



**JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY**  
**JAIPUR**

**SYLLABUS**

**DIPLOMA IN  
MEDICAL LABORATORY  
TECHNOLOGY (DMLT)**

**YEAR – 2016**

**DURATION – 3 YEAR (6 SEMESTERS)**

**SYLLABUS FOR:  
I - VI SEMESTERS**

**FACULTY OF PHYSIOTHERAPY & DIAGNOSTICS**

[www.jvwu.ac.in](http://www.jvwu.ac.in)

### Provision of Lateral Entry:

- Lateral entry at Diploma level should not be there, as this is the basic entry level for the professionals.
- There should a provision for lateral entry for the students who has successfully completed DMLT and would like to pursue B.Sc MLT (4 Year) can directly enter into the second year or 3<sup>rd</sup> semester of B.Sc MLT (4 Year) subject to availability of vacancy on merit of entrance test.

## DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY (DMLT) (Batch -2016)

### Program Summary: I Semester

Nature of course	Name of Course	C	T	D&T	P	PS
Human Anatomy	Human Anatomy	9	6	1	1.5	0.5
Fundamentals of MLT	Fundamentals of MLT	7	5.5	0.6	0.9	0
Biochemistry	Basics of Clinical Biochemistry	7	5.5	0.4	1.1	0
Microbiology	Basic Microbiology	8	7	0.4	0.6	0
Human science	Basic Human Science	7	7	0	0	0
University Compulsory Course	English Communication	2	2	0	0	0
	Extra-Curricular Activities	1	0	0	1	0
	Community Development Activities	1	0	0	1	0
University Optional Courses	Professional activities	-	-	-	-	-
Total Credits		42	33	2.4	6.1	0.5

## SYLLABUS FOR DMLT 1<sup>ST</sup> YEAR

### Program Structure – I Year (1<sup>st</sup> Year consists of I & II Semester)

**Motive: 1<sup>st</sup> Year Motive:** This year students will be nourished with the basic knowledge of subjects like Human Anatomy, Human Physiology, Biochemistry, Microbiology and pathology along with basics of computer. This will help students to know the basic structure and functioning of the human body.

### I Semester

**Motive:** This semester will cover the detailed knowledge of human anatomy, fundamentals of MLT, practical biochemistry, basic microbiology & basic bioscience. The students will be able to apply the knowledge of subjects while studying the applied subjects in further semesters. Students will get the knowledge English Language proficiency.

Nature of Course	Name of course	C	T	D&T	P
<b>Human Anatomy</b>	<b>Human Anatomy-I</b> Introduction to human body, Parts of human bone, Muscle & its function	3	2	0.5	0.5
	<b>Human Anatomy-II:</b> Digestive and urinary system, cardiovascular system.	3	2	0.5	0.5
	<b>Human Anatomy-III:</b> Nervous, Endocrine, Respiratory and Organ of sense	2.5	2	0	0.5
	<i>Practice sessions from I in University Lab/recognized hospital.</i>	0.5	0	0	5 sessions
<b>Fundamentals of MLT</b>	<b>Fundamentals of MLT –I:</b> Introduction to the clinical laboratory, Laboratory management.	2	1.5	0.2	0.3
	<b>Fundamentals of MLT –II:</b> Training of technician, Role of technician in clinical laboratory.	2.5	2	0.2	0.3
	<b>Fundamentals of MLT –III:</b> Collection, preservation & Transport of clinical specimens. Anticoagulants	2.5	2	0.2	0.3
	<i>Practice sessions from I, II &amp; III in University attached lab /recognized hospital</i>	0	0	0	0
<b>Biochemistry</b>	<b>Basics of Clinical Biochemistry-I:</b> Solutions & glassware in clinical biochemistry lab.	2.5	2	0.2	0.3
	<b>Basics of Clinical Biochemistry -II:</b> Acid & base, pH & buffer.	2.5	2	0.2	0.3
	<b>Basics of Clinical Biochemistry -III:</b> Clinical Laboratory equipments.	2	1.5	0	0.5
	<i>Practice sessions from I, II &amp; III in University lab /recognized hospital</i>	0	0	0	0
<b>Microbiology</b>	<b>Basic Microbiology –I:</b> History of microbiology. Structure of prokaryotic		2.5	0.2	0.3

	cell. Function of prokaryotic cell organelles.	<b>3</b>			
	<b>Basic Microbiology –II:</b> Morphology of bacteria, Bacterial surface appendages. Fimbriae, Pili etc.	<b>3</b>	2.5	0.2	0.3
	<b>Basic Microbiology –III:</b> Introduction to viruses, fungi & parasites.	<b>2</b>	2	0	0
	<i>Practice sessions from I &amp; II in university attached lab/recognized hospital.</i>	<b>0</b>	0	0	0
<b>Human Science</b>	<b>Basic Human Science – I:</b> Human cell, Skin, Chromosome	<b>3</b>	2.5	0	0
	<b>Basic Human Science –II:</b> Organization of human body, Tissues	<b>2</b>	2	0	0
	<b>Basic Human Science – III:</b> Introduction to chemistry, Atomic structure, etc. Introduction to force, work, heat, light etc.	<b>2</b>	2.5	0	0
	<i>Practice sessions from I, II &amp; III in university attached lab.</i>	<b>0</b>	0	0	0
<b>University Compulsory Course</b>	English Communication (Level A)	<b>2</b>	2	0	0
	Extra-Curricular Activities	<b>1</b>	0	0	1
	Community Development Activities	<b>1</b>	0	0	1
<b>University Optional Courses</b>	Professional Activities	-	-	-	-
<b>Total credit</b>		<b>42</b>			

**Note:**

- **C** represents number of credit per course
- **T** represents number of theory credit per course
- **D&T** represents demonstration/ tutor in the lecture hall.
- **P** represents number of practical credits per course.
- **PS** represents number of practice sessions credit per course.

## HUMAN ANATOMY

### Unit –I (Introduction to human body, Parts of human bone, Muscle & its function) (2, 1)

#### Theory (2 credits)

1. Human body as a whole: Introduction of anatomy and its divisions, Terms of location, positions and planes. Structure & functions of human cell and its organelles. Glands-classification, serous & mucous glands with examples & function, Basic tissues – classification & function with examples.
2. Skeleton system: Cartilage – types & function with example. Bone -classification, parts & names of bones of human body. Joints – classification of joints with examples. Muscular system-names & function of muscles of the body.

#### **Lab. Experiments:** Practical (0.5 credit), D&T (0.5credits)

##### Practice session (0.5 credits)

1. Identification of organs of the body. (0.1credit)
2. Histology of the 3 types of cartilage (0.1credit)
3. Identification of all bones showing parts, Joints. (0.1credit)
4. Identification of muscles of the body (0.1credit)
5. Histology of skeletal (TS & LS), smooth & cardiac muscle. (0.1credit)

Practice based on above practical. (0.5 credit)

### Unit-II (Digestive and urinary system, cardiovascular system.) (2, 0.5)

#### Theory (2 credits)

1. Digestive system: Parts of mouth with function, tonsil, salivary glands. Structure of pharynx, oesophagus. Parts & function of stomach, small and large intestine. Structure & function of liver, gall bladder & pancreas.
2. Cardiovascular system: Heart - size, location, chambers, exterior & interior. Artery, vein, aorta & blood supply of heart. Valves of heart. Introduction of lymph, lymphatic tissues, names of regional lymphatics, axillaries and inguinal lymph nodes.
3. Urinary System: Structure & function of kidney, Parts of urinary system, Structure & types of nephron.

#### **Lab. Experiments:** Practical (0.5 credit), D&T (0.5credits)

1. Identification of parts of the heart and vessels of the human body. (0.1credit)
2. Identification of parts of the Digestive system of the human body. (0.1credit)
3. Identification of parts of the liver. (0.1credit)
4. Demonstration of parts of respiratory system. (0.1credit)
5. Identification of parts of the urinary system. (0.1credit)

### Unit -III (Nervous, Endocrine, Respiratory and Organ of sense.) (2, 0.5)

#### Theory (2credits)

1. Respiratory System: Structure & parts of nose, nasal cavity, larynx, trachea, lungs, broncho pulmonary segments.
2. Endocrine Glands: Structure & function pituitary gland, thyroid gland, parathyroid gland, suprarenal glad. Structure of the parts of female and female reproductive system, mammary gland-gross.
3. Nervous System: Neuron, structure of nervous system, Introduction of cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve, meninges, ventricles & cerebrospinal fluid, Names of basal nuclei, Cranial nerves, Sympathetic trunk & names of parasympathetic ganglia.

4. Sensory Organs: Appendages of skin, Parts of eye & lacrimal apparatus, parts of ear- external, middle and inner ear and contents. Tests buds.

**Lab. Experiments:** Practical (0.5 credit)

1. Identification of parts of the nervous system. (0.1credit)
2. Identification of parts of the respiratory system. (0.1credit)
3. Identification of the glands of the human body. (0.1credit)
4. Identification of parts of the brain. (0.1credit)
5. Identification of the eyeball, cornea & retina.  
(0.1credit)

**Recommended Text Books**

1. B.D chaurasia, General anatomy
2. N.Muruges, General anatomy

**Suggested Reading**

1. Ross and Wilson, Anatomy a & physiology

## FUNDAMENTALS OF MLT

### **Unit -I** (Introduction to the clinical laboratory, Laboratory management) (1.5, 0.3)

Theory (1.5credits)

1. Introduction of the clinical laboratory, components & department of clinical Laboratory.
2. Basic principles of laboratories: laboratory quality control. Collection and handling of specimens. Laboratory safety & biohazards: Safety manuals of a clinical laboratory, Management of physical, chemical & biological hazards of clinical laboratory. Maintenance of cleanliness of the laboratory: maintenance of cleanliness, Personal Health and hygiene, cleaning of laboratory glassware, cleaning pipette.
3. Proper clinical waste disposal. Components, uses and management of First Aid Box in the laboratory.

**Lab. Experiments:** Practical (0.3credit), D&T (0.2 credits)

1. Cleaning of laboratory glasswares. (0.1 credits)
2. Washing of hands using seven step rules. (0.1 credits)
3. Preparation of First Aid Box. (0.1 credits)

### **Unit-II** (Training of technician, Sterilization & disinfection) (2, 0.3)

Theory (2 credits)

1. Scope of medical laboratory technology, Role of technician in clinical laboratory, basic ethics of laboratory technician. Training of clinical laboratory technicians.
2. Sterilization & disinfection: Introduction of sterilization & disinfection. Differences between sterilization & disinfection, different methods and procedure of sterilization. Different disinfectants & their procedure of disinfection. Procedure for sterilization of glasswares, infected materials, plastic materials, culture media & solutions. Process of sterilization in autoclave & hot air oven. Concept of septic & aseptic conditions.

**Lab. Experiments:** Practical (0.3 credit), D&T (0.2 credits)

1. Sterilization of glasswares using hot air oven. (0.1 credits)
2. Sterilization of materials using autoclave. (0.1 credits)
3. Preparation of 70% ethanol. (0.1 credits)

### **Unit -III** (Containers for collection of clinical specimens, Anticoagulants) (2, 0.3)

Theory (2 credits)

1. Anticoagulants: Introduction of anticoagulants, mechanism of action of an anticoagulants, preparation & merits & demerits of different anticoagulants like EDTA, double oxalate, trisodium citrate, fluoride etc. Introduction of different anticoagulants used in blood banking.
2. Containers for collection of clinical specimens: Containers of collection of blood samples, preparation of an EDTA vial, Preparation of container for collection urine & sputum samples, stool samples, preparation of swab for collection of pus sample.
3. Phlebotomy: Introduction of phlebotomy, syringe & needles. Collection of blood: selection of veins, use of antiseptics, procedure of venipuncture for collection of blood, precautions & contraindication of venipuncture, collection of blood by figure prick.

**Lab. Experiments:** Practical (0.3credit), D&T (0.2 credits)

Practical: (0.3 credits)

1. Preparation of EDTA vials. (0.1 credits)
2. Collection of blood from vein& figure prick. (0.1 credits)
3. Preparation of container for collection urine & sputum sample. (0.1 credits)

**Recommended text books:**

1. Maithi, Text book of medical laboratory Technology.
2. V.H Talib, A hand book of Medical laboratory Technology, CBS Publishers & distributors, New Delhi.

**Suggested Reading**

1. P. Godkar, Text book of medical laboratory Technology.



## BASICS OF CLINICAL BIOCHEMISTRY

### Unit -I (Solutions & glassware in clinical biochemistry lab) (2, 0.3)

#### Theory (2credits)

1. Glassware: Introduction of clinical biochemistry, importance of clinical biochemistry. Basic awareness of laboratory in respect to glassware & equipments. Composition of glass. Structure, function & uses of laboratory glassware like graduated measuring cylinders, burettes, volumetric flasks, pipettes, beakers & test tubes. Cleaning of laboratory Glassware & glassware conditioning.

2. Solution: Introduction of solution, solute, solvent & reagents. Expressing the concentration of solution: Qualitative expression - dilute & concentrated solution, Semi-quantitative expression - unsaturated & saturated solution, Quantitative expressions - normality, molarity, mass concentration, mass fraction, mass percentage or %( w/w), volume percentage, molality (m). Types of solutions: stock solution, standard solution, working solution, an acid solution of required normality.

#### Lab. Experiments: Practical (0.3 credit), D&T (0.2 credits)

1. Cleaning and conditioning of glassware. (0.1 credits)
2. Preparation of 1normal solution. (0.1 credits)
3. Preparation of 1molar solution. (0.1 credits)

### Unit- II (Acid & base, pH & buffer) (2, 0.3)

#### Theory (2.2credits)

1. Acid, base & pH: Introduction of acid and bases, types of acid & base with examples. Introduction of pH and its importance, measurement of pH- litmus paper & paper strip method, application of pH.

2. Buffers: Introduction of buffers, principle of buffering. Type and working of Buffers: acidic and alkaline buffer solutions, working of buffer solution. Preparation of buffer solution: Acetate buffer, Phosphate buffer and Tris(hydroxymethyl) aminomethane buffer or tris buffer. Criteria for selection of buffers.

#### Lab. Experiments: Practical (0.3 credit), D&T (0.2 credits)

1. Measurement of pH by litmus & paper strip method. (0.1 credits)
2. Preparation of phosphate buffer of a desired pH. (0.1 credits)
3. Preparation of acetate buffer of a desired pH. (0.1 credits)

### Unit- III (Clinical Laboratory equipments) (1.5, 0.5)

#### Theory (1.5credits)

1. Clinical Laboratory equipments: Principle, working and application of spectrophotometer, colorimeter. pH meter- introduction, principle and working procedure for measurement of pH of a solution, maintainance of pH meter.

2. Principle, and procedure and application of cyclomixture, centrifuge, balance, Incubator etc.

#### Lab. Experiments: Practical (0.5 credit)

1. Demonstration of working of colorimeter. (0.1 credits)
2. Demonstration of working of pH meter. (0.1 credits)
3. Demonstration of working of incubator. (0.1 credits)
4. Demonstration of working of cyclomixture. (0.1 credits)
5. Demonstration of working of centrifuge, balance. (0.1 credits)

**Recommended text books:**

1. Ramnik Sood, Text book of medical laboratory Technology.
2. V.H Talib, A hand book of Medical laboratory Technology, CBS Publishers & distributors, New Delhi.

**Suggested Reading**

1. Singh & Sawhney, Introductory practical biochemistry.
2. P. Godkar , Text book of medical laboratory Technology.

## **BASIC MICROBIOLOGY**

### **Unit -I** (Clinical Laboratory equipments) (2.5, 0.3)

Theory (2.5credits)

1. Introduction to medical microbiology: Scope of medical microbiology. In discovery of microorganism, contribution of Robert Hook, Robert Koch- Koch's postulates, Antony von leeuwenhook, Louis Pasteur, Bordet, Paul Eharlich, Alexander Fleming, Tyndall, Joseph lister, Karl landstainer, Needham etc.
2. Prokaryotic cell: structure of prokaryotic cell, structure and function of components of prokaryotic cell like, cell wall, cell membrane, mesosomes, cytoplasm & cell organells etc. Difference between eukaryotic & prokaryotic cell.

**Lab. Experiments:** Practical (0.3 credit), D&T (0.2 credits)

1. Demonstration of a bacterial cell by simple staining. (0.1 credits)
2. Demonstration of cell wall by slide. (0.1 credits)
3. Demonstration of a eukaryotic cell by slide. (0.1 credits)

### **Unit -II** (Morphology of bacteria, Bacterial surface appendages) (2.5, 0.3)

Theory (2.5credits)

1. Morphology and nature of bacteria: Size, shape & arrangement of bacteria. Bacterial appendages - structure and functions of flagella, structure and functions of fimbri & pilli.
2. Bacterial capsule- structure and functions. Spores- structure, functions and process of spore formation. Structure and functions cyst. Morphological and biological classification and identification of bacteria. Different forms of microorganism: L-form bacteria, spheroplast, leucoplast etc. Bacterial inclusions bodies.

**Lab. Experiments:** Practical (0.3 credit), D&T (0.2 credits)

1. Demonstration of a bacterial spore. (0.1 credits)
2. Demonstration of flagella. (0.1 credits)
3. Demonstration of inclusions bodies. (0.1 credits)

### **Unit -III** (Introduction to the virology, mycology & parasitological) (2, 0)

Theory (2credits)

1. Introduction to virology, structure of a virus and function of its components, general characteristics of viruses, symmetry of viruses.
2. Introduction to mycology, structure of fungi, Characteristics, morphology and classification of fungi, fungal spores.
3. Introduction to parasitology, terminologies used in parasitology. Structure, characteristics and classification of protozoa, helminthes.

#### **Recommended Text Books**

1. Baweja, Medical Microbiology
2. Anantha Narayan and Panikar, Text book of Microbiology

#### **Suggested Reading**

1. Prescotte, Microbiology

## **BASIC HUMAN SCIENCE**

### **Unit-I:**

Theory (2.5credits)

Cell structure – Structure & function of human cell & their components. Protoplasm, Structure and function of cell membrane, cytoplasm and cell organelles. Membranes and glands: Types- mucous membranes, serous and cutaneous membranes. Skin- epidermis, dermis and accessory organs. Glands – Definition, composition and types. Chromosome- structure and function. Cell division- mitosis and meiosis.

### **Unit-II:**

Theory 2 credits)

Tissues- Definition types & functions. Organization of human body: Brief structure and function of digestive system, respiratory system, cardiovascular system, excretory system & urinary system, skeleton system, nervous system, endocrinal system, reproductive system.

### **Unit-III:**

Theory (2.5 credits)

Introduction to chemistry: atom, element compound, atomic structure, atomic number, atomic wt. & mass. Acid, base, alkali & salt. Isotopes, valence, lone pair electron & electronegativity. Introduction of organic & inorganic compound, aliphatic & aromatic compound etc. Introduction of physics: unit of measurements-CGS, MKS & SI unit. Introduction of force, work, heat, light etc.

### **Recommended Text Books:**

1. Biology for class XI & XII, NCRT
2. Chemistry for class XI & XII, NCRT.
3. Physics for class XI & XII, NCRT

# ENGLISH COMMUNICATION

**Credit: 2**

**Objective:** To enable students to develop Four major skills Reading, Writing, Speaking and Listening in relevance to English culture according to time and venue.

## **Unit 1: Reading and Listening**

- Types of passages, purpose of reading, reading strategies, vocabulary building, antonyms and synonyms and one-word substitution etc.
- Role of Listening, Barriers of Listening, Remedies to remove the barriers. Listening to Narratives, Listening to specific information or data, listening to Conversational contexts etc.

## **Unit 2: Writing and Speaking**

- Subject- Verb Concord, Sentence Pattern (SVOCA), Time and Tenses. Different Letter Writing Formats: Application, Cover Letter, Notice, Report etc. Resume Building.
- Introduction to the sounds of English-Vowels, Diphthongs and Consonants phonetic sounds, Introduction to Stress and Intonation, Situational Dialogues / Role Play 'Just a minute' Sessions (JAM), action verbs (play way method), Describing Objects/ Situations/ People (personality), Debates (current topics), Turn Coat, Telephonic Conversation.

## **Recommended Books:**

- Phonetics by Peter Roach, Oxford University Press 2004.
- Better English Pronunciation by J.D.O'Connor, OUP 2010.
- Accents of English by J.C.Wells, Cambridge University Press.
- English Grammar Today with CD: An A-Z of Spoken and Written
- Grammar by Ronald Carter, Michael Mac Carthy, Geraldine Mark
- Anne O'Keeffe, Cambridge University Press, 2009.
- Alred, Gerald J. . The Business Writers Handbook. 9th ed. Boston:
- Bedford/St. Martins, 2009.
- Geeta Jajivan, Kiranmai: Course Listening and Speaking Skills part 1. Foundation Books Pvt Ltd.
- Lorven: Enrich Your Communication in English

## SYLLABUS FOR DMLT 1<sup>ST</sup> YEAR

### Program Summary: II- Semester

Nature of course	Name of Course	C	T	D&T	P	PS
Human Physiology	Human Physiology -I	7	5.3	0.6	0.6	0.5
Pathology	Basic Pathology	8	6	0.4	0.6	1
Biochemistry	Fundamental Biochemistry	7	5	0.6	0.9	0.5
Clinical Microbiology	Microbial Instrumentation	7	5.5	0.6	0.9	0
Information & Communication Technology	Information & Communication Technology	8	6	0.5	0.5	1
University Compulsory Course	Extra-Curricular Activities	1	0	0	1	0
	Community Development Activities	1	0	0	1	0
University Optional Courses	Professional activities	-	-	-	-	-
Total credits		38	24.8	3	7.2	3

## SYLLABUS FOR DMLT 1<sup>ST</sup> YEAR

### Program Structure – I Year

(1<sup>st</sup> Year consists of I & II Semester)

**Motive: 1<sup>st</sup> Year Motive:** This year students will be nourished with the basic knowledge of subjects like Human Anatomy, Human Physiology, Biochemistry, Microbiology and pathology along with basics of computer. This will help students to know the basic structure and functioning of the human body.

### II - SEMESTER

**Motive:** This semester along with Human physiology will also cover basics of microbial instrumentation, pathology and biochemistry. The students will be able to apply the knowledge of these subjects while studying the applied subjects in further semesters. Students will also get knowledge of basic computer application.

Nature of Course	Name of course	C	T	D&T	P
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<b>Human physiology</b>	<b>Human Physiology I -I:</b> Blood, Physiology of digestion	2.5	2	0.2	0.3
	<b>Human Physiology I -II:</b> Cardiovascular, Body temperature measurement	2	1.5	0.2	0.3
	<b>Human Physiology I - III:</b> Physiology of Sense & Respiratory system	2	1.8	0.2	0
	<i>Practice sessions from I &amp; II in University attached /recognized hospital.</i>	0.5	0	0	0.5
<b>Pathology</b>	<b>Basic Pathology-I:</b> Introduction to pathology, properties & morphology of blood, Haematopoiesis	2.5	2	0.2	0.3
	<b>Basic Pathology-II:</b> Stains & its procedure. Type & cell of immune system.	2.5	2	0.2	0.3
	<b>Basic Pathology-III:</b> Cell injury, Neoplasm, Inflammation.	2	2	0	0
	<i>Practice sessions from I &amp; II in University attached hospital /recognized hospital.</i>	1	0	0	10 sessions
<b>Biochemistry</b>	<b>Fundamental Biochemistry-I:</b> Introduction of chemistry, Chemical Bonds, Chemistry of carbohydrates.	2	1.5	0.2	0.3
	<b>Fundamental Biochemistry -II:</b> Chemistry of enzymes & lipids.	2	1.5	0.2	0.3
	<b>Fundamental Biochemistry -III:</b> Chemistry of amino acids & proteins & nucleic acid.	2.5	2	0.2	0.3
	<i>Practice sessions from II &amp; III in University attached Hospital /Recognized hospital.</i>	0.5	0	0	5 Sessions
<b>Clinical Microbiology</b>	<b>Microbial Instrumentation –I:</b> Introduction, type, principle of working & application of microscope.	2	1.5	0.2	0.3
	<b>Microbial Instrumentation –II:</b> Sterilization & disinfection, Laminar air flow, Autoclave, Hot air oven.	2.5	2	0.2	0.3

	<b>Microbial Instrumentation –III:</b> Colony counter, McIntosh field Jar. Petri plate, Inoculating loop etc.	2.5	2	0.2	0.3
	<i>Practice sessions from I, II &amp; III in University attached lab. /recognized hospital.</i>	0	0	0	0 sessions
<b>Information &amp; Communication Technology</b>	<b>Information &amp; Communication Technology – I :</b> Basics of computer System and Number System	2	2	0	0
	<b>Information &amp; Communication Technology –II:</b> Hard Devices and software device, CPU, Memory disks and its types.	2	2	0	0
	<b>Information &amp; Communication Technology – III:</b> Software and MS office	3	2	1	0
	<i>Practice sessions from I, II &amp; III in University attached lab.</i>	0	0	0	0 sessions
<b>University Compulsory Course</b>	Extra-Curricular Activities	1	0	0	1
	Community Development Activities	1	0	0	1
<b>University Optional Courses</b>	Professional Activities	-	-	-	-
<b>Total credits</b>		<b>39</b>			

**Note:**

- C represents number of credit per course
- T represents number of theory credit per course
- D/T represents demonstration/ tutor in the lecture hall.
- P represents number of practical credits per course.
- PS represents number of practice sessions credit per course.



# HUMAN PHYSIOLOGY-I

## UNIT-I (Blood, Digestive system) (2-0.5)

Theory (2 credits)

1. Blood: Composition and function of blood and plasma. Blood Volume - Normal value, determination and regulation of blood volume. Plasma Proteins - types & functions. Hemostasis – introduction of normal haemostasis, clotting factors, mechanism of clotting. Blood groups-A, B, O system, Rh system. Anaemia's– Classification, etiology, effects on body. Red cell indices. Lymph – lymphoid tissue formation, circulation, composition and function of lymph.
2. Digestive System - Functions of various organs of digestive system. Salivary glands. Gastric secretion – Composition function, regulation of gastric juice. Composition, secretion & function of bile secretion. Digestion and absorption of carbohydrates, proteins & lipids.

**Lab. Experiment:** Practical (0.3 credit), D&T (0.2 credit)

Practice session (0.5 credit)

1. Hb estimation (0.1credit)
2. Determination of Blood Groups (0.1credit)
3. Determination of body temp, Clotting Time, Bleeding Time (0.1credit)
4. Determination of total leucocyte count (0.1credit)
5. Determination of RBC count (0.1credit)

## UNIT-II (Cardiovascular, Body temperature measurement) (1.5-0.5)

Theory (1.5 credits)

1. Cardiovascular system: Heart –Properties of cardiac muscle, Cardiac cycle, Cardiac output. Blood Pressure - clinical measurement & significance. Physiological variations, regulation of heart rate, cardiac shock, hypotension. Pulse – Jugular, radial pulse, Triple response. Heart sounds – Normal heart sounds, cause characteristics and significance. Electrocardiogram (ECG) –significance. Blood circulation.
2. Body temperature measurement, Physiological variation, Regulation of body temperature by physical chemical and nervous mechanisms. Role of Hypothalamus, Hypothermia and fever.

**Lab. Experiment:** Practical (0.3 credit), D&T (0.2 credit)

1. Blood pressure recording (0.1credit)
2. Auscultation for Heart Sounds (0.1credit)
3. Measurement of body temperature. (0.1credit)

## UNIT-III (Physiology of Sense & Respiratory system) (1.8-0.2)

Theory (1.8 credit)

1. Special senses: Vision – structure & function of different parts of eye. Hearing structure & mechanism of hearing. Taste – Taste buds & functions. Smell –physiology, Receptors.
2. Respiratory system: Mechanism of normal and rigorous respiration. Forces opposing and favouring expansion of the lungs. Intra pulmonary pleural pressure, surface tension, recoil tendency of the wall. Transportation of respiratory gases. Lung volumes and capacities. Mechanisms of Regulation of respiration, Respiratory centre. Applied physiology respiration- Hypoxia, Cyanosis, Asphyxia, Dyspnea, Dysbarism, Artificial Respiration, Apnoea.

**Lab. Experiment:** Practical (0.0credit), D&T (0.2credit)

1. Demonstration of mechanism of respiration. (0.1credit)
2. Demonstration of testing of hearing. (0.1credit)

### Recommended Text Books

1. Shembulingam, Human Physiology
2. A. K Jain, Text Book of Medical Physiology.

### Suggested Reading

1. Ross and Wilson, Anatomy a & physiology

## BASIC PATHOLOGY

### UNIT-I (Introduction to blood and anticoagulants) (2-0.5)

Theory (2 credits)

1. Introduction to pathology. Terminologies used in pathology, Role of hematology in diagnosis of various diseases. Laboratory organization and safety measure
2. Composition, function and of blood and plasma. Morphology of various blood cells and their identifications, abnormal morphology of red blood cells
3. Haematopoiesis: Erythropoiesis, Leucopoiesis and Thrombopoiesis.

**Lab. Experiments:** Practical (0.3credits), D&T (0.2credit)  
Practice session (0.5credit)

1. Collection of blood by veini-puncture (0.1 credit)
2. Demonstration & Identification of blood cells. (0.1 credit)
3. Collection of blood by finger prick ( Lancet) (0.1 credit)

### UNIT-II (Introduction to stain and blood cell morphology) (2-0.5)

Theory (2 credit)

1. Romanowasky dyes: Principle of staining, Leishman's stain, Geimsa stain, Field's stain etc, their mechanism of action and preparation.
2. Blood smear: Role of spreader, Preparation and staining procedures of thin & thick blood smear. Basic hematology, physiological variations, normal and absolute values.
3. Immunity- types, Cells & organs of immune system.

**Lab. Experiments:** Practical (0.3credit), D&T (0.2credit)  
Practice session (0.5 credits)

1. Collection of blood by vacationer. (0.1credit)
2. Preparation of blood smears (0.1 credits)
3. Staining of blood smears and identification of blood cells (0.1 credit)

### UNIT-III (Cell Injury and Cell death, Inflammation) (2-0)

Theory (2credit)

1. Cell Injury and Cellular Adaptations: Normal cell structure and function, cell Injury- types of cell injury, etiology of cell injury. Cell death: types- autolysis, necrosis, apoptosis & gangrene.
2. Cellular adaptations-Atrophy, hypertrophy, hyperplasia & dysplasia. Definition & types of Neoplasia & hyperplasia-benign tumor and malignant tumor.
3. Hemodynamic Disorders: Introduction & causes of - Edema, Hyperemia, Congestion, Hemorrhage, Circulatory, Thrombosis, Ischemia & Infarction. Inflammation: causes, sign & types.

#### Recommended text books:

3. Harsh Mohan, Text book of pathology.
4. P. Godkar , Text book of medical laboratory Technology
5. V.H Talib, A hand book of Medical laboratory Technology, CBS Publishers & distributors, New Delhi.

#### Suggested Reading

1. Rabbins & Cotran, Pathologic Basis & Diseases

# FUNDAMENTAL BIOCHEMISTRY

## UNIT-I (Introduction to Solution and glassware) (1.5, 0.5)

Theory (1.5credit)

1. Basic concept: Atomic structure, valiancy, Atomic number & mass, Electronegativity, stabilizing forces in biomolecules: Ionic bonds, Hydrogen bond, hydrophobic interaction, van dar waals forces etc.
2. Carbohydrate: Introduction, classification, Structure, properties and their function of monosaccharide, disaccharides and polysaccharides. Derivatives of polysaccharides. D&L form isomers of carbohydrates, Mutarotation, Oxidation and reduction of carbohydrates.

**Lab. Experiments:** Practical (0.3 credits), D&T (0.2credit)

Practice session (0.5credits)

1. Qualitative tests of carbohydrates by Molisch test. (0.1credit)
2. Qualitative tests of carbohydrates by Saliwanoff's test. (0.1credit)
3. Qualitative tests of carbohydrates by Benedict test. (0.1credit)

## UNIT-II (Enzymes, Sterilization and Carbohydrates) (1.5, 0.5)

Theory (1.5 credit)

1. Lipid: General structure and classification of lipid fatty acids, Properties & function lipid & fatty acids. Iodine number, sufonification, Acid value and rancidity of fat. Saturated and unsaturated fatty acid, Natural fats, Phospholipids – properties and uses. Cholesterol- Structure, properties & uses.
2. Enzymes: Definition, Properties, classification, concept of active sites and its general properties, Mode of action of enzymes, Cofactor and coenzymes, Different specificity, Lock and key hypothesis, Koshland's induced fit theory. Factor affecting enzyme activity.

**Lab. Experiments:** Practical (0.3 credit), D&T (0.2credit)

1. Qualitative tests for lipids. (0.3credit)

## UNIT-III (Lipid, Protein, Nucleic acid) (2, 0.5)

Theory (2 credit)

2. Protein: Classification, structural organization and function of protein, peptide and sulfide bonds, Amino acid-classification, isoelectric point, optical activity and concept of pK value of amino acid.
3. Nucleic acids: Structure, function and types of DNA and RNA. Nucleotide, nucleoside and nitrogen bases, Role of nucleic acid, cyclic nucleotide, Synthetic nucleotides. Role of free nucleotide in biological system.

**Lab. Experiments:** Practical (0.3credit), D&T (0.2credit)

1. Qualitative tests of amino acid & Proteins (0.3credit)

### Recommended Text Books

1. Vasudevan DM & Sreekumari S, Text Book of Biochemistry for Medical Students.
2. Satyanarayan, Medical Biochemistry

### Suggested reading

1. Lehninger, Principle of biochemistry

## MICROBIAL INSTRUMENTATION

### UNIT-I (Microscopy) (1.5-0.5)

Theory (1.5credit)

1. Microscopy: - Magnification, Numerical aperture, Resolution power and component of microscope. Use of immersion oil and care of microscope and common difficulties. Light Microscope- Principle, instrumentation, working & application of Medical microscope, Dark Field Microscope, Fluorescent Microscope, Phase Contrast Microscope. Electron microscope- Principle, instrumentation, working & application of Transmission Electron Microscope (TEM) and Scanning Electron Microscope (SEM), preparation of smear for electron microscope. Care and maintenance of microscope.

**Lab. Experiment:** Practical (0.3 credit), D&T (0.2credit)

Practice sessions (0.2credits)

1. Demonstration of working of microscopy. (0.1credit)
2. To learn the cleaning of microscope (0.1credit)
3. To learn the use of medical microscope. (0.1credit)

### UNIT-II (Instrumentation, Sterilization & Disinfection) (2-0.5)

Theory (2 credits)

1. Instrumentation: principle, component & working of Autoclave, Incubator, Hot Air Oven, Laminar Air Flow etc. Care, maintenance and validation of above instruments.
2. Sterilization & Disinfection: Introduction of sterilization & disinfection. Sterilization- Physical & chemical methods. Different disinfectants & their procedure of disinfection. Procedure for sterilization of glasswares, infected materials, plastic materials, culture media & solutions. Process of sterilization in autoclave & hot air oven. Concept of septic & aseptic conditions.

**Lab. Experiment:** Practical (0.3 credit), D&T (0.2credit)

Practice sessions (0.2credits)

1. To learn the use of autoclave. (0.1credit)
2. To learn the use of hot air oven. (0.1credit)
3. To learn the use of Laminar air flow. (0.1credit)

### UNIT-III (Instrumentation in Microbiology) (2-0.5)

Theory (2 credit)

1. Instrumentation: Principle components, working and application of Colony counter, MacIntosh Field Jar, various inoculators. Care, maintenance and validation of above instruments.
2. Instrumentation: Petri Plate, Hot plate, distillation plant, centrifuge, Water bath, Magnetic stirrer, water bath, Deionizer etc. Care, maintenance and validation of above instruments.

**Lab. Experiment:** Practical (0.3 credit), D&T (0.2credit)

1. To learn the use of colony counter. (0.1credit)
2. To learn the use of magnetic stirrer. (0.1credit)
3. To learn the use of laminar air flow. (0.1credit)

### Recommended Text Books

1. R.C Dubey, D.k Maheswari, Practical microbiology

2. D.R Arora, Bharti Arora, Practical microbiology

**Suggested Reading:** 1. P. Godkar, Text book of Medical Lab Technology

## **INFORMATION & COMMUNICATION TECHNOLOGY**

**(Credit: 8)**

**Objective:** To impart basic knowledge about computer with application of various packages to Business and Commerce.

### **Unit - I**

#### **Introduction to computers:**

Definition, Characteristics and limitations of computers - Elements of Computers - Hardware - CPU - Primary and Secondary memory - Input and Output devices. IT enabled services - BPO, KPO, Call centers.

#### **Modern communications**

(Concepts only): Communications – FAX, Voice mail, and information services – E Mail – Creation of email id - group communication – Tele conferencing – Video conferencing – File exchange – Bandwidth – Modem – Network Topologies – Network types LAN, MAN, WAN and their architecture – Dial up access.

**Operating System and Windows:** Operating Systems: Meaning, Definition, Functions and Types of Operating Systems - Booting process – Disk Operating System: Internal and External Commands – Wild Card Characters – Computer Virus, Cryptology. Windows operating system - Desktop, Start menu, Control panel, Windows accessories .

**(Credit: 2)**

### **Unit - II:**

#### **MS Office I:**

MS Word & Word Processing : Meaning and features of word processing – Advantages and applications of word processing - Parts of MS Word application window – Toolbars – Creating, Saving and closing a document – Opening and editing a document - Moving and copying text – Text and paragraph formatting, applying Bullets and Numbering – Find and Replace – Insertion of Objects, Date and Time, Headers, Footers and Page Breaks – Auto Correct – Spelling and Grammar checking – Graphics, Templates and wizards - Mail Merge :

Meaning, purpose and advantages – creating merged letters, mailing labels, envelopes and catalogs- Working with Tables – Format Painter.

#### **MS EXCEL:**

Features of MS Excel – Spread sheet / worksheet, workbook, cell, cell pointer, cell address etc., - Parts of MS Excel window – Saving, Opening and Closing workbook – Insertion and deletion of worksheet – Entering and Editing data in worksheet – cell range – Formatting – Auto Fill –Formulas and its advantages – References : Relative, absolute and mixed – Functions: Meaning and Advantages of functions, different types of functions available in Excel – Templates –Charts – Graphs – Macros : Meaning and Advantages of macros, creation, editing and deletion of macros – Data Sorting, Filtering, validation, Consolidation, Grouping, Pivot Table and Pivot Chart Reports.

#### **MS Office II:**

MS Access - Data, Information, Database, File, Record, Fields - Features, advantages and limitations of MS Access – Application of MS Access – 10 parts of MS Access window – Tables, Forms, Queries and Reports – Data validity checks – (Theory with simple problems)

#### **MS PowerPoint:**

Features, advantages and application of Ms Power point – Parts of MS Power point window – Menus and Tool bars – Creating presentations through Auto content wizard, Templates and manually – slide show – saving, opening and closing a Presentation – Inserting, editing and deleting slides – Types of slides - Slide Views- Formatting –Insertion of Objects and Charts in slides- Custom Animation and Transition.

#### **Multimedia:**

Meaning, Purpose, Usage and application – Images, Graphics, sounds and music – Video presentation devices – Multimedia on web. **(Credit: 3)**

**Unit- III:**

**Internet & E commerce:**

Services available on internet - WWW - ISP.

**E commerce:**

Meaning, advantages and limitations, applications of E commerce - trading stocks online, ordering products / journals / books etc., online, travel and tourism services, employment placement and job market, internet banking, auctions, online publishing, advertising-Online payment system (including practicals). **(Credit 2)**

**Lab Work:**

**PRACTICALS:**

MS DOS MS WINDOWS MS WORD MS EXCEL  
MS ACCESS MS POWERPOINT INTERNET & E COMMERCE.

**Recommended practice session:** *10 Practice Sessions of Ms Dos Ms Windows Ms Word Ms Excel, Ms Access Ms PowerPoint Internet & E Commerce* **(Credit 1)**

**Recommended Text Books:**

Computer Fundamentals; Pradeep K. Sinha, Priti Sinha; BPB Publications

**Suggested Readings:**

1. Introduction to Information Technology: Rajaraman, PHI
2. Fundamentals of Computers 4/E: Rajaraman, PHI
3. Fundamentals of Computers: P. Mohan, Himalaya
4. Information Technology: Dennis P. Curtin, McGraw Hill International
5. Fundamentals of Information Technology: Saha etal, Himalaya
6. Microsoft Office Excel 2003 step by step: Frye, PHI
7. Fundamentals of Computers: Atul Kahate, Tata McGraw Hill

## SYLLABUS FOR DMLT 2<sup>ND</sup> YEAR

### Program Summary: III-Semester

Nature of course	Name of Course	C	T	D&T	P	PS
Human Physiology	Human Physiology II	8	7.1	0.9	0	0
Pathology	Clinical Hematology	9	5.5	1	1.5	1
Clinical Biochemistry	Metabolic & Technical Biochemistry	8	5.5	0.9	0.6	1
Clinical Microbiology	Technical Microbiology	9	5.5	1.2	1.3	1
University Compulsory Courses	Extra-Curricular Activities	1	0	0	1	0
	Community Development Activities	1	0	0	1	0
University Optional Courses	Professional activities	-	-	-	-	-
Total Credit		36	23.7	3.9	5.4	3

## SYLLABUS FOR DMLT 2<sup>ND</sup> YEAR

### Program Structure – 2<sup>nd</sup> Year (2<sup>nd</sup> Year consists of III, IV Semester)

**Motive:** This year students will be nourished with the knowledge of subjects like human physiology, pathology, clinical biochemistry, and clinical microbiology. At the completion of this year the students will be able to perform test for diagnosis of hematological, microbiological & biochemical test.

### III - SEMESTER

**Motive:** This semester along with human physiology, students will also gain the knowledge of hematology & technical biochemistry and technical microbiology. This will help them in biochemical and microbial techniques to perform tests.

Nature of Course	Name of course	C	T	D&T	P
Human Physiology	Human Physiology II –I: Physiology of Muscle.	2	1.7	0.3	0

	<b>Human Physiology II –II:</b> Reproductive system. Nervous system	3	2.7	0.3	0
	<b>Human Physiology II –III:</b> Excretory system, Endocrinal system	3	2.7	0.3	0
	<i>Practice sessions from I, II &amp; III in University attached /recognized hospital.</i>	0	0	0	0
<b>Pathology</b>	<b>Clinical Haematology–I:</b> Hemoglobin & Its Methods of Estimation, Anaemia	2.5	1.8	0.2	0.5
	<b>Clinical Haematology–II:</b> Introduction To Hemocytometry, RBC, WBC, & platelets count, DLC, Leukemia.	2.5	1.7	0.3	0.5
	<b>Clinical Hematology–III:</b> ESR, PCV, Raticulocyte count, Red cell indices.	3	2	0.5	0.5
	<i>Practice sessions from I, II &amp; III in University attached /recognized hospital.</i>	1	0	0	10 sessions
<b>Clinical Biochemistry</b>	<b>Metabolic &amp; Technical Biochemistry - I:</b> Auto analyzer, Carbohydrate metabolism, Glycolysis & TCA cycle.	2.5	2	0.2	0.3
	<b>Metabolic &amp; Technical Biochemistry - II:</b> Lipid metabolism, Colorimeter & photometer. ELISA,	2.5	2	0.2	0.3
	<b>Metabolic &amp; Technical Biochemistry - III:</b> Digestion & absorption of protein. Electrophoresis, chromatography.	2	1.7	0.3	0
	<i>Practice sessions from I &amp; II in University attached hospital /recognized hospital.</i>	1	0	0	10 sessions
<b>Clinical Microbiology</b>	<b>Technical Microbiology - I:</b> Inoculation, culture media, culture methods.	3	2	0.5	0.5
	<b>Technical Microbiology – II:</b> Different microbial staining techniques.	3	2	0.5	0.5
	<b>Technical Microbiology –III:</b> Antibiotic sensitivity test, Isolation of mo's.	2	1.5	0.2	0.3
	<i>Practice sessions from I, II &amp; III in University attached hospital /recognized hospital.</i>	1	0	0	10 sessions



<b>University Compulsory Course</b>	<b>Extra-Curricular Activities</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>
	<b>Community Development Activities</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>
<b>University Optional Courses</b>	<b>Professional Activities</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Total credits</b>		<b>36</b>			

**Note:**

- **C** represents number of credit per course
- **T** represents number of theory credit per course
- **D/T** represents demonstration/ tutor in the lecture hall3
- **P** represents number of practical credits per course.
- **PS** represents number of practice sessions credit per course.

## HUMAN PHYSIOLOGY-II

### UNIT-I (Nervous system) (1.7 - 0.3)

Theory (1.7 credits)

1. Nervous system: Functions of nervous system & neuron structure. Neuroglia, nerve fiber. Conduction of impulses continuous and saltatory. Synapse & Receptors. Reflex action—unconditioned properties of reflex action. Babinski's sign. Spinal cord nerve tracts. Functions of Medulla, pons. Hypothalamic disorders. Cerebral cortex lobes and functions, Sensory cortex, Motor cortex, Cerebellum .Basal ganglion-functions. EEG. Cerebro Spinal Fluid (CSF) - formation, circulation, properties, composition and functions. Autonomic Nervous System

1. **Lab. Experiment:** Practical (0.0 credit), D&T (0.3 credit)  
Practice session (0.0 credit)

### UNIT-II (Reproductive system, Nervous system) (2.7 - 0.3)

Theory (2.7 credits)

1. Reproductive system: spermatogenesis & oogenesis. Endocrine functions of testes & ovary. Menstrual cycle. Physiological changes during pregnancy. Lactation – Composition of milk & factors controlling lactation.  
2. Muscle & nerve physiology: Structure of skeletal muscle - sarcomere contractile proteins. Neuromuscular junction. Transmission across the neuromuscular junction. Mechanism of muscle contraction, muscle tone, fatigue, Rigour, mortis. Skin - structure and function.

**Lab. Experiment:** Practical (0.0 credit), D&T (0.3 credit)

### UNIT-III (Physiology of Sense & Respiratory system) (2.7 - 0.3)

Theory (2.7 credits)

1. Endocrine System: Mode of action of hormones. Thyroid hormone – function & regulation of secretion, disorders due to thyroid hormone. Secretion, functions and regulation of hormones of Adrenal, Pituitary, Parathyroid gland & Pancreas, Functions of Adrenaline and nor adrenaline, Insulin – secretion, regulation & function.  
2. Excretory System: Nephron & Juxta Glomerular Apparatus - structure and function. Renal circulation peculiarities. Mechanism of urine formation: Ultra filtration, Selective reabsorption, GFR, Plasma fraction, Mechanisms of reabsorption of glucose, urea, H<sup>+</sup>, Cl<sup>-</sup>, amino acids. Renal threshold % of reabsorption of different substances, Selective secretion. Properties and composition of normal urine, urine output. Abnormal constituents in urine, Mechanism of urine concentration.

**Lab. Experiment:** Practical (0.0credit), D&T (0.3credit)

### Recommended Text Books

1. Shembulingam, Human Physiology
2. A. K Jain, Text Book of Medical Physiology.

### Suggested Reading

1. Ross and Wilson, Anatomy a & physiology

# CLINICAL HAEMATOLOGY

## UNIT-I (Hemoglobin & Methods of Estimation, Anaemia) (1.8 - 0.7)

Theory (1.8 credits)

1. Haemoglobinometry: hemoglobin - definition, function, structure, various methods of estimation - Sahli's, CMG, oxyhemoglobin, specific gravity method etc., Clinical significance of Hb estimation.
2. Anaemia: Definition, classification, clinical features. Introduction, causes & lab. diagnosis of - Iron deficiency anemia, Megaloblastic anemia, aplastic anemia, sickle cell anemia - sickling test & thalassemia.

**Lab. Experiments:** Practical (0.5credit), D&T (0.2credit)  
Practice session. (0.4credit)

1. Hb estimation by Sahli's method. (0.1credit)
2. Hb estimation by CMG method. (0.2credit)
3. Hemoglobin determination by specific gravity method. (0.1credit)
4. Sickling test. (0.2 credit)

## UNIT-II (Hemocytometry, Leukemia.) (1.7 - 0.8)

**Theory** (1.7credit)

1. Hemocytometry: Neubour counting chamber-structural detail & application, Hb pipette, RBC and WBC pipette - structure & application. Counting of RBCs, WBCs & Platelets - Principle, requirements, specimen, procedure, calculation, precautions, normal values and clinical significance. Differential Leucocytes Count (DLC) - Principle, requirements, specimen, procedure, precautions, normal values and clinical significance. Significance of complete blood count (CBC) & peripheral blood smear.
2. Leukemia: Definition, classification & cause & clinical features. Introduction & laboratory diagnosis of AML, CML, ALL & CLL.

**Lab. Experiments:** Practical (0.5credit), D&T (0.3credit)  
Practice session (0.4credit)

1. Total leucocyte count (TLC). (0.1credit)
2. Total RBCs count. (0.1credit)
3. Total platelets count. (0.1credit)
4. Differential leucocytes count (DLC). (0.1credit)
5. Examination of peripheral blood smears (PBF). (0.1credit)

## UNIT-III (ESR, PCV, Reticulocyte count, hemostasis) (2.0- 1.0)

**Theory** (2credit)

1. Red cell indices - significance and estimation. Determination of packed cell volume (PCV) or Hematocrit (Hct) value - various methods & clinical significance. Erythrocyte Sedimentation Rate (ESR) - wintrob's, westergreen's & automated methods & clinical significance.
2. Hemostasis: Determination of bleeding time (BT), Clotting time (CT), prothrombin time (PT) & activated partial prothrombin time (APTT) - various methods, principle, procedure of methods & clinical significance.
3. LE cell preparation - principle, procedure & clinical significance. Reticulocyte count - principle procedure & clinical significance.

**Lab. Experiments:** Practical (0.5credit), D&T (0.5credit)  
Practice session (0.2 credit)

1. Determination of ESR by wintrob's method. (0.1credit)
2. Determination of ESR by Westergreen method. (0.1credit)
3. Determination of PCV. (0.1credit)
4. Determination of BT & CT. (0.1credit)
5. Determination of prothrombin time (PT). (0.1credit)

**Recommended text books:**

6. P. Godkar , Text book of medical laboratory Technology
7. V.H Talib, A hand book of Medical laboratory Technology, CBS Publishers & distributors, New Delhi.

**Suggested Reading**

2. Wintrob's hematology

# METABOLIC & TECHNICAL BIOCHEMISTRY

## UNIT - I (Auto analyzer, Carbohydrate metabolism) (2.0, 0.5)

Theory (2.0 credit)

1. Auto analyzer: Introduction and classification of auto analyzer, Parts of auto analyzer. Working principle of wet chemistry analyzer - End point chemistry, Kinetic chemistry & Two point chemistry. Semi-automated analyzer - components, working principle & application. Fully-automated analyzer - components, working principle & application. Dry chemistry analyzer-principle, procedure and application.
2. Carbohydrate metabolism: Digestion of carbohydrates, Glycolysis with clinical significance. TCA cycle with clinical significance.

**Lab. Experiments:** Practical (0.3 credit), D&T (0.2credit)

Practice session (0.3credit)

1. Demonstration of working of Semiautoanalyzer. (0.1credit)
2. Demonstration of working of fully automated analyzer. (0.1credit)
3. Estimation of blood sugar by calorimetric method. (0.1credit)

## UNIT - II (Lipid metabolism, Colorimeter & photometer, ELISA,) (2.0, 0.5)

Theory (2.0 credit)

1. Lambert's and Beer's law. Colorimeter - principle, instrumentation, working & application. Photometer - principle, instrumentation, working & application. Role of blank. ELISA - principle, procedure & application.
2. Lipid metabolism: Digestion of lipid, Role of bile salt in digestion of lipid. Absorption of lipid. Hydrolysis of triacylglycerol or natural fat.

**Lab. Experiments:** Practical (0.3 credit), D&T (0.2credit)

Practice session (0.3credit)

1. Demonstration of working of calorimeter. (0.1credit)
2. Demonstration of working of photometer. (0.1credit)
3. Demonstration of working of ELISA. (0.1credit)

## UNIT-III (Protein Metabolism, Electrophoresis, chromatography) (1.7, 0.3)

Theory (1.7 credit)

Protein metabolism: Digestion of protein, Absorption of protein. Electrophoresis: introduction, principle, Electrophoresis of protein, CSF & hemoglobin - Principle, procedure. Chromatography – principle procedure & application. Coulter counter - introduction & application.

**Lab. Experiments:** Practical (0.0credit), D&T (0.3credit)

1. Demonstration of electrophoresis. (0.1credit)
2. Demonstration of chromatography. (0.1credit)
3. Demonstration of working of coulter counter. (0.1credit)

### Recommended Text Books

8. P. Godkar , Text book of medical laboratory Technology
3. V.H Talib, A hand book of Medical laboratory Technology, CBS Publishers & distributors, New Delhi

### Suggested reading

4. Vasudevan DM & Sreekumari S, Text Book of Biochemistry for Medical Students.

# TECHNICAL MICROBIOLOGY

## UNIT-I (Culture media, Cultivation of bacteria) (2 - 0.5)

Theory (2 credit)

1. Culture media: Common ingredients of culture media. Types/classification of culture media - liquid/broth, semi solid and solid media, synthetic media, types of media based on use, Aerobic & anaerobic media. Introduction, composition and uses of following media - peptone water, nutrient agar, nutrient broth, Mac Conkey agar, blood agar, chocolate agar, and meat extract broth etc. Special media for enterobacteriaceae group, Neisseria, Corynebacterium, Mycobacterium etc. Agar slant- preparation & use.

2. Cultivation of bacteria: Use of culture. Instruments used - inoculation loop, needle etc, Methods of culture - Streak, Lawn, Stroke, Stab, pour plate & liquid culture methods etc. Aerobic culture methods, anaerobic culture methods. Incubation (Aerobic and anaerobic).

**Lab. Experiment:** Practical (0.5 credit), D&T (0.5credit)

Practice sessions (0.4credits)

1. Preparation of nutrient agar, Mac Conkey agar. (0.1credit)
2. Inoculation of NA. (0.1credit)
3. Preparation of agar slant. (0.1credit)
4. Preparation of blood agar. (0.1credit)
5. Demonstration of stab & pour plate culture method. (0.1credit)

## UNIT-II (Identification of bacteria) (2-0.5)

Theory (2 credits)

1. Identification of bacteria: A) Staining for identification of bacteria: Types of staining - simple staining, negative staining, differential staining. Gram's staining- principle, preparation of stains. AFB staining- principle, preparation of stains, staining procedure. Staining procedure for - Diphtheria, spores, capsule, intracytoplasmic lipids, polysaccharides and nuclear materials. Staining for amoeba, fungi & rickettsiae.

B) Culture characteristics for identification of bacterial.

C) Biochemical tests for identification of bacteria: IMVC pattern - Indole production test, Methyl red (MR) test, Voges-Proskauer (VP) tests, Citrate utilization test. Coagulase test, Urease test, Catalase test, oxidase test, Triple sugar iron (TSI) test, Nitrate reduction test, Sugar fermentation test, Litmus milk test, Methylene blue reduction test etc. etc.

**Lab. Experiment:** Practical (0.5 credit), D&T (0.5credit)

Practice sessions (0.4credits)

1. Simple & Negative staining of given culture. (0.1credit)
2. Gram staining of given culture. (0.1credit)
3. AFB staining of given culture. (0.1credit)
4. Culture characteristics of given culture. (0.1credit)
5. To perform IMVC pattern. (0.1credit)
- 6.

## UNIT-III (Instrumentation in Microbiology) (2-0.5)

Thoery (1.5 credit)

1. Antimicrobial drug sensitivity test: Introductions, requirements, Different methods of sensitivity and interpretation of result.

2. Pure culture: Definition, isolation of pure culture, maintenance and preservation of pure cultures.

**Lab. Experiment:** Practical (0.3 credit), D&T (0.2credit)

Practice sessions (0.2credits)

1. To perform antibiotic sensitivity test by KB method. (0.3credit)

**Recommended Text Books**

1. C. P. Baweja, text t book of microbiology.
1. R.C Dubey, D.k Maheswari, Practical microbiology
2. D.R Arora, Bharti Arora, Practical microbiology

**Suggested Reading:**

1. P. Godkar, Text book of Medical Lab Technology

## SYLLABUS FOR DMLT 2<sup>ND</sup> YEAR

### Program Summary: IV- Semester

Nature of course	Name of Course	C	T	D&T	P	PS
Pathology	Histopathological Techniques	9	6.5	0.6	0.9	1
Clinical Biochemistry	Clinical Biochemistry I	9	5.5	1	1.5	1
Clinical Microbiology	Clinical Microbiology I	9	5.5	1.2	1.3	1
Pathology	Clinical pathology	9	5.5	1.5	1	1
University Compulsory Course	Extra-Curricular Activities	1	0	0	1	0
	Community Development Activities	1	0	0	1	0
University Optional Courses	Professional activities	-	-	-	-	-
Total Credits		38	23	4.3	6.7	4

### Program Structure – 2<sup>nd</sup> Year (2<sup>nd</sup> Year consists of III, IV Semester)

**Motive:** This year students will be nourished with the knowledge of subjects like human physiology, pathology, clinical biochemistry, and clinical microbiology. At the completion of this year the students will be able to perform test for diagnosis of hematological, microbiological & biochemical test.

### IV – SEMESTER

**Motive:** This semester along students will gain a detailed knowledge of Histopathology technique, clinical biochemistry, clinical microbiology and clinical pathology. This will help them in understanding the techniques to perform tests for diagnosis of microbial, biochemical & pathological disease.

Nature of Course	Name of course	C	T	D&T	P
Pathology	<b>Histopathological Techniques – I:</b> Fixation and various fixatives. Tissue processing	2	1.5	0.2	0.3
	<b>Histopathological Techniques –II:</b> Microtome, Section cutting, Mounting and mounting media.	3	2.5	0.2	0.3



	<b>Histopathological Techniques -III:</b> Histopathological stains & staining techniques, mordents, accelerators and accentuates.	3	2.5	0.2	0.3
	<i>Practice sessions from I, II &amp; III in university attached lab. / recognized hospitals.</i>	1	0	0	10 sessions
<b>Clinical Biochemistry</b>	<b>Clinical Biochemistry I-I:</b> Significance & estimation of blood metabolites.	3	2	0.4	0.6
	<b>Clinical Biochemistry I-II:</b> Significance & estimation of diagnostic enzymes.	2	1.5	0.2	0.3
	<b>Clinical Biochemistry I-III:</b> Biochemical examination of urine.	3	2	0.4	0.6
	<i>Practice sessions from I, II &amp; III in university attached lab. /recognized hospital.</i>	1	0	0	10 sessions
<b>Clinical Microbiology</b>	<b>Clinical Microbiology I -I:</b> Biochemical identification of bacteria, culture & sensitivity of urine.	3	2	0.5	0.5
	<b>Clinical Microbiology I -II:</b> culture & sensitivity of pus, sputum & stool.	3	2	0.5	0.5
	<b>Clinical Microbiology I -III:</b> Introduction of Ag & Ab, Measurement of Ag- Ab reaction	2	1.5	0.2	0.3
	<i>Practice sessions from I, II &amp; III in University attached hospital /recognized hospital.</i>	1	0	0	10 Sessions
<b>Clinical Pathology</b>	<b>Clinical Pathology-I:</b> Physical, biochemical & microscopic examination of urine.	3	2	0.5	0.5
	<b>Clinical Pathology-II:</b> Stool Examination, Semen analysis.	3	2	0.5	0.5
	<b>Clinical Pathology-III:</b> CSF, Pericardial, Pleural, Peritoneal, Amniotic and Synovial fluid examination.	2	1.5	0.5	0
	<i>Practice sessions from I, II &amp; III in University attached /recognized hospital.</i>	1	0	0	10 sessions
<b>University</b>	<b>Extra-Curricular Activities</b>	1	0	0	1

<b>Compulsory Course</b>	<b>Community Development Activities</b>	1	0	0	1
<b>University Optional Courses</b>	<b>Professional Activities</b>	-	-	-	-
<b>Total credits</b>		38			

**Note:**

- C represents number of credit per course
- T represents number of theory credit per course
- D/T represents demonstration/ tutor in the lecture hall.
- P represents number of practical credits per course.
- PS represents number of practice sessions credit per course.

# HISTOPATHOLOGICAL TECHNIQUES

## UNIT-I (Introduction, Fixation and various fixatives )(1.5-0.5)

Theory (1.5 credits)

1. Introduction to histopathology: Type of specimens & material obtained in histopath laboratory - biopsy, autopsy etc. Types of Histological preparation – Whole mount , Section, Smear etc. Responsibility of histopath technician. Basic steps for Tissue processing- Fixing, Dehydration, Clearing, Impregnation, Embedding, Microtomy, Staining.

2. Fixation: Definition & principle of fixation, Aims and effects of fixation. Fixative: Properties of fixatives, amount of fixative. Types of fixatives - Simple fixatives, Compound fixatives - microanatomical, histochemical & cytological fixatives. Secondary fixation & Post chromatization.

3. Tissue Processing: Tissue processing of histological tissues for paraffin embedding. Embedding: various embedding media & technique of embedding. Mould - types of moulds, techniques of casting embedding media.

**Lab. Experiments:** Practical: (0.3credit), D&T (0.2credits)

1. Preparation of histopathological block. (0.1credit)

2. Demonstration of microtomes. (0.1credit)

3. Preparation of fixative. (0.1credit)

## UNIT-II (Microtome, Mounting and Mounting media) (2.5-0.5)

Theory ( 2.5credit)

1. Microtomy: various parts of microtome & its use, various types of microtome. Microtome knives - General description of microtome knives, Types of microtome knives. Sharpening of microtome knives - 1. Honning - definition, types of hones, lubricants for hone, methods of honing 2. Stopping - definition, method of stopping. Care & maintenance of knives.

2. Section cutting: Equipment required of paraffin section cutting, Section adhesives – introduction & types. Process of section cutting of paraffin embedded tissue - fixing of block, trimming of tissue block, picking up sections, drying of section etc. Types of section - serial section, step section. Trouble shooting for poor sections (Discrepancies in section cutting)

3. Mounting and mounting media: Introduction, Criteria of acceptable mounting media. Types of mounting media - Aqueous media & Resinous media.

**Lab. Experiments:** Practical: (0.3credit), D&T (0.2credits)

Practice sessions (0.5credits)

1. H&E staining (0.1credit)

2. Preparation of tissue block (0.1credit)

3. Section cutting (0.1credit)

## UNIT-III (Solvent, Mordents, Accelerators and Accentuators) (2.5-0.5)

Theory (2.5credit)

1. Staining: Introduction, various terminologies. Classification of stain/dye - natural synthetic, acidophilic, basophilic dye. Principle/ Theory of staining, Composition of dye - auxochrome &

chromophore. Staining Techniques – Direct & indirect staining, Hematoxylin & Eosin staining, PAP staining- components & methods.

2. Decalcification: Definition, Steps (Process) of decalcification, Factor affecting decalcification. Decalcifying agents - criteria for good decalcifying agents, Types of decalcifying agents - acid decalcifier, use of ion exchange resins & chelating agents as decalcifier etc. Determination of end points of decalcification - various methods with procedure. Treatment of hard tissues for decalcification.

3. Metachromasia and metachromatic dyes.

**Lab. Experiments:** Practical: (0.3credit), D&T (0.2credits)

1. Section cutting (0.1credit)

2. Slide preparation of histological section. (0.1credit)

3. Mounting of slide. (0.1credit)

### **Recommended Text Book**

1. Praful Godkar, Textbook of Medical Laboratory Technology.

2. Harsh Mohan, Text book of pathology

### **Suggested Reading**

1. Culling Histopathology techniques.

# CLINICAL BIOCHEMISTRY – I

## UNIT-I (Carbohydrates Metabolism, GTT) (2.0, 1.0)

Theory (2 credit)

1. Quantitative determination of blood sugar: Types of sample for plasma sugar estimation - Fasting blood sugar, Post prandial and random blood sugar. Significance of fluoride as anticoagulant. Clinical significance of estimation of blood sugar. Various methods of estimation of blood sugar – principle, procedure & calculation. Glucose tolerance test, glycosylated Hb – methods of estimation & significance.
2. Quantitative determination of blood Lipid: Principle, procedure, calculation and clinical significance of – Triglyceride, Total cholesterol, HDL cholesterol. Blood Nitrogen: Principle, procedure, calculation and clinical significance of – urea, creatinine & BUN.
3. Estimation of total protein, Albumin - Principle, procedure, calculation and clinical significance. Significance of A:G ratio.

**Lab. Experiments:** Practical: (0.credit), D&T (0.credits)

Practice sessions (0.6 credits)

1. Estimation of plasma glucose fasting (0.1credit)
2. Estimation of serum Triglyceride, Total cholesterol, HDL cholesterol. (0.2credit)
3. Estimation of urea, creatinine & BUN. (0.2credit)
4. Estimation of total protein, Albumin (0.1credit)

## UNIT-II (Significance & estimation of diagnostic enzymes) (1.5, 0.5)

Theory (1.5 credit)

1. Introduction to isoenzymes. Unit for expression of enzyme activity.
2. Principle of assay, procedure and clinical significance of Serum glutamate oxaloacetate transaminase (AST), Serum glutamate pyruvate transaminase (ALT), Lactate dehydrogenase, Alkaline phosphatase and Acid phosphatase,
3. Principle of assay, procedure and clinical significance of Amylase, Lipase, Aldolase, Creatine phosphokinase & creatine phosphokinase-MB & Amino peptidase, Gamma glutamyl transferases in serum.

**Lab. Experiments:** Practical (0.3 credit), D& T (0.2credits)

Practice sessions (0.2credits)

1. Estimation of serum SGOT (AST). (0.1credit)
2. Estimation of serum SGPT estimation. (0.1credit)
3. Estimation of serum alkaline phosphatase. (0.1credit)

## UNIT-III (Biochemical examination of urine) (2.0, 1.0)

Theory (2.0 credits)

Chemical Examination of urine: Methods of qualitative determination & clinical significance of urinary – sugar, protein, ketone bodies, bile pigment, bile salt, urobilinogen, blood, pH etc. Esbach's test. Bence Jones protein – determination & significance.

**Lab. Experiments:** Practical (0.6 credit), D& T (0.4 credits)

Practice sessions (0.2credits)

1. Qualitative test of protein in urine (0.2credit)
2. Qualitative test of ketone bodies (0.2credit)
3. Qualitative test of bile salt (0.1credit)

4. Qualitative test of reducing substance (sugar) in urine. (0.1 credit)

**Recommended Text Book**

1. V.H Talib, A hand book of medical laboratory technology.

**Suggested Reading**

1.P.Godkar, A text book of medical laboratory technology.

# CLINICAL MICROBIOLOGY – I

## UNIT-I (Microbiological examination of urine) (2 - 1)

Theory (2 credit)

Microbiological examination of urine: Collection of sample, selection & preparation of culture media, sterilization & inoculation of sample on culture media, staining of specimen- gram's staining etc, identification of growth by colony characteristics, biochemical identification of bacterial growth, sensitivity test on growth.

**Lab. Experiments:** Practical: (0.5credit), D&T (0.5credits)

Practice sessions (0.5 credits)

1. Gram staining of urine specimen. (0.1credit)
2. Preparation of media for urine culture. (0.1credits)
3. Inoculation of urine specimen on culture media. (0.1credits)
4. Identification of culture by colony characteristics.
5. Biochemical Identification of bacteria by IMViC pattern. (0.1credits)

## UNIT-II (Microbiological examination of sputum, pus & stool) (2 - 1)

Theory (2 credit)

1. Microbiological examination of sputum : Collection of sample, selection & preparation of culture media, sterilization & inoculation of sample on culture media, staining of specimen- gram's staining, AFB staining etc, identification of growth by colony characteristics, biochemical identification of bacterial growth, sensitivity test on growth.

2. Microbiological examination of Pus, stool : Collection of sample, selection & preparation of culture media, sterilization & inoculation of sample on culture media, staining of specimen- gram's staining, AFB staining etc, identification of growth by colony characteristics, biochemical identification of bacterial growth, sensitivity test on growth.

**Lab. Experiments:** Practical: (0.5credit), D&T (0.5credits)

Practice sessions (0.5 credits)

1. Gram staining of urine specimen. (0.1credit)
2. Preparation of media for sputum, pus & stool culture. (0.1credits)
3. Inoculation of urine specimen on culture media. (0.1credits)
4. Identification of culture by colony characteristics
5. Biochemical identification of bacteria. (0.1credits)

## UNIT-II (Microbiological examination of sputum, pus & stool) ( 1.5, 0.5)

Theory (1.5 credit)

1. Antigen: Definition, general characteristics, types, hepten, carrier protein, epitopes, adjuvants. Antibodies: Immunoglobulin vs antibodies, structure of antibodies, paratopes, different classes and their function.

2. Antigen - Antibody reaction: stages, general properties and mechanism. Specificity, sensitivity and avidity. Measurement of Antigen Antibody reaction: agglutination, precipitation and flocculation (definition and application)

**Lab. Experiments:** Practical: (0.3credit), D&T (0.2credits)

1. Demonstration of qualitative agglutination reaction (widal test) (0.1credit)

2. Demonstration of blood grouping (slide method) (0.1credit)
3. Demonstration of flocculation reaction (RPR test). (0.1credit)

**Recommended Text Books**

1. C. P. Baweja, text t book of microbiology.
1. R.C Dubey, D.k Maheswari, Practical microbiology
2. D.R Arora, Bharti Arora, Practical microbiology

**Suggested Reading:**

1. P. Godkar, Text book of Medical Lab Technology



# CLINICAL PATHOLOGY

## UNIT-I (Examination of urine) (3-0.7)

Theory (3credit)

1. Introduction to clinical pathology and Laboratory organization and management.
2. Urine: Composition of urine, Collection, Transport, Preservation of urine.
  - A. Physical Examination: Volume Specific gravity, Color, Turbidity, Odor etc. and their clinical significance.
  - B. Chemical examination: Qualitative test and clinical significance of – Reaction, Blood protein, albumin, Bence-Johns protein, reducing substances(sugar), ketone bodies, urobilinogen & urobilin, Bile. Strip Technology.
  - C. Microscopic Examination: Procedure of urine examination. Presence of various cells, Ova and parasites, various crystals and their identification, casts-their types and identification etc. in urine their clinical significance.

**Lab. Experiments:** Practical: (0.7credit), D&T (0.3credits)

Practice sessions (0.5credits)

1. Routine Examination of urine. (0.1credit)
2. Microscopic examination of urine. (0.1credit)
3. Qualitative test of protein in urine (0.2credit)
4. Qualitative test of albumin in urine (0.1credit)
5. Qualitative test of reducing substance (sugar) in urine. (0.1credit)
6. Test for ketone bodies (0.2credit)

## UNIT-II (Semen analysis, stool examination) (2, 1.0)

Theory (2credit)

1. Seminal fluid: Introduction, Collection of semen.
  - 1) Routine Examination-
    - a. Physical examination: Quantity, Viscosity, Colour, Reaction and their clinical significance.
    - b. Microscopic examination of semen: Sperm count, motility of spermatozoa, Morphological examination of spermatozoa, other various cells.
  2. Stool: Introduction, Collection of specimen for stool examination. Normal appearance and composition.
    1. Physical examination: Amount, Form and consistency, colour, odour, reaction, mucous and their significance.
    2. Chemical examination: Occult blood, Bilirubin, Stercobilin, urobilinogen, fat and nitrogen etc.
    3. Microscopic Examination: Intestinal parasites/ova/cyst, pathogenic bacteria, cellular exudates and Erythrocytes etc.
      - a) Preparation- saline and iodine preparation
      - b) Examination: presence of Intestinal parasites/ova/cyst, pathogenic bacteria, cellular exudates and Erythrocytes etc
    4. Concentration Techniques: Concentrated saline floatation, Formal Ether Co
5. **Lab. Experiments:** Practical: (0.3credit), D&T (0.2credits)

Practice sessions (0.5credits)

1. Fuctosamin test. (0.1credit)
2. Microscopic examination of semen. (0.1credit)
2. Preparation and examination of stool. (0.1credit)
3. Qualitative test for occult blood in stool. (0.1credit)

## UNIT-III (Pericardial, Pleural, Peritoneal, Synovial, CSF) (1.5, 0.5)

### Theory (2credit)

1. C.S.F (Cerebrospinal Fluid): Introduction and normal physiology of CSF. Normal values for lumbar C.S.F in adults: Pressure, volume, Specific gravity, various cells, Proteins and other various organic and inorganic constituents. Collection, transport and preservation of C.S.F.

A. Physical Examination: Appearance and colour, Formation of clot

B. Chemical Examination: Estimation of total proteins, Qualitative test for globulin, Quantitative protein estimation.

C. Microscopic Examination: Cell counts: RBC count, Total leukocyte count, DLC.

D. Bacteriological examination: smear, culture, serological test.

2. Pericardial, Pleural, Peritoneal, Amniotic and Synovial Fluids: Physical, Chemical examination. Cytological examination - Differential cell count. Bacteriological Examination- Gram and ZN staining on smear from the sediment, Culture on suitable media.

**Lab. Experiments:** Practical: (0 credit), D&T (0.5credits)

### **Recommended Text Book**

1. V.H Talib, A hand book of medical laboratory technology.

### **Suggested Reading**

1. P.Godkar, A text book of medical laboratory technology.

## SYLLABUS FOR DMLT 3<sup>RD</sup> YEAR

### Program Summary: V-Semester

Nature of course	Name of Course	C	T	D&T	P	PS
Pathology	Blood Banking Techniques	9	6.5	0.6	0.9	1
Clinical Biochemistry	Clinical Biochemistry II	9	5.5	1.2	1.3	1
Clinical Microbiology	Clinical Microbiology II	9	8.5	0.6	0.9	1
Preventive Medicine & Health Care	Preventive Medicine & Health Care	7	6	0.2	0.3	5
University Compulsory Course	Extra-Curricular Activities	1	0	0	1	0
	Community Development Activities	1	0	0	1	0
University Optional Courses	Professional activities	-	-	-	-	-
Total credits		36	35.5	1.9	2.6	3

## SYLLABUS FOR DMLT 3<sup>RD</sup> YEAR

### Program Structure – 3<sup>rd</sup> Year (3<sup>rd</sup> Year consists of V, VI Semester)

**3<sup>rd</sup> Year Motive:** This year students will be nourished with the knowledge of subjects like blood banking, clinical biochemistry, clinical microbiology, preventive medicine & health care. At the completion of this year the students will be able to perform all the relevant lab tests for specific pathological tests.

#### V– SEMESTER

**Motive:** In this semester students will gain the knowledge of blood banking, clinical biochemistry, clinical microbiology, preventive medicine & health care.

Nature of Course	Name of course	C	T	D&T	P
Pathology	<b>Blood Banking Techniques–I:</b> Introduction & techniques of blood grouping.	2.5	2	0.2	0.3
	<b>Blood Banking Techniques –II:</b> Blood	2.5	2	0.2	0.3

	donation & Donor screening				
	<b>Blood Banking Techniques –III:</b> Blood components, Compatibility Testing,	3	2.5	0.2	0.3
	<i>Practice sessions from I, II &amp; III in university attached hospital/recognized hospital.</i>	1	0	0	10 sessions
<b>Clinical Biochemistry</b>	<b>Clinical Biochemistry II -I:</b> Diabetes & its diagnostic profile, Thyroid function test.	2	1.5	0.2	0.3
	<b>Clinical Biochemistry II -II:</b> Jaundice & liver function test.	3	2	0.5	0.5
	<b>Clinical Biochemistry II -III:</b> Lipid profile & cardiovascular disease, Kidney function test.	3	2	0.5	0.5
	<i>Practice sessions from I, II &amp; III in university attached /recognized hospital.</i>	1	0	0	10 sessions
<b>Clinical Microbiology</b>	<b>Clinical Microbiology II -I:</b> Typhoid, UTI & Tuberculosis & their diagnosis.	3	2	0.5	0.5
	<b>Clinical Microbiology II -II</b> Culturing of Biological Sample	3	2	0.5	0.5
	<b>Clinical Microbiology II -III</b> Sampling Methods In Microbiology, Immunology & Sero-diagnosis	2	1.5	0.2	0.3
	<i>Practice sessions from I, II &amp; III in university attached /recognized hospital.</i>	1	0	0	10 sessions
<b>Preventive Medicine &amp; Health Care</b>	<b>Preventive and Social Medicine-I:</b> Pollution, Hygiene & Sanitation.	3	3	0	0
	<b>Preventive and Social Medicine–II:</b> Epidemiology, Immunization,	2	2	0	0
	<b>Preventive and Social Medicine-III:</b> Balance diet & introduction to nursing.	1.5	1	0.2	0.3
	<i>Practice sessions from III in University attached hospital /recognized hospital.</i>	0.5	0	0	5 sessions
<b>University Compulsory Course</b>	<b>Extra-Curricular Activities</b>	1	0	0	1
	<b>Community Development Activities</b>	1	0	0	1

<b>University Optional Courses</b>	<b>Professional Activities</b>	-	-	-	-
<b>Total credits</b>		36			

**Note:**

- C represents number of credit per course
- T represents number of theory credit per course
- D/T represents demonstration/ tutor in the lecture hall.
- P represents number of practical credits per course.
- PS represents number of practice sessions credit per course.

## **BLOOD BANKING TECHNIQUES**

### **UNIT-I** (Blood group system, Blood grouping techniques, ABO discrepancies) (2-0.5)

Theory (2 credits)

1. Blood group system: Introduction, human blood group system, ABO grouping antigens on red cell, antibodies to ABO antigens. Rh System: Rh antigens & Rh antibodies & its significances. Antisera used in ABO grouping procedures.
2. Blood grouping techniques: Principal of blood grouping. Forward and reverse ABO grouping & significance. Slide & tube method methods for ABO grouping. Use of gel & beads techniques in blood grouping. D<sup>u</sup> antigen - testing & significance. Haemolytic disease of newborn (HDN) – introduction & its prevention.

**Lab. Experiments:** Practical (0.3 credit), D& T (0.2credits)

Practice sessions (4 credits)

1. Forward blood grouping and Rh typing by tube method & slide method. (0.1credit)
2. Preparation of 5% A, B & O red cell's suspension (0.1credit)
3. Reverse blood grouping by tube method. (0.1credit)
3. Du test for detection of Du antigens. (0.1 credit)

### **UNIT-II** (Principle of transfusion, Blood donation, Donor blood screening) (2.5-0.5)

Theory (2.5 credits)

1. Blood donation: Blood bank organization, Introduction & types of donor, Blood donor requirements, Criteria for selection & rejection of donor. Blood Collection: Techniques of collecting blood from a donor, Blood bags & anticoagulants, Instructions given to the donor before & after blood donation. Adverse donor reactions & their remedies.
2. Testing of Donor Blood: Antibodies screening - Coomb's test, AHG reagent. Screening of transfusion transmitted infection (TTI). Bacterially contaminated blood. Storage of blood. Changes in donor blood after storage.

**Lab. Experiments:** Practical (0.3 credit), D& T (0.3credits)

Practice sessions (3 credits)

1. Direct coomb's test for antibodies in donor blood. (0.1 credit)
2. Indirect coomb's test for antibodies in donor blood. (0.1 credit)
3. Testing of donor's blood for HIV, HBsAg, and syphilis. (0.1 credit)

### **UNIT-III** (Blood components, Compatibility Testing, Transfusion Reactions) (3-0.5)

Theory (3credits)

1. Blood components: Collection of blood components for fractional transfusion. Preparation, storage and use of PRC (Packed Red Cell), FFP (Fresh Frozen Plasma), PRP (Platelet Rich Plasma & RDPC (Random Donor Platelets Concentrate) etc. Cryo-preparation and its significance. Aphaeresis: Introduction
2. Compatibility Testing: Introduction, Cross matching – Types, principle, procedure and its significance. Difficulties in cross-matching & their remedies. Aphaeresis: Introduction

**Lab. Experiments:** Practical (0.5 credit), D& T (0.5credits)

Practice sessions (3 credits)

1. Minor cross matching. (0.1 credit)
2. Major cross matching. (0.2 credit)

**Recommended Text Book.**

1. Godkar, Text book of Medical Laboratory Technology.

**Suggested Reading**

1. Hillyer, Silberstein, Blood Banking & Transfusion Medicine (Basic Principle & Practice)

## CLINICAL BIOCHEMISTRY II

### UNIT- I (Diabetes profile, Thyroid function test) (1.5 - 0.5)

Theory (1.5 credits)

1. Introduction of hormones – definition & classification. Diabetes mellitus: types, clinical features & laboratory diagnosis of, Hypoglycemia & Hyperglycemia. Diabetes insipidus-introduction. Laboratory diagnosis of diabetes.
2. Thyroid disorders: introduction of thyroid hormones. Introduction & lab diagnosis of hyperthyroidism, Hypothyroidism & Graves disease. Thyroid function test.

**Lab. Experiments:** Practical (0.3credit), D& T (0.2credit)

Practice sessions (0.4credits)

1. Estimation of glucose in plasma (0.1 credits)
2. Determination of urinary sugar (0.1 credit)
3. Demonstration of estimation of T3, T4 & TSH. (0.1 credit)

### UNIT- II (Jaundice, Liver function Test) (2 – 1.0)

Theory (2credits)

Jaundice: definition, causes of jaundice - formation & excretion of bilirubin, types of jaundice - hereditary & acquired,. Liver function test – test based on metabolic function, test based on excretory function, test based on synthetic function, enzyme estimation etc.

**Lab. Experiments:** Practical: (0.5credit), D&T (0.5credits)

Practice sessions (0.2 credits)

1. Estimation of serum ALP (0.1credit)
2. Estimation of serum total protein, albumin and A/G ratio. (0.1credit)
3. Estimation of SGPT. (0.1credit)
4. Estimation of SGOT. (0.1credit)
5. Estimation of serum total bilirubin. (0.1credit)
6. Estimation of serum direct bilirubin. (0.1credit)

### UNIT- III (Lipid profile, cardiovascular disease) (2, 1.0)

Theory (2credits)

2. Lipid profile: Triglyceride, Cholesterol, HDL, LDL & VLDL-their principle procedure & clinical significance. Electrolytes - quantitative estimation of sodium, potassium, calcium, chloride, and their clinical significance.
3. Renal function test & their clinical interpretation. Urea & creatinine clearance test,

**Lab. Experiments:** Practical: (0.5credit), D&T (0.5credits)

Practice sessions (0.5 credits)

1. Estimation of serum total cholesterol. (0.1credits )
2. Estimation of serum HDL cholesterol. (0.1credits )
3. Estimation of serum triglyceride. (0.1credits )
4. Estimation of serum urea & BUN. (0.1credits )
5. Estimation of serum calcium.(0.1credits )

**Recommended Text Books**

1. Vasudevan (DM) Sreekumari(S) Text book of Biochemistry for Medical students
2. P.Godkar, Text of Medical Laboratory technology.

**Suggested Reading**

1. Harper's Illustrated Biochemistry.

## CLINICAL MICROBIOLOGY II

### UNIT- I (Typhoid, UTI & Tuberculosis) (2, 1.0)

Theory (2credits)

1. General Requirements for Collecting and Submitting Specimens: Patient details, Identification of Specimens, Special Culture / Specimen Requirements, specimen collection, specimen handling and storage, specimen delivery, labeling, logbook, specimen rejection criteria. Preparation of container and swab for collection of specimens for microbial examination. Collection, transport and processing of clinical samples - urine, sputum, pus, stool & body fluid and throat swab etc. for microbiological studies.
2. Flowchart of diagnostic procedure in microbiology laboratory. Introduction & laboratory diagnosis of - Typhoid, UTI & Tuberculosis.

**Lab. Experiments:** Practical (0.5credit), D& T (0.5credits)

Practice sessions (0.3credits)

1. Widal test qualitative. (0.1credit)
2. Collection and processing and identification mo's from urine. (0.2credit)
3. Collection and processing and identification mo's from pus. (0.1credit)
4. Montaux test (0.1credit)

### UNIT- II (Culturing of Biological Sample) (2, 1.0)

Theory (2credits)

Culturing Of Biological Sample: Urine Culture, Blood Culture , Cerebrospinal Fluid (CSF),Body Fluid Culture, Conjunctiva Discharge , Ear Discharge , Genital Culture and sensitivity , Pus(wound, Abscesses, Burns and sinuses) culture & sensitivity , Sputum Culture and Sensitivity, Stool Culture - Routine, Salmonella & Shigella , Stool Culture - E. coli O157:H7, Stool Culture - Vibrio spp. Throat Swab for Beta-Haemolytic Streptococcus Culture, Group A Only.

**Lab. Experiments:** Practical (0.5credit), D& T (0.5credits)

Practice sessions (0.5credits)

1. Preparation of swab (0.1credit)
2. Culturing of blood. (0.1credit)
3. Culturing of pus. (0.1credit)
4. Culturing of sputum. (0.1credit)
5. Culturing of stool. (0.1credit)

### UNIT- III (Sampling Methods In Microbiology, Immunology & Sero-diagnosis) (1.5, 0.5)

Theory (2credits)



1. Sampling Methods In Microbiology: sampling surfaces for microbiological contamination, sampling for microbes inhabiting skin surfaces. Introduction & laboratory diagnosis of - Hepatitis, AIDS, Dengue.
2. Immunology & Sero-diagnosis: Principle, procedure & clinical application of WIDAL Test, VDRL Test, RA Test, CRP Test, ASLO, Pregnancy Test.

**Lab. Experiments:** Practical (0.3 credit), D& T (0.2credits)

Practice sessions (0.2credits)

1. Widal test qualitative. (0.1credit)
2. RPR & RA test (0.1credit)
3. Rapid test by one strip method for HIV & Hepatitis B. (0.1credit)
4. Rapid test of VDRL. (0.1credit)

**Recommended Text Book**

1. P. Godkar, Text book of medical laboratory technology.
2. P.C Baweja, Text book of medical laboratory technology.
3. R.C Dubey & d.k Maheshwary , Practical microbiology.

**Reference Book**

1. Philip A Thomas, Clinical Microbiology

## PREVENTIVE AND SOCIAL MEDICINE

### UNIT-I (Pollution, Hygiene & Sanitation.) (3-0-0)

#### Theory (3credit)

1. Water, air and noise pollution: The concept of safe and wholesome water, removal of hardness of water, methods of purification of water on small scale and large scale. Standards of Water quality. Air and noise pollution and their prevention.
2. Hygiene and sanitation: sanitation barriers, excreta disposal and disposal of hospital waste. Incineration and disinfection
3. Infection and control: Source and agent of infection in community. Microbial pathogenesis, toxigenicity and pathogenicity & virulence. Mode of transmission of infection, control of infection/disease by physical and chemical agents. Host factors controlling infection to men

### UNIT-II (Epidemiology, Immunization) (2-0-0)

#### Theory (2credit)

1. Epidemiology: Epidemiology surveillance and control of infection in community infection. Methods of prevention and control- isolation of patient, quarantine and incubation period of various infectious disease.
2. Prophylactic Immunization: definition, Controlled study of prophylactic vaccines and hazards immunization. Various national immunization programs and vaccine schedule.
3. Family welfare planning and child health care programs.

### UNIT-III (Balance diet & Introduction to Nursing) (1- 0.3-0.2)

#### Theory (1credit)

2. Healthcare by balance diet and yoga: Normal constituents of diet, balance diet and factor responsible for etiology of various nutritional disorders. Carcinogens in food. Role of regular exercise and yoga prevention and management of various disease.
3. Introduction to Nursing: What is Nursing ? Nursing principles. Inter-Personnel relationships. Bandaging -Basic turns, bandaging extremities, Triangular bandages and their application. Nursing Position, Bed making, prone, lateral, dorsal, dorsal re-cumbent, Fowler's positions, comfort measures, Aids and rest and sleep.

**Lab. Experiment:** Practical (0.3 credit), D&T (0.2credit)  
Practice sessions (0.5credits)

1. Recording of body temperature, respiration and pulse (0.1credit)

1. Simple aseptic technique, sterilization and disinfection (0.1credit)
3. **Surgical Dressing: Observation of dressing procedures (0.1credit)**

**Recommended Text Book**

1. **K. Perks, Sunder Lal, Adarsh Pandey, Textbook of Preventive Social Medicine**

## SYLLABUS FOR DMLT 3<sup>RD</sup> YEAR

### Program Summary- VI Semester

S.N	Name of Course	Credit
1	Six month certified training in Hospital/ Nursing homes	40

### VI – SEMESTER

**Motive:** In this semester students will undergo training in the certified hospitals/ nursing home's laboratories.

- **The students will undergo six month training in all the departments like hematology, biochemistry, blood bank, histopathology, microbiology, clinical pathology, of the same laboratory of university attached hospital / recognized hospital/nursing home.**
- **At the end of training, she has to submit a hard copy of training certificate to the department of examination, JVVU, given by hospital/nursing home to her against the training completion.**
- **She will be awarded with a certificate of Diploma in Medical Laboratory Technology (DMLT) only after submission of training certificate to the university.**