



DETAILED SYLLABUS

Certificate Programme

C.M.L.T.

**(CERTIFICATE IN MEDICAL LAB. TECHNOLOGY)
(YEARLY SYSTEM)**

**SYLLABUS FOR CERTIFICATE IN MEDICAL LAB. TECHNOLOGY
(ONE YEAR CERTIFICATE COURSE)**

S.No.	Paper Name	Internal Assessment		University Examination			Total
		Th.	Pr.	Th.	Viva	Pr.	
1.	Anatomy & Physiology	20	20	100	20	40	200
2.	Pathology	20	20	100	20	40	200
3.	Clinical Pathology	20	20	100	20	40	200
4.	Bacteriology	20	20	100	20	40	200
	Total						

ANATOMY AND PHYSIOLOGY

Max.Marks- 100

DURATION – 3 HRS.

Note – Paper will be divided into five units. Each unit will consist of one essay type and two short answer type questions. Students are required to attempt either essay type or two short answer type question from each unit. All unit carry equal marks.

UNIT – I

- A. Definitions Terminology of different parts, Structure of Cell and Tissues, General Anatomy of Tissues, bone, Joint, Nervous Tissue, Connective (Tissue, Lymph, Epithelial Tissue, Muscular Tissue.)
- B. Anatomy of Upper Extremity - (a) Important region (Axilla, Cubital Fossa), (b) Important blood vessels, brachial Plexus and Nervous, (c) Important Muscles of upper Extremity, (d) Joints of upper Extremity in short.
- C. Anatomy of Lower Extremity - (a) Important Region femoral triangle, (b) and popliteal fossa, (c) Important blood vessels, Nervous joints in short

UNIT - II

- A. THORAX - (a) Structure of Heart, (b) Mediastinum, (c) Important big blood vessels (aorta, venacava, subclavian artery), (d) Structure in short of Trachea, Oesophagus, Bronchi, (e) Lungs
- B. Abdomen - (a) In General structure of GI tract liver, spleen, pancreas, kidney, uterus urinary bladder, ovary testes, Biliary apparatus.
- C. Head, Neck and Face- (a) Formation of Triangle of the Neck, (b) Structure of gland (e.g. salivary gland, Thyroid gland, (c) Structure of Eye Ball, Ear, Nose and Tongue.
- D. Brain- (a) Structure of Spinal Cord, Brain, Brain stem, cerebellum and CSF.

UNIT - III

- A. General physiology of cell membrane and Tissues.
- B. Composition and function of various Body fluids - (a) Blood: Composition, function, RBC, WBC, Thrombocytes, coagulation of blood, (b) Lymph, composition and function, (c) Function of Reticular system, (d) C.S.F. composition and function, (e) Anticoagulants and their uses.
- C. Respiratory system – (a) Mechanism of Respiration, (b) Composition of inspiratory, expiratory and alveolar air, (c) Exchange of gases, (d) Control of respiration in short,

UNIT - IV

- A. **Circulation system** - (a) General properties of Cardiac muscles, (b) Functional tissues of Heart. (c) Circulation of Heart, (d) Cardiac cycle, Blood pressure, cardiac output in short , (e) Different waves of ECG and their significant.
- B. **Excretory** - (a) Structure and function of Kidney and Nephron, (b) Formation of urine, (c) Composition of urine (normal), (d) Abdominal constituent of urine, (e) Function of skin
- C. **Digestive system** - (a) Composition and functions of various digestive juices, (b) Digestion of food stuff in short, (c) Functions of Digestive organs in short (e.g. Liver, Stomach), (d) Formation of stool and composition of stool, (e) Vitamins: in short

UNIT - V

- A. **Reproductive and endocrine glands** - (a) Hormones of pituitary, thyroid, para thyroid,

Pancreas, Testes, ovary, Supra-renal glands.

- B. **Nervous System** – (a) Structure of neuron, Nerve fiber and their properties in short. (b) Synapse and transmission of impulse through synapse, (c) Functions of Brain, cerebellum, (d) Neurotransmitters in short, (e) Special senses.

Marks Distribution :

Theory -

University examination	– 100
Internal Assessment (Two test + sessional)	– 10+10

Practical -

University Examination	– 60
Internal Assessment	– 20

Lecture-Demonstration & Practical-

1. Muscles of the whole body.
2. Demonstration of organs in thorax and abdomen.
3. Demonstration of viscera in head, face and neck.
4. Demonstration of all the glands in the body.
5. Identification of bony prominences on inspection and palpation in the body, especially of extremities.
6. Points to palpate nerves and arteries.
7. Identification of prominent muscles.
8. Extra-ocular muscles and salient points about the eye ball.
9. Demonstration on Brain.
10. Haematology –[Demonstration only
11. Study of Graphs
 - a. Skeletal muscles- (i) Simple muscle twitch (ii) Effect of increasing strength on SMT. (iii) Effect of increasing load on SMT. (iv) Effect of free load & after load (Starting' aw). (v) Effect of temperature. (vi) Effect of two successive stimuli. (vii) Effect of fatigue. (viii) Effect of multiple stimuli & tetanus
 - b. Cardiac muscles- (i) Simple myocardiogram. (ii) Effect of temperature on the myocardiogram. (iii) Effect of drugs. (iv) All of none law. (v) Staircase phenomenon.
12. Physiology Fitness- (i) Breath holding, (ii) Mercury column test,
 - a. Cardiac efficiency test – Harvard step test – Master step test
 1. Recording of arterial blood pressure – effects of change in posture & exercise on A.B.P.
 2. Stethography – (a) Effect of deglutition. (b) Effect of voluntary hyperventilation (c) Effect of exercise.
 3. Spirometry - Lung volumes and capacities.
 4. Mosso's finger ergography and bicycle ergography
 5. Perimetry
 6. Clinical examination of (a) Respiratory system. (b) Cardiovascular system. (c) Central Nervous system. (d) Special senses.

PATHOLOGY

Max.Marks- 100

DURATION – 3 HRS.

Note – Paper will be divided into five units. Each unit will consist of one essay type and two short answer type questions. Students are required to attempt either essay type or two short answer type question from each unit. All unit carry equal marks.

UNIT - I

Introduction to pathology- Principles of Laboratory work, Medical ethics, Para and cleanliness, and care with regard to infected material.

UNIT - II

Principle, function, maintenance and use of centrifuge, electric stove, sterilizer, microscope and its component part, simple, Analytical, electronic balancer, microtones, Automatic knife sharpeners, Automatic slide stainer, incubator, electronic cell counter, Automatic Tissue procured beep, freeze, Preening, Macro tome, and cryostat.

UNIT - III

Principles and working knowledge of the equipment and glassware used.
Preparation of the stains and solution required including anticoagulant used in pathology.

UNIT - IV

Collection of specimen.
Ph
Acid & Base

UNIT - V

Estimation of -
Blood Sugar, Blood Urea, Serum creatinin, Serum Billurbin, Total Protein, Albumin, Cholestrol

Marks Distribution :

Theory -		Practical -	
University examination	– 100	University Examination	– 60
Internal Assessment (Two test + sessional)	– 10+10	Internal Assessment	– 20

Practical

- (a) Cleaning, neutralization and preparation of glassware's for sterilization.
- (b) Examination of living Bacteria.
- (c) Staining

- simple staining	- negative staining
- Gram staining	- Acid fast staining
- (d) Staining the cell structure

- Spare staining	- Metachromatic granule straining
- Cell wall staining	- Capsule staining
- Lipid (fat globules) staining	- Nuclear Maternal Staining
- (e) Preparation of bacteriological, mycological & biochemical types of media.
- (f) Isolation and identification of pathogenic aerobic, anaerobic types of bacteria and their cultivation.
- (g) Isolation and identification of human pathogenic fungus.

CLINICAL PATHOLOGY

Max.Marks- 100

DURATION – 3 HRS.

Note – Paper will be divided into five units. Each unit will consist of one essay type and two short answer type questions. Students are required to attempt either essay type or two short answer type question from each unit. All unit carry equal marks.

UNIT - I

URINE: Urine meter, Esbachl's Albuminometer, preparation of various reagents. Composition, collection and preservation of urine for various tests, physical chemical and microscopic examination of urine, estimation of total albumin, Specific gravity, litmus paper, tests for albumin, sugar, blood, bile salts and pigments, urobilinogen, ketones bodies etc.

UNIT - II

STOOL: Sample collection, physical, chemical and microscopic examination.
SPUTAM : Sample collection, stain and study of A.F.B.

UNIT - III

Cerebrospinal Fluid: Pandy's test, Cell count, cell type differential count and malignant cells.
Body fluids: Cells count; cell morphology and detection of malignant cells in peritoneal fluid, pleural fluid, pericardial fluid, and synovial fluid. Differences between transudates and exudates.

UNIT - IV

SEMEN: Sample collections microscopic examination for count and malignant and morphology.

UNIT - V

A. Anatomic pathology:

1. Reception, Registration, preservation and processing of specimens. Haematoxyline and eosine staining procedure, mounting of stained sections, Filing of paraffin blocks, and slides. Method of decalcification, Sharpening and holding Knives techniques, using of microtome.
2. **Museum:** Mounting of specimens, labeling, maintenance of specimens and catalogue etc.

B. Post mortem/ Auteosy:

Maintenance of the records of the Dead Bodies and specimens received, Autopsy techniques, Autopsy instruments, clod storage plants, legal aspects etc.

Marks Distribution :

Theory -

University examination – 100
 Internal Assessment – 10+10
 (Two test + sessional)

Practical -

University Examination – 60
 Internal Assessment – 20

Practical-

- (1) Urine analysis Physical, Chemical, Microscopic, Microbiological.
- (2) Stool analysis Physical, Chemical, Microscopic, Microbiological.
- (3) Sputum analysis Physical, Chemical, Microscopic, Microbiological.
- (4) Seman analysis Physical, Chemical, Microscopic, Microbiological.
- (5) Bacteriological examination of pus.
- (6) Bacteriological examination of trout swab.
- (7) Laboratory study of parasites in stool, blood. Giardia, lamblia Enbamoeba stool filaria in blood.

BACTERIOLOGY

Max.Marks- 100

DURATION – 3 HRS.

Note – Paper will be divided into five units. Each unit will consist of one essay type and two short answer type questions. Students are required to attempt either essay type or two short answer type question from each unit. All unit carry equal marks.

UNIT - I

- A. Bacteriology- General
- B. General measures of personal hygiene & cleanliness in Laboratory.
- C. Use of Gloves, and masks and Aprons for personal protection.
- D. Cleaning of equipment and glassware
- E. Cleaning and disinfections of workbenches.
- F. Use of centrifuges, water bath etc.
- G. Disinfection of accidental spills.
- H. Methods of sterilization-practical aspect of various methods of discard material before disposal or washing.
- I. Sterilization of glass syringes and needles.
- J. Proper disposal of disposable syringes & needles.
- K. Sterilization of slides, pipettes, bottles, flasks and other glassware.
- L. Preparation of smears and various staining methods.
- M. Preparation of Throat swabs.
- N. Collection of different specimens viz: Throat swab, stool, Urine, Blood, Pus, Wound swab, sputum, Theater swab etc.

UNIT - II

MYCOLOGY:

1. Collection of specimens and storage.
2. KOH preparation
3. Putting up culture.

UNIT - III

SEROLOGY:

1. Sample collection, labeling, serum separation & Inactivation.
2. Cleaning of test tubes and bottles and their disinfections.
3. Disinfections of disposal.

UNIT - IV

A. GENERAL:

1. Maintenance of sterility in the laboratory.
2. Assist the technicians wherever necessary.

B. Various techniques of processing:

Throat Swab, Sputum, blood, urine, stool, pus, CSF, other body fluids, other swabs like from wounds, skin clipping, spore strips, culture of Mycobacteria and other routine organisms, theatre swabs etc.

C. Antibiotic Sensitivity testing:

UNIT - V

A. Food Poisoning – Collection of specimen & processing.

B. Culture Techniques – Primary Culture, Sub – culture

C. Maintenance of stock cultures.

D. MYCOLOGY:

1. Introduction.
2. Superficial Mycoses.
3. Dermatophytes.
4. Sub – Cutaneous and deep mycoses.
5. Systemic Mycoses.
6. Contaminant Fungi.

Marks Distribution :**Theory -**

University examination – 100
Internal Assessment – 10+10
(Two test + sessional)

Practical -

University Examination – 60
Internal Assessment – 20

Practical

1. Collection of material.
2. Labeling and Microscopy.
3. Culture methods.