AC- 06/04/2024

Item No-4.12

Rayat Shikshan Sanstha's

KARMAVEER BHAURAO PATIL COLLEGE VASHI

(**AUTONOMOUS COLLEGE**)

Sector-15- A, Vashi, Navi Mumbai - 400 703

Syllabus for S.Y.B.Sc. Medical Laboratory Technology

Program: Medical Laboratory Technology

Course: S.Y.B.Sc. Medical Laboratory Technology

(National Education Policy-2020, Grading and Semester System with effect from the academic year 2024-2025)

Rayat Shikshan Sanstha's

Karmaveer Bhaurao Patil College Vashi Autonomous College

Syllabus

Sr. No.	Heading	Particulars
1	Title of Course	S.Y.B.Sc. Medical Laboratory Technology
2	Eligibility for Admission	12th Science and equivalent [of recognized Boards]
3	Passing Marks	40%
4	Ordinances/Regulations (if any)	-----
5	No. of Years/Semesters	One year/Two semester
6	Level	U.G.
7	Pattern	Semester
8	Status	Revised0
9	To be implemented from Academic year	2024-2025

Preamble

Medical Laboratory Technology is a branch of medical science responsible for performing laboratory investigations relating to diagnosis, treatment and prevention of disease. With this course, the basic aim is to provide students with knowledge and training that will enable them to work in various lab settings.

Educational Pedagogy:

The course design is based on NEP 2020 guidelines where learner is given a choice to have vertical mobility while pursuing this program. His annualized credits earned will be banked to allow his subsequent year's enrollment. The three-year degree program is designed as –

- **1st year BSC with Certification in Phlebotomy**
- **2nd Year BSC with Diploma in Medical Technology**
- **3rd Year BSC with Bachelor's Degree in Medical Laboratory Technology.**
- **4th Year BSC with Bachelor's Honors in Medical Laboratory Technology**

The pedagogical design is based on the core objective of making students job ready and hence a lot of focus is given in learner's engagement through Industry based skilling in Hospitals.

As anyone who seeks admission in this program comes from non-healthcare background, the course starts with the Foundation Course which is more like a platform setting to make learner understand the topicalities and Dos and Don'ts of Healthcare Organizations.

Industry interface is divided into 3 phases of learning as –

- Observership – Objective is to see what is being taught in the class room through clinical sessions on the subject.
- On The Job Training – Objective is to learn the job skills by working with someone.
- Internship – Working independently, but under supervision as per defined job role.

Considering that the program needs to empower job readiness of learners, a lot of focus is kept in active engaging Life Skills workshops. These cover topics like Self Awareness, Objective setting, Team Work, Leadership Development, Time Management, Communication Skills, Interpersonal abilities etc.

Program also focuses in creating a better path for students to pursue their higher education opportunities in healthcare sector. As such special skill enhancing modules like Basic Life Support, Bed Side Care, Hospital Administration and Public Health etc. are included in the curriculum. This will help learners to get into PG programs like Masters in Hospital Management or Masters in Hospital Administration or Masters in Public Health.

As regards to the Core expertise of the program on Lab Technology, key subjects that get covered are –

- **Phlebotomy**:

Phlebotomy, which is the science of drawing blood, from various sites, e.g., Veins, arteries & capillaries, is among the most common procedures in healthcare and a core component of diagnosis and laboratory analysis.

Estimates indicate that nearly 70% of medical decisions are based on laboratory results which often rely on phlebotomy to produce a blood sample ready for laboratory analysis.

Despite the critical role of phlebotomy, there is an insufficient level of awareness among the Health Care Professionals about the International guidelines and understand the consequences to patients and their own safety from improper sample collection practices.

Poor Blood Collection Practices Introduce Serious Errors into Diagnosis and Laboratory Analysis.

- **Microbiology**:

The diagnostic microbiology laboratory procedures are essential for the diagnosis and treatment of infectious diseases. Microbiological pathogens are divided into bacteria, fungi, viruses, prions, and protozoa. Role of Microbiology is to isolate & identify the disease-causing micro-organism.
To train the students to conduct Antibiotic Sensitivity test to provide appropriate medical treatment (antibiotics) to the patients.

- **Hematology**:

Hematology concerns with the study of the cause, prognosis, treatment, and prevention of diseases related to blood.
It involves treating diseases that affect the production of blood and its components, e.g., blood cells, hemoglobin, blood proteins, bone marrow, platelets, blood vessels, spleen, the mechanism of coagulation & also blood parasites, e.g., Malaria
Such diseases might include hemophilia, blood clots (thrombus), other bleeding disorders, and blood cancers such as leukemia, multiple myeloma, and lymphoma.

- **Biochemistry**:

Biochemistry combines the two traditional disciplines of biology and chemistry. Biochemistry is the science of living matter.
Medical biochemistry teaches us about:
-The chemical components of the human body, e.g., carbohydrates and lipids; amino acids and proteins; nucleic acids (DNA and RNA), etc.
-The major chemical processes in the human body, Nutrition and mineral metabolism, Molecular genetics & Heredity

- **Clinical Pathology**:

This branch of Medical Laboratory Science deals with complete study of formation, the clinical significance of analyzing various body fluids, e.g., urine, stool, sputum, seminal fluid, CSF, pleural, peritoneal, pericardial & synovial fluids.

- **Histopathology & Cytology**:

Histopathology & Cytology provides a diagnostic service for cancer; it handles the cells and tissues removed from suspicious ‘lumps and bumps’, identify the nature of the abnormality
Histopathology is the examination of biological tissues in order to observe the appearance of diseased cells in microscopic detail.
Histopathology typically involves a biopsy, which is a procedure involving taking a small sample of tissue, processed by Histo-technologists and reported by the Pathologists

- **Immunology/serology**:

Different types of serologic tests are used to diagnose various disease conditions. Serologic tests have one thing in common. They all focus on proteins made by our immune system (antibodies)

Serological testing is very helpful in the diagnosis of certain bacterial, parasitic, and viral diseases, e.g., Typhoid, Dengue. Malaria, etc.
Serological testing has proved valuable mass-screening tool, as in the detection of diseases such as syphilis, HIV/AIDS, and epidemic and pandemic infectious diseases (e.g., influenza and coronavirus disease).

- **Blood Bank (Transfusion Medicine):**

A blood transfusion provides blood or blood components if patient has lost blood due to an injury, during surgery or have certain medical conditions that affect blood or its components. The blood typically comes from donors. Blood banks and healthcare providers ensure that the transfusions are a safe, low risk treatment.
The Transfusion Medicine Department is responsible for the collection and testing of blood to be given to patients (traditional "blood banking").
It also collects & processes hematopoietic stem cells for blood and bone marrow transplantation as well as the testing necessary for organ transplantation.

Key Objectives of this program:

- To implement NEP 2020 through this Vocational Skills development program
- Learners will inculcate right attitude, skills and knowledge to do the job role of Medical Laboratory Technologist as required by the industry.
- Program will also empower learners' abilities to pursue higher education in medical industry

After completing this program, learner will exhibit following skills and knowledge as Medical Laboratory Technologist:

- Demonstrate knowledge about the healthcare sector and diagnostic services
- Demonstrate the ability to perform clinical skills essential in providing basic diagnostic services such as Correctly collect, transport, receive, accept or reject and store blood /urine/stool and tissue samples.
- Conduct analysis of body fluids/ samples; Maintain, operate and clean Laboratory equipment; Provide technical information about test results
- Prepare and document medical tests and clinical results; etc.
- Demonstrate quality assurance in Laboratory works
- Practice infection control measures
- Demonstrate readily availability of medical and diagnostic supplies
- Demonstrate techniques to maintain the personal hygiene needs
- Demonstrate actions in the event of medical and facility emergencies
- Work as a medical laboratory professional with right attitude in any lab setting Additionally, he will be developing following allied skills and knowledge through this program:

- CPR
- Care giver
- Basics on Hospital management
- Good communicator & allied health professional

Program Outcomes (POs)

PO-1	**Disciplinary Knowledge:** **(i) Acquire knowledge with facts and figures related to various subjects in pure sciences such as Physics, Chemistry, Mathematics, Microbiology and Computer Science; and Biotechnology, Information Technology and itsother fields related to theprogram.** **(ii)Understand the basic concepts, fundamental principles, theoretical formulations and experimental findings and the scientific theories related to various scientific phenomena and their relevance in the day-to-day life.**
PO-2	**Communication Skills: Develope various communication skills such as reading, listening and speaking skills etc., which we will help in expressing ideas and views clearly and effectively.**
PO-3	**Critical Thinking: Think creatively to propose novel ideas in explaining the scientific data, facts and figures related to science and technology.**
PO-4	**Analytical Reasoning and Problem Solving: Identify, describe, formulate, interpret, analyze the data systematically and solve theoretical and numerical problems in the diverse areas of science and technology and provide alternate solutions to the problems.**
PO-5	**Sense of Inquiry: Curious for asking relevant questions like why and how for better understanding of the basic concepts, fundamental principles, scientific theories and applications related to the study.**
PO-6	**Use of Modern Tools: Use of modern tools, equipment, instrumentation and laboratory techniques to design and perform the experiments and write the programs in different languages (software).**
PO-7	**Research Skills: Ability to search for, find, collect, analyze, interpret and evaluate information/data that is relevant to the subjects related to science and technology being studied.**
PO-8	**Application of Knowledge: Develop scientific outlook with respect to the subjects related to science and technology and also participate in various social and cultural activities.**
PO-9	**Ethical Awareness: Imbibe ethical and social values in personal and social life leading to cultured and civilized personality.**

PO-10	**Teamwork: Work effectively within the groups and individuals, participate and take initiative for various field-based situations related to science, technology and society at large.**
PO-11	**Environment and Sustainability: Understand how development in science and technology and interdisciplinary subjects are taking place for protecting our environment and sustainable developments.**
PO-12	**Lifelong Learning: Ability of self-driven to explore, learn and gain knowledge and new skills to improve the quality of life and sense of self-worth by paying attention to the ideas and goals throughout the life.**

Program Specific Outcomes [PSO's]: BSC [MLT]

PSO_1: Understanding different branches and their functions of medical laboratory like microbiology, biochemistry, hematology, transfusion medicine, histopathology through on the job training and internships in hospitals.

PSO_2: Learn professional guidelines and norms for patient safety and apply laboratory skills in basic diagnostic services to collect, transport, receive and accept or reject clinical samples (3*)

PSO_3: Remember laboratory procedures that are essential for the diagnosis and treatment of infectious diseases. (1&3)*

PSO_4: Understand the methods of testing & analyzing various body fluids samples (operating techniques, labelling & storing).

PSO_5: Evaluating technical information about test results and creating medical test reports.

PSO_6: Illustrate the basic molecular diagnosis & quality management in pathology.

PSO_7: Learning the latest medical instruments and equipment technology in a laboratory set up, their upkeep and error minimization.

PSO_8: Developing a professional laboratory technologist through various ability enhancement programs on communication skills, life skills, field visits and personality development workshops.

PSO_9: Understanding the larger scope of medical profession and creating an opportunity for higher education in hospital management domain and overseas work opportunities.

***Note: [1] Remembering, [2] Understanding, [3] Applying,**
[4] Analyzing, [5] Evaluating, [6] Creating

Course Outcome (CO)		
Course Code	**Name of the Course**	**Course outcomes**
UGMLTC301 A	**Basic techniques of pathology A**	**CO1**.To understand & perform basic Biochemical tests 1 **CO2**. To perform basic Hematological tests 1 **CO3**. To perform basic Microbiological tests 1
UGMLTC301 B	**Basic techniques of pathology B**	**CO1.** To understand & perform basic Biochemical tests 2 **CO2.** To perform basic Hematological tests 2 **CO3** To perform basic Microbiological tests 2
UGMLTC302	**Body Fluid Analysis**	**CO1**. To do physical, chemical & microscopic examination of urine & stool specimens. **CO2**. To do physical, chemical & microscopic examination of sputum & seminal fluid specimens **CO3**. To do physical, chemical & microscopic examination of cavity fluid specimens (peritoneal, pericardial, pleural, synovial fluids & CSF)
UGMLTGE-303	**Soft Skills**	**CO1**. **CO2**. **CO3**.
UGMLTVSC-304	**Basic Techniques in Hospital Management**	**CO1**. **CO2**. **CO3**.

UGMLTC401 A	**Special techniques of pathology A**	**CO1**. To perform Biochemical Organ Profile studies 1 **CO2**. To do Hematology Coagulation studies 1 **CO3**. To study & identify, Gram positive bacteria
UGMLTC401 B	**Special techniques of pathology B**	**CO1.** To perform Biochemical Organ Profile studies 2 **CO2.** To do Hematology Coagulation studies 2 **CO3.** To study & identify, Gram negative bacteria
UGMLTC402	**Immunology**	**CO1**. To understand the concept of Immunology, organs of immune system **CO2**. To know the mechanism of immunity, antigen/antibody, immunological reactions **CO3**. To perform routine serological tests
UGMLTGE-403	**Patients Cares Techniques**	**CO1**. **CO2**. **CO3**.
UGMLTVSC404	**Advance Techniques in Hospital Management**	**CO1**. **CO2**. **CO3**.

HOD
DR. KESHAW SHINDE
DEPT OF MICROBIOLOGY

Scheme of examination for Each Semester

Continuous Internal Evaluation: 40 Marks
Common Test 20 Marks & 20 Marks for Assignment, Projects, Group discussion, Open book test, online test etc. based on Units of each paper.

Semester End Examination: 60 Marks will be as follows –

I.	**Theory:** The Semester End Examination for theory course work will be conducted as per the following scheme.	
	Each theory paper shall be of two hours duration.	
	All questions are compulsory and will have internal options.	
	Q – I	Subject questions from Unit – I (having internal options.) 15 M
	Q – II	Subjective questions from Unit – II (having internal options.) 15 M
	Q – III	Subjective questions from Unit – III (having internal options.)15 M
	Q- IV	Objective type questions based on all the Units with equal weightage. 15 M
II.	**Practical**	The Semester End Examination for practical course work will be conducted as per the following scheme.

Sr. No.	**Particulars of Semester End Practical Examination**	**Marks%**
1	Laboratory Work	80%
2	Journal	10%
3	Viva	10%
	TOTAL	**100%**

S.Y.BSc. Medical LabTechnology
NEP-2020
Semester 3

Course Code	Unit	Topics	Credits	L/week
Paper 1 [UGMLTC301-A]: Basic techniques of pathology MAJOR				
UGMLTC301-A	I	Biochemical analysis -1		
	II	Hematological analysis-1		
	III	Microbiological analysis-1		
Paper 2 [UGMLTC301-B]: Basic techniques of pathology MAJOR				
UGMLTC301-B	I	Biochemical analysis -2		
	II	Hematological analysis-2		
	III	Microbiological analysis-2		
Paper 3[UGMLTC302]: Body Fluid Analysis MINOR				
UGMLTC302	I	Urine Examination & Stool Examination		
	II	Sputum & Seminal fluid Examination		
	II	Cavity fluid Examination		
Paper 4: [UGMLTGE303]: Soft Skils GENERIC				
UGMLTGE303	I			
	II			
	III			
Paper 5: [UGMLTVSC-304]: Basic Techniques in Hospital Management VSC				
UGMLTVSC-304	I			
	II			
	III			
Semester 3 Practical				
UGMLTCP301-A	MAJOR	Basic Biochemical, hematological, microbiological analytical methods -1		
UGMLTCP301-B	MAJOR	Basic Biochemical, hematological, microbiological analytical methods -2		
UGMLTCP302	MINOR			
UGMLTGEP 303	GE			

- We have designed special practical for this module to enhance allied healthcare professional skills of the learner

S.Y.BSc. Medical Lab Technology **NEP-2020**
Semester 4

Paper 1 [UGMLT401-A]: Special techniques of pathology MAJOR				
Course Code	**Unit**	**Topics**	**Credits**	**L/week**
UGMLTC401-A	I	Tests of Biochemistry (profile studies) 1		
	II	Tests of Hematology (coagulation studies) 1		
	III	Tests of Microbiology (study of Gram positive organisms) 1		
Paper 2 [UGMLT401-B]: Special techniques of pathology MAJOR				
UGMLTC401-B	I	Tests of Biochemistry (profile studies) 2		
	II	Tests of Hematology (coagulation studies) 2		
	III	Tests of Microbiology (study of Gram negative organisms) 2		
Paper 3: [UGMLTC402]: ImmunologyMINOR				
UGMLTC402	I	Introduction to Immunology		
	II	Mechanism of Immunity		
	III	Serological tests		
Paper 4: [UGMLTGE403]: Patients Cares TechniquesGENERIC				
UGMLTGE 403	I			
	II			
	II			
Paper 5 [UGMLTAEC404]: Advance Techniques in Hospital Management VSC				
UGMLTVSC 404	I			
	II			
	III			
Semester 4 Practical				
UGMLTCP401-A & B	MAJOR			
UGMLTCP402	MINOR			
UGMLTGEP 402	GE			

Additional 8 Credits

Sem -3 M.S OFFICE(credits) Internship(credits)

Sem 4- M.S OFFICE(credits) Internship(credits)

Exit option with certification with 90 Credits

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S.Y.BSc. Medical LabTechnology

NEP-2020 Semester 3

Paper-1, Basic techniques of pathology MAJOR		
Course Code	**Title**	**Credits**
UGMLTC 301-A		
Unit I	**BIOCHEMICAL ANALYSIS -1** • Carbohydrates (classification: monosaccharides, disaccharides, polysaccharides, metabolism of carbohydrates, different types of Diabetes mellitus) • Proteins (classification of amino acids: essential, non-essential, primary, secondary, tertiary, quaternary protein structure, types of proteins, hemoglobin, myoglobin, etc) • Lipids (classification: simple, conjugated, derived lipids, digestion & absorption of lipids, types of lipoproteins, Triglyceride, HDL, LDL, VLDL, Chylomicrons, etc.)	
Unit II	**HEMATOLOGICAL ANALYSIS -1** • Hemoglobin (formation of hemoglobin, normal & abnormal types of hemoglobin, different methods for estimation of hemoglobin) • RBC, WBC, platelets (process of hematopoiesis: formation of RBC, WBC, platelets, different methods of counting RBC, WBC, platelets) • Estimation of hematocrit (packed cell volume by macro & micro methods)	
Unit III	**MICROBIOLOGICAL ANALYSIS -1** • Staining methods (Acid fast bacilli, spore staining, spirochete staining, negative staining, etc. • Growth media (nutrient agar, blood agar, chocolate agar, MacConkey's agar, Deoxycholate citrate agar (DCA), Eosin methylene blue agar (EMB), etc • Biochemical test (Indol, Mr-Vp test media, coagulase, citrate, gelatin, nitrate reduction, Triple sugar Iron test (TSI), oxidation/fermentation test, etc) • Inoculation techniques (in liquid, semisolid & solid media, types of culture methods-streak method, pour plate method, stab method, lawn method, etc)	

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S.Y.BSc. Medical LabTechnology
NEP-2020 Semester 3

Paper-2, Basic techniques of pathology MAJOR		
Course Code	**Title**	**Credits**
UGMLTC 301-B		
Unit I	**BIOCHEMICAL ANALYSIS -2** • Enzymes (properties of enzymes, chemical nature, factors affecting enzyme activity, classification: oxidoreductases, hydrolases, transferases, etc.) • Hormones (organs of endocrine system: pituitary gland, hypothalamus, thyroid gland, adrenal, etc, mechanism of hormone activity, classification of hormones: peptide hormones, steroid hormones, etc, functions of various hormones, e.g. T3, T4, TSH, LH, FSH, aldosterone, adrenalin, insulin, glucagon, progesterone, etc) • Vitamins & minerals (biological importance & functions of water-soluble vitamins B complex, C vitamin, fat soluble vitamins: A, D, E, K, diseases caused by deficiency & toxicity of various vitamins, biological importance & functions of macro-minerals, e.g. Na, K, Ca, P, etc, micro-minerals (trace metals) e.g. Zn, Cu, Mn, Co, etc)	
Unit II	**HEAMATOLOGICAL ANALYSIS -2** • RBC indices (calculation of MCV, MCH, MCHC & their significance in diagnosis of anemia) • Peripheral smear (formation, staining & examination of peripheral smear, observation of blood parasites on peripheral smear) • Study of abnormal morphologies of RBC, WBC (anisocytosis, poikilocytosis, inclusion bodies, immature blast cells, etc)	
Unit III	**MICROIOLOGICAL ANALYSIS -2** • colony characteristics (size, shape, colour, margin, elevation, consistency, etc) • Introduction of Gram positive bacteria (general characteristics of Staphylococci, Streptococci, Clostridium, Bacillus, Corynebacterium, etc) • Introduction of Gram negative bacteria (general characteristics of E.coli, Klebsiella, Proteus, Pseudomonas, Salmonella, Shigella, etc) • Antibiotic sensitivity test using Kirby-Bauer method	

S.Y.BSc. Medical LabTechnology
NEP-2020
Semester 3

Paper-3 Body Fluid Analysis MINOR		
Course Code	**Title**	**Credits**
UGMITC 302		
Unit I	**Urine Examination & Stool Examination** • Urine formation • Types of Kidney diseases (pyelonephritis, glomerulonephritis, nephrotic syndrome, etc) • Physical, chemical, microscopic examination of Urine • Chemical analysis of renal calculi • Clinical significance of stool examination • Physical, chemical examination of stool • Microscopic examination of Stool (saline, iodine, methylene blue wet mounts)	
Unit II	**Sputum & Seminal fluid Examination** • Anatomy of respiratory system, composition of sputum • Diseases of respiratory system (TB, bronchitis, pneumonia, etc) • Physical & microscopic examination of sputum (wet mount, Leishman staining, Gram's staining, AFB) • Anatomy of male reproductive system, clinical significance of seminal fluid examination • Process of spermatogenesis • Physical, chemical examination of seminal fluid • Microscopic examination of Seminal fluid (sperm count, sperm motility, sperm morphology)	
Unit III	**Cavity fluid Examination** **Study of transudates & exudates** • Collection of various cavity fluids (thoracentesis, pericardiocentesis, paracentesis) • Clinical significance of cavity fluid examination • Physical, chemical, microscopic examination of • CSF (Cerebro spinal fluid) • Peritoneal fluid • Pericardial fluid • Pleural fluid • Synovial fluid	

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S.Y.BSc. Medical LabTechnology
NEP-2020
Semester 3

Paper 4 Soft Skils GENERIC		
UGMLTGE 303	**Title**	**Credits**
Unit I		
Unit II		
Unit III		

- We have designed special practical for this module to enhance allied healthcare professional skills of the learner

S.Y.BSc. Medical Lab Technology
NEP-2020
Semester 3

Paper 5– Basic Techniques in Hospital Management VSC		
UGMITVSC 304	**Title**	**Credits**
Unit I	.	
Unit II		
Unit III		

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S.Y.BSc. Medical Lab Technology
NEP-2020
Semester 3 Practical

Course code	Title	Credit
UGMLCP301-A	**Basic Biochemical Analytical methods -1** • Standardization of photometer • Identification of reducing sugars • Determination of • Blood glucose by GOD-POD method **Basic Hematological Analytical methods -1** • Hemoglobin estimation by different methods (Sahli's method, Drabkin's method) • RBC count & WBC count (using Neubauer chamber) • Hematocrit estimation & RBC indices (MCV, MCH, MCHC) **Basic Microbiological Analytical methods – 1** • Different types of staining (AFB staining, Metachromatic granules staining, Negative staining, Spore staining) • Using different Growth media for different bacteria	
UGMLCP301- B	**Basic Biochemical Analytical methods -2** • Serum & urine creatinine • Serum & urine urea nitrogen content • Serum Total proteins by biuret method & serum Albumin by BCG method • SGPT & SGOT activity **Basic Hematological Analytical methods-2** • Study of Blood smear for Differential count & Cell Morphology • Platelet count (using Neubauer chamber)	

	• Erythrocyte Sedimentation Rate (ESR) & Reticulocyte count **Basic Microbiological Analytical methods -2** • Biochemical media & tests, analyzing positive & negative reactions to identify different organisms • Inoculation techniques in liquid, semisolid & solid media, • Conducting Antibiotic Susceptibility test by Kirby-Bauer method using Mueller Hinton agar	
UGMLTCP 302		
UGMLTGEP 303		

- We have designed special practical for this module to enhance allied healthcare professional skills of the learner

S.Y.BSc. Medical LabTechnology
NEP-2020
Semester 4

Paper I Special techniques of pathology MAJOR		
Course Code	**Title**	**Credits**
UGMLTC-401-A		
Unit I	**Special techniques of Biochemistry (profile studies) 1** • Liver function tests (functions of liver, formation of bilirubin, different types of jaundices, significance of biochemical tests) • Renal function tests (structure of nephron, process of urine formation, different kidney diseases, different types of dialysis, significance of biochemical tests, Group I, II, III, IV, V)	
Unit II	**Special techniques of Hematology (coagulation studies) 1** • Introduction to coagulation studies, Hemostasis & coagulation factors • Mechanism of coagulation. Intrinsic &Extrinsic Pathway • Laboratory Investigation in Coagulation studies & their significance	
Unit III	**Special techniques of Microbiology 1** **Study of Gram positive organisms regarding general characteristics, diseases caused, growth requirements, biochemical reactions, etc** • Staphylococci, • Streptococci, • Corynbacterium diphtheriae • Mycobacterium tuberculosis • Mycobacterium leprae	

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S.Y.BSc. Medical LabTechnology
NEP-2020
Semester 4

Paper 2 Special techniques of pathology MAJOR		
Course Code	**Title**	**Credits**
UGMLTC-401-B		
Unit I	**Special techniques of Biochemistry (profile studies) 2** • Lipid profile tests (significance of abnormal ratio of Triglyceride, Total cholesterol, HDL, LDL, VLDL, in heart diseases) • Cardiac profile tests (different cardiac diseases, atherosclerosis, ischemic heart disease, myocardial infarction, acute cardiac failure, rheumatic heart disease, etc, Group I, II, III tests)	
Unit II	**Special techniques of Hematology (coagulation studies) 2** • Bleeding time & Clotting time, Clot retraction and clot lysis time • Prothrombin time, • Activated Partial Thromboplastin time, • Thrombin time	
Unit III	**Special techniques of Microbiology 2** **Study of Gram negative organisms regarding general characteristics, diseases caused, growth requirements, biochemical reactions, etc**. • Escherischia coli, • Klebsiella pneumoniae • Proteus species, • Pseudomonas • Salmonella species	

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S.Y.BSc. Medical LabTechnology
NEP-2020
Semester 4

Paper- 3 Immunology MINOR		
Course Code	**Title**	**Credit**
UGMLTC 402		
Unit I	**Introduction to Immunology** • Organs of immune system (thymus, bone marrow, lymph nodes, spleen, etc. • Body's 3 lines of defense (1st, 2nd, 3rd line of defense) • Types of immunity (inborn, induced, active, passive, natural, artificial, etc) • Different types of T cells & B cells (cytotoxic, helper, suppressor, memory cells)	
Unit II	**Mechanism of Immunity** • Humoral & cell mediated immunity • Definition of Antigen-Antibody • Immunoglobulins – Structure, function and role in immunity (IgM, IgG, IgA, IgD, IgE) • Antigen – Antibody reactions, Precipitation, agglutination, neutralization reactions • Compliment fixation tests • Labelled immune assays	
Unit III	**Serological tests: significance, mechanism & limitations of** • Widal test • VDRL, RPR test • RA test • ASO test • CRP test • HBsAg • HIV tests • Pregnancy test	

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S.Y.BSc. Medical LabTechnology
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Semester 4

Paper 4 Patients Cares Techniques GENERIC		
Course Code	**Title**	**Credit**
UGMLTGE 403		
Unit I		
Unit II		
Unit III		

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S.Y.BSc. Medical Lab Technology
NEP-2020
Semester 4

Paper 5 Advance Technique In Hospital Management VSC		
Course Code	**Title**	**Credit**
UGMLT AEC404		
Unit I		
Unit II		
Unit III		

- We have designed special practical for this module to enhance allied healthcare professional skills of the learner

F.Y.BSc. Medical Lab Technology
NEP-2020
Semester 4 Practical

Course code	Title	Credit
UGMLCP401 - A	**Special techniques of Biochemistry 1** **Determination of** • Serum Bilirubin • Gamma Glutamyl Transferase • Serum Alkaline Phosphatase **Special techniques of Hematology 1** • Bleeding time & Clotting time (by different methods) • Clot retraction time & Clot lysis time • Prothrombin time (PT) **Special techniques of Microbiology 1** **Doing Gram staining, Inoculation & identification (using biochemical tests) of** • Staphylococci • Streptococci • Escherischia coli	
UGMLCP401 - B	**Special techniques of Biochemistry 2** **Determination of** • Creatinine clearance • Urea clearance • Determination of Total Cholesterol, HDL, LDL & VLDL **Special techniques of Hematology 2** • Activated partial Thromboplastin time (APTT) • Thrombin clotting time (TCT) • D-Dimer test **Special techniques of Microbiology 2** **Doing Gram staining, Inoculation & identification (using biochemical tests) of** • Klebsiella pneumoniae • Proteus species • Salmonella species	
UGMLTCP 402	**To conduct serological tests of** • Widal test • VDRL, RPR test • RA test • ASO test • CRP test • HBsAg • HIV tests • Pregnancy test	

UGMLTGEP 403	.	

- We have designed special practical for this module to enhance allied healthcare professional skills of the learner

References:

1. iTransform Handbook on Anatomy, Physiology
2. iTransform Handbook on Foundation Program
3. iTransform Handbook on Medical Terminologies
4. iTransform Handbook on Phlebotomy
5. MEDICAL LABORATORY TECHNOLOGY, Vol. 1,2,3, Chief editor: Kanai Mukherjee CBS Publication
6. TEXT BOOK of MEDICAL LABORATORY TECHNOLOGY, by Mrinalini Sant CBS PUBLICATION
7. EXTBOOK of MEDICAL LABORATORY TECHNOLOGY, by P.B.GODKAR, DARSHAN GODKAR, vol. 1,2 BHALANI Publication.
8. MEDICAL LABORATORY TECHNOLOGY, Methods & Interpretation, by Ramnik Sood, Jaypee Publication
9. HISTOLOGICAL TECHNIQUES, A Practical Manual by K. Laxminaraa