatomy & Physiology	135	50	135	50	270	100
	OJT	-	-	365	100	365	100
	TOTAL	**705**	**250**	**770**	**250**	**1475**	**500**

*on the Job Training for 1st year from 1stNovember to 31st December

SECOND YEAR

Part-A		Theory		Practicals		Total	
		Periods	Marks	Periods	Marks	Periods	Marks
1.	English	150	50	-	-	150	50
2.	General Foundation course	150	50	-	-	150	50
Part-B							
3.	**Paper-1** Bio-chemistry-II	110	50	115	50	225	100
4.	**Paper-II** Micro-biology	110	50	115	50	225	100
5.	**Paper-III** Pathology	110	50	115	50	225	100
Part-C							
6.	**OJT**	0	0	450	100	450	100
	Total	**630**	**250**	**795**	**250**	**1425**	**500**
TOTAL FIRST YEAR AND SECOND YEAR MARKS 1000							

*OJT Programme for 2nd year students from 1stAugust to 30thOctober

EVALUATION OF ON THE JOB TRAINING:

The "On the Job Training" shall carry 100 marks for each year and pass marks is 50. During on the job training the candidate shall put in a minimum of 90 % of attendance.

The evaluation shall be done in the last week of January.

Marks allotted for evaluation: 100

S.No	Name of the activity	Max. Marks allotted for each activity
1	Biometric Attendance and punctuality	30
2	Familiarity with technical terms	05
3	Familiarity with tools and material	05
4	Manual skills	05
5	Application of knowledge	10
6	Problem solving skills	10
7	Comprehension and observation	10
8	Human relations	05
9	Ability to communicate	10
10	Maintenance of logbook	10
	Total	100

NOTE: The On the Job Training programme mentioned is tentative. The spirit of On the Job training is to be maintained. The colleges are at liberty to conduct on the job training according to their local feasibility of institutions & industries. They may conduct the entire on the job training periods/hrs of 365 for 1st year and 450 hrs for 2nd year **either by conducting classes in morning session and send the students for OJT in afternoon session or two days in week or weekly or monthly or by any mode which is feasible for both the college and the institution**. However, the total assigned periods/hrs for on the job training should be completed before 31st December

SCHEME OF INSTRUCTION PER WEEK

	Part-A	**Theory**	**Practicals**	**Total**
1.	English	4	-	4
2.	General Foundation Course	4	-	4
	Part-B			
3.	Paper –I	4	4	8
4.	Paper-II	4	4	8
5.	Paper-III	4	4	8
	Total	**20**	**12**	**32**

MEDICAL LAB TECHNOLOGY
FIRST YEAR
PART B – VOCATIONAL SUBJECTS
PAPER – I: BIO - CHEMISTRY (THEORY)

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
1.	**Introduction and Scope of Biochemistry** Ethics and Disciplines Lab Ethics, Lab Discipline Importance of Patient and Patients Management for Medical Lab Technicians and Medical Lab Organizations	10	2	1	0
2.	**Reception, Identification, Registration of Bio-Chemical parameters for investigation**	10	2	1	0
3.	**Glassware and plastic ware used in bio-chemical laboratory**	08	6	0	1
	I. Glass ware:				
	a) Types of glassware, their identification, applications and uses.				
	b) Cleaning, drying, maintenance and storage of glassware.				
	II. Plastic ware: Brief outline.				
4.	Instruments used in Bio-Chemistry Lab:	08	6	0	1
	I. Colorimetry:				
	Visual and photoelectric methods, Design (parts), principles and laws involved construction, operation, applications, care and maintenance.				
	II. Spectrophotometry:				
	Principle, theory, types, construction, operation, applications and Maintenance.				
5.	**Basic Lab Operations**	08	6	0	1
	I. Separation of solids from liquids by				
	a) **<u>Centrifugation</u>**: Principle, Different types of centrifuges, construction of electrical centrifuge, Procedure, care, maintenance and applications.				
	b) Filtration – using funnel.				
	II. Weighing: Different types of balances – simple balance, electronic balance – operation, uses, care and maintenance.				
	III. Evaporation				
	IV. Distillation				
	V. Refluxing				
	VI. Drying different salts.				
6.	**Water Different Types, Chemicals and related substances**	08	2	1	0
	I. Purity of chemicals				
	II. Corrosives.				
	III. hygroscopic substances				
7.	• **<u>Hazards and Safety</u>**	8	6	0	1

MEDICAL LAB TECHNOLOGY

S.No	NAME OF THE UNIT		No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
		Physical, Chemical and Biological Hazards Awareness responsibility and measures of safety Prevention, communication and Control of Lab Hazards				
8.		**Collection of specimens**	08	8	1	1
	I.	Blood – Phlebotomy [How to draw the blood and precautions], types of Specimens, processing and preservation.				
	II.	Urine: Types of Specimens, Collection of 24 hours urine – Preservatives.				
9.		**Urine biochemical parameters.**	08	2	1	0
10.		**Units of measurements.**	08	2	1	0
11.		**Solutions**	**08**	**8**	**1**	**1**
		Types based on solute and solvent, Types based on method of expressing concentration, Percentage calculations.				
12.		**Carbohydrates**	**04**	**6**	**0**	**1**
		Carbohydrates- Definition, Biological importance, classification, qualitative tests.				
		Lipids: Definition, Biological importance, Classification and clinical importance.	4			
13.		**Proteins and Amino Acids**	**08**	**2**	**1**	**0**
		Definition, Biological importance of Proteins and Amino Acids Classification, Qualitative tests.				
14.		**Diagnostic Tests:** Blood Sugar- [GOD – POD Method] Blood urea [DAM-TSC Method, Enzymatic Method] Glucose tolerance Test [GTT] Serum Uric Acid Serum Creatinine [Jaffe's method /Alkaline picrate method]	**19**	**8**	**1**	**1**
15.		**Vitamins:**	**04**	**2**	**1**	**0**
		Vitamins classification Fat soluble vitamins, Water Soluble Vitamins, Sources, Daily requirements, Deficiency diseases.				
		Minerals: Sources, Daily requirements, Deficiency diseases.	**04**			
		Total	**135**	**68**	**10**	**8**

MEDICAL LAB TECHNOLOGY
FIRST YEAR
PART B – VOCATIONAL SUBJECTS
PAPER – I : BIO - CHEMISTRY [PRACTICALS]

S.No.	Name of the Unit.	No. Of Periods	Weightage in marks
1.	Reception and registration	**10**	3
2.	Collection of capillary blood	**10**	3
3.	Collection of venous blood.	**10**	4
4.	Collection of arterial blood.	**10**	4
5.	Separation of Serum and plasma from blood.	**10**	4
6.	Preparation of protein free blood filtrate.	**10**	4
7.	Lab glass ware a) Identification b) Handling c) Care and Maintenance d) Uses.	**10**	4
8.	Lab instruments a) centrifuges b) Balances c) Photo Electric Colorimeter d) Spectrophotometer	**10**	4
9.	Preparation of a) Percentage solutions b) Normal Solutions c) Molar Solutions.	**10**	4
10.	Qualitative identification tests for sugars	**10**	4
11.	Qualitative identification tests for proteins.	**10**	4
12.	Quantitative determination of Blood Sugar	**10**	3
13.	Semi Quantitative determination of Urine Sugar.	**15**	5
	Total	**135**	**50**

MEDICAL LAB TECHNOLOGY
FIRST YEAR
PART B – VOCATIONAL SUBJECTS
PAPER – II: MICROBIOLOGY & PATHOLOGY [THEORY]

S.No	NAME OF THE UNIT		No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
1.	**Introduction and Scope of Biochemistry** Ethics and Disciplines Lab Ethics, Lab Discipline Importance of Patient and Patients Management for Medical Lab Technicians and Medical Lab Organizations		10	**2**	**1**	**0**
2.	**Reception, Identification, Registration of Bio-Chemical parameters for investigation**		10	**2**	**1**	**0**
3.	**Glassware and plastic ware used in bio-chemical laboratory**		08	**6**	**0**	**1**
	I.	**Glass ware:**				
	a)	Types of glassware, their identification, applications and uses.				
	b)	Cleaning, drying, maintenance and storage of glassware.				
	II.	**Plastic ware:** Brief outline.				
4.	Instruments used in Bio-Chemistry Lab:		08	**6**	**0**	**1**
	I.	**Colorimetry:**				
		Visual and photoelectric methods, Design (parts), principles and laws involved construction, operation, applications, care and maintenance.				
	II.	**Spectrophotometry:**				
		Principle, theory, types, construction, operation, applications and Maintenance.				
5.	**Basic Lab Operations**		08	**6**	**0**	**1**
	I.	Separation of solids from liquids by				
	a)	**<u>Centrifugation</u>**: Principle, Different types of centrifuges, construction of electrical centrifuge, Procedure, care, maintenance and applications.				
	b)	Filtration – using funnel.				
	II.	Weighing: Different types of balances – simple balance, electronic balance – operation, uses, care and maintenance.				
	III.	Evaporation				
	IV.	Distillation				
	V.	Refluxing				
	VI.	Drying different salts.				
6.		**Water Different Types, Chemicals and related substances**	08	**2**	**1**	**0**
	I.	Purity of chemicals				
	II.	Corrosives.				
	III.	hygroscopic substances				
7.		• **<u>Hazards and Safety</u>** Physical, Chemical and Biological	8	**6**	**0**	**1**

MEDICAL LAB TECHNOLOGY

S.No	NAME OF THE UNIT		No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
		Hazards Awareness responsibility and measures of safety Prevention, communication and Control of Lab Hazards				
8.		**Collection of specimens**	08	**8**	**1**	**1**
	I.	Blood – Phlebotomy [How to draw the blood and precautions], types of Specimens, processing and preservation.				
	II.	Urine: Types of Specimens, Collection of 24 hours urine – Preservatives.				
9.		**Urine biochemical parameters.**	08	**2**	**1**	**0**
10.		**Units of measurements.**	08	**2**	**1**	**0**
11.		**Solutions**	**08**	**8**	**1**	**1**
		Types based on solute and solvent, Types based on method of expressing concentration, Percentage calculations.				
12.		**Carbohydrates**	**04**	**6**	**0**	**1**
		Carbohydrates- Definition, Biological importance, classification, qualitative tests.				
		Lipids: Definition, Biological importance, Classification and clinical importance.	4			
13.		**Proteins and Amino Acids**	**08**	**2**	**1**	**0**
		Definition, Biological importance of Proteins and Amino Acids Classification, Qualitative tests.				
14.		**Diagnostic Tests:** Blood Sugar- [GOD – POD Method] Blood urea [DAM-TSC Method, Enzymatic Method] Glucose tolerance Test [GTT] Serum Uric Acid Serum Creatinine [Jaffe's method /Alkaline picrate method]	**19**	**8**	**1**	**1**
15.		**Vitamins:**	**04**	**2**	**1**	**0**
		Vitamins classification Fat soluble vitamins, Water Soluble Vitamins, Sources, Daily requirements, Deficiency diseases.				
		Minerals: Sources, Daily requirements, Deficiency diseases.	**04**			
		Total	**135**	**68**	**10**	**8**

MEDICAL LAB TECHNOLOGY
FIRST YEAR
PART B – VOCATIONAL SUBJECTS
PAPER – II : MICROBIOLOGY & PATHOLOGY [PRACTICAL]

S.No	Name of the Unit	No. of Periods	Weightage in marks
	MICROBIOLOGY		
I	Lab instructions for personal safety precautions Good Laboratory Practices.	10	3
II	Receiving, Rejection criteria of a specimen, Registration	10	3
III	Cleaning of glassware (Old and New), and maintenance of lab equipment	5	2
IV.	• Maintenance of Lab Equipment • Centrifuge, Incubator, Bio Safety Cabinet, Autoclave, Hot air Oven, Water bath		
V.	Handling and care of Microscope.	10	3
VI.	Operation of Autoclave, incubator, water bath, Hot air oven, Deep-freezer, centrifuge etc.,	10	3
VII.	Preparation of various media and biochemical sugars.	10	3
VIII.	Preparation of stains and smears.	10	4
IX	Quality control IQC and EQAS	10	4
X	Culture Techniques and inoculation methods		
XI	Bio Medical Waste Management		
	Syllabus for OJT same as above.		
I	**PATHOLOGY**		
II	Collection of blood - Receipt of requisition forms - Receipt of samples - Labeling	10	5
III	Universal precautions	5	2
IV	Preparation of anticoagulants	08	3
V.	RBC, WBC & Platelet count.	08	3
VI.	ESR stands & ESR estimation.	08	3
VII	PCV – estimation.	5	2
VIII	Hb estimation by different methods.	08	3
	Urine- physical examination, Chemical examination & Microscopic examination. - collection - Preservatives - Strip method.	08	4
	Total	**135**	**50**

MEDICAL LAB TECHNOLOGY
I YEAR
PART B – VOCATIONAL SUBJECTS
PAPER – III: ANATOMY & PHYSIOLOGY [THEORY]

S.No.	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
I & II	**Basics in Human Anatomy & Physiology**				
1 & 13.	Introduction to Human Anatomy. Introduction to Human Physiology	6+6	2	1	0
2 & 14.	Cell – Definition, Structure and properties. Tissue – Classification in brief [epithelial, connective, muscular, nervous] Muscle physiology & Nerve physiology	6+6+6	8	1	1
3 & 16.	Respiratory system	6+5	8	1	1
4 & 17.	Digestive system & Hepato Biliary system	6+6	8	1	1
5 & 18.	Cardio-vascular system.	5+5	8	1	1
6 & 15.	Lymphatic system. Blood & Lymph	5+5	2	1	0
7.	Bones & Joints.	5	6	0	1
8, 12 & 22.	Nervous system – CNS Sense organs- Eye, ear, Skin, nose, tongue Nervous system [CNS] & Sense organs [Eye, ear, skin, nose, tongue]	5+5+10	8	1	1
9 & 19.	Excretory system – Urinary system	5+5	8	1	1
10 &20.	Endocrine system	5+9	8	1	1
11 & 21.	Reproductive system- Male & Female	5+10	2	1	0
	Total	**135**	**68**	**10**	**8**

MEDICAL LAB TECHNOLOGY

I YEAR

PART B – VOCATIONAL SUBJECTS

PAPER – III: ANATOMY & PHYSIOLOGY [PRACTICAL]

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks
I	**Human Skeleton**		
1.	Name of the Bones- Identification points, Surfaces of [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, vertebrae, sternum	30	10
2.	**Human Organs[POP Models]**	**20**	**09**
	Brain, Stomach, Lungs, Intestines, Heart, Kidney, Liver, Uterus, Spleen, Fallopian tubes.		
3.	**Human Slides [Permanent Slides]**	**30**	**10**
	Epithelial Tissue. Connective Tissue. Muscular Tissue. Nervous Tissue. Liver Kidney Spleen Pancreas Lymph nodes Skin Testes Ovary Uterus Tonsil Stomach layers Small intestine Large intestine.		
4.	**Blood pressure**	**15**	**5**
	Estimation of Blood pressure		
5.	T.P.R. [Temperature, pulse, respiration] chart	**10**	**05**
6.	TC,DLC [RBC Total Count, WBC Total Count, differential Leucocytes count]	**30**	**11**
	Total	**135**	**50**

MEDICAL LAB TECHNOLOGY
SECOND YEAR
PART B – VOCATIONAL SUBJECTS
PAPER – I : BIO- CHEMISTRY [THEORY]

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
I	**Instrumental methods of Bio-Chemical Analysis**	**10**	**6**	**0**	**1**
	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. New Instrument Automated Electrolyte Analyzer				
	2. Fluorometry: Definition Principle, Theory and Construction of Fluorometer and its clinical Applications, general and Clinical applications.				
II	**Separation Techniques.**	**10**	**8**	**1**	**1**
	1. Electrophoresis: Definition and basic principle, Procedure, Different types, and Clinical Applications, Example:- Electrophoretic fractionation of serum protein and Serum lipo proteins.				
	2 Chromatography: Definition, Basic Principles, Different types, Procedure and Clinical applications.				
III.	**Immuno Assays – Definition, Basic Principles of Immuno chemical reactions and immune assays.**	**10**	**2**	**1**	**0**
	1. Radio immune assays. Introduction to radioactivity, Radioactive substances and its applications Ex:- Thyroid Hormone Assays [T3,T4,TSH]				
	2. Enzyme linked immune sorbent assays (ELISA). Description, Instruments used in these assays, Applications				
IV.	**Metabolism:**	**10**	**6**	**0**	**1**
	1. Carbohydrate metabolism – Glycolysis, TCA Cycle and Gluconeogenesis.				
	2. Lipid metabolism- β-Oxidation of Fatty Acids.				
	3. Protein metabolism – Urea cycle.				
V.	**Titrimetric methods of quantitative determination, preparation of various solutions used in Titrimetric analysis.**	**5**	**2**	**1**	**0**
	Organ Function Tests				
VI	Liver Function Tests[LFT]: Functions of Liver	**10**	**8**	**1**	**1**

S.No		NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
		Metabolism of Hb. Bilirubin Explanation Jaundice and its types Determination of Serum Bilirubin(Vandenberg's Tests)				
	4.	Determination of total Serum proteins (Albumin and Globulin) & A/G Ratio.				
	5.	Estimation of Enzymes – SGOT, SGPT, Alkaline Phosphatase (ALP) & Acid phosphatase				
VII.		**Kidney function tests [KFT/RFT]:** **Functions of Kidney** **Synthesis of Urea** **Basic Concepts** **Estimation of Blood Urea** **DAM-TSC Method** **Estimation of Serum Creatinine [Jaffe's Method / Alkaline Picrate]** **Clearance Test - Definition** **Creatinine Clearance, Urea Clearance** **Urine Examination in accessing KFT** **Abnormal Constituents of Urine (Sugar Ketone bodies, Protein Blood bile salts and bile pigments)**	**10**	**8**	**1**	**1**
VIII.		**Gastric Function Tests [GFT]**	**5**	**2**	**1**	0
	1.	Introduction & Basic concepts.				
	2.	Estimation of Free HCL combined Acids – Clinical significance.				
IX.		**Thyroid Function Tests [TFT]**	**5**	**2**	**1**	0
	1.	Introduction - Thyroid Gland and its Functions				
	2.	Estimation of Thyroid Hormones [T3,T4,TSH] - Methods – RIA &Chemiluminiscence and its Clinical significance.				
X.		**Pancreatic Function Test [PFT]**	**5**	**2**	**1**	0
	1.	Introduction of Basic concepts.				
	2.	Determination of Serum amylase.				
XI.		**Clinical Enzymology :**	**5**	**6**	**0**	1
	1.	Introduction & Basic concepts of Enzymes, Co-Enzymes, Iso Enzymes.				
	2.	Importance of Enzymes.				
	3	Liver Enzymes - SGPT, ALP and GGT				
	4	Cardiac Enzymes – CPK, LDH, SGOT.				
	5.	Acid Phosphatase.				
XII.		**Body Fluids:**	**5**	**2**	**1**	0
	1.	Outlines of formations of different body fluids				
	2.	Composition & Analysis of CSF including.				

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
	a) CSF Sugar estimation b) CSF Proteins estimation c) CSF Chlorides estimation. Including interpretation of results.				
XIII.	**Automation of Biochemistry Labs and usage of Computers.**	**5**	**6**	**0**	1
XIV	**Quality Control**	**5**	**2**	**1**	0
	a) Introduction and importance of quality assurance, General principle. b) Internal and external quality control.				
XV	**Diagnostic Tests :**	**10**	**6**	**0**	**1**
	• Blood Glucose • Blood Urea • Serum Creatinine • Plasma Proteins • Lipid Profile - Serum Total cholesterol, Tri Glycerides HDL Cholesterol, LDL cholesterol and VLDL Cholestrol. • GlycoselatedHaemoglobin • Serum Calcium and Inorgonic Phosphate • Arterial Blood Gas Analysis [PH, PO2 AND PCO2]				
		110	**68**	**10**	**8**

[

MEDICAL LAB TECHNOLOGY
SECOND YEAR
PART B – VOCATIONAL SUBJECTS
PAPER – I : BIO- CHEMISTRY [PRACTICALS]

S.No.	Name of the Unit	No. Of Periods	Weightage in marks
I.	**BLOOD TESTS**		
	Estimation of Blood Glucose	10	10
	Estimation of Blood Urea		
	Estimation of Serum Creatinine		
	Plasma Proteins		
	Estimation of Serum Cholestrol		
	Lipid Profile		
	Enzymes a) SGOT b) SGPT c) ALP		
	Vandenberg's Test (Estimation of Bilirubin)		
	Estimation of Calcium and Inorganic Phosphates		
	Estimation of Serum Electrolytes		
	URINE TESTS	5	6
	Identification of Ab normak constituents of Urine		

	(Sugar, Ketone Bodies, Protein, Blood, Bilesalts and Bilepigments)		
	DEMONSTRATION	5	3
	Oral Glucose Tolerance Test(OGTT)		
	Electrophorosis		
	Chromatography		
	CSF ANALYSIS	3	2
	Bio Chemical Analysis of Sugar and Proteins		
1.	Electrophoretic fractionation of serum proteins and lipo proteins – Demo.	3	2
2.	Separation of amino acids and carbohydrates by paper chromatography – Demo.	3	2
3.	Determination of plasma prothrombin time	2	2
4.	Oral glucose tolerance test [GTT]- Demo	2	2
5.	Estimation of serum calcium and inorganic phosphate.	2	2
6.	Practice and use of automated pipettes.	5	2
7.	Estimation of HDL cholesterol.	5	2
8.	Determination of urine proteins by turbidmetric method – [Sulfosalysilic Acid]	5	2
9.	CSF analysis – Pandy's test Nonne-Apelt – Sugars, Proteins	5	2
10.	Demonstration of working of Auto analysers.	10	5
11.	Training of Computer basics.	15	7
12.	Estimation of serum sodium and potassium by Flame photometry.	5	3
13.	Qualitative identification of urine sugars.	5	2
14.	Qualitative identification of urine proteins [Heat Coagulations}	5	2
15.	Qualitative identification of urine Bile Salts & Bile Pigments.	5	2
16.	Determination of Serum Bilirubin, SGPT & Alkaline Phosphatase [LFT]	10	5
17.	Determination of Blood Urea and serum creatinine [KFT]	10	4
18.	Practice and interpretation of lipid profile.	5	2
	Total	**115**	**50**

MEDICAL LAB TECHNOLOGY
SECONDYEAR
PART B – VOCATIONAL SUBJECTS
PAPER – II: MICROBIOLOGY [THEORY]

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
I	**Normal Flora of Micro-organisms in the Human Body**	**5**	**2**	**1**	**0**
II	**Introduction to Immunology:**	**10**	**8**	**1**	**1**
a)	Brief outline of Immunity				
b)	What are antigens?				
c)	What are antibodies?				
d)	Different types of antigen and antibody reactions, their applications in the diagnostics - agglutination, precipitation, complement fixation, Neutralisation, RIA.				
e)	Principle and method of ELISA Test.				
III	**Collection and processing of faecal samples, concentration techniques of stool for Microscopic Examination**	**10**	**8**	**1**	**1**
	Parasitology : - E - histolytica - Giardia lambia - Plasmodium spp. - Ascarislumbricoidis - Taeniasolium - Enterobiusvermicularis - Wucherariabancrofti. W.Malayi. W.Loaloa.				
IV.	**Antibiotic sensitivity Test – preparation of Antibiotic discs.**	**5**	**6**	**0**	**1**
V.	**Preservation methods of stock cultures and their importance and principle - procedure**	**5**	**2**	**1**	**0**
VI.	**Brief outline of Morphology cultural characteristics and Lab diagnosis of imp. Pathogens.**	**25**	**14**	**1**	**2**
a)	Gram Positive – Staphylococcus, Streptococcus, Pneumococcus				
b)	Gram Negative cocci– Gonococci, Meningococci.				
c)	Gram Positive Bacilli- Corynebacterium – diphtheriae, Mycobacterium tuberculosis, Mycobacterium leprae				

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
d)	Gram Negative Bacilli – Enterobacteriaceae – E.coli, Klebsiella, Salmonella, Shigella.				
e)	Anaerobic Bacteria- Bacteriodes, Clostridium spp.				
f)	Vibriocholera, Pseudomonas.				
g)	H.influenza, B.pertusis.				
h)	Spirochetes- Treponema, Leptospira.				
i)	Actinomyces&Nocardia.				
VII.	**Bacteriological Examination of Water, Milk & Food.**	**10**	**8**	**1**	**1**
VIII.	**Mycology**	**15**	**8**	**1**	**1**
	Morphology, cultural characteristics and lab diagnosis of : Candida, Cryptococcus, Dermatophytes, Aspergillus, Penicillum.				
IX	**Virology**	**10**	**8**	**1**	**1**
	Classification, General properties and cultivation of imp. pathogenic viruses such as Polio, Hepatitis, Rabies, HIV and Dengue.				
X.	**Quality Control in Laboratory.**	**10**	**2**	**1**	**0**
XI	**Automation in Clinical Laboratories - in brief.**	**5**	**2**	**1**	**0**
	Total	**110**	**68**	**10**	**8**

MEDICAL LAB TECHNOLOGY
SECOND YEAR
PART B – VOCATIONAL SUBJECTS
PAPER – II : MICROBIOLOGY [PRACTICAL]

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks
1.	Parasitology a) Collection, preservation and transportation of faecal material for examination of parasites. b) Concentration techniques of stool for ova and cysts. c) Wet preparation of faecal sample for ova and cysts.	10	5
2.	Procedure, processing of sputum for AFB	5	2
3.	Procedure of skin clipping of leprae bacilli.	5	2
4.	Inoculation techniques on media and putting up biochemical reactions for the isolation of common organisms like – Staphylococcus, E.coli, Klebsiella, Shigella, Salmonella, Proteus, Pseudomonas, Automated Identification Systems	10	4
5.	Preparation of antibiotic discs and putting Sensitivity Tests, Automated Sensivity Testing Systems.	10	6
6.	Preservation and Maintenance of Stock Cultures.	5	2
7.	Collection and processing of Clinical Samples for Culture. a) Blood • Collection of Blood • Blood Culture Media • Incubation • Direct Staining • Subculture and Identification • Automated Bed Culture System b) Urine • Sample Collection, Transport and Storage • Media for inoculation • Incubation • Semi Quantitative Colony Count c) Stool • Sample Collection, Transport and Storage • Media – Transport, Enrichment, Selective • Inoculation of Media • Identification of Pathogens d) Sputum • Sample Collection • Adequacy of Specimen • Inoculation of Media • Identification of Pathogens e) Exudates – Pus / Throat Swab, Vaginal Swab etc., • Sample Collection • Direct Smear • Inoculation of Media • Identification of Pathogens	15	5

	f) Sterile Fluids • CSF • Centrifugation • Direct Smear • Inoculation of Media • Identification of Pathogens g) Other Fluids – Peritoneal, Pleural, Liver Aspirates • Sample Collection • Centrifugation • Direct Smears • Inoculation of Media • Identification of Pathogens		
8.	Collection of specimen for fungal examination like skin scrapings, CSF & Nail clippings.	5	2
9.	Processing like germ tube tests ,culture of samples, LCB Mounts	5	2
	Serology		
10.	CRP, ASO, RA, VDRL, Widal, Brucella, ELISA, Western blot tests.	35	16
	Virology		
11.	• Incubation of fertile eggs and inoculation by various routes • Collection of Swabs for Swine flu	5	2
12.	Laboratory Information System	5	2
	Total	**115**	**50**

❖ **Syllabus for OJT same as above.**

MEDICAL LAB TECHNOLOGY
SECOND YEAR
PART B – VOCATIONAL SUBJECTS
PAPER – III: PATHOLOGY [THEORY]

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
I	Preparation of blood smears and examination: - Thin & thick blood films. - Making an ideal blood film. - Methods – slide method, Cover slip method - Staining – composition, preparation & procedure of leishman stain. - Knowledge about Romanowsky stains. - Examination – Morphology & Identification of RBC, WBC & Platelets Counting – DLC – Counting methods, Normal values, clinical significance and limitations. - Oils used for immersion- types	08	8	1	1
II	Special stains for Bone marrow smears : - Giemsa, Wrights, Myeloperoxidase stain, Periodic Acid Schiff [PAS]- Composition, Preparation, procedure and interpretation.	5	2	1	0
III	Bone Marrow Aspiration / trephine biopsy : - Setting up of tray for bone marrow aspiration - Preparing smears – methods- Imprints, crush. - Staining, clinical significance.	5	2	1	0
IV	Identification of hemoparasites : - Morphology of malaria parasite, microfilaria, leishmania, trypanosomiasis. - Importance of sample collection time. - Making thick and thin smears. - Procedure of making & staining the smears. - Identification of the parasite.	5	6	0	1
V	Absolute Eosinophil count : - Materials required, diluting fluids, procedure, and identification and counting of cells.	5	2	1	0
VI	Sickle cell preparation: - Principle, procedure, methods, Materials required, clinical significance.	5	6	0	1
VII	Osmotic fragility test : - Methods used, materials required, procedure, observation, reporting, Normal values, factors affecting and interpretation.	5	2	1	0
VIII	Coagulation Tests: a) Bleeding time- methods- Dukes method, lvy's method – procedure, normal values and clinical significance. b) Clotting time – methods- Lee & White, capillary tube method- procedure,	08	6	0	1

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
	materials, normal values, factors affecting coagulation and clinical significance. c) Prothrombin time [PT] d) APTT e) Introduction to Coagulometers				
IX	Buffy coat preparation : L.E. cells, microfilaria and abnormal cells.	5	2	1	0
X. *	L.E cell Test : - Principle, procedure, material required, reporting, clinical significance.	5	2	1	0
XI.	Basics of cell counter : - Diluting fluids - Maintenance of counter. - Quality Control and is significance	5	2	1	0
XII.	Histopathology : - Maintenance of Registers – receiving register, gross register, Slide register and report issue register. - Biopsy & tissue specimens – Example: Thyroid, GIT, breast, soft tissue, bone etc. - Fixatives - processing - Dehydration - clearing - Impregnation - paraffin embedding and block making - Trimming of blocks. - Tissue cutting [Microtomes] - Staining of the sections. - Mounting & Mounting Media, cover slips, labeling. - Decalcification of bone & calcified tissue. - Routine Hematoxylin& Eosin staining. - Immunohistochemistry. - Special stains- PAS, Reticulin, Perls, Masson's Trichrome etc. - Filing of slides, storing of blocks etc.	13	6	0	1
XIII.	Microtomes & Knives: - Types of Microtomes – Maintenance. - Sharpening of Knives – Honing & Stropping - Disposable Blades – Types and Care - Advantages and dis-advantages of frozen section cutting.	08	2	1	0
XIV	Cytology : - FNAC - Guided aspiration - Pap smear - Cytospin – equipment – machine, Procedure, material, laying a tray for the procedure. - Making smears, staining & mounting cover slip, labeling. - Identification & Interpretation – basics.	08	6	0	1
XV	Museum techniques:	5	6	0	1

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
	- Labeling & storage of specimens - Methods of color maintenance. - Presentation of specimen. - Mounting, Labeling and cataloging the specimen - Maintenance and cleanliness of the Museum. - Disposal of waste, - Safety in the lab.				
XVI	Autopsy : -Aims & methods of performing Autopsy, cleaning, suturing and restoring the body. Cleaning the autopsy instruments, tables and rooms, preservation of organs.	5	2	1	0
XVII.	ImmunoHematology and Blood Banking: - Introduction - Human blood group antigens, their inheritance and antibodies. - ABO Blood group systems. - RH Blood group system. - Techniques of grouping and cross matching. - Blood collection, screening of donor, preservation and maintenance of records. - Coombs Test – a) Direct b) indirect.	10	6	0	1
	Total	**110**	**68**	**10**	**8**

MEDICAL LAB TECHNOLOGY
SECOND YEAR
PART B – VOCATIONAL SUBJECTS
PAPER – I : BIO- CHEMISTRY [THEORY]

S.No	NAME OF THE UNIT		No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
I	**Instrumental methods of Bio-Chemical Analysis**		**10**	**8**	**1**	**1**
	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. New Instrument Automated Electrolyte Analyzer				
II		**Separation Techniques.**	**10**	**8**	**1**	**1**
	1.	Electrophoresis: Definition ,basic principle,and Clinical Applications, Example:- Electrophoretic fractionation of serum protein and Serum lipo proteins.				
	2	Chromatography: Definition, Basic Principles, Different types, Procedure and Clinical applications of Paper Chromatography				
III.		**Immuno Assays – Definition and Basic Principle.**	**10**	**8**	**1**	**1**
	1.	Radio immune assays. Introduction and Clinical Applications.				
	2.	Enzyme linked immune sorbent assays (ELISA). Description, Instruments used in these assays, Applications				
IV.		**Metabolism:**	**10**	**6**		**1**
	1.	Carbohydrate metabolism – Glycolysis, TCA Cycle.				
	2.	Lipid metabolism Importance				
	3.	Protein metabolism – Importance				
V.		**Titrimetric methods of quantitative determination. Concept of stock standard solutions, working standard solutions.**	**5**			
		Organ Function Tests				
VI		Liver Function Tests[LFT]: Determination of Serum Bilirubin(Vandenberg's Tests)	**10**	**8**	**1**	**1**

S.No	NAME OF THE UNIT		No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
	4.	Determination of total Serum proteins (Albumin and Globulin) & A/G Ratio.				
	5.	Estimation of Enzymes – SGOT, SGPT, Alkaline Phosphatase (ALP) & Acid phosphatase				
VII.		**Kidney function tests [KFT/RFT]:** **Introduction and classification** **Estimation of Blood Urea** **DAM-TSC Method** **Estimation of Serum Creatinine** **[Jaffe's Method / Alkaline Picrate]** **Clearance Test - Definition** **Creatinine Clearance, Urea Clearance**	**10**	**8**	**1**	**1**
VIII.		**Gastric Function Tests [GFT]**	**5**	**2**	**1**	
	1.	Introduction .				
	2.	Estimation of Free HCL combined Acids – Clinical significance.				
IX.		**Thyroid Function Tests [TFT]**	**5**	**2**	**1**	
	1.	Introduction - Thyroid Gland and its Functions				
	2.	Estimation of Thyroid Hormones [T3,T4,TSH] - Methods – RIA & Chemiluminiscence and its Clinical significance.				
X.		**Pancreatic Function Test [PFT]**	**5**	**2**	**1**	
	1.	Introduction of Basic concepts.				
	2.	Determination of Serum amylase.				
XI.		**Clinical Enzymology :**	**5**	**6**	**1**	
	1.	Introduction & Basic concepts of Enzymes, Co-Enzymes, Iso Enzymes.				
	2.	Importance of Enzymes. In Diagnosis of Liver and Cardiac condition				
	3	Liver Enzymes - SGPT, ALP and GGT				
	4	Acid Phosphatase.				
XII.		**Body Fluids:**	**5**	**2**	**1**	
	1.	Outlines of different body fluids				
	2.	Analysis of CSF including.				

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
	d) CSF Sugar estimation e) CSF Proteins estimation f) CSF Chlorides estimation. Including interpretation of results.				
XIII.	**Automation of Biochemistry Labs and usage of Computers in Medical field**	**5**	**6**	**1**	
XIV	**Quality Control**	**5**			
	c) Introduction and importance of quality assurance,Internal and external quality control.				
XV	**Diagnostic Tests :**	**10**	**8**	**1**	
	• Blood Glucose • Lipid Profile - Serum Total cholesterol, Tri Glycerides HDL Cholesterol, LDL cholesterol and VLDL Cholestrol. • Glycoselated Haemoglobin • Serum Calcium and Inorgonic Phosphate				
		110			**1**

MEDICAL LAB TECHNOLOGY
SECONDYEAR
PART B – VOCATIONAL SUBJECTS
PAPER – II: MICROBIOLOGY [THEORY]

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
I	**Normal Flora of Micro-organisms in the Human Body**	**5**	**2**	**1**	
II	**Introduction to Immunology:**	**10**	**8**	**1**	**1**
a)	Brief outline of Immunity				
b)	What are antigens?				
c)	What are antibodies?				
d)	Different types of antigen and antibody reactions, their applications in the diagnostics - agglutination, precipitation, complement fixation, Neutralisation, RIA.				
e)	Principle and method of ELISA Test.				
III	**Collection and processing of faecal samples, concentration techniques of stool for Microscopic Examination**	**10**	**8**	**1**	**1**
	Parasitology : - E - histolytica - Plasmodium spp. - Taenia solium				
IV.	**Antibiotic sensitivity Test – preparation of Antibiotic discs.**	**5**	**6**		**1**
V.	**Preservation methods of stock cultures and their importance and principle procedure.**	**5**	**4**	**2**	
VI.	**Brief outline of Morphology cultural characteristics and Lab diagnosis of imp. Pathogens.**	**25**	**16**	**2**	**2**
a)	Gram Positive – Staphylococcus, Streptococcus, Pneumococcus				
b)	Gram Negative cocci– Gonococci, Meningococci.				
c)	Gram Positive Bacilli- Corynebacterium – diphtheriae, Mycobacterium tuberculosis, Mycobacterium leprae				
d)	Gram Negative Bacilli – Enterobacteriaceae – E.coli, Klebsiella, Salmonella, Shigella.				
e)	Anaerobic Bacteria- Bacteriodes,				

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
	Clostridium spp.				
f)	Vibriocholera,.				
g)	H.influenza, B.pertusis.				
h)	Spirochetes- Treponema.				
i)	Actinomyces & Nocardia.				
VII.	**Bacteriological Examination of Water, Milk & Food.**	**10**	**10**	**2**	**1**
VIII.	**Mycology.**	**15**	**12**	**3**	**1**
	Morphology, cultural characteristics and lab diagnosis of : Candida, Cryptococcus, Dermatophytes, Aspergillus, Penicillum.				
IX	**Virology**	**10**	**8**	**1**	**1**
	Classification, General properties and cultivation of imp.pathogenic viruses such as Polio, Hepatitis, Rabies, HIV and Dengue.				
X.	**Quality Control in Laboratory.**	**10**	**8**	**1**	**1**
XI	**Automation in Clinical Laboratories - in brief.**	**5**	**6**		**1**
	Total	**110**			

MEDICAL LAB TECHNOLOGY
SECOND YEAR
PART B – VOCATIONAL SUBJECTS
PAPER – II : MICROBIOLOGY [PRACTICALS]

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks
1.	Parasitology d) Collection, preservation and transportation of faecal material for examination of parasites. e) Concentration techniques of stool for ova and cysts. f) Wet preparation of faecal sample for ova and cysts.	10	5
2.	Procedure, processing of sputum for AFB	5	2
3.	Procedure of skin clipping of leprae bacilli.	5	2
4.	Inoculation techniques on media and putting up biochemical reactions for the isolation of common organisms like – Staphylococcus, E.coli, Klebsiella, Shigella, Salmonella, Proteus, Pseudomonas, Automated Identification Systems	10	4
5.	Preparation of antibiotic discs and putting Sensitivity Tests, Automated Sensivity Testing Systems..	10	6
6.	Preservation and Maintenance of Stock Cultures.	5	2
7.	Collection and processing of Clinical Samples for Culture. h) Blood • Collection of Blood • Blood Culture Media • Incubation • Direct Staining • Subculture and Identification • Automated Bed Culture System i) Urine • Sample Collection, Transport and Storage • Media for inoculation • Incubation • Semi Quantitative Colony Count j) Stool • Sample Collection, Transport and Storage • Media – Transport, Enrichment, Selective • Inoculation of Media • Identification of Pathogens k) Sputum • Sample Collection • Adequacy of Specimen • Inoculation of Media • Identification of Pathogens l) Exudates – Pus / Throat Swab, Vaginal Swab etc., • Sample Collection • Direct Smear • Inoculation of Media • Identification of Pathogens	15	5

8.	Collection of specimen for fungal examination like skin scrapings, CSF & Nail clippings.	5	2
	Serology		
9.	CRP, ASO, RA, VDRL, Widal, ELISA, Western blot tests.	35	16
	Total	**115**	**50**

- **Syllabus for OJT same as above.**

MEDICAL LAB TECHNOLOGY
SECOND YEAR
PART B – VOCATIONAL SUBJECTS
PAPER – III: PATHOLOGY [THEORY]

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
I	Preparation of blood smears and examination: - Thin & thick blood films. - Making an ideal blood film. - Methods – slide method, Cover slip method - Staining – composition, preparation & procedure of leishman stain. - Knowledge about Romanowsky stains. - Examination – Morphology & Identification of RBC, WBC & Platelets Counting – DLC – Counting methods, Normal values, clinical significance and limitations. - Oils used for immersion- types	08	8	1	1
II	Special stains for Bone marrow smears : - Giemsa, Wrights, Myeloperoxidase stain, Periodic Acid Schiff [PAS]- Composition, Preparation, procedure and interpretation.	5	2	1	
III	Bone Marrow Aspiration / trephine biopsy : - Setting up of tray for bone marrow aspiration - Preparing smears – methods- Imprints, crush. - Staining, clinical significance.	5	2	1	
IV	Identification of hemoparasites : - Morphology of malaria parasite, microfilaria, leishmania, trypanosomiasis. - Importance of sample collection time. - Making thick and thin smears. - Procedure of making & staining the smears. - Identification of the parasite.	5	6		1
V	Absolute Eosinophil count : - Materials required, diluting fluids, procedure, and identification and counting of cells.	5	2	1	
VI	Sickle cell preparation: - Principle, procedure, methods, Materials required, clinical significance.	5	6		1
VII	Osmotic fragility test : - Methods used, materials required, procedure, observation, reporting, Normal values, factors affecting and interpretation.	5	2	1	
VIII	Coagulation Tests: f) Bleeding time- methods- Dukes method, lvy's method – procedure, normal values and clinical significance. g) Clotting time – methods- Lee & White, capillary tube method- procedure,	08	6		1

MEDICAL LAB TECHNOLOGY

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
	materials, normal values, factors affecting coagulation and clinical significance. h) Prothrombin time [PT] i) APTT j) Introduction to Coagulometers				
IX	Buffy coat preparation : L.E. cells, microfilaria and abnormal cells.	5	2	1	
X. *	L.E cell Test : - Principle, procedure, material required, reporting, clinical significance.	5	2	1	
XI.	Basics of cell counter : - Diluting fluids - Maintenance of counter. - Quality Control and is significance	5	2	1	
XII.	Histopathology : - Maintenance of Registers – receiving register, gross register, Slide register and report issue register. - Biopsy & tissue specimens – Example: Thyroid, GIT, breast, soft tissue, bone etc. - Fixatives - processing - Dehydration - clearing - Impregnation - paraffin embedding and block making - Trimming of blocks. - Tissue cutting [Microtomes] - Staining of the sections. - Mounting & Mounting Media, cover slips, labeling. - Decalcification of bone & calcified tissue. - Routine Hematoxylin & Eosin staining. - Immuno histochemistry. - Special stains- PAS, Reticulin, Perls, Masson's Trichrome etc. - Filing of slides, storing of blocks etc.	13	16	2	2
XIII.	Microtomes & Knives: - Types of Microtomes – Maintenance. - Sharpening of Knives – Honing & Stropping - Advantages and dis-advantages of frozen section cutting.	08	2	1	
XIV	Cytology : - FNAC - Pap smear - Cytospin – equipment – machine, Procedure, material, laying a tray for the procedure. - Making smears, staining & mounting cover slip, labeling. - Identification & Interpretation – basics.	08	6		1
XV	Museum techniques: - Labeling & storage of specimens -	5	6		1

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks	Short answer questions	Essay/ Problem questions
	- Mounting, Labeling and cataloging the specimen - Maintenance and cleanliness of the Museum. - Safety in the lab.				
XVI	Autopsy : -Aims & methods of performing Autopsy, cleaning, suturing and restoring the body. Cleaning the autopsy instruments, tables and rooms, preservation of organs.	5	2	1	
XVII.	Immuno Hematology and Blood Banking: - Introduction - Human blood group antigens, their inheritance and antibodies. - ABO Blood group systems. - RH Blood group system. - Techniques of grouping and cross matching. - Blood collection, screening of donor, preservation and maintenance of records. - Coombs Test – a) Direct b) indirect.	10	6		1
	Total	**110**			

MEDICAL LAB TECHNOLOGY
II YEAR
PART B – VOCATIONAL SUBJECTS
PAPER – III:PATHOLOGY [PRACTICALS]

S.No	NAME OF THE UNIT	No. Of Periods	Weightage in marks
I	1.Maintenance, Cleaning and care about Automatic tissue processor	15	7
	2. Microtomes & knives – sharpening		
II.	Maintenance & Preservation of cytology slides, histopathology blocks & slides – Histopathology specimens & Processing. - Preparation of formalin for fixation.	10	5
III.	Glass Ware - Slides, Cover slips, sample collection jars, test tubes and watch glasses.	5	2
IV.	Immuno Hematology & Blood Banking - ABO Blood grouping techniques - RH Factor - Cross matching. - Coombs test- Direct & indirect methods.	20	8
V.	Histopathology : 1. Fixation of Tissue 2. Processing 3. Dehydration 4. Clearing 5. Impregnation 6. Paraffin embedding and block making. 7. Trimming of block 8. Staining of the sections 9. Special stains – PAS, Perls, Reticulin and Masson's Trichrome. 10. Mounting & labeling 11. Decalcification – to be told separately.	20	8
VI.	Cytology : Fixatives. Cytological exam of all fluids Slide preparation , staining Pap smears – staining, labelling, mounting & preservation	15	7
VII	Sickle Cell preparation	5	2
VIII	Buffy Coat preparation	5	2
IX	Bone marrow smears- preparation & staining.	5	2
X	Coagulation tests – B.T, C.T. , P.T, A.P.T.T etc.,	15	7
	Total	**115**	**50**

Example:If the student strength is 40 they can attend by rotation as below. For first year

Area	Activity to be done.	Number of students
Outpatient Biochemistry Lab	Reception, Sample collection .Accepting and rejecting criteria for samples.	7
Outpatient Pathology Lab	Reception, Sample collection .Accepting and rejecting criteria for samples.	7
Outpatient Microbiology Lab	Reception, Sample collection.Accepting and rejecting criteria for samples.	7
Main Lab Biochemistry	Helping the senior technicians in estimation of Various analytes	7
Main Lab Pathology	1. Preparing the anticoagulants 2. Preparing the Leishman's stain. 3. Preparing peripheral blood smear. 4. Staining of peripheral blood smear. 5. Preparing and staining thick smear . 6. Estimation of haemoglobin by sahli's method and by photoelectric method. 7. Estimation of ESR 8. Estimation of PCV by Micro and Macro Methods. 9. Physical examination of Urine. 10. Chemical Examination of urine for sugars-manual method/strip method. 11. Chemical Examination of urine for Ketone bodies-manual method/strip method. 12. Chemical Examination of urine for Protiens-manual method/strip method. 13. Chemical Examination of urine for blood-manual method/strip method. 14. Chemical Examination of urine for bile salts -manual method/strip method. 15. Chemical Examination of urine for bile pigments -manual method/strip method. 16. Preparing wet smear for urine microscopy. 17. Preparing processing the blood sample for reticulocyte count by wet and dry method. 18. Charging the improved Neubauer chamber 19. WBC Count by manual method. 20. Platelet Count by manual	7

	method. 21. Processing of body fluids for cell count. 22. Processing of semen for sperm count. 23. Coagulation Tests- Bleeding time, Clotting time, Prothrombin time [PT]& APTT 24. Absolute Eosinophil count- Materials required, diluting fluids, procedure, 25. Sickle cell preparation. 26. Screening of blood donor.	
Main Lab Microbiology	• Reception area and its quality control. • Cleaning and maintenance of equipment, glassware. • Preparation of stains, culture media and sugar medias. • Proper Disposal of lab waste.	5

First month they will be taught about the theoretical aspects of the first 3 units of Biochemistry,Microbiologyand Pathology. This can be within the premises of hospital during morning hours to orient them into appropriate subjects. Simultaneously practical aspects of Physiology recording BP, Temperature,Respiratory rate, TC,DLC can also be practiced.

OJT Master and lecture incharge should work in coordination with hospital superintendent.
Printed Log book should be designed and every day the student should be able to describe the activity done for that day. It should be signed by the concerned incharge staff in the respective wards/labs.

Example:If the student strength is 40 they can attend by rotation as below. For second year

Area	Activity to be done.	Number of students
Outpatient Biochemistry Lab	Reception,Sample collection.Accepting and rejecting criteria for samples.	2
Outpatient Pathology Lab	Reception ,Sample collection	2
Outpatient Microbiology Lab	Reception ,Sample collection	2
Inpatient G.Medicine	collection of samples, Recording of BP,Pulse ,Respiratory rate,	5
Inpatient G.Surgery	collection of samples, Recording of BP,Pulse ,Respiratory rate,	5
Inpatient Gynaecology	collection of samples, Recording of BP,Pulse ,Respiratory rate,	5
Inpatient Paediatrics	collection of samples, Recording of BP,Pulse ,Respiratory rate,	5
casualty	collection of samples, Recording of BP,Pulse ,Respiratory rate,	5
Main Lab Biochemistry	Helping the senior technicians in estimation of Various analytes	5
Main Lab Pathology	1. Performing Coombs Test – a) Direct b)	5

	indirect 2. Staining of Cytological smears. 3. Setting up of tray for bone marrow aspiration 4. Preparing bone marrow smears – methods- Imprints smears, crush smears. 5. Staining of bone marrow smear. 6. Buffy coat preparation. 7. Techniques of grouping and cross matching 8. Receiving and preserving histopathology specimens. 9. Maintaining the registers-receiving register, grossing register, slide register, report issue register. 10. Taking the consent for investigation. 11. Counseling of patient before and after test. 12. Maintaining haematology analyser. 13. Processing the sample in haematology analyser. 14. Fixation of Histopathology specimen. 15. Preparing the specimen for grossing. 16. Processing of histopathology specimen manual and automated method. 17. Paraffin embedding and block making 18. Trimming of blocks 19. Tissue section cutting. 20. H&E Staining of tissue sections 21. H&E Staining cytology slides. 22. Mounting of slides 23. Maintaining microtome and tissue processor and tissue floatation bath. 24. Sharpening of microtome knife. 25. Staining of histopathology sections. 26. Fixatives for cytology specimens. 27. Processing fluid sample for cytology. 28. Preparing tray for FNAC and guided aspiration. 29. PAP stain preparation and staining of smears. 30. Maintenance & Preservation of cytology slides, histopathology blocks & slides.	
Main Lab Microbiology	• Preparation of direct smears and staining of smears. • Techniques of inoculation on media and biochemical sugars for the isolation of bacteria. • Stool concentration techniques and microscopy of stool. • Serological tests. • Antibiotic sensitivity tests. • Maintenance of stock cultures. • Mycology processing	5

VIII

MODEL QUESTION PAPER

MEDICAL LAB TECHNICIAN

FIRST YEAR

Paper – I: BIO-CHEMISTRY (THEORY)

Time: 3 Hours **Max. Marks : 50**

SECTION-A

Note: (i) Answer all the Questions

(ii) Each Question carries 2 marks **10X2=20**

1. Give the normal values of Blood sugars.
2. Define solution.
3. Mention the different methods of Blood collection.
4. What are the different types of Urine specimens? Give examples of urinary preservatives.
5. Explain the terms a) Solute b) solvent.
6. What are the hygroscopic substances? Give examples.
7. Expand GTT and give the normal values of serum uric acid.
8. Write the source of Vitamin-A. And write the diseases caused by its deficiency.
9. Write the names of water soluble vitamins.
10. Give the classification of carbohydrates.

Section-B

Note: (i) Answer any five Questions

(ii) Each Question carries 6 marks **5X6=30**

11. Give the classification of Lipids and write the biological importance.
12. Write the determination of Blood glucose using GOD-POD method.
13. Give a note on different types of Glass ware used in Bio-chemistry lab. Write the applications.
14. Describe the prevention, safety and first- Aid in lab accidents.
15. Write the principle and construction of Electrical Centrifuge. And give the applications.
16. Define Colorimetry. Describe the construction, operation and uses of colorimeter.
17. What is Phlebotomy? Describe the collection of venous blood.
18. Write the principle, construction and applications of Spectro photometer.

MEDICAL LAB TECHNOLOGY

MEDICAL LAB TECHNICIAN

FIRST YEAR

Paper – II: MICRO-BIOLOGY & PATHOLOGY (THEORY)

Time: 3 Hours **Max. Marks : 50**

SECTION-A

Note: (i) Answer all the Questions

(ii) Each Question carries 2 marks **10X2=20**

1. Mention the names of different body fluids.
2. Write the physical properties of Urine.
3. Write the names of Bile salts and Bile Pigments.
4. Give the normal values of Total RBC & Platelets.
5. Write about a) Glycosurea b) Hematuria.
6. What is Liquefaction time of Semen?
7. Define Sterilization and disinfection.
8. Give the differences between Gram Positive & Gram Negative bacteria
9. Write the principle of Compound Micro-scope
10. Write the contributions of Antony van Leeuwenhoek&Louis Pasteur to Microbiology

SECTION-B

Note: (i) Answer any five Questions

(ii) Each Question carries 6 marks **5X6=30**

11. What is an Anti-Coagulant? Write the uses , Quantities required and preparation of EDTA & Sodium citrate
12. Describe the Estimation of ESR. Give the normal values of and write the clinical importance.
13. Write the Qualitative determination of Urine sugar. And write the clinical importance.
14. What are the collection methods of Semen? Describe the Physical examination of Semen.
15. Describe the construction & operation of Fluorescent Microscope and write the applications.
16. What are the different methods of Sterilization? Describe the construction and operation of Autoclave
17. Write a note on Media for Blood cultures and anaerobic media. Write the composition & preparation of Zeil Nelsons stain.
18. Estimation of Hemoglobin by Sahli's method.

MEDICAL LAB TECHNICIAN
FIRST YEAR
Paper – III: ANATOMY & PHYSIOLOGY (THEORY)

Time: 3 Hours **Max. Marks : 50**

SECTION-A

Note: (i) Answer all the Questions

(ii) Each Question carries 2 marks **10X2=20**

1. Define Anatomy &physiology
2. Mention the varieties of tissues in our body
3. Write the functions of saliva
4. What is Dextro Cardia
5. List the Proximal Row Carpal Bones
6. What is Meningitis
7. What are the Exocrine Glands
8. Write the surfaces of Kidney
9. Mention the parts of Fallopian Tubes
10. Write names of the following Nerves & arteries
    a) 7^{th} Cranial nerve c) 4^{th} Cranial nerve
    b) Blood supply to liver and Heart

SECTION-B

Note: (i) Answer any five Questions

(ii) Each Question carries 6 marks **5X6=30**

11. Draw the Neat and labeled diagram of heart and explain coronary circulation
12. Write the classification of Bones with examples and mention the functions of Bones
13. Define organ write the organs present in Respiratory system and explain one in detail
14. Draw the diagram of skin and write the functions of skin
15. Draw the labeled structure of stomach and explain the functions of liver
16. Write the composition of blood and functions of blood
17. a) list the Endocrine glands
    b) Write short notes on
    1) Uterus 2) Tonsils 3) Appendix

18. Draw a neat diagram of urinary system with labelling. And explain the formation of urine.

MEDICAL LAB TECHNOLOGY
MODEL QUESTION PAPER
SECOND YEAR
Paper – I: BIO-CHEMISTRY (THEORY)

Time: 3 Hours **Max. Marks: 50**

SECTION-A

Note: (i) Answer all the Questions
(ii) Each Question carries 2 marks **10X2=20**

1. What are transaminases? Give examples.
2. Write the clinical application of chromatography and electrophoresis
3. Write the principle of Flame photometry
4. Define a) Glycolysis b) Urea cycle
5. What is quality assurance? Explain internal quality control
6. Mention Lipid profile tests
7. What are the Thyroid Hormone assayed by RIA
8. Give the Normal values of Serum Bilirubin & Total Proteins
9. Define enzymes. Mention the unit of measurement.
10. Mention various tests done to asses renal functioning

SECTION-B

Note: (i) Answer any five Questions
(ii) Each Question carries 6 marks **5X6=30**

11. Write about determination of Glycosylated hemoglobin and its clinical importance
12. Write about enzyme. Give the classification
13. Determination of Serum total Bilirubin
14. Describe the construction, operation, application of a Flamephotometer with a neat schematic diagram
15. How do you determine serum amylase? Give the principle requirements and methods
16. Discuss about automation in a biochemical laboratory
17. Define primary standard and secondary standard classify different titrimetric methods
18. Explain separation of plant pigments by paper chromatography

MEDICAL LAB TECHNOLOGY
MODEL QUESTION PAPER
SECOND YEAR
Paper – II: MICRO-BIOLOGY (THEORY)

Time: 3 Hours **Max. Marks: 50**

SECTION-A

Note: (i) Answer all the Questions
(ii) Each Question carries 2 marks **10X2=20**

1. Expand ELISA & RIA.
2. Name causative Organism for Cholera and Diphtheria.
3. Define Antigen and Antibody.
4. Give the importance of Vaccines.
5. Explain about Euthanasia.
6. Write difference between Gram positive & Gram negative bacteria.
7. Define Immunity
8. Principle of stock culture
9. Morphology of Gonococci
10. Importance of Mycology

SECTION-B

Note: (i) Answer any five Questions
(ii) Each Question carries 6 marks **5X6=30**

11. Write Morphology and lab diagnosis of E. histolytica
12. Antibiotic sensitivity Test
13. Explain the Normal flora of Micro-organism in Human body
14. Write about Bacteria causing food poisoning.
15. Write Short Notes on
    1) Candida
    2) Penicillin
    3) Actinomyces.
16. Write a note on Preservation, methods of stock culture and their importance
17. Write about the collection and processing of faecal samples.
18. Write morphology, cultural characteristics and lab diagnosis of E.coli

MEDICAL LAB TECHNOLOGY
MODEL QUESTION PAPER
SECOND YEAR
Paper – III: PATHOLOGY (THEORY)

Time: 3 Hours **Max. Marks: 50**

SECTION-A

Note: (i) Answer all the Questions
(ii) Each Question carries 2 marks **10X2=20**

1. Mention specimen collection sites for Bone Marrow Examination.
2. Expand PAS and APTT.
3. Write the principle for sickle cell preparation.
4. Expand CT & BT.
5. Define Biopsy.
6. Write the names of various Microtomes.
7. Explain the characters of Blood donor.
8. What is Regressive stain?
9. What is Mordant?
10. Write the composition of Leishman stain.

SECTION-B

Note: (i) Answer any five Questions
(ii) Each Question carries 6 marks **5X6=30**

11. Explain automatic tissue processing.
12. Give blood grouping procedure and its importance.
13. Identification of Microfilaria.
14. Write the principle and clinical signification of sickle cell preparation
15. Describe the Decalcification by nitric acid method
16. Explain about the Direct & indirect comb's test. Give clinical importance
17. Write the principle, procedure & material required for L.E. Cell test
18. Give a note on preparation of Thick & Thin blood films and uses

MEDICAL LAB TECHNOLOGY
MODEL QUESTION PAPER
FIRST YEAR
PAPER – I: BIO-CHEMISTRY (PRACTICAL)

Time: 3 Hours **Max. Marks: 50**

SECTION -A

Note: Attempt any two practicals. Each question carries 15marks 2X15=30

1. Collect the Venous blood. Write the procedure. Show the result
2. Prepare 250ml of 0.9%Nacl solution. Show the preparation. write the procedure
3. Find out the Glucose in the given urine sample by Benedict's method. Write the procedure. produce the results

SECTION-B

4. Spotters 10marks

SECTION –C

5. Viva 5marks
6. Record 5marks

MEDICAL LAB TECHNOLOGY
MODEL QUESTION PAPER
FIRST YEAR
Paper – II: MICRO-BIOLOGY & PATHOLOGY (PRACTICAL)

Time: 3 Hours **Max.Marks: 50**

SECTION -A

Note: Attempt any two practicals. Each question carries 15marks 2X15=30

1. Estimate the Hb% in the given blood sample by Sahli's method. Produce the result. Write the procedure
2. Count the Total WBC in the given sample. Show the result. Write the procedure
3. Prepare Mac Conkey's agar media. Show the preparation. Write the procedure.

SECTION-B

4. Spotters 10marks

SECTION –C

5. Viva 5marks
6. Record 5marks

MEDICAL LAB TECHNOLOGY
MODEL QUESTION PAPER
FIRST YEAR
Paper –II: ANATOMY & PHYSIOLOGY (PRACTICAL)

Time: 3 Hours **Max.Marks: 50**

SECTION -A

Note: Attempt any two practicals. Each question carries 15marks
2X15=30

1. Count the Total RBC in the given blood sample using Neubauer counting chamber. Show the result. Write the procedure
2. Draw the neat diagrams of Skull &Humerus with labeling
3. Estimate the Blood pressure. Write the procedure

SECTION-B

4 .Spotters 10marks

SECTION –C

5. Viva 5marks
6. Record 5marks

MEDICAL LAB TECHNOLOGY
MODEL QUESTION PAPER
SECOND YEAR
PAPER – I: BIO-CHEMISTRY (PRACTICAL)

Time : 3 Hours **Max.Marks : 50**

SECTION -A

Note: Attempt any two practicals. Each question carries 15marks **2X15=30**

1. Estimate the serum sodium in the given sample using FPM. Produce the result. write the procedure
2. Determine the serum Bilirubin in the given sample. Show the result. Write the procedure.
3. Estimate the concentration of blood urea in the given sample by DAM- TSC method. Show the result. Write the procedure

SECTION-B

4 .Spotters 10marks

SECTION –C

5.Viva 5marks
6. Record 5marks

MEDICAL LAB TECHNOLOGY
MODEL QUESTION PAPER
SECOND YEAR
PAPER –II: MICRO-BIOLOGY (PRACTICAL)

Time : 3 Hours **Max.Marks : 50**

SECTION -A

Note: Attempt any two practicals. Each question carries 15marks 2X15=30

1. Perform widal test with the given sample. Show the result and write the procedure.
2. To identify the Ova & Cyst in the given sample, perform concentration technique. Show the result and write the procedure
3. Put up the Biochemical reactions required to identify Escherichia coli. Write the procedure.

SECTION-B

4 .Spotters
10marks

SECTION –C

5.Viva 5marks
6. Record 5marks

MEDICAL LAB TECHNOLOGY
MODEL QUESTION PAPER
SECOND YEAR
Paper –III: PATHOLOGY (PRACTICAL)

Time: 3 Hours **Max.Marks : 50**

SECTION -A

Note: Attempt any two practicals. Each question carries 15marks **2X15=30**

1. Find out the Blood Group in the given sample. Show the result and write the procedure
2. Find out the Clotting time & bleeding time in your own blood. Show the result and write the procedure
3. Describe the Sharpening of Microtome Knives.

SECTION-B

4 .Spotters 10 marks

SECTION –C

5. Viva 5 marks
6. Record 5 marks

IX LIST OF EQUIPMENTS

BIOCHEMISTRY

1.	Hot Plate	1
2.	Gas Cylinder with Burner	2
3.	Spirit Lamps	15
4.	Electrical Centrifuges	2
5.	Refrigerator 165 lit.	1
6	Colorimeter	1
7.	Hot Air oven	1
8.	Water bath	1
9.	Simple balance	1
10.	Electronic balance	1
11.	Flame photometer	1
12.	Spectrophotometer	1
13.	Flourimeter	1
14.	Incubator	1
15.	Electrophoresis apparatus	1
16.	Computer with Printer	1
17.	Semi Auto Analyzer.	1
18.	Automated Electrolyte Analyzer	1

GLASSWARE

1.	**Test Tubes**	
	18X150mm	100
	15X150mm	100
	15X125mm	100
2.	Centrifuge Tubes	20
3.	Beakers- 250 ml	5
4.	**Pipettes**	
	a)Volumetric Pipettes.	
	2ml	5 No's
	5ml	5 No's
	10ml	5 No's
	20ml	5 No's
	25ml	5 No's
	b)Serological Pipettes.	
	1ml 1/100	5 No's
	2ml/1/100	5 No's
	5ml1/100	5 No's
	1.10 ml1/10	5 No's
	2ml 1/10 ml	5 No's
	0.1ml 1/100ml	5 No's
	02 ml 1/100	5 No's
	C)Ostwald pipettes	
	0.1ml	2
	0.2ml	2
	0.5 ml.	2
5	**Burettes**	
	25 ml	5
	50 ml	5
6	**Reagent Bottles**	
	60 ml	10
	120 ml	10
	250 ml	10
	500 ml	10
	1000 ml	10
7.	**Dropper Bottles 30 ml**	5

8.	**Watch glass**	6
9.	**Volumetric Flasks**	
	25ml	5
	50ml	5
	100ml	5
	250ml	5
	500ml	5
	1000ml	3
10.	**Stoppaerd graduated Test Tubes**	
	15ml	5
	40ml	5
	50ml	5
11.	Distillation assembly [complete set]	1
12.	Round Bottom flask 500 ml & 1000 ml	1+1
13.	Filter paper	1 Ream
14.	What man filter paper	No.1 – 20 sheets
	What man filter paper	No.2- 10 sheets.
15.	Cotton (absorbent)	1 kg.
16.	Glass slides	100
17.	Plastic wash bottles 500 ml	10
18.	Mortar and Pestle	2 no's
19	Measuring Jar	
20	Test tube racks, Test tube holders and Funnels	

MICROBIOLOGY

1.	Compound Microscope	
2.	Variable Volume Micro Pipettes Full Set	1
3.	Centrifuge	
4.	Refrigerator	
5.	Autoclave	
6.	Hot air oven	
7.	Incubator Bacteriological	
	BOD Incubator	
	Micro Plate Washer and Reader	
8.	Distil water plant	
9.	Pipette washer	
10.	Anaerobic Jar	
11.	Vacuum Pump	
12.	Analytical Balance	
13.	Water Bath	
14	VDRL Rotator	
15	Bunsen Burner with Gas Connection	
16	Inoculating loop	
17	Straight wire	
18	Petri dishes 100X17	100 no's
19	Filter paper	1 Ream
20	What man filter paper	No.1 – 20 sheets
21	Dropper Bottles 30 ml	5
22	Cotton (absorbent)	1 kg.
23.	Glass slides	100
24	Depression Slides	
25	Cover Slips	
26	Serum Storage Vials and Boxes	
27	Test Tubes 150X19	100

28	100X12	100
29	Pipettes	
30	10ml	10 Nos.
31	5ml	10 Nos.
32.	1ml	10 Nos.
33.	Wash bottles	5
34.	Spatulas	12
35	Reagent bottles	10
36	Measuring Cylinders 50 ml	5
37	Compound Microscope	5

PATHOLOGY

1.	Binocular Microscope	1
2.	Hot air oven	1
3.	Incubator	1
4.	Centrifuge	1
5.	Haematology analyser (Blood cell counter) 3/5 Part	1
6.	Water Bath	1
7.	Chemical balance	1
8.	Hot plate	1
9.	Stopwatch	1
10.	Haemometer	5
11.	Haemocytometer	5
12.	Lab Counter for DC	4
13.	ESR Stand	5
14.	ESR Tubes	5
15.	Motor and pestle	5
16	Urino meter	2
17	Microhaematocrit centrifuge	1
18	Automated pippets	5
19.	WBC pippets RBC pippetsHbpippets	20 each
20.	Spirit lamp	2
21	Syringes	
	20ml	10
	10ml	10
	5ml	10
	2ml	10
22	Beaker	
	100ml	5
	250ml	5
23	Test Tubes	
	10 ml	50
	15 ml	50
24	Watch glasses.	5
25	Trays	5
26.	Syringe dispenser to crush needles.	1
27.	Refrigerator	1
28.	Glass slides and cover slips.	50
29.	Tissue processor	1
30.	Microtome	1
31.	Microtome knives	3
32	Coupling jars	20
33.	Slide holder baskets	4
34	Water bath	1

MODEL LOG BOOK FOR MLT STUDENTS

Date	Description of the work performed	Signature of the OJT Master /Lecturer	Classroom Lectures
6.5.17	Went to Hospital Biochemistry lab; Number of patients interacted ;		
8.5.17	Blood drawn from Number of patients		
9.5.17	Assisted in labelling the samples.		
10.5.17	Assisted in entering of samples in the register.		

Date	Description of the work performed	Signature of the OJT Master /Lecturer	Classroom Lectures
6.5.17	Went to Hospital microbiologylab Number of patients interacted ;		
8.5.17	Number of samples accepted,rejected entered ….		
9.5.17	Assisted in labelling the samples.		

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 Educational Institutes.

B. On the Job Training Centers.

1. Government Hospitals
2. PHCs Primary Health Centers.
3. Dispensaries.
4. Medical Colleges.
5. Private Hospitals
6. Private Labs.

X. Qualification of Lecturers

1.MD Pathology /Microbiology/Biochemistry/DCP.

2. M. Sc Microbiology / Biochemistry / MLT.

3. B. Pharmacy/ MSc Genetics.

4. MBBS/MBBS(Hom)/BHMS

5. PGD. Clinical Bio chemistry.

XI. Vertical Mobility

A) With Bridge Course

1. B. Sc (BZC)
2. Courses through EAMCET

B) Without Bridge Course.

1. B. Sc MLT, B.A & B.Com, D.MLT
2. B. Sc Microbiology
3. B. Sc Biochemistry
4. B. Sc Biotechnology
5. M.Sc. MLT/Biochemistry /Microbiology/ Biotechnology [at P.G. level]

XII REFERENCE BOOKS

Biochemistry

1. Harold Varley

Anatomy & Physiology

1. C.C. Chatterjee
2. Chowrasia

Microbiology

1. A manual on Medical laboratory Technicians.. A.v. Naigonkar
2. RamnikSood

Pathology

1. RamnikSood
2. Mukerjee 3 volumes
3. Talib
4. PrafulGodkar
5. WHO Lab Manual
6. Harsh Mohan – Practical book.
7. Tejinder Singh – Practical book.
8. Praful – Godkar
9. K.M. Samuel.

XIII. LIST OF SUBJECT COMMITTEE MEMBERS:

1.	Dr. Ather Fatima, M.D., Associate Professor, Department of Pathology, Govt Medial College, Nizamabad.
2.	Dr. M. Rama Devi, M.D. Professor and HOD, Department of Biochemistry Osmania Medical College, Hyderabad.
3.	Dr. Pooja Palla, Assistant Professor Department of Microbiology. Govt. Medial College, Nizamabad
4.	Sri. S. Srinivasa Rao Principal GJC, Pidiprolu Khammam
Verified & Corrected By	
1.	Dr. Shravan Kumar Prof &Hod of Pathology Gandhi Medical College, Hyderabad
2.	Dr. Nagamani Prof &Hod of Microbiology Gandhi Medical College, Hyderabad
3.	Dr. Suleman Prof of Bio Chemistry Gandhi Medical College, Hyderabad
Co- ordinator:-Sri K.Vishweshwar, O/o the Commissioner of Intermediate Education, Andhra Pradesh, Hyderabad	

Sd/- Dr A. Ashok
COMMISSIONER OF INTERMEDIATE EDUCATION