

**STUDY & EVALUATION SCHEMES
OF
BACHELOR OF SCIENCE IN
MEDICAL LABORATORY TECHNOLOGY
(B. Sc.MLT)**

(B.Sc. MLT- V SEMESTER)

[Applicable w.e.f. Academic Session 2020-21]



INTEGRAL UNIVERSITY, LUCKNOW

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Syllabus approved by Board of Study, Faculty Board, Academic Council, Executive Council of the Integral University, Lucknow

INTEGRAL UNIVERSITY, LUCKNOW INTEGRAL
INSTITUTE OF ALLIED HEALTH SCIENCES & RESEARCH DEPARTMENT OF
PARAMEDICAL & HEALTH SCIENCES

STUDY & EVALUATION SCHEME B.Sc. in MEDICAL LABORATORY
TECHNOLOGY (B. Sc. MLT)
(w.e.f. Session 2020)

III -Year

V-Semester

S. No	Code	Name of the Subject	Periods			Credits	Evaluation Scheme				Subject Total
			L	T	P		Sessional			Exam	
							CT	TA	Total	ESE	
1.	LT301	General & Clinical Pathology	3	1	0	4	25	15	40	60	100
2.	LT302	Blood Banking & Genetics	2	1	0	3	25	15	40	60	100
3.	LT303	Analytical Biochemistry	2	1	0	3	25	15	40	60	100
4.	LT304	Basic Preventive Medicine & Community Health Care	2	1	0	3	25	15	40	60	100
5.	LT305	Medical Parasitology	2	1	0	3	25	15	40	60	100
6.	LT306	Blood Banking & Genetics- Lab	0	0	2	1	30	30	60	40	100
7.	LT307	Analytical Biochemistry- Lab	0	0	2	1	30	30	60	40	100
8.	LT308	Medical Parasitology - Lab	0	0	2	1	30	30	60	40	100
9.	LT309	Hospital Posting - Lab	0	0	12	6	30	30	60	40	100
Total			11	05	18	25	245	195	440	460	900

L: Lecture

T: Tutorials

P: Practical

C: Credit

CT: Class Test

TA: Teacher Assessment

ESE: End Semester Examination

Sessional Total: Class Test + Teacher Assessment

Subject Total: Sessional Total + End Semester Examination (ESE)

SUBJECT: GENERAL & CLINICAL PATHOLOGY

SUBJECT CODE: LT301

(w.e.f. July 2020)

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LEARNING OBJECTIVE: The students will be made aware of the General Pathology. In addition they will understand Mechanism of disease, its Nature, processes, pathogenesis and accountability.

UNIT-I: (8Hours)

Cell injuries –Introduction and Types. Reversible cell injury: Types, Sequential changes. Irreversible cell injury: Types of Necrosis & Gangrene, Autolysis. Amyloidosis - Classification, Pathogenesis, Pathology including special stains.

UNIT-II: (8Hours)

Growth Disturbances and Neoplasia Atrophy, Hypertrophy, Hyperplasia, Aplasia, Hypoplasia, Metaplasia, Malformation, agenesis, dysplasia. Precancerous lesions. Neoplasia: Definition, classification, Biological behaviour: Benign and Malignant, Carcinoma and Sarcoma. Malignant Teratoma.

UNIT-III: (8Hours)

Infections- Definition, Components, Types, Pathogenesis. Inflammation- Introduction, Definition, Sign, Types. Acute inflammation, Chronic inflammation, mechanism, sign, inflammatory cells, symptoms.

UNIT-IV: (8Hours)

Hepato – biliary pathology. Jaundice: Types, aetio-pathogenesis and diagnosis. Hepatitis: Acute, Chronic, neonatal. Alcoholic liver disease. Cirrhosis: Postnecrotic, Alcoholic, Metabolic and Portal hypertension Liver abscesses; Pyogenic, parasitic and Amoebic. Tumours of Liver, Endocrine pathology-Diabetes Mellitus: Types, Pathogenesis, Pathology, Laboratory diagnosis.

UNIT –V: (8Hours)

Seminal fluid analysis: Normal semen, production, composition, specimen handling and disposal of sample, physical examination, chemical and microscopic examination, sperm concentration techniques.

CSF and other body fluids: Normal composition, production, normal values, physiological alteration, sample collection, preservation, storage, handling, processing and disposal of CSF, Ascetics fluid, Plural fluid, pericardial fluid, Synovial fluid

SUGGESTED READINGS:

1. Textbook of Medical Laboratory Technology by Praful B. Godkar
2. Medical Laboratory Technology by K L Mukherjee Volume-I
3. Practical Haematology by J.B. Dacie
4. Clinical Diagnosis & Management by Laboratory methods (20th edition) by John Bernard Henry
5. Atlas of Haematology by G.A. McDonald
6. De Gruchy's clinical Haematology in medical practice
7. Wintrobe's Clinical Haematology– 2013 by John P. Greer, Daniel A. Arber, Bertil E. Glader, Alan F. List

SUBJECT- BLOOD BANKING & GENETICS
SUBJECT CODE- LT302
(w.e.f. July 2020)

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LEARNING OBJECTIVE: Blood banking will make students learn about blood grouping & blood, Transfusion. The students will learn about the concept of blood grouping, compatibility testing in blood transfusion & screening of donated blood for various Infection Diseases. Genetics will make students learn about Fundamentals of Heredity. The students will learn about the concept of inheritance in various genetic diseases.

UNIT- I: (8Hours)

History and discovery of blood group system, ABO and Rhesus blood group system, Cell and serum grouping, various methods, interpretation of results.

Discrepancies in blood grouping and resolving problems, Variants of D antigen and weak D typing.

Compatibility testing:- definition, indication methods.

Coombs test:- Direct, indirect, principle, procedure, interpretation, applications.

UNIT- II: (8Hours)

Blood component: Preparation, labeling, storage, cell separator, Preparation of packed cells and various fractions of blood for transfusion purposes.

Total quality management, documentation record keeping.

UNIT- III: (8Hours)

Transfusion reactions- Laboratory investigation of transfusion reactions and mismatched, transfusion reactions.

Compatibility tests in blood transfusion, complications and hazard of blood transfusion.

Transfusion transmissible diseases, screening methods (Sample collection, processing, handling and disposal).

UNIT- IV: (8Hours)

Genetics- Continuity of life-heredity, variation, Mendel's laws of inheritance, Chromosomal basis of inheritance; other patterns of inheritance- incomplete dominance, multi parallelism, quantitative inheritance.

UNIT- V: (8Hours)

Chromosomes-Bacterial cell and eukaryotic cell; parallelism between genes and chromosomes; genome, linkage and crossing over; gene mapping; recombination.

Molecular genetics: DNA as a genetic material- its structure and replication; structure of RNA and its role in protein synthesis, Vectors, plasmids, Human Genetics, Microbial genetics.

SUGGESTED READINGS:

1. Practical Haematology by J.B. Dacie
2. Transfusion Science by Overfield, Hamer
3. Medical Laboratory Technology by K.L. Mukherjee Volume-I
4. Mollison's Blood Transfusion in Clinical Medicine, 12th Edition by Harvey G. Klein
5. Genes by Benjamin Lewin
6. Genetics by B.D. Singh
7. Principals of Genetics by Gardner
8. Instant Notes on Genetics by PC Winter, GI Hickey and HL Fletcher

SUBJECT- ANALYTICAL CLINICAL BIOCHEMISTRY
SUBJECT CODE- LT303
(w.e.f. July 2020)

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LEARNING OBJECTIVE: The students will learn basic principles/mechanisms, procedures and various types of techniques commonly performed in analytical biochemistry such as:

UNIT- I: (8Hours)

Spectrophotometry and colorimetry

Introduction, Theory of spectrophotometry and colorimetry, Lambert`s law and Beer`s law, Applications of colorimetry and spectrophotometry.

UNIT- II: (8Hours)

Photometry

Introduction, General principles of flame photometry, Limitations of flame photometry, Instrumentation, Applications of flame photometry, Atomic absorption spectroscopy – Principle & applications.

UNIT- III: (8Hours)

Chromatography

Introduction, Types of Chromatography.

Paper Chromatography: Introduction, principle, types, details for qualitative and quantitative analysis, application.

Thin layer chromatography: Introduction, experimental techniques, application of TLC, limitations, High performance thin layer chromatography.

Column chromatography: Introduction, principle column efficiency, application of column chromatography.

Gas chromatography: Introduction principle, instrumentation, application.

Ion exchange chromatography: Introduction, Definition and principle, cation and anion exchangers, application.

Gel Chromatography: Introduction Principle and method, application and advantages.

UNIT- IV: (8Hours)

Electrophoresis:

Introduction, Principle, Instrumentation, Applications, Types of electrophoresis, Paper electrophoresis,

Gel electrophoresis.

UNIT- V: (8Hours)

Enzymes Principles, Clinical significance and Procedures for estimation:

Acid phosphatase, Alkaline phosphatase, Lactate dehydrogenase , Aspartate transaminase Alanine transaminase, Creatine phosphokinase.

SUGGESTED READINGS

1. Practical Clinical Biochemistry by Harold Varley
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by Chatterjee, Shinde
7. Principal of Biochemistry by Lehninger
8. Biochemistry by Voet&Voet

SUBJECT- BASIC PREVENTIVE MEDICINE AND COMMUNITY HEALTH CARE

SUBJECT CODE- LT304

(w.e.f. July 2020)

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LEARNING OBJECTIVE: This curriculum impart the knowledge of various types of diseases and functioning of various programmes.

UNIT- I: (8Hours)

Definition and concepts of health, important public health acts, health problems of developed and developing countries, environment and health.

Definition and concepts of epidemiology, diseases, types and use of epidemiology. Basic emergency care and first aid.

UNIT- II: (8Hours)

Epidemiology, etiology, pathogenesis and control of communicable disease like malaria, cholera, tuberculosis, leprosy, diarrhoea, poliomyelitis, viral hepatitis, measles, dengue, rabies, AIDS.

UNIT- III: (8Hours)

National Health Policy and Programs, DOTS, National AIDS control programme, National cancer control programme, universal immunization programme etc.

Nutrition and major nutritional problems, etiology, manifestations and prevention, components of RCH care. Examination of water, food adulteration, role of regular exercise and yoga in prevention and management of various diseases.

UNIT- IV: (8Hours)

Population, problems of population growth, birth rates, death rates, fertility rates, MMR.,CPR, Approaches and methods of contraception, Reproductive and child health. Hygiene and sanitation, sanitation barriers, excreta disposal.

UNIT- V: (8Hours)

Immunization programme, various national immunization programs and vaccine schedules, Family welfare and planning, communicable and non-communicable disease, Health planning in India including various committees, national health policy and health goals. Objectives and goals of WHO, UNICEF, Indian Red Cross Society, UNFPA, FAO, ILO.

SUGGESTED READINGS:

1. K.Parks & Sunder Lal, (2015),Textbook of Preventive Social Medicine ,3rd edition, Bhanot Publications
2. Harshmohan (2017), Textbook of Pathology,7th edition, Jaypee Publications

SUBJECT- MEDICAL PARASITOLOGY

SUBJECT CODE- LT305

(w.e.f. July 2020)

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LEARNING OBJECTIVE: The student will be taught about introduction, general characteristics, life cycle and laboratory diagnosis of various medically important parasites.

UNIT- I: (8Hours)

Introduction to Medical Parasitology with respect to terms used in Parasitology.

Protozoology/ Protozoal parasites: General characteristics of protozoa, Geographical distribution, Habitat, Morphology, life cycle, Mode of infection and laboratory diagnosis of Entamoeba sp. Geographical distribution, Habitat, Morphology, life cycle, Mode of infection and laboratory diagnosis of Intestinal and vaginal flagellates i.e. Giardia, Trichomonas sp. Geographical distribution, Habitat, Morphology, life cycle, Mode of infection and laboratory diagnosis of blood and tissue flagellates i.e. Plasmodium and Toxoplasma sp.

UNIT- II: (8Hours)

Helminthology/ Helminthic parasites:

General characteristics of Cestodes, Trematodes and Nematodes. Geographical distribution, Habitat, Morphology, life cycle, Mode of infection and laboratory diagnosis of -Taeniasolium and saginata, Echinococcusgranulos, Hymenolepis nana, Schistosoma haematobium and mansoni, Fasciola hepatica and buski, Trichuristrichura, Trichinellaspiales, Strongyloidesstercoralis, Ancylostomaduodenale, Enterobiusvermicularis, Ascarislumbricoides, Wuchereriabancrofti, Dracunculusmedinensis.

UNIT- III: (8Hours)

Diagnostic procedures: Collection of stool samples, Preparation of material for unstained and stained preparations Staining methods i.e. Iodine staining and permanent staining.

General rules for microscopic examination of stool samples, Examination of Stool for parasites for intestinal protozoal infections, For Helminthic infections.

UNIT- IV: (8Hours)

Introduction, direct smear preparation and examination, Concentration techniques i.e. Flotation and sedimentation techniques, Egg counting techniques.

Examination of blood for parasites, Preparation of thin and thick blood film, Leishman staining Examination of thick and thin smear, Field's stain, JSB stain.

UNIT- V: (8Hours)

Collection, Transport, processing and preservation of samples for routine parasitological investigations.

Laboratory diagnosis of hydrated cyst and cysticercosis.

Concentration techniques for demonstration of Ova and Cysts (Principles and applications).

SUGGESTED READINGS:

1. Parasitology in relation to Clinical Medicine by K D Chhatterjee
2. Medical Entomology by A.K. Hati, Pub. Allied Book Agency
3. Medical Parasitology by D.R. Arora
4. Clinical Parasitology by Paul Chester Beaver

SUBJECT-BLOOD BANKING & GENETICS- LAB
SUBJECT CODE- LT306
(w.e.f. July 2020)

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1. Screening of blood donor: physical examination including medical history of the donor.
2. Collection and preservation of blood for transfusion purpose.
3. Screening of blood for Malaria, Microfilaria, HBs Ag, Syphilis and HIV.
4. To determine the ABO & Rh grouping-Direct or preliminary grouping, Indirect or proof grouping
5. Rh grouping and determination of Du in case of Rh negative.
6. To perform Direct and Indirect Coomb's test
7. To perform cross matching - Major cross matching, Minor cross matching
8. Preparation of various fractions of blood.

SUGGESTED READINGS:

1. Practical Haematology by J.B. Dacie
2. Transfusion Science by Overfield, Hamer
3. Medical Laboratory Technology by K.L. Mukherjee Volume-I
4. Mollison's Blood Transfusion in Clinical Medicine, 12th Edition by Harvey G. Klein
5. Genes by Benjamin Lewin
6. Genetics by B.D. Singh
7. Principals of Genetics by Gardner
8. Instant Notes on Genetics by PC Winter, GI Hickey and HL Fletcher

SUBJECT-ANALYTICAL CLINICAL BIOCHEMISTRY- LAB
SUBJECT CODE- LT307
(w.e.f. July 2020)

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1. To demonstrate the principle, working & maintenance of spectrophotometer.
2. To demonstrate the principle, working & maintenance of colorimeter.
3. To demonstrate the principle, working & maintenance of flame photometer.
4. To demonstrate the principle, procedure of paper chromatography.
5. To demonstrate the principle & procedure of Gas chromatography.
6. To demonstrate the principle & demonstration of TLC.
7. To demonstrate the principle & procedure of column chromatography.
8. To demonstrate the principle & procedure of Electrophoresis.

SUGGESTED READINGS:

1. Practical Clinical Biochemistry by Harold Varley
2. Text book of Medical Laboratory Technology by P. B. Godker
3. Medical Laboratory Technology by Mukherjee
4. Principal of Biochemistry by M. A. Siddiqi
5. Instrumental Analysis by Chatwal Anand
6. Text book of Medical Biochemistry by Chatterjee, Shinde
7. Principal of Biochemistry by Lehninger
8. Biochemistry by Voet&Voet

SUBJECT- MEDICAL PARASITOLOGY - LAB

SUBJECT CODE- LT308

(w.e.f. July 2020)

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1. Routine stool examination for detection of intestinal parasites with concentration methods:
2. Saline preparation , Iodine preparation, Flootation method, Centrifugation method, Formal ether method, Zinc sulphate method
3. Identification of adult worms from models/slides
4. Tapeworm, Tapeworm segments, Ascaris (Round worm), Hookworms, Pinworms
5. Malarial parasite:
6. Preparation of thin and thick smears, Staining of smear, Examination of smears for malarial parasites (*P. vivax* and *P. falciparum*)

Suggested Readings:

1. Parasitology in relation to Clinical Medicine by K D Chhatterjee
2. Medical Entomology by A.K. Hati, Pub. Allied Book Agency
3. Medical Parasitology by D.R. Arora
4. Clinical Parasitology by Paul Chester Beaver

SUBJECT-HOSPITAL POSTING- LAB

SUBJECT CODE- LT309

(w.e.f. July 2020)

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1. Clinical sample collection e.g. Blood, Urine, Stool, Saliva, Sputum .
2. Sample accountability- Labeling of sample, Making entries in Laboratory records.
3. Reporting results- Basic format of a test report, Release of examination results, Alteration in reports.
4. Quality Management system- Quality assurance, Internal and External quality control, Quality improvement.
5. Biomedical waste management in a clinical laboratory - Disposal of used samples, reagents and other biomedical waste.
6. Calibration and Validation of Clinical Laboratory instruments.
7. Ethics in medical laboratory practice in relation to the following-
8. Pre-Examination procedures, Examination procedures, Reporting of results, Preserving medical records, Access to medical laboratory records