EXAM SCHEME AND SYLLABUS

(Applicable for the batches admitted from the Academic Session 2023-24 onwards)

Bachelor in Medical Lab Technology

(BMLT, 3 Year Degree Programme)

Faculty of Paramedical Science & Allied Health Science

Chirayu University

Bhopal, MP 462030, India

AIMS: The aims of Degree in Medical Laboratory Technology program is designed to equip students with the necessary knowledge and skills to work effectively in a laboratory setting.

OBJECTIVES:

1.Technical Proficiency: Develop practical skills in using laboratory equipment, conducting experiments, and performing various tests in areas such as clinical, medical, or scientific laboratories.
2.Laboratory Safety: Emphasize the importance of adhering to safety protocols, handling hazardous materials, and maintaining a safe laboratory environment for both students and those working in the future.
3.Scientific Methodology: Teach students the principles of scientific inquiry, research methodology, and the ability to design, conduct, and analyze experiments in a systematic manner.
4.Sample Collection and Processing: Train students in proper techniques for collecting, handling, and processing different types of specimens or samples, depending on the focus of the laboratory (e.g., blood, tissues, chemicals).
5.Quality Control: Instill the importance of maintaining high standards of accuracy and precision in laboratory work, including the implementation of quality control measures to ensure reliable results.
6.Instrumentation: Familiarize students with the operation and maintenance of laboratory instruments and equipment, such as microscopes, centrifuges, spectrophotometers, and automated analyzers.
7.Data Analysis: Develop skills in data analysis, interpretation, and reporting of laboratory findings. This includes the use of computer software for data management and generating reports.
8.Ethics and Professionalism: Instill ethical principles and professional conduct in handling confidential information, respecting privacy, and maintaining the integrity of scientific research.
9.Communication Skills: Foster effective communication skills, both written and verbal, to enable clear reporting of findings, collaboration with colleagues, and communication with healthcare professionals or researchers.
10.Continuing Education: Encourage a commitment to continuous learning and staying updated on advancements in laboratory techniques, technologies, and research methods.
11.Certification and Accreditation: Prepare students for relevant certification and ensure that the program meets accreditation standards set by the council.
12.Team Collaboration: Develop the ability to work collaboratively with other healthcare professionals, researchers, and colleagues in a multidisciplinary environment.
These aims and objectives collectively aim to produce competent and skilled laboratory technicians who can contribute effectively to various fields such as healthcare, research, and industry. The emphasis is on a combination of technical proficiency, adherence to safety and ethical standards, and effective communication skills.

COURSE STRUCTURE:
Bachelor in Medical Lab Technology (BMLT) is 3 Year Degree Programme.

DURATION OF THE PROGRAM:

1. BMLT I YEAR
2. BMLT II YEAR
3. BMLT III YEAR

TEACHING DAYS: Each academic year shall consist of 160 teaching days.

BACHELOR IN MEDICAL LAB TECHNOLOGY (BMLT)

SCHEME Of EXAMINATION:BMLT-1st Year

S. No.	Subject	Theory	Internal Assessment	Practical	Total
1	Basic Histology (Anatomy & Physiology)	100	100	100	300
2	Microbiology-I	100	100	100	300
3	Biochemistry-I	100	100	100	300
4	Hematology-I	100	100	100	300
Total Max. Marks					1200

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

SCHEME Of EXAMINATION:BMLT-2nd Year

S. No.	Subject	Theory	Internal Assessment	Practical	Total
1	Histology	100	100	100	300
2	Microbiology-II	100	100	100	300
3	Biochemistry-II	100	100	100	300
4	Hematology-II	100	100	100	300
Total Max. Marks					1200

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

SCHEME Of EXAMINATION:BMLT-3rd Year

S. No.	Subject	Theory	Internal Assessment	Practical	Total
1	Applied Histopathology	100	100	100	300
2	Microbiology-III	100	100	100	300
3	Biochemistry-III	100	100	100	300
4	Hematology-III	100	100	100	300
Total					1200
5	Instrumentation #	--	50	--	50
Total Max. Marks					1250

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

-All theory papers will of 100 max. Marks and 3Hrs. time duration . Pattern of Examination(Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	**Marks for each Question**	**Total Marks**
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

SYLLABUS & SCHEME OF EXAMINATION FOR BMLT FIRST YEAR

BACHELOR IN MEDICAL LAB TECHNOLOGY (BMLT)

SCHEME Of EXAMINATION:BMLT-1st Year

S. No.	Subject	Theory	Internal Assessment	Practical	Total
1	Basic Histology (Anatomy & Physiology)	100	100	100	300
2	Microbiology-I	100	100	100	300
3	Biochemistry-I	100	100	100	300
4	Hematology-I	100	100	100	300
Total Max. Marks					1200

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

-All theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	**Marks for each Question**	**Total Marks**
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

SCHEME Of EXAMINATION & Syllabus :BMLT-1st Year

Paper-I: Basic Histology (Anatomy & Physiology)

Subject	Theory	Internal Assessment	Practical	Total
Basic Histology (Anatomy & Physiology)	100	100	100	300

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

- Theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	Marks for each Question	Total Marks
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

INSTRUCTION FOR THE PAPER SETTER

Section-A: This will consist of 10 very short answer type questions with answer to each question up to five lines (Fifty to sixty words) in length . All questions will be compulsory to answer. Each question will carry two marks. Total weight age of the section shall be 20 marks.

Section-B: This will consist of short answer questions with answer to each question up to 2 pages (250-300 words) in length. Eight questions will be set by the examiner and five have to be answered by the candidate. Each question will carry 10 marks. Total weight age of the section shall be 50 marks.

Section-C: This will consist of essay type questions with answer to each question up to 5 pages (approx 500 words) in length. Four questions will be set by the examiner and two have to be answered by the candidate. Each question will carry 15 marks. Total weight age of the section shall be 30 marks.

INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word.

Paper-I: Basic Histology (Anatomy & Physiology)

ANATOMY& PHYSIOLOGY

Total No. of Teaching Hrs: 210 Theory-90hrs & Practical-120hrs

Syllabus Contents:-

1. The anatomic and physiological organization of human body and integrated physiology.
2. Cell organization and function.
3. Skeletal system, bones, joints, and muscles.
4. Body fluids and their significance.
5. Blood morphology, chemistry and function.
6. Respiratory system
7. Cardiovascular system viii) Alimentary system, mechanism and physiology of digestion and absorption
8. Liver structure
9. Urinary system.
10. Male genital system
11. Female genital system.
12. Nervous system.
13. Spleen, lymph node and R.E. system.
14. Endocrine glands and their functions.

HISTOTECHNOLOGY

FUNDAMENTALS OF APPLIED HISTOLOGY

INTRODUCTION:

1. Introduction to histopathology and laboratory organization.
2. Laboratory equipment, uses and maintenance.
3. Laboratory hazards and safety precautions.
4. Compound microscope - optical system, magnification and maintenance.

FUNDAMENTALS OF APPLIED HISTOLOGY

1. Reception, recording and labeling of histology specimens.
2. Fixation and various fixatives.
3. Processing of histological tissues for paraffin bedding.
4. Embedding and embedding media.
5. Decalcification various types, there.
6. Micro tomes various types, there working principle and maintenance.
7. Microtome knives and knife sharpening.
8. Practical section cutting, cutting faults and remedies.
9. Routine staining procedures, mounting and mounting media.
   Dye chemistry, theory and practice of staining.
   Solvents, mordents, accelerators and accentuators.
10. Uses of controls in various staining procedures.

CYTOLOGY LECTURES:

1. Introduction to exfoliative cytology with special emphasis on female genital tract.
2. Collection processing and staining of the Cytologic specimen

Book Reference:

I. General Anatomy – B.D. Chaurasia
II. Human Anatomy – H.C. Shrivastava
III. Anatomy & Physiology – Rose & Wilson
IV. Textbook of Medical Physiology – K.Simbulingam
V. Human Physiology – C.C. Chatterjee
VI. Handbook of general Antomy – N. Murgesh
VII. Textbook of Histology - Gunsegaran

Paper-II: Microbiology-I

Subject	Theory	Internal Assessment	Practical	Total
Microbiology-I	100	100	100	300

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

- Theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	**Marks for each Question**	**Total Marks**
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

INSTRUCTION FOR THE PAPER SETTER

Section-A: This will consist of 10 very short answer type questions with answer to each question up to five lines (Fifty to sixty words) in length . All questions will be compulsory to answer. Each question will carry two marks. Total weight age of the section shall be 20 marks.

Section-B: This will consist of short answer questions with answer to each question up to 2 pages (250-300 words) in length. Eight questions will be set by the examiner and five have to be answered by the candidate. Each question will carry 10 marks. Total weight age of the section shall be 50 marks.

Section-C: This will consist of essay type questions with answer to each question up to 5 pages(approx 500 words) in length. Four questions will be set by the examiner and two have to be answered by the candidate. Each question will carry 15 marks. Total weight age of the section shall be 30 marks.

INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word.

Paper-II: Microbiology-I

Syllabus Contents

Total No of Teaching hrs:220hr Theory-100hrs & Practical:120hr

MEDICAL MICROBIOLOGY

1. Introduction and brief history of microbiology.
2. Safety measures in microbiology.
3. General characteristics and classification of bacteria and fungi.
4. Growth and nutrition of microbes.
5. Care and maintenance of laboratory equipments.
6. Care and handling of various microscopes – binocular, DGI, phase – contrast, fluorescence and electron microscopes.
7. Principles and methods of sterilization.
8. Uses and mode of action of antiseptics and disinfectants.
9. Handling and cleaning of glassware apparatus. Decontamination and disposal of contaminated material.
10. Preparation, uses and standardization of culture media.
11. Principles of staining methods and preparation of reagents.
12. Aerobic and anaerobic culture methods.
13. General characters and nature of antigens and antibodies.
14. Principles of Antigen Antibody reactions.
15. Collection, transportation and processing of clinical samples for microbiology investigations.
16. Principles and mode of action of antibiotics and chemotherapeutic agents for bacteria and fungi.
17. Care and handling of laboratory animals.
18. Laboratory organization, management, recording of results and quality control in microbiology.

VIROLOGY

1. Introduction to Medical Virology.
2. Nomenclature and classification of viruses.
3. General characteristics of viruses: physical, chemical and biological properties.
4. Collection, transport, processing and storage of sample for viral diagnosis.

Practical

1. Introduction to use of different laboratory instruments and their safety precautions.
2. Collection, handling and storage of samples for viral diagnosis.
3. Washing, cleaning and sterilization of media and glassware in virology.
4. Principles of bio safety hoods, use of pipettes, syringes and other virus contaminated instruments in the laboratory.
5. Demonstration of preservation of viruses, viral antigens, infected biological materials and viruses.

PARASITOLOGY

1. Introduction to medical and safety.
2. General characters and classification of protozoa.
3. Laboratory procedure collections, preservation and processing of samples for parasites stool/blood/fluids/tissue/biopsy.
4. Morphology and life cycles of intestinal protocol, Amoeba-Giardia.
5. Laboratory diagnosis of intestinal protozoa infection: - Amoeba-Giardia.
6. Morphology and diagnosis of oral of – trichomonas vaginal flagellates – E. Gingivalia.
7. Morphology and life cycle of Haemopro- malaria protozoa-parasite.
8. Laboratory diagnosis of malarial infection.
9. General characters and classification of medical helminthology.
10. Morphology and life cycles of Nematodes (Intestinal), - Ascaris, Enterobious, - ancylostoma, - Strongyloides.
11. Laboratory diagnosis of intestinal Nematode infection.

Practical

1. Introduction to operation of laboratory instruments and safety precautions.
2. Macroscopic examination of adult worms, cysts, tissues, and processing of stood sample for routine examination.
3. Saline and I2 preparation for protozoa cysts and trophozoites.
4. Concentration procedures for protozoa cysts and trophoziotes.
5. Concentration procedures for helminthic ova and cyst.
6. Examination and identification of ova and cyst of parasites of medical importance

Book Reference:

I. Textbook of Microbiology – C.P. Baveja
II. Textbook of Microbiology – Ananthanarayan
III. Medical Laboratory Technology – Sood
IV. Medical Laboratory Science – Ochei
V. Textbook of Medical Lab Technology - Godkar

Paper-III: Biochemistry-I

Subject	Theory	Internal Assessment	Practical	Total
Biochemistry-I	100	100	100	300

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

- Theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	Marks for each Question	Total Marks
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

INSTRUCTION FOR THE PAPER SETTER

Section-A: This will consist of 10 very short answer type questions with answer to each question upto five lines (Fifty to sixty words) in length . All questions will be compulsory to answer. Each question will carry two marks. Total weightage of the section shall be 20 marks.
Section-B: This will consist of short answer questions with answer to each question upto 2 pages (250-300 words) in length. Eight questions will be set by the examiner and five have to be answered by the candidate. Each question will carry 10 marks. Total weightage of the section shall be 50 marks.
Section-C: This will consist of essay type questions with answer to each question upto 5 pages (approx 500 words) in length. Four questions will be set by the examiner and two have to be answered by the candidate. Each question will carry 15 marks. Total weightage of the section shall be 30 marks.
INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word.

Paper-III: Biochemistry-I

Syllabus Contents

Total No. of Teaching Hrs:200 Theory-80hrs & Practical-120hrs

BASIC PRINCIPLES OF BIOCHEMISTRY

1. Introduction to medical technology role of medical laboratory Technologists, ethics, responsibility, safety, measures First aid (accidents).
2. Cleaning and care of general laboratory glassware and equipment, preparation and storage of distilled water analytical balance, preparation of reagents and standard solutions, storage of chemicals .
3. Units of measurement, S.I. Units, measurement of volumetric apparatus, (pipettes, flasks, cylinders) Calibration of volumetric apparatus.
4. Radioisotopes and their use in Biochemistry, mole, molar and normal solutions, pH, buffer solutions, pH and pH measurement, Osmosis, dialysis, surface tension.
5. Urine analysis (qualitative) for sugar, proteins bile pigments, ketone bodies, porpholinogen, faecal of blood.
6. Collection and recording of biological specimens separation of serum plasma, preservation and disposal of biological samples material. Basic statistics (mean, SD, CV, normal distribution, probability).

7. Normal or Reference range. Definition, influencing factors, determination.
8. Volumetric analysis- Preparation of standard acid and base solutions, chloride estimation.

Book Reference:

I. Biochemistry – U. Satyanarayan
II. Textbook of Medical Biochemistry – Chatterjee
III. Fundamental of Biochemistry
IV. Essential of Biochemistry – Naik
V. Medical Laboratory Technology – Sood
VI. Medical Laboratory Science – Ochei
VII. Textbook of Medical Lab Technology - Godkar

Paper-IV: Hematology-I

Subject	Theory	Internal Assessment	Practical	Total
Hematology-I	100	100	100	300

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

- Theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	**Marks for each Question**	**Total Marks**
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

INSTRUCTION FOR THE PAPER SETTER

Section-A: This will consist of 10 very short answer type questions with answer to each question upto five lines (Fifty to sixty words) in length . All questions will be compulsory to answer. Each question will carry two marks. Total weightage of the section shall be 20 marks.
Section-B: This will consist of short answer questions with answer to each question upto 2 pages (250-300 words) in length. Eight questions will be set by the examiner and five have to be answered by the candidate. Each question will carry 10 marks. Total weightage of the section shall be 50 marks.
Section-C: This will consist of essay type questions with answer to each question upto 5 pages (approx 500 words) in length. Four questions will be set by the examiner and two have to be answered by the candidate. Each question will carry 15 marks. Total weightage of the section shall be 30 marks.
INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word

Paper-IV: Hematology-I

1. Introduction to hematology and Laboratory Organization.
2. Lab. Safety and instrumentation.
3. Formation of blood.
4. Composition and functions of blood.
5. Various anticoagulants, their uses, mode of action and their merits and demerits.
6. Collection & preservation of blood for various hematological investigations.
7. Physiological variations in Hb, PCV, TLC and platelet.
8. Normal and absolute values in hematology. 8. Quality assurance in hematology.
9. Haemoglobinometry, various methods of estimation of Hb, errors involved and standardization of instrument for adaptation for Hb estimation.
10. Hemocytometry, procedures for cell counts visual as well as electronic, red cell, leucocytes and platelet counts. An error involved and means to minimize such errors.
11. Romanowsky dyes, preparation and staining procedure of the blood smears.
12. Morphology of normal blood cells and their identification.
13. Erythrocyte sedimentation rate, factors influencing and various procedures for its estimation with their significance.
14. Haemocrit value by macro and micro methods their merit and demerits.
15. Routine examination of urine.
16. Examination of biological fluids such as CSF, etc.
17. Examination of semen.

Book Reference:

I. Textbook of Hematology – Tejindar Singh
II. Essential of Hematology – Kwathalkar
III. Essential of Clinical Pathology – Kwathalkar
IV. Textbook of Pathology – Harsh Mohan

SYLLABUS & SCHEME OF EXAMINATION FOR BMLT SECOND YEAR

BACHELOR IN MEDICAL LAB TECHNOLOGY (BMLT)

SCHEME Of EXAMINATION:BMLT-2nd Year

S. No.	Subject	Theory	Internal Assessment	Practical	Total
1	Histology	100	100	100	300
2	Microbiology-II	100	100	100	300
3	Biochemistry-II	100	100	100	300
4	Hematology-II	100	100	100	300
Total Max. Marks					1200

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

-All theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	**Marks for each Question**	**Total Marks**
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

SCHEME Of EXAMINATION & Syllabus :BMLT-2nd Year

Paper-I: Histology

Subject	Theory	Internal Assessment	Practical	Total
Histology	100	100	100	300

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

- Theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	Marks for each Question	Total Marks
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

INSTRUCTION FOR THE PAPER SETTER

Section-A: This will consist of 10 very short answer type questions with answer to each question upto five lines (Fifty to sixty words) in length . All questions will be compulsory to answer. Each question will carry two marks. Total weightage of the section shall be 20 marks.
Section-B: This will consist of short answer questions with answer to each question upto 2 pages (250-300 words) in length. Eight questions will be set by the examiner and five have to be answered by the candidate. Each question will carry 10 marks. Total weightage of the section shall be 50 marks.
Section-C: This will consist of essay type questions with answer to each question upto 5 pages (approx 500 words) in length. Four questions will be set by the examiner and two have to be answered by the candidate. Each question will carry 15 marks. Total weightage of the section shall be 30 marks.
INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word

Paper-I: Histology

HISTOTECHNOLOGY: BASIC CELLULAR PATHOLOGYAND ALLIED TECHNOLOGY

Total No. of Teaching hrs: 210hr Theory-90hrs & Practical-120hrs

Syllabus Contents:

HUMAN HISTOLOGY

I. Study of various body tissues.
   1. Epithelial tissue.
   2. Connective tissue including bone and cartilage.
   3. Muscular tissue.
   4. Nervous tissue.
   5. Glands ,epithetical and endocrine glands.

II. Histological study of various system
   1. The circulatory system
   2. The alimentary system.
   3. The digestive system including liver, pancreas and gall bladder.
   4. The respiratory system.
   5. The urinary system.
   6. The endocrinal gland system
   7. The reproductive system
   8. Nerve ending and organ of special senses.

FUNDAMENTALS OF APPLIED HISTOLOGY

1. Microscopy ,working principle, maintenance and application ofvarious types of microscope :-
   a) Dark ground microscope
   b) Polarizing microscope
   c) Phase contrast microscope
   d) Interference microscope
   e) UV microscope
   f) Micrometry
2. Metachromasis and metachromatic dyes
3. Haematoxylene its importance in histology.
4. Carbohydrates and amyloid –special stains procedures.
5. Connective tissue, trichome staining and other special stains for the muscular fibres , elastic.reticulin and collagen fibres.
6. Principle of metal impregnation techniques.
7. Demonstration and identification of mineral pigments.

CYTOLOGY LECTURES:

1. Stain cytologic preparation with special emphasis of MGG,PAPANICOLOU stains.
2. Special stains like PAS, mucicaramine , alcian blue ,schmorl and acid phosphates.
3. Cytolologic screening and quality control in cytology laboratory.

HISTOLOGY& CYTOLOGY PRACTICALS

- **Includes practical demonstration of all contents includes in theory syllabus contents .**

Book Reference:

I. Medical Laboratory Technology – Sood
II. Medical Laboratory Science – Ochei
III. Textbook of Medical Lab Technology – Godkar
IV. Textbook of Histology – gunsegaran

Paper-II: Microbiology-II

Subject	Theory	Internal Assessment	Practical	Total
Microbiology-II	100	100	100	300

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

- Theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	Marks for each Question	Total Marks
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

INSTRUCTION FOR THE PAPER SETTER

Section-A: This will consist of 10 very short answer type questions with answer to each question upto five lines (Fifty to sixty words) in length . All questions will be compulsory to answer. Each question will carry two marks. Total weightage of the section shall be 20 marks.
Section-B: This will consist of short answer questions with answer to each question upto 2 pages (250-300 words) in length. Eight questions will be set by the examiner and five have to be answered by the candidate. Each question will carry 10 marks. Total weightage of the section shall be 50 marks.
Section-C: This will consist of essay type questions with answer to each question upto 5 pages (approx 500 words) in length. Four questions will be set by the examiner and two have to be answered by the candidate. Each question will carry 15 marks. Total weightage of the section shall be 30 marks.
INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word.

Paper-II: Microbiology-II

Total No. of Teaching hrs:220hr Theory-100hrs & Practical-120hrs

Syllabus Contents:-

MICROBIOLOGY

I. IDENTIFICATION OF BACTERIA

1. Micrococci
2. Staphylococci
3. Streptococci
4. Pneumococci
5. Corynebacteria
6. Escherrichia
7. Kiebsiella
8. Enterobacter
9. Proteus-providencia
10. Salmonella
11. Shigella
12. Arrizona
13. Citrobacter
14. Yersinia
15. Pseudomonas
16. Vibrio
17. Haemophilus
18. Hydobacteris
19. Brucella
20. Bordetella
21. Bacillus
22. Clostridia
23. Anaerobic cocci
24. Neisseria
25. Treponema

26. Borrelia
27. Laptospira
28. Mycoplasma
29. Ricketessia
30. Chlomydia
31. Tric agent

PATHOGENIC AND NONPATHOGENIC FUNGI

1. Candida
2. Cryptococci
3. Dermatophytes
4. Sprotrichoums
5. Histoplasma
6. Blastomyces
7. Coccidioides
8. Para Coccidioides
9. Dematiaceous fungi
10. Mycetoma
11. Actinomyces
12. Nocardia
13. Common laboratory contamins
14. Biochemical test used for the identification of bacteria and fungi
15. Antimicrobial sensitivity testing
16. Assay methods for body fluids
17. Antimicrobial susceptibility testing for mycobacterium
18. Preparation and standardization of antigen and antisera

VIROLOGY:

1. Different staining technique used virology.
2. Used of embryonated eggs in clinical virology
3. Principles of animal cell culture and their use in virology.
4. Use of common laboratory animals in viral culture.

Practical's :-

1. Demonstration of staining procedure :-
   Preparation of following stains and demonstration of viral inclusion of bodies:-
   a) Seller's stain for negri body demonstration.
   b) Giemsa's stain for CMV & Herpes viral inclusion.
2. Preparation of reagent for serological tests
   Phosphate buffered saline,veronal buffered saline,alsever's solution,dextrose gelatin,veronal buffer and tris buffer.
3. Principle and performance of viral haemoagglutination and haemoagglutination in hibition test.
4. Demonstration of haemadsorption test'IHA & RPHA test
5. Collection,titration and reservation of gunes pig serum for complement
6. Demonstration of complement fixation test
7. Demonstration of immunofluoroscence test and immunoperoxidase tests .
8. Demonstration of ELISA for HBsAg detection

PARASITOLOGY:

1. Morphology and life cycle of haemoflagellates – leishmania and trepanosomes.
2. Morphology and life cycle of tissue and blood nematodes – filariae,trichmella ,dracunculus.
3. Laboratory diagnosis of tissue and blood nematodes infection :- tanenia,echinococcus.Morphology and life cycle of intestinal cestodes – H.nana ,D.Latum
4. Laboratory diagnosis of cessode infection- hydatid,cysticerosis.
5. Culture technique for protozoa ,amoeba ,giardia,leishmania.
6. Culture method for helminth's –hook worm,round worm.
7. Egg counting techniques
8. Putting up cason's test and its interpretation.
9. Examination and processing of cysticerosis cyst.
10. Laboratory processing, staining and examination of sample.

Book Reference:

I. Textbook of Microbiology – C.P. Baveja
II. Textbook of Microbiology – Ananthanarayan
III. Medical Laboratory Technology – Sood
IV. Medical Laboratory Science – Ochei
Textbook of Medical Lab Technology - Godkar

Paper-III: Biochemistry-II

Subject	Theory	Internal Assessment	Practical	Total
Biochemistry-II	100	100	100	300

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

- Theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	Marks for each Question	Total Marks
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

INSTRUCTION FOR THE PAPER SETTER

Section-A: This will consist of 10 very short answer type questions with answer to each question upto five lines (Fifty to sixty words) in length . All questions will be compulsory to answer. Each question will carry two marks. Total weightage of the section shall be 20 marks.
Section-B: This will consist of short answer questions with answer to each question upto 2 pages (250-300 words) in length. Eight questions will be set by the examiner and five have to be answered by the candidate. Each question will carry 10 marks. Total weightage of the section shall be 50 marks.
Section-C: This will consist of essay type questions with answer to each question upto 5 pages (approx 500 words) in length. Four questions will be set by the examiner and two have to be answered by the candidate. Each question will carry 15 marks. Total weightage of the section shall be 30 marks.
INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word.

Paper-III: Biochemistry-II

Teaching hrs:200hr Theory-80hrs & practical-120hrs

Syllabus Contents:-

BIOCHEMISTRY

ANALYTICAL BIOCHEMISTRY AND METABOLISM

1. Colorimeter
2. Spectrophotometer
3. Flame photometry
4. Atomic absorption spectroscopy
5. Electrometric determination of Na^+ and K^+
6. Chromatography and electrophoresis.
7. Introduction, properties and simple metabolism of carbohydrates, protein, fats, nucleic acid and enzymes
8. Digestion and absorption
9. Nutrition (vitamin and calories)
10. Radioimmunoassay (RIA) and ELISA

BIOCHEMISTRY PRACTICAL

1. Study Of Colorimeter
2. Study of spectrophotometer
3. Study of flame photometer
4. Study of gel electrophoresis
5. Study of ELISA
6. Study of paper chromatography
7. Study of thin layer chromatography
8. Study of pH meter
9. To prepare phosphate buffer (200 ml p H 7.45) and determine its p H by using meter.
10. Determine the pKa value of acetic acid.
11. Estimation of sugar by DNS method.
12. To extract invertase enzyme from solanum tuberosum (patato).
13. Estimation of protein by lawry's method.
14. Estimation of protein by DNS method for determining the invertase activity.
15. Different type of glassware's and their composition.
16. Preparation of benedict's qualitative reagent.
17. Estimation of serum (SGPT & ALT).
18. Determination of SGOT
19. Plot a standard graph of SGPT.
20. Plot a standard graph of SGOT.
21. Determination of serum acid phosphatase.
22. To plot a standard graph of serum acid phosphatase.

Book Reference:

I. Biochemistry – U. Satyanarayan
II. Textbook of Medical Biochemistry – Chatterjee
III. Fundamental of Biochemistry
IV. Essential of Biochemistry – Naik
V. Medical Laboratory Technology – Sood
VI. Medical Laboratory Science – Ochei
VII. Textbook of Medical Lab Technology - Godkar

Paper-IV: Hematology-II

Subject	Theory	Internal Assessment	Practical	Total
Hematology-II	100	100	100	300

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

- Theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	Marks for each Question	Total Marks
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

INSTRUCTION FOR THE PAPER SETTER

Section-A: This will consist of 10 very short answer type questions with answer to each question upto five lines (Fifty to sixty words) in length . All questions will be compulsory to answer. Each question will carry two marks. Total weightage of the section shall be 20 marks.
Section-B: This will consist of short answer questions with answer to each question upto 2 pages (250-300 words) in length. Eight questions will be set by the examiner and five have to be answered by the candidate. Each question will carry 10 marks. Total weightage of the section shall be 50 marks.
Section-C: This will consist of essay type questions with answer to each question upto 5 pages (approx 500 words) in length. Four questions will be set by the examiner and two have to be answered by the candidate. Each question will carry 15 marks. Total weightage of the section shall be 30 marks.
INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word.

Paper-IV: Hematology-II

Teaching hrs:210hr Theory-90hr & Practical-120hrs

Syllabus Contents:

FUNDAMENTALS OF HAEMATOLOGY:-

1. History and discovery of blood group.
2. ABO and Rhesus blood group system.
3. Compatibility test in blood transfusion, complication and hazards of blood transfusion.
4. Laboratory investigation of transfusion reaction and mismatched transfusion.
5. Preparation of packed cells and various fractions of blood for transfusion purpose.
6. Staining of bone marrow smear and preparation of histological section
7. Haemoglobin its synthesis function and degradation.
8. Haemoglobin pigments and their measurements.
9. Abnormal haemoglobin and their means of identification andestimation.
10. LE cells phenomenon and various method of its demonstration.
11. Haemostatic mechanism and theories of blood coagulation.
12. Screening coagulation procedure.
13. Quantitative assay of coagulation factors.

Book Reference:

I. Textbook of Hematology – Tejindar Singh
II. Essential of Hematology – Kwathalkar
III. Essential of Clinical Pathology – Kwathalkar
IV. Textbook of Pathology – Harsh Mohan

SYLLABUS & SCHEME OF EXAMINATION FOR BMLT THIRD YEAR

BACHELOR IN MEDICAL LAB TECHNOLOGY (BMLT)

SCHEME Of EXAMINATION:BMLT-3rd Year

S. No.	Subject	Theory	Internal Assessment	Practical	Total
1	Applied Histopathology	100	100	100	300
2	Microbiology-III	100	100	100	300
3	Biochemistry-III	100	100	100	300
4	Hematology-III	100	100	100	300
Total					1200
5	Instrumentation #	--	50	--	50
Total Max. Marks					1250

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

-All theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	**Marks for each Question**	**Total Marks**
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

Paper-I: Applied Histopathology

Subject	Theory	Internal Assessment	Practical	Total
Applied Histopathology	100	100	100	300

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

- Theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	Marks for each Question	Total Marks
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

INSTRUCTION FOR THE PAPER SETTER

Section-A: This will consist of 10 very short answer type questions with answer to each question upto five lines (Fifty to sixty words) in length . All questions will be compulsory to answer. Each question will carry two marks. Total weightage of the section shall be 20 marks.
Section-B: This will consist of short answer questions with answer to each question upto 2 pages (250-300 words) in length. Eight questions will be set by the examiner and five have to be answered by the candidate. Each question will carry 10 marks. Total weightage of the section shall be 50 marks.
Section-C: This will consist of essay type questions with answer to each question upto 5 pages (approx 500 words) in length. Four questions will be set by the examiner and two have to be answered by the candidate. Each question will carry 15 marks. Total weightage of the section shall be 30 marks.
INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word.

Paper-I: Applied Histopathology

Total No. of Teaching hrs:210hrs Theory-80hr & Practical-120hr

SPECIAL HISTOLOGY AND HISTOCHEMICAL METHODS

Syllabus Contents:-

I. APPLIED HISTOLOGY

1. Handling of fresh histological specimen,cryo/frozen section of fresh and fixed tissue,freeze drying.
2. Lipid identification and demonstration
3. Micro-organism in the tissue-various staining techniques for their demonstration and identification.
4. Nucleic acid ,DNA and RNA special stains and procedures.
5. Cytoplasmic constituent and their demonstration.
6. Tissue requiring special treatment i.e eye ball,B.M.biopsy ,under calcified bones.
7. Neuropathology techniques.
8. Enzyme histochemistry demonstration of phosphatase,dehydrogenase,oxidase and peroxidase etc.
9. Electron microscope ,their working ,component and allied techniques for electron microscopy.
10. Ultra microtomy
11. Museum technique.

II. CYTOLOGY

1. Cervical cytology –basis of detection of malignant and pre malignant lesions.
2. Hormonal assessment with cytological techniques and sex chromatin and pregnancy test.
3. Aspiration cytology principles, indications and utility of technician in FNAC clinics.

III. IMMUNOPATHOLOGY

1. cells and organs of immune systems
2. immunoglobulin’s antibodies and humoral immune response.
3. Allergy
4. Rheumatological diseases and investigations.
5. Infection and the immune system.
6. Cancer immunology
7. Tissue typing for kidney transplant.

Book Reference:

I. Medical Laboratory Technology – Sood
II. Medical Laboratory Science – Ochei
III. Textbook of Medical Lab Technology – Godkar
IV. Textbook of Histology – gunsegaran

Paper-II: Microbiology-III

Subject	Theory	Internal Assessment	Practical	Total
Microbiology-III	100	100	100	300

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

- Theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	Marks for each Question	Total Marks
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

INSTRUCTION FOR THE PAPER SETTER

Section-A: This will consist of 10 very short answer type questions with answer to each question upto five lines (Fifty to sixty words) in length . All questions will be compulsory to answer. Each question will carry two marks. Total weightage of the section shall be 20 marks.
Section-B: This will consist of short answer questions with answer to each question upto 2 pages (250-300 words) in length. Eight questions will be set by the examiner and five have to be answered by the candidate. Each question will carry 10 marks. Total weightage of the section shall be 50 marks.
Section-C: This will consist of essay type questions with answer to each question upto 5 pages (approx 500 words) in length. Four questions will be set by the examiner and two have to be answered by the candidate. Each question will carry 15 marks. Total weightage of the section shall be 30 marks.
INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word.

Paper-II: Microbiology-III

Teaching hrs:100hr

Theory-100hrs & Practical-120hrs

Syllabus Contents:-

I. APPLIED MICROBIOLOGY

1.Preservation of microbes and lyophilisation methods.

2.Total and viable count of bacteria.

3. Testing of disinfectant Riedeal –walker,Chick Martin,In use test .

4. Preparation and standardisation of vaccines and immunization schedule.

5.Bacteriological examination of water milk ,food and air.

6. Nosocomial infections and sterility testing of IV fluids and processing of various samples for hospital infections.

7. Toxin-Antitoxin Assay and pathogenicity tests.

8. Epidemiological markers of micro-organisms serotyping, bacteriophage and bacteriocin typing method.

9. laboratory diagnosis of common bacterial infections-pyogenic infections,respiratory tract infections,meningitis, diphtheria ,whooping cough,gas gangrene,food poisoning,entric fever,acute diarrhoeal disease,cholera,urinary tract infections,tuberculosis,leprosy,plague,anthrax,typhoid fever,syphilis,gonorrhea and others STDs disease.

10 . Serological test.

Widal, ASO,LET,CRP, Rosewaller brucella agglutination,coldagglutination,VDRL,TPHA FTA – ABS.

11. laboratory diagnosis of fungal infections

Superficial dermatophyte, fungal infections, candidiasis infection, cryptococcosis,pulmonary infections,Mycetoma, other deep mycotic infections,subcutaneous fungal infections - Sporotrichosis, chromoblasato mycosis, eye and ear fungal infections.

12 .Serological test for fungal infection and skin tests.

13. Advance techniques in microbiology – ELISA , RIA ,CCIE, Coagglutination ,GLC,HPLC etc.

14. Rapid diagnostic method and automation in microbiology.

II. BASIC VIROLOGY METHODS

1. Principles of serology techniques used in virology – PART I : HA,HAI,HAB,SRB RPHA,JHA,CET,CIEP.

2. Principles of serology techniques used in virology – PART II Ht , ELISA,RIA,IF,Immuno-ferooxidase test.

3. Mode of transmission of viral agent.

4.Prevention of viral diseases.

5. Immunity of viral infections.

Practical's

1. Demonstration of anatomical structure in fertile hen's egg –technique of inoculation of fertile egg-
    a. Chorioallantoic
    b. Membrane
    c. Allantoic cavity
    d. Yolk sac
2. Inoculation of virus infected material into the mice by the following route :-
    a. Intracerebral
    b. Intravenous
    c. Intraperitoneal
    d. Subcutaneous
3. Harvesting of infected of infected mouse brain for rabies virus.
4. Preparation of tissue culture media :-
    a. Hank's balance salt solution
    b. Barle's balanced salt solution
    c. Minimum essential medium
5. Collection of blood from :-
    a. Mice - retro orbital route
    b. One day old chick –cardiac bleeding
6. Preparation of guinea pig kidney powder for Paul Bunnel Test.
7. Demonstration of Arboviral Antigen preparation from mouse brain for HAI and CFT Test.
8. Demonstration of herpes viral antigen in tissue culture system .

III PARASITOLOGY

i. Morphology and life cycle of :- Free Living Amoeba Balantidium
Toxoplasma

ii. Diagnosis of morphology and life cycle of tramatiodes :- schistosomos
Intestinal flukes
Blood flukes
Lung flukes

iii. Serological & immunological technique used for the diagnosis of :- gel-diffusion
THFA, IFA. ELISA, indirect fluorescent antibody

Iv. Introduction to the biological identification of adult :- mosquitoes
Flies
Tics and fleas

Animal care and handling and its uses in parasitological preparation of parasitic antigen and
antisera.handling and operation of sophisticated equipments.

Practical's

1. Serological and immunological test use in parasitological
   a. Gel diffusion technique
   b. Electrophoretic technique
   c. Preparation of various parasitic antigen and standardization.
   d. Differentiation of various mosquitoes flies,worms and ticks.
   e. Uses of laboratory animals bleeding and inoculation.

Book Reference:

I. Textbook of Microbiology – C.P. Baveja
II. Textbook of Microbiology – Ananthanarayan
III. Medical Laboratory Technology – Sood
IV. Medical Laboratory Science – Ochei
V. Textbook of Medical Lab Technology - Godkar

Paper-III: Biochemistry-III

Subject	Theory	Internal Assessment	Practical	Total
Biochemistry-III	100	100	100	300

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

- Theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	Marks for each Question	Total Marks
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

INSTRUCTION FOR THE PAPER SETTER

Section-A: This will consist of 10 very short answer type questions with answer to each question upto five lines (Fifty to sixty words) in length . All questions will be compulsory to answer. Each question will carry two marks. Total weightage of the section shall be 20 marks.
Section-B: This will consist of short answer questions with answer to each question upto 2 pages (250-300 words) in length. Eight questions will be set by the examiner and five have to be answered by the candidate. Each question will carry 10 marks. Total weightage of the section shall be 50 marks.
Section-C: This will consist of essay type questions with answer to each question upto 5 pages (approx 500 words) in length. Four questions will be set by the examiner and two have to be answered by the candidate. Each question will carry 15 marks. Total weightage of the section shall be 30 marks.
INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word.

Paper-III: Biochemistry-III

Teaching hrs:200hr Theory-80hrs & Practical-120hrs

Syllabus contents:-

CLINICAL BIOCHEMISTRY METHODS

1. Principle for assay procedure for biological material-
   i. Total protein
   ii. Total albumin
   iii. Glucose
   iv. Urea
   v. Uric acid
   vi. Creatinine
   vii. Cholesterol
   viii. Bilirubin
   ix. Sodium
   x. Potassium
   xi. Chloride
   xii. Calcium
   xiii. Inorganic phosphates
   xiv. PBD 17 ketosterious
   xv. Barbiturates
2. Glucose tolerance test
3. Insulin tolerance test gastric analysis
4. Xylose absorption test
5. Clearance test for renal function
6. Enzyme-acid and alkaline phosphatase
7. AST
8. ALT
9. Amylase lactate dehydrogenase
10. CPK
11. Analysis of calculi and CSF
12. Quality control of clinical investigations
13. Automation in clinical biochemistry laboratory
14. Laboratory organizations
15. Management and maintenance of records

Book Reference:

I. Biochemistry – U. Satyanarayan
II. Textbook of Medical Biochemistry – Chatterjee
III. Fundamental of Biochemistry
IV. Essential of Biochemistry – Naik
V. Medical Laboratory Technology – Sood
VI. Medical Laboratory Science – Ochei
VII. Textbook of Medical Lab Technology - Godkar

Paper-IV: Hematology-III

Subject	Theory	Internal Assessment	Practical	Total
Hematology-III	100	100	100	300

N.B.-Internal Assessment marks will be added in theory marks; candidate have to get min. 50% marks i.e.-100 marks in theory and internal assessment collectively for passing the examination and in practical he/she should get 50% marks i.e.-50 marks to get pass.

- Theory papers will of 100 max. marks and 3Hrs. time duration . Pattern of Examination (Theory) if Maximum Marks are 100 will be as under;-

No. and Type of Questions	Marks for each Question	Total Marks
10 very short answer Questions *Answer to be given in 50-60 words*	**02**	**20**
5 short answer Questions *Answer to be given in 250-300 words*	**10**	**50**
2 essay type Questions *Answer to be given in 450-500 words*	**15**	**30**
Total Marks		**100**

INSTRUCTION FOR THE PAPER SETTER

Section-A: This will consist of 10 very short answer type questions with answer to each question upto five lines (Fifty to sixty words) in length . All questions will be compulsory to answer. Each question will carry two marks. Total weightage of the section shall be 20 marks.
Section-B: This will consist of short answer questions with answer to each question upto 2 pages (250-300 words) in length. Eight questions will be set by the examiner and five have to be answered by the candidate. Each question will carry 10 marks. Total weightage of the section shall be 50 marks.
Section-C: This will consist of essay type questions with answer to each question upto 5 pages (approx 500 words) in length. Four questions will be set by the examiner and two have to be answered by the candidate. Each question will carry 15 marks. Total weightage of the section shall be 30 marks.
INSTRUCTIONS FOR THE CANDIDATES: Answer all questions only in required word.

Paper-IV: Hematology-III

Teaching hrs:200hr
Theory-80hrs &
Practical-120hrs

HAEMATOLOGY

Syllabus Contents:-

APPLIED HAEMATOLOGY

1. Definition and classification of Anaemia's.
2. Laboratory investigations of megaloblastic anaemia.
3. Laboratory investigations of iron deficiency anaemia .
4. Laboratory investigations of haemolytic anaemia including classification and causes.
5. Leukaemia :-definition and classification
6. Cytochemical staining procedures in various haemopioetic disorder.
7. Laboratory test for assessing bleeding disorder.
8. Laboratory investigation for disseminated intravascular coagulation
9. Mechanism of fibrinolysis : Test for fibrinolysis
10. Platelets function test and their interpretation.
11. Techniques available for cytogenetic studies.
12. Uses of radio-isotopes in haematology.
13. Safety measures for handling radio-isotopes.

Book Reference:

I. Textbook of Hematology – Tejindar Singh
II. Essential of Hematology – Kwathalkar
III. Essential of Clinical Pathology – Kwathalkar
IV. Textbook of Pathology – Harsh Mohan

SCHEME Of EXAMINATION & SYLLABUS :BMLT-3rd Year

Subject	Theory	Internal Assessment	Practical	Total
Instrumentation #	--	50	--	50

N.B.-There will be institutional examination/practical demonstrations of following instruments and procedures of 50 max. marks, where min.25 marks are required to get pass and after duly compilation of examination the marks have to sent to university prior to theory examination .

INSTRUMENTATION

1. SIMPLE MICROSCOPY
2. Compound microscopy
3. Dark ground microscopy
4. Phase contrast microscopy
5. Fluorescence microscopy
6. PTL metry
7. Photometry electro
8. Spectrophotometry
9. Haemoglobinometry
10. Haemocytometer
11. hematocrit
12. centrifuge
13. Sterilization instrument(Autoclave, Hot air oven, Laminar air flow)
14. Egg incubator and dental drill
15. Co incubator
16. Bacteriological incubator
17. Microtome and accessories
18. Tissue floatation bath
19. Tissue meton.
20. Serological water bath
21. Micropipettes and microlitre plates
22. Cellephan tubes and bags.
23. Paper and gel electrophoresis
24. Flame photometer
25. Polarizing microscope
26. Micro-hematocrit centrifuge
27. Gas chromatography
28. Radio immune assay
29. Auto analyzers
30. ECG