# VIDYASAGAR UNIVERSITY

Midnapore, West Bengal



PROPOSED CURRICULUM & SYLLABUS (DRAFT) OF

# BACHELOR OF MEDICAL LABORATORY TECHNOLOGY -BMLT (HONOURS)

# 4-YEAR UNDERGRADUATE PROGRAMME

(w.e.f. Academic Year 2023-2024)

Based on

Curriculum & Credit Framework for Undergraduate Programmes (CCFUP), 2023& NEP, 2020

# VIDYASAGAR UNIVERSITY BACHELOR OF MEDICAL LABORATORY TECHNOLOGY -BMLT (HONOURS) (under CCFUP, 2023)

Level	YR.	SEM	Course	Course Code	Course Title	Credit	L-T-P	Marks		
			Type					CA	ESE	TOTAL
	1 <sup>st</sup>	I	SEMESTER-I							
BMLT (Hons.)			Major-1	BMLTHMJ101	T: Basic Haematology; P: Practical	4	3-0-1	15	60	75
			SEC	BMLTSEC01	P: Phlebotomy and Sample Processing; P: Practical	3	0-0-3	10	40	50
			AEC	BMLTAEC01	Basic diagnostic Instrumentation (only for BMLT programmes)	2	2-0-0	10	40	50
			MDC	BMLTMDC01	Laboratory Ethics and Biosafety (only for BMLT programmes)	3	3-0-0	10	40	50
			VAC	BMLTVAC01	Environment and Health (only for BMLT programmes)	4	2-0-2	50	50	100
			Minor-1	BMLTMI01	T: Basic Anatomy and Physiology; P: Practical	4	3-0-1	15	60	75
					Semester-I Total	20				400
		п	SEMESTER-II							
			Major-2	BMLTHMJ102	T: Basic Pathology; P: Practical	4	3-0-1	15	60	75
			SEC	BMLTSEC02	P: Pathological data entry in computer; P: Practical	3	0-0-3	10	40	50
			AEC	BMLTAEC02	Diagnostic Laboratory Waste Management (only for BMLT prog.)	2	2-0-0	10	40	50
			MDC	BMLTMDC02	Community Health Programme in India (only for BMLT prog.)	3	3-0-0	10	40	50
			VAC	BMLTVAC02	T: Basic Microbiology (only for BMLT prog.)	4	4-0-0	10	40	50
			Minor-2	BMLTMI02	T: Fundamental Biochemistry; P: Practical	4	3-0-1	15	60	75
			Summer	CS	Internship Service to Hospital (to be decided by the College)	4	0-0-4	-	-	50
			Intern.							
		Semester-II Total								400
					TOTAL of YEAR-1	44				800

MJ = Major, MI = Minor Course, SEC = Skill Enhancement Course, AEC = Ability Enhancement Course, MDC = Multidisciplinary Course, VAC = Value Added Course; CA= Continuous Assessment, ESE= End Semester Examination, T = Theory, P= Practical, L-T-P = Lecture-Tutorial-Practical, MIL = Modern Indian Language, ENVS = Environmental Studies

# **SEMESTER-I**

# MAJOR (MJ)

MJ-1: Basic Haematology Credits 04(FM: 75)

MJ-1T: Basic Haematology Credits 03

#### **Course content:**

- 1. Basic concept of Blood, Plasma and Serum, Differences between plasma and serum and their separation.
- 2. Cellular components of blood- RBC structure, Erythropoiesis in brief and its importance, WBC types- Description of each type. Arneth Index, Leucopoiesis in brief, Function. Platelets- Structure, Formation and Function of platelets.
- 3. Blood film preparation and staining.
- 4. Clotting Time and Bleeding Time- Definition, Determination, and Importance.
- 5. Blood group: ABO-System & Rh typing, Basic method of blood group detection. Importance of blood grouping in brief.
- 6. Plasma protein-Types, Importance of each type.
- 7. PCV, ESR, Hb concentration-types-MCH, MCHC, Hb- quantification-Sahli's method.
- 8. Anticoagulants- Types, Uses in blood for processing, Merits and Demerits.
- 9. Anaemia-General concept, Types-Causes, Detection of Anaemia.
- 10. Concept of Thalassemia in brief.

#### **MJ-1P: Basic Haematology (Practical)**

Credits 01

# **Practical contents:**

- 1. Blood film preparation and staining.
- 2. Separation of plasma and serum from blood.
- 3. Blood cell count-Total count, Differential count.
- 4. Identification of different types of WBC.
- 5. Haemoglobin estimation by Sahli's method.
- 6. Blood group by Ag-Ab reaction (Agglutination).
- 7. ESR, PCV determination.
- 8. Clotting Time & Bleeding Time determination.
- 9. MCV, MCH, MCHC determination.

# SKILL ENHANCEMENT COURSE (SEC)

**SEC 1: Phlebotomy and Sample Processing** 

**Credits 03(FM: 50)** 

**SEC 1P: Phlebotomy and Sample Processing** 

Credits 03

#### **Course Outline:**

- 1. Phlebotomy Equipment and Supplies:
  - i. Gloves, Tourniquet
  - ii. Alcohol pads, Gauze
  - iii. Needle and needle holder
  - iv. Evacuated blood collection tube and tube inversion technique
  - v. Blood specimen in Phlebotomy
  - vi. Lancet
  - vii. Centrifuge
- 2. Capillary blood collection procedure, Urine specimen collection, Stool specimen collection, Sputum specimen collection, Throat swab specimen collection:
  - i. Venipuncture using a syringe
  - ii. Venipuncture using a butterfly needle
  - iii. Venipuncture using a multisampling needle
  - iv. Dermal puncture
- 3. Specimen processing:
  - i. Specimen labelling, Specimen handling (Light, Time, Temperature).
  - ii. Specimen transportation- Precaution.
  - iii. Process for rejection of specimen.

#### ABILITY ENHANCEMENT COURSE (AEC)

#### **AEC 1T: Basic diagnostic Instrumentation**

**Credits 02 (FM: 50)** 

#### **Course content:**

- 1. Microscope: Light microscope, Compound microscope, Phase Contrast microscope, Fluorescent, Polarized, Electron Microscope.
- 2. Colorimeter: Working Principle, components, and its application.
- 3. Spectrophotometer: Working Principle, components, and its application.
- 4. Centrifuges: Working Principle, types and its application g and rpm.
- 5. Laminar flow: Working Principle, components, and its application.
- 6. Autoclave: Types, Working Principle, and its application.
- 7. Incubator: Working Principle, types, and its application.
- 8. Blood cell counter: Working Principle, and its application.
- 9. Semi and full auto-analyser: Working Principle, and its application.

#### 10. **Demonstration:**

- a) Demonstration and operation of different microscope (Light microscope, Compound-microscope).
- b) Demonstration and operation of Colorimeter and spectrophotometer.
- c) Demonstration and operation of Centrifuges.
- d) Demonstration and operation of incubator, hot air oven, laminar flow, and autoclave.

# MULTIDISCIPLINARY COURSE (MDC)

### MDC 1T: Laboratory Ethics and Biosafety

### **Credits 03(FM: 50)**

#### **Course content:**

- 1. Laboratory ethics of patient-Safety. Code of good and safe laboratory practice for support staff and responsibilities of the workers regarding Biosafety. ISO rules for laboratory medicine. Laboratory Biosafety Level Criteria (BSL-1-4).
- 2. Chemical, electrical, fire and radiation safety. Safety organization. General Safety checklist. Safety equipment. Safety signs.
- 3. Handling, transfer and shipment of specimen. Decontamination and disposal. Treatment and disposal technologies for health- care waste. Responsibility from acquisition of the specimen to the production of data.
- 4. Medical ethics Definition Goal Scope, Basic principles of medical ethics Confidentiality.
- Medico legal aspects of medical records Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.
- 6. Obtaining an informed consent.
- 7. Ethics in the profession of Medical Laboratory Science

#### VALUE ADDED COURSE (VAC)

# **VAC 1T: Environment and Health**

#### **Credits 04(FM: 100)**

#### **Course content:**

- 1. Basic idea about environment, Relation between environment and health.
- 2. Water pollution-Water related diseases (biological and chemical), water pollution law, water quality criteria and standards, controlling measures of water pollution. Heavy metal pollution of water –Pb, Cd, Hg, As pollution- Sources and Health Hazards.

- 3. Air pollution- Sources of air pollutants, types, Health hazards by air pollutants, ventilation and its standards, controlling measures of air pollution, air stress indices- heat stress, cold stress, global warming.
- 4. Noise pollution- Sources, Types of health hazards by noise pollutant. Protection against noise pollution.
- 5. Pesticides, fertilizers and food preservative link pollution and its impact on human health-in general

# MINOR (MI)

# MI – 1: Basic Anatomy and physiology

# MI – 1T: Basic Anatomy and physiology

Credits 03

**Credits 04(FM: 75)** 

#### **Course contents:**

- 1. Basic concept of Homeostasis in Physiological system- Specially- Blood Pressure, Heart Rate, Blood Coagulation, Endocrine System, feedback system, PH in blood by Buffers.
- 2. Digestive System- Anatomy of different parts of digestive tract and digestive organs in brief (Stomach, Liver, Gall bladder, Small and Large Intestine).
  - Digestion of Carbohydrate, Protein and Fat.
  - Gastric ulcer, Gastritis, Pancreatitis.
- 3. Excretory System: Anatomy of Excretory duct and Excretory organ- Kidney, Urinary bladder. GFR. Renal failure in brief, Renal function Test-Brief description.
- 4. Endocrine: Reproductive System- Anatomy of Endocrine and Reproductive organs- Functions of Thyroid, Ant. And Post. Pituitary. Pancreatic, Adrenal glands and gonads. Spermatogenesis and oogenesis. Ovulation. Menstrual Cycle in brief.
- 5. Cardiovascular System: Anatomy of Heart, Heart Rate, Cardiac Cycle, Heart Sound, Blood pressure, Superficial vein and their anatomical location in details.
- 6. Respiratory System: Anatomy of Lungs and Trachea, Breathing Process, Mechanism of O2 and CO2 transport, Hypoxia, Lung Volume, and its significance. Blood O2 saturation level and clinical importance.
- 7. Neuro-Muscular system: Anatomy of Cerebral Cortex, Cerebellum, Brain and Spinal Cord. Reflex Process, Autonomic Nervous System.

# MI – 1P: Basic Anatomy and physiology (Practical)

Credits 01

#### **Practical contents:**

- 1. Identification of stained tissue section of Stomach, Small Intestine, Thyroid, Pancreas, Testis, Ovary, Adrenal.
- 2. Staining of Squamous epithelial cells.
- 3. Blood Pressure Recording.

- 4. Analysis of Spirometry Record.
- 5. Oxygen saturation study by pulse oximeter.
- 6. p<sup>H</sup> determination of different body fluids- Blood, plasma, serum, urine, sweat.
- 7. Buffer preparation of different strength.

# SEMESTER-II

# MAJOR (MJ)

MJ-2: Basic Pathology Credits 04(FM: 75)

MJ-2T: Basic Pathology Credits 03

#### **Course content:**

- 1. Introduction Pathology, Different domains. Clinical importance of pathological studies.
- 2. Pathological samples for clinical diagnosis: Collection procedure, Storing, Processing, Transportation-Precaution in above steps.
- 3. Composition of urine, collection & preservation of urine
  - a) Physical examination- Colour, pH & specific gravity
  - b) Chemical examination Protein, Sugar, ketone body, bile salt, bile pigment, blood.
  - c) Microscopic examination. Cells, casts, crystals
- 4. Detection of micro albumin & 24 hrs urinary total protein estimation.
- 5. Stool sample collection, Routine processing, Routine diagnostic tests.
- 6. Sputum collection, Smear preparation- Routine diagnostic tests.

# **MJ-2P: Basic Pathology (Practical)**

Credits 01

#### **Practical contents:**

- 1. Routine analysis of urine sample: Physical, Chemical (Protein, Sugar, ketone body, bile salt, bile pigment, blood) and Microscopical tests.
- 2. Sputum: Smear preparation, Staining (AFB).
- 3. Stool: Collection, Routine diagnosis, Cysts, Ova of Helminth, Occult blood test.

#### SKILL ENHANCEMENT COURSE (SEC)

# SEC 2: Pathological data entry in computer

**Credits 03(FM: 50)** 

#### SEC 2P: Pathological data entry in computer

#### **Course Outline:**

- 1. Operation of personal computer.
- 2. Computer data entry using MS Word and MS Excel.
- 3. Presentation of data through histogram.
- 4. Presentation of data through Bar diagram, Line diagram.
- 5. Laboratory Report proforma preparation in computer.
- 6. Data storage through file with patient registration no.
- 7. Mean computation of data.

# ABILITY ENHANCEMENT COURSE (AEC)

#### **AEC 2T: Diagnostic Laboratory Waste Management**

**Credits 02 (FM: 50)** 

#### **Course content:**

- 1. Introduction about health care waste and diseases
- 2. Infectious waste, geno-toxic waste, waste sharps
- 3. Biomedical waste categories categorization, composition of biomedical waste
- 4. Colour coding, sources of health care waste
- 5. Health impact of biomedical waste-direct and indirect
- 6. Persons at risk of health care waste, legislation policies for management

#### MULTIDISCIPLINARY COURSE (MDC)

#### **MDC 2T: Community Health Programme in India**

**Credits 03(FM: 50)** 

#### **Course content:**

- 1. Brief idea about National Health Programme-Programme formulation, implementation, monitoring, and evaluation.
- 2. National Vector Borne Disease Control Programme- Malaria, Filaria, Dengue, Chikungunya.
- 3. National Leprosy Eradication Programme.
- 4. Revised National Tuberculosis Programme.
- 5. National AIDS Control Programme.
- 6. National Programme for Control of Blindness.
- 7. Iodine Deficiency Disorders Programme.
- 8. Universal Immunization Programme.

#### VALUE ADDED COURSE (VAC)

# **VAC 2T: Basic Microbiology**

**Credits 04(FM: 50)** 

#### **Course content:**

- 1. Bacterial taxonomy; characteristics of bacterial pathogens; Morphology-structure of a typicalbacterial cell- size, shape, arrangement; ultra-structures- flagella, pili, cell-wall, cytoplasmicmembrane, endospore, capsule, prokaryotic cellular reservematerials.
- 2. Bacterial nutrition, factors influence bacterial growth.
- 3. Specimen collection and handing in microbiological laboratory; safety regulation of thelaboratory, basic laboratory procedures of diagnostic laboratory.
- 4. Gram- positive and Gram- negative Staining- Method, Features
- 5. Fungal taxonomy; morphology, cell structure & reproduction of medically important fungi in brief.
- 6. Fungal sample collection techniques from mycoses-suspected patient,

- 7. Types of mycoses: superficial, cutaneous, subcutaneous, systemic, and opportunistic.
- 8. Laboratory diagnosis of Candida, Aspergillus, Cryptococcus.
- 9. General properties of viruses, Classification of viruses, Study on common disease producing Virus.

#### 10. **Demonstration:**

- a) Sterilization techniques and cleaning of glassware.
- b) Preparation of culture media
- c) Culture techniques of different clinical specimens
- d) Semi-quantitative urine analysis
- e) Staining techniques: Gram staining, AFB stain

# MINOR (MI)

# MI – 2: Fundamental Biochemistry

**Credits 04(FM: 75)** 

# MI – 2T: Fundamental Biochemistry

Credits 03

#### **Course contents:**

- 1. Carbohydrate- Definition, Source, Classification, Functions and Importance, Major types of carbohydrates present in blood and urine. Detection of different carbohydrates in urine by chemical testing. Importance of of glucose quantification in blood, Method-Strip & GOD-POD in brief. Blood Glucose level- Fasting, Postprandial.
- 2. Protein & Amino acids- Definition, Source, Classification, First class and Second Class, Essential and Non-essential amino acid.

Presence of protein in urine: Qualitative testing and Clinical importance.

Protein in plasma, Clinical Importance, Quantitative measurement of plasma protein, Biochemical method in brief.

- 3. Lipid-Types, Classification and function. Saturated and unsaturated fatty acid, Cholesterol-Level, Types. Blood level of Cholesterol.
- 4. Vitamin-Definition, Classification, Function and Clinical Importance. Only name of method for quantification of vitamin by specific method (Principle).
- 5. Enzymes Definition, Classification, Mechanism of action, Factors affecting enzyme action, coenzyme, co-factor, Chemical importance of enzyme.

Serum Amylase, Lypase ACP, GOT, GPT study and their normal level.

- 6. Minerals- Na, K, Ca, Fe, Phosphorus- Level in blood. Clinical condition of Hyper and Hypo mineralization. Name of the method for their quantification in blood/ serum.
- 7. Ketone body-Types, Clinical Importance of their presence in urine. Name of the method for quantification.

# MI – 2P: Fundamental Biochemistry (Practical)

# **Credits 01**

# **Practical contents:**

- 1. Qualitative analysis of Glucose, Albumin, Ketone bodies, Fructose, Protein in Urine. General and specific test.
- 2. Determination of Blood Glucose by Glucometer, GOD-POD method
- 3. Determination of SGOT & SGPT using kit.
- 4. Quantification of Na, K using kit.