SYLLABUS & SCHEME OF EXAMINATION FOR BMLTFIRST YEAR

SARDAR PATEL UNIVERSITY, BALAGHAT (M.P.)

BACHELOR IN MEDICAL LAB TECHNOLOGY (BMLT)

Syllabus :BMLT-1st Year

Paper-I: Basic Histology (Anatomy & Physiology)

ANATOMY PHYSIOLOGY

Syllabus Contents:-

1. The anatomic and physiological organization of human bodyand 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 andphysiology 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.

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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 andmaintenance.

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 andmaintenance.
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 onfemale genital tract.
2. Collection processing and staining of the Cytologic specimen

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Paper-II: Microbiology-I

Syllabus Contents

MEDICAL MICROBIOLOGY

1. Introduction and brief history of microbiology.
2. Safety measures in microbiology.
3. General characteristics and classification of bacteria andfungi.
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 samplesfor 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 resultsand quality control in microbiology.

VIROLOGY

1. Introduction to Medical Virology.

2. Nomenclature and classification of viruses.
3. General characteristics of viruses: physical, chemical andbiological properties.
4. Collection, transport, processing and storage of sample forviral diagnosis.

Practical

1. Introduction to use of different laboratory instruments and theirsafety precautions.
2. Collection, handling and storage of samples for viral diagnosis.
3. Washing, cleaning and sterilization of media and glassware invirology.
4. Principles of bio safety hoods, use of pipettes, syringes andother 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 processingof 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 vaginalflagellates – E. Gingivalia.
7. Morphology and life cycle of Haemopro- malaria protozoa-parasite.
8. Laboratory diagnosis of malarial infection.
9. General characters and classification of medicalhelminthology.
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 safetyprecautions.
2. Macroscopic examination of adult worms, cysts, tissues, andprocessing 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 ofmedical importance.

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Paper-III: Biochemistry-I

Syllabus Contents

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 analyticalbalance, preparation of reagents and standard solutions, storageof chemicals .
3. Units of measurement, S.I. Units, measurement of volumetricapparatus, (pipettes, flasks, cylinders) Calibration of volumetric apparatus.
4. Radioisotopes and their use in Biochemistry, mole, molar andnormal 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 ofserum plasma, preservation and disposal of biological samplesmaterial. 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 basesolutions, chloride estimation.

HEMATOLOGY

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 theirmerits and demerits.
6. Collection & preservation of blood for various hematologicalinvestigations.

7. Physiological variations in Hb, PCV, TLC and platelet.
8. Normal and absolute values in hematology. 8. Quality assurancein 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 aselectronic, red cell, leucocytes and platelet counts. An errorinvolved and means to minimize such errors.
11. Romanowsky dyes, preparation and staining procedure of theblood smears.
12. Morphology of normal blood cells and their identification.
13. Erythrocyte sedimentation rate, factors influencing and variousprocedures for its estimation with their significance.
14. Haemocrit value by macro and micro methods their merit anddemerits.
15. Routine examination of urine.
16. Examination of biological fluids such as CSF, etc.
17. Examination of semen.

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Paper-I: Histology

Syllabus Contents

HISTOTECHNOLOGY: BASIC CELLULAR PATHOLOGYAND ALLIED TECHNOLOGY

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 gallbladder.
   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 forthe 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 ,schmorland acid phosphates.
3. Cytolologic screening and quality control in cytologylaboratory.

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Paper-II: Microbiology-II

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. salmo-nella
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 andfungi
15. Antimicrobial sensitivity testing
16. Assay methods for body fluids
17. Antimicrobial susceptibility testing for mycobacterium
18. Preparation and standardization of antigen and antiseraVIROLOGY

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 viralinclusion 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'ssolution,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 forcomplement
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 nematodesinfection :- tanenia,echinococcus.

4. Morphology and life cycle of intestinal cestodes – H.nana ,D.Latum
5. Laboratory diagnosis of cessode infection-hydatid,cysticerosis.
6. Culture technique for protozoa ,amoeba,giardia,leishmania.
7. Culture method for helminth's –hook worm,round worm.
8. Egg counting techniques
9. Putting up cason's test and its interpretation.
10. Examination and processing of cysticerosis cyst.
11. Laboratory processing,staining and examination ofsample.

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Syllabus Contents:-

Paper-III: Biochemistry-II

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 and 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 determineits 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 theinvertase activity.
15. Different type of glassware's and their composition.
16. Preparation of benedict's qualitative reagent.
17. Estimation of serum glutamate pyruvate transaminase enzyme(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.
23. Determination of serum amylase by colorimeteric method.

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Paper-IV: Hematology-II

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 andhazards of blood transfusion.
4. Laboratory investigation of transfusion reaction and mismatchedtransfusion.
5. Preparation of packed cells and various fractions of blood fortransfusion purpose.
6. Staining of bone marrow smear and preparation of histologicalsection
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.

SYLLABUS & SCHEME OF EXAMINATION FOR BMLT THIRD YEAR

SARDAR PATEL UNIVERSITY, BALAGHAT (M.P.)

SYLLABUS : BMLT-3rd Year

Paper-I: Applied Histopathology

Syllabus Contents:-

SPECIAL HISTOLOGY AND HISTOCHEMICAL METHODS

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 calcifiedbones.
7. Neuropathology techniques.
8. Enzyme histochemistry demonstration of phosphatase,dehydrogenase,oxidase and peroxidase etc.
9. Electron microscope ,their working ,component and allied techniques forelectron 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.

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Syllabus Contents:-

MICROBIOLOGY

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 varioussamples 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,respiratorytract 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,cold agglutination,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 andCFT 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 parasiticantigen 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.

SARDAR PATEL UNIVERSITY, BALAGHAT (M.P.)

SYLLABUS : BMLT-3rd Year

Paper-III: Biochemistry-III

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

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SYLLABUS : BMLT-3rd Year

Paper-IV: Hematology-III

Syllabus Contents

HAEMATOLOGY

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 andcauses.
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.

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SYLLABUS :BMLT-3rd Year

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