
 <b>MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI</b> <b>TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES</b>																	
<b>COURSE NAME : DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY</b>																	
<b>COURSE CODE : ML</b>																	
<b>DURATION OF COURSE: SIX SEMESTERS</b>										<b>WITH EFFECT FROM 2014-15</b>							
<b>SEMESTER : THIRD</b>										<b>DURATION : 16 WEEKS</b>							
<b>PATTERN : FULL TIME - SEMESTER</b>										<b>SCHEME : G</b>							
SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (19300)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	General Bacteriology	GBA	19316	03	--	03	03	100	40	50#	20	--	--	25@	10	<b>50</b>	
2	Biochemistry - I	BIO	19317	03	--	03	03	100	40	50#	20	--	--	25@	10		
3	Basic Lab. Instruments	BLI	19318	02	--	02	02	50	20	--	--	--	--	25@	10		
4	Community Medicine	CME	19319	04	02	--	03	100	40	--	--	--	--	--	--		
5	Computer Application	CAP	19040	02	--	02	--	--	--	--	--	--	--	25@	10		
6	Professional Practices - I	PRA	19041	--	--	03	--	--	--	--	--	--	--	50@	20		
<b>TOTAL</b>				<b>14</b>	<b>02</b>	<b>13</b>	<b>--</b>	<b>350</b>	<b>--</b>	<b>100</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>150</b>	<b>--</b>	<b>50</b>	
<p>Student Contact Hours Per Week: <b>29 Hrs.</b>  <b>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</b>  Total Marks : <b>650</b>  @ Internal Assessment, # External Assessment, \$ - Common to All Conventional Diploma, <span style="background-color: #cccccc; padding: 2px 10px;"> </span> No Theory Examination.</p> <p>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Termwork, SW- Sessional Work</p> <ul style="list-style-type: none"> <li>➤ Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).</li> <li>➤ Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms</li> <li>➤ Code number for TH, PR, OR &amp; TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.</li> </ul>																	

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<b>COURSE NAME : DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY</b>																	
<b>COURSE CODE : ML</b>																	
<b>DURATION OF COURSE: SIX SEMESTERS</b>												<b>WITH EFFECT FROM 2014-15</b>					
<b>SEMESTER : FOURTH</b>												<b>DURATION : 16 WEEKS</b>					
<b>PATTERN : FULL TIME - SEMESTER</b>												<b>SCHEME : G</b>					
SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (19400)
				TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)			
								Max	Min	Max	Min	Max	Min	Max	Min		
1	Environmental Studies \$	EST	17401	01	--	02	01	50#*	20	--	--	--	--	25@	10	<b>50</b>	
2	Medical Bacteriology	MEB	19408	04	--	03	03	100	40	50#	20	--	--	25@	10		
3	Biochemistry - II	BIO	19409	03	--	03	03	100	40	50#	20	--	--	25@	10		
4	Medical Lab. Instruments	MLI	19410	02	--	02	02	50	20	--	--	--	--	25@	10		
5	Clinical Medicine	CME	19411	04	02	--	03	100	40	--	--	--	--	50@	20		
6	Professional Practices – II	PPR	19059	--	--	03	--	--	--	--	--	--	--	50@	20		
<b>TOTAL</b>				<b>14</b>	<b>02</b>	<b>13</b>	--	<b>400</b>	--	<b>100</b>	--	--	--	<b>200</b>	--	<b>50</b>	
<p>Student Contact Hours Per Week: <b>29 Hrs.</b>  <b>THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.</b>            Total Marks : <b>750</b>            @ Internal Assessment, # External Assessment, \$ - Common to All Conventional Diploma, <span style="background-color: #cccccc; padding: 2px 10px;"> </span> No Theory Examination.</p> <p>Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Termwork, SW- Sessional Work</p> <ul style="list-style-type: none"> <li>➤ Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).</li> <li>➤ Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms</li> <li>➤ Code number for TH, PR, OR &amp; TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.</li> </ul>																	

**Course Name : Diploma in Medical Laboratory Technology**

**Course Code : ML**

**Semester : Third**

**Subject Title : General Bacteriology**

**Subject Code : 19316**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	03	03	100	50#	--	25@	175

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

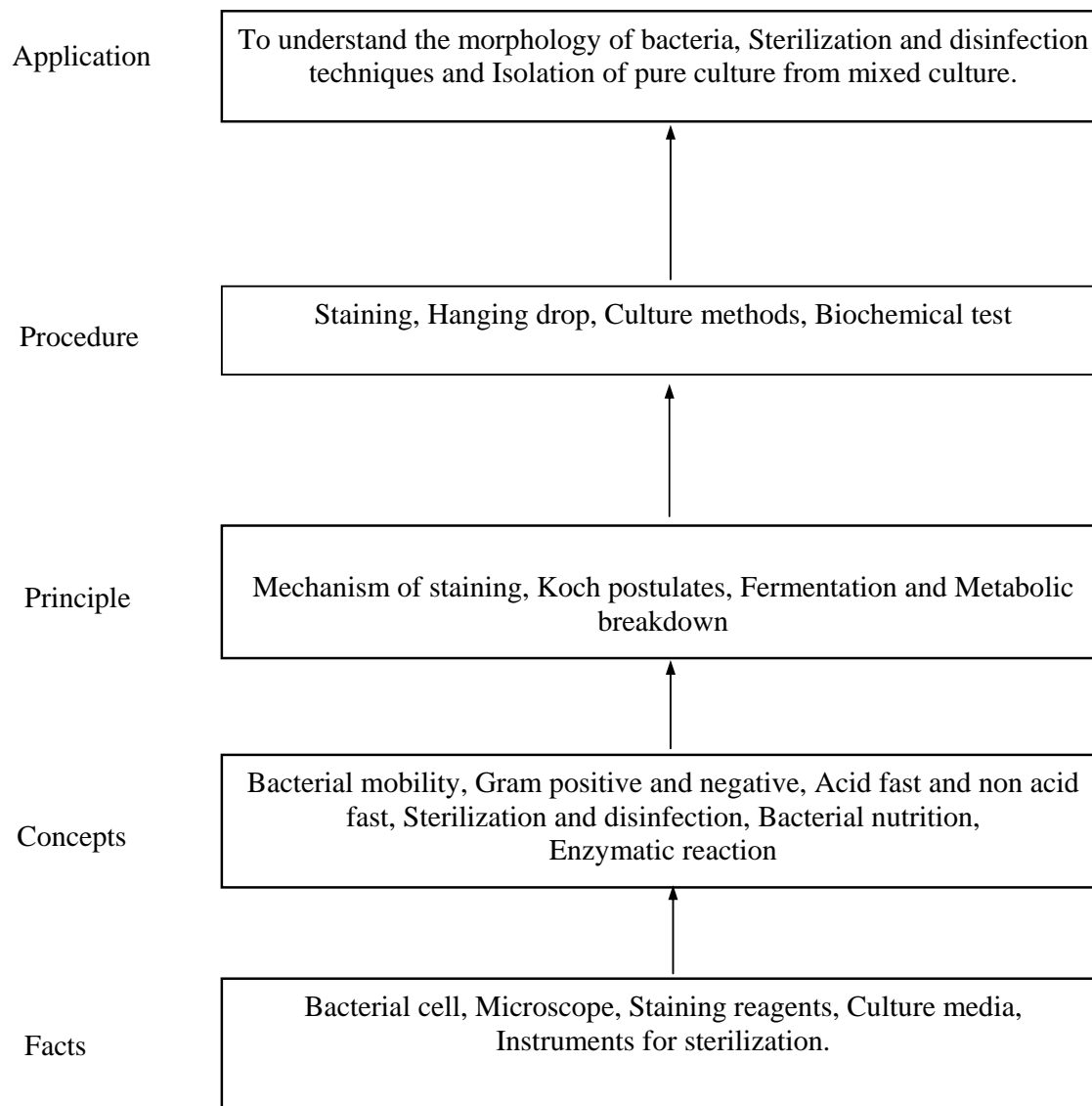
**Rationale:**

Bacteriology is a study of Bacteria Responsible for human illness. They are ubiquitous. Study of Bacteriology helps in identification of infections/communicable diseases caused by them. It also helps in finding suitable antimicrobial agents for the treatment. The principle of bacteriology have a wide application in many branches of medicine bacteriology therefore turns indispensable basis for most of the Lab Investigations.

**General Objectives:**

Students will be able to -

- 1) U applications of basic principles in Microbiology.
- 2) Know different shapes and arrangements of bacterial cell.
- 3) Draw different diagrams of bacterial cell and identify the type of bacteria in the sample.
- 4) Prepare different staining reagents.
- 5) Identify, prepare, sterilize different bacteriological media useful for lab diagnosis and to learn Aseptic techniques.
- 6) They will be aware of laboratory safety and biohazards and will understand the preventive measures for laboratory safety.

**Learning Structure:**

**Contents: Theory**

<b>Topic and Contents</b>	<b>Hours</b>	<b>Marks</b>
<p><b>Topic 1: INTRODUCTION TO BACTERIOLOGY</b></p> <p><b>SPECIFIC OBJECTIVES</b></p> <ul style="list-style-type: none"> <li>➤ Write Koch Postulates</li> <li>➤ Draw well labelled diagram of compound microscope</li> <li>➤ Draw well labelled diagram of Bacterial Cell</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Contribution of ROBERT KOCH, LOUISE PASTEUR. KOCH POSTULATES.</li> <li>• Compound Microscope diagrams, different parts, use and care.</li> <li>• Typical bacterial cell. Different parts of bacterial cell viz. cell wall, flagella, Fimbriae, Capsule, Different arrangement of bacterial cell. Bacterial spore, structure and function.</li> </ul>	10	12
<p><b>Topic 2: STAINING AND CULTURE METHOD</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ Write Procedure of Gram Staining</li> <li>➤ Describe Pure Culture &amp; Antibiotic Sensitivity Test</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Composition, procedure and mechanism of Gram- staining, Acid - fast staining, Albert's staining</li> <li>• Isolation and preservation of pure culture</li> <li>• Antibiotic sensitivity test by disc diffusion method.</li> </ul>	10	24
<p><b>Topic 3: CULTURE MEDIA</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ Write Procedure of Preparation of Culture Media</li> <li>➤ State Types and uses of Culture Media</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Solid Media: Nutrient Agar, Blood Agar, Blood Tellurite Agar, Chocolate Agar, MacConkey Agar, Loeffler's Serum Slope and Lowenstein Jenson Media.</li> <li>• Liquid Media: Peptone water, Nutrient broth, Glucose broth and bile broth.</li> </ul>	10	24
<p><b>Topic 4: BIOCHEMICAL TEST</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ Write Principles of Biochemical Tests</li> <li>➤ Describe the procedure of Biochemical Tests</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Carbohydrate Fermentation Test (Lactose, Glucose, Mannitol, Sucrose)</li> <li>• Indol Test</li> <li>• Methyl Red Test</li> <li>• Vogus - Proskeur Test</li> <li>• Citrate utilization Test</li> <li>• Urease Test</li> <li>• Oxidase Test and Catalase Test.</li> </ul>	10	24

<b>Topic 5: STERILIZATION AND DISINFECTION</b> <b>Specific Objectives</b> <ul style="list-style-type: none"> <li>➤ Write Thermal methods of Sterilisation</li> <li>➤ Classify Chemical Disinfectants</li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• Thermal and Non thermal methods of sterilization</li> <li>• Sterilization Indicators for Autoclave and Hot Air Oven.</li> <li>• Common disinfectants: Classification and Uses</li> </ul>	08	16
<b>Total</b>	<b>48</b>	<b>100</b>

**Practical:****Skills to be developed****1) Intellectual Skills**

1. Understand preparation of Vaccines and Antitoxins by growing bacteria under controlled conditions.
2. Identify different morphology of pathogenic bacteria.
3. Identify and use various culture media for bacteriological diagnosis.
4. Interpret of the results.
5. Learn aseptic technique.

**2) Motor Skills**

Students will be able to

1. Observe microorganism under microscope. Handle instrument carefully.
2. Prepare various media and reagent.
3. Draw the diagram of arrangement of bacterial cells and identify the type of bacteria.
4. Perform various staining techniques.
5. Isolate pure culture of pathogenic bacteria, by techniques such as dilution, streaking, spreading, on artificially prepared media.

**List of Practical:**

1. To study different parts, care and use of compound microscope.
2. To prepare chart of different arrangements of bacteria.
3. To demonstrate bacterial motility by hanging drop method.
4. To perform Gram staining.
5. To perform Zeihl- Neelsen techniques.
6. To perform capsules staining.
7. Preparation sterilization and identification of various solid and liquid media mentioned in theory units.
8. To perform spore staining.
9. Inoculation of solid media liquid media and slopes.  
Preparation of media, reagents and methods for biochemical test. IMViC test, sugar fermentation test.

**Learning Resources:****Books:**

Sr. No.	Title	Name of Author	Name of Publisher	Year of Publication
01	Medical Microbiology Vol. I and II	Robert Cruickshank et all	London Churchill Livinginh stone	12th edition 1998
02	Text book of Microbiology	R. Anantnarayan	Hyderabad Orient Longman	6th edition 2000
03	A Text book of Microbiology	P. Chakraborty	Calcutta New Central book agency	1st edition 1996.

**Links:**

1. [www.en.wikipedia.org/wiki/bacteriology/history](http://www.en.wikipedia.org/wiki/bacteriology/history)
2. [www.en.wikipedia.org/wiki/bacterial\\_culture](http://www.en.wikipedia.org/wiki/bacterial_culture)
3. [www.en.wikipedia.org/wiki/bacteria/biochemical\\_reaction](http://www.en.wikipedia.org/wiki/bacteria/biochemical_reaction)
4. [www.en.wikipedia.org/wiki/sterilisation/disinfection](http://www.en.wikipedia.org/wiki/sterilisation/disinfection)

**Equipments:**

Sr. No.	Name of equipment/M/C	Technical specifications	Total Quantity
1	Compound Microscope	10x Eye piece + 3 Objective lenses 10x, 45x, 100x with mechanical stage.	10
2	Centrifuge	With speed regulator, tubes & glass tubes.	02
3	Autoclave	Aluminum alloy with double safety valve, kW heater & pressure regulator.	01
4	Hot Air Oven.	18*18*18 inches, mild steel with thermostat & shelves.	01
5	Staining Racks	-----	05
6	Steam Steriliser	30x30x50 cms. stainless steel covered with asbestos.	01
7	Inspissator	45x35x50 cms for 50 tubes.	01
8	Incubator	45x45x45 cms mild steel temperature range 05* C. to 60*C.	01
9	Analytical Balance	Capacity 0.2mg to 200 g.	02

**Course Name : Diploma in Medical Laboratory Technology****Course Code : ML****Semester : Third****Subject Title : Biochemistry-I****Subject Code : 19317****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPERS HRS	TH	PR	OR	TW	TOTAL
03	--	03	03	100	50#	--	25@	175

**NOTE:**

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

**Rationale:**

Biochemistry is a science concerned with the chemical constituents of living cells and with the reactions and processes they undergo. Abnormalities in the chemical constituents are exhibited by various diseases. Therefore a technologist must have the knowledge of Clinical Biochemistry. So that he can understand the principle behind the biochemical reactions and can work in the laboratory with confidence.

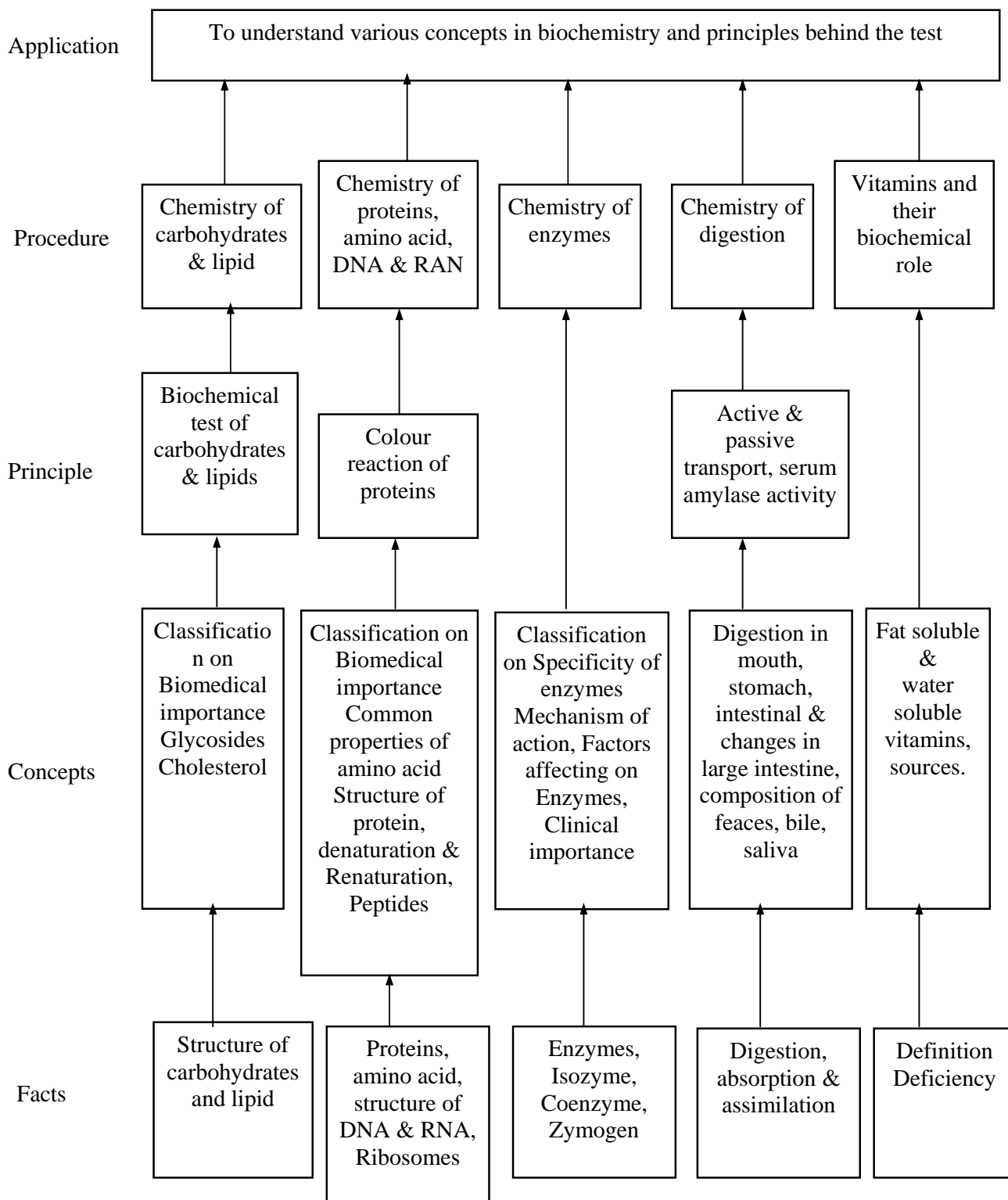
**General Objectives:**

Students will be able to:

- 1) Know disease at its molecular level.
- 2) Study the chemical components of the body.
- 3) Estimate varies chemical molecules, the level of which affects the normal and abnormal functions of body systems.
- 4) Find out the abnormal function at earlier stage of the disease and also helpful for prognostic purpose.



**Learning Structure:**



## Contents: Theory

Topic and Contents	Hours	Marks
<p><b>Topic 1: CHEMISTRY OF CARBOHYDRATES AND LIPIDS.</b></p> <p><b>Specific objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Classify Carbohydrates.</li> <li>➤ Write examples Carbohydrates.</li> <li>➤ Classify lipids.</li> <li>➤ Write properties of lipid.</li> </ul> <p><b>Contents:</b></p> <p><b>1.1 CHEMISTRY OF CARBOHYDRATES 12 Marks</b></p> <ul style="list-style-type: none"> <li>• Define carbohydrate.</li> <li>• Classify carbohydrates-Monosaccharide, disaccharide and polysaccharide.</li> <li>• Optical isomerism in carbohydrates (in brief).</li> <li>• What are epimer, isomer, anomers and glycosides.</li> <li>• State physiological importance of carbohydrates.</li> </ul> <p><b>1.2 CHEMISTRY OF LIPID (Structures Not Required) 12 Marks</b></p> <ul style="list-style-type: none"> <li>• Definition of lipid.</li> <li>• Classification of Simple Lipid, (Fats and oils), Derived Lipid (Sterols only), Compound Lipid (phospholipid, glycolipid and amino lipids).</li> <li>• Essential fatty acids.</li> <li>• Important properties like saponification, saponification value, iodine value and rancidity.</li> <li>• State physiological importance of lipid.</li> </ul>	12	24
<p><b>Topic 2: CHEMISTRY OF PROTEINS AND NUCLEIC ACID.</b></p> <p><b>2.1 CHEMISTRY OF PROTEINS 12 Marks</b></p> <p><b>Specific objective</b></p> <ul style="list-style-type: none"> <li>➤ Classify amino acid and proteins.</li> <li>➤ Write uses of protein.</li> <li>➤ Differentiate between nucleic acid.</li> <li>➤ Write functions of nucleic acid.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Definition, classification of amino acid on basis of chemical nature and nutritional requirement.</li> <li>• Elementary structure of protein.</li> <li>• Denaturation of protein, factors causing denaturation.</li> <li>• Definition and classification of proteins.</li> <li>• Physiological importance of proteins.</li> </ul> <p><b>2.2 CHEMISTRY OF NUCLEIC ACIDS 12 Marks</b></p> <ul style="list-style-type: none"> <li>• Structure of DNA, nucleosides and nucleotides.</li> <li>• Structure of RNA – r – RNA, m – RNA , t - RNA</li> <li>• Physiological importance of Nucleic acids</li> </ul>	12	24

<p><b>TOPIC 3: CHEMISTRY OF ENZYMES</b></p> <p><b>Specific Objectives</b></p> <ul style="list-style-type: none"> <li>➤ Classify enzymes.</li> <li>➤ Enlist factors affecting enzyme action.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Definition-Enzyme, coenzyme, zymogen and Isozyme.</li> <li>• Classification of enzyme and nomenclature.</li> <li>• Enzymes specificity (Definition and example)</li> <li>• Structure of enzyme, active site of enzyme.</li> <li>• Factors affecting on Enzyme action. (PH, Temp, substrate concentration etc.</li> <li>• Mechanism of enzyme action.</li> <li>• Importance of enzyme. (Diagnostic and Therapeutic ex. Streptokinase and Asperginase).</li> </ul>	08	16
<p><b>TOPIC 4: DIGESTION AND ABSORPTION</b></p> <p><b>Specific Objective</b></p> <ul style="list-style-type: none"> <li>➤ <b>Enlist chemical components in gastric juice.</b></li> <li>➤ <b>Write mechanism of digestion.</b></li> </ul> <p><b>Contents:</b></p> <p><b>4.1 Digestion <span style="float: right;">Marks 16</span></b></p> <ul style="list-style-type: none"> <li>• Digestion In The Mouth (Function Of Saliva)</li> <li>• Digestion in the stomach</li> <li>• Digestion in the intestine (action of pancreatic juice and intestinal juice).</li> <li>• Role of bile in the process of digestion</li> </ul> <p><b>4.2 Assimilation <span style="float: right;">Marks 04</span></b></p> <p>Absorption of carbohydrate, protein &amp; Lipids from small intestine (in brief)</p>	08	20
<p><b>Topic 5: VITAMINS (STRUCTURES NOT REQUIRED)</b></p> <p><b>Specific objectives</b></p> <ul style="list-style-type: none"> <li>➤ <b>Enlist fat soluble vitamins.</b></li> <li>➤ <b>State functions of vitamins.</b></li> </ul> <p><b>Contents:</b></p> <p><b>5.1 Fat soluble vitamins <span style="float: right;">06 Marks</span></b></p> <ul style="list-style-type: none"> <li>• Sources, function and Deficiency diseases of Fat soluble vitamin A,D,E,K</li> <li>• Sources, functions and deficiency diseases of Vitamin C (Ascorbic acid)</li> </ul> <p><b>5.2 Water soluble vitamins <span style="float: right;">10 Marks</span></b></p> <ul style="list-style-type: none"> <li>• Sources, functions and deficiency diseases of Thiamin, Riboflavin, Niacin, Pyridoxine, Pantothenic acid, Folic acid, Vitamin B12</li> </ul>	08	16
<b>Total</b>	<b>48</b>	<b>100</b>

**Practical:****Skills to be developed****Intellectual Skills:**

1. Understand lab safety and its preventive measures.
2. Analyze and interpret basic principles of working of various instruments.
3. Select proper instruments and study the working principle.
4. Test various macromolecules in body sample.
5. Detect, estimate and interpret of abnormal constituents.

**Motor Skills:**

1. Handle instruments properly.
2. Prepare Reagents, solutions and clean glassware.
3. Develop experimental technique.

**List of Practical:**

1. Qualitative test for Carbohydrates. a) Molish's test b) Fehling test c) Benedict test d) Barfoed test e) Seliwanoff's test f) Osazone test
2. Estimation of blood sugar
3. Qualitative test for Lipid  
a) Libemann Burchard Rextn b) Salkowaski's Test c) Formaldehyde - H<sub>2</sub>SO<sub>4</sub> test.
4. Colour reaction of protein  
a) Biuret test b) Ninhydrin test c) Xanthoprotein test d) Millions test  
f) Lead Sulphide test
5. Estimation of Total Protein in serum by Biuret method.
6. Estimation of serum Amylase activity

**Learning Resources:****Books:**

Sr. No.	Title	Name of Author	Publisher	Year of Publication
01	Fundamentals of Biochemistry	Deb and Deb	New central agency chinamanidas Lane Calcutta	--
02	Text book of Biochemistry (2nd)	Ramkrishman, Prasannan, Rajan	Orient Longman Ltd.	1994
03	Test book of (8th) Biochemistry	Rama Rao	L.K. & S. Publication	1998
04	Text book of medical laboratory technology	P.B.Godkar and D.P.Godkar	Bhalani publishing house Mumbai-12	2008
05	Comprehensive viva and practice in biochemistry	Deb and Deb	New central agency chinamanidas Lane Calcutta	1997
06	Fundamental of Biochemistry	J.L. Jain	S. Chand & Company	1999
07	Practical Biochemistry for students	Malhotra Varun Kumar	Jaypee Brothers New Delhi	1989
08	A text book of Biochemistry	V.R. Agrawal	Goel publisher	1984

**WEB SITES:**

[Wikipedia.org/wiki/carbohydrate](http://Wikipedia.org/wiki/carbohydrate)  
[Wikipedia.org/wiki/proteins](http://Wikipedia.org/wiki/proteins)  
[Wikipedia.org/wiki/nucleic acid](http://Wikipedia.org/wiki/nucleic acid)  
[Wikipedia.org/wiki/vitamins](http://Wikipedia.org/wiki/vitamins)

**List of equipments**

<b>Sr. No.</b>	<b>Name of equipment/M/C</b>	<b>Technical specifications</b>	<b>Total Quantity</b>
1	Colorimeter	With seven filters.	01
2	Centrifuge	With speed regulator, tubes & glass tubes.	02
3	Serological water bath.	With thermostat.	02
4	pH meter	Having PH range of PH 0.1 to 14, with automatic calibration & temperature control	01
5	Analytical Balance	Capacity 0.2mg to 200 g.	02

**Course Name : Diploma in Medical Laboratory Technology****Course Code : ML****Semester : Third****Subject Title : Basic Laboratory Instruments****Subject Code : 19318****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPERS HRS	TH	PR	OR	TW	TOTAL
02	--	02	02	50		--	25 @	75

**NOTE:**

- Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.
- Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).

**Rationale:**

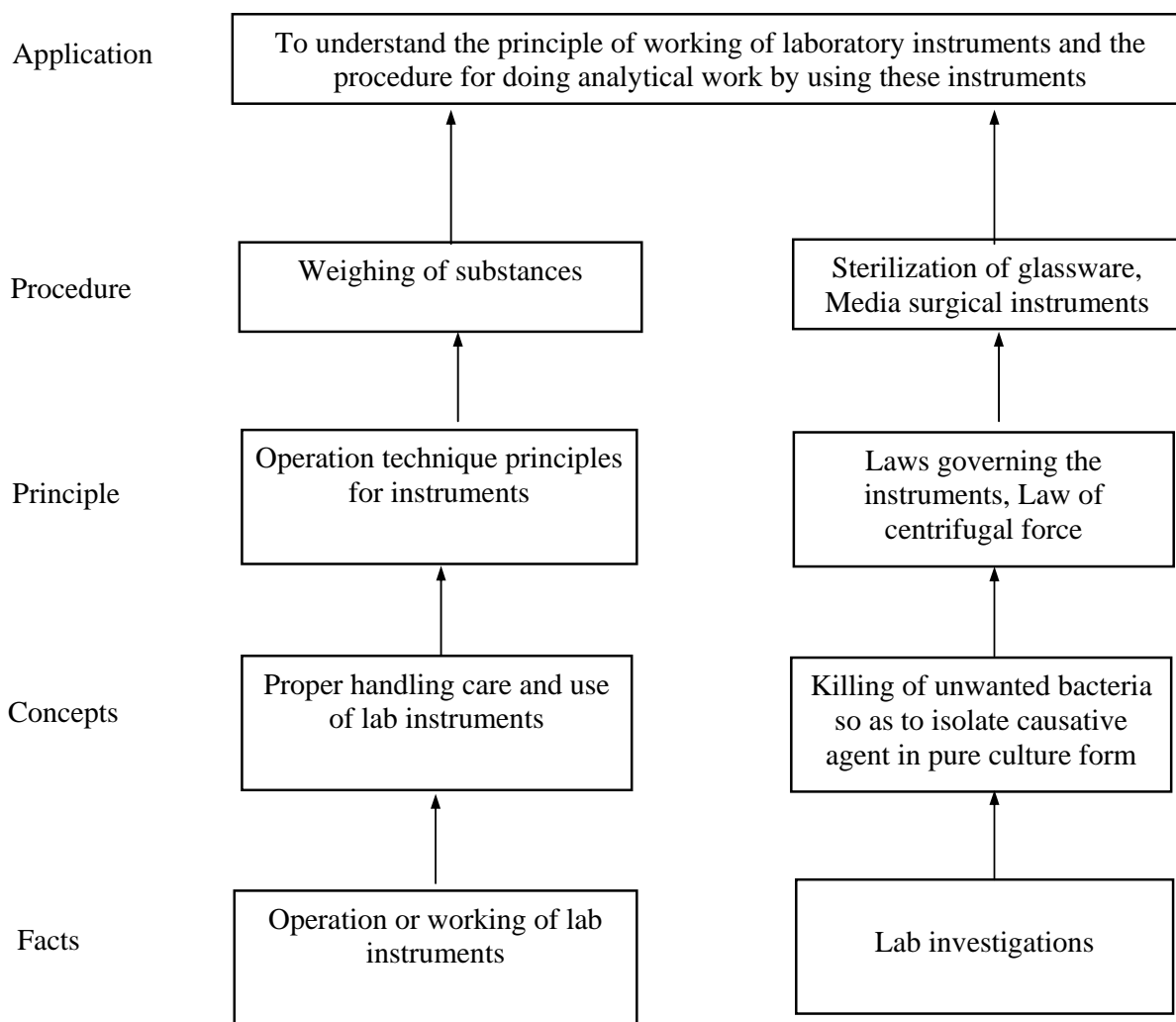
Basic laboratory instruments play an important role in modern pathology laboratory. This subject will provide basic information regarding the principles of working of various instruments and the procedure for doing routine analytical work using various Instruments.

**General Objectives:**

Students will be able to

- 1) Understand the basic working principles of various common laboratory instruments.
- 2) Get aware of care of laboratory glassware, equipments and the handling as well as disposal of laboratory specimens.
- 3) Learn the basic lab principles and lab procedures, the students will be able to work in modern pathology laboratory.
- 4) Familiarize with advance techniques and future trends.

**Learning Structure:**



**Contents: Theory**

<b>Topic and Contents</b>	<b>Hours</b>	<b>Marks</b>
<b>Topic 1: Basic Laboratory Principles And Procedures</b> <b>Specific objectives:</b> <ul style="list-style-type: none"> <li>➤ State principle of various instruments.</li> <li>➤ Enlist the basic components and uses of instruments in Medical field.</li> <li>➤ Draw diagrams of instruments in Medical field.</li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• compound microscope, digital pH meter</li> <li>• Hot air over, autoclave, incubator, centrifuge</li> <li>• Inspissator, anaerobic culture jar, Glucometer</li> </ul>	11	14
<b>Topic 2: Care of Laboratory Glasswares, Equipments And Chemicals</b> <b>Specific Objectives</b> <ul style="list-style-type: none"> <li>➤ Write importance of care of instrument and glass wares.</li> <li>➤ Name and identify containers for specimen collection.</li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• Care and cleaning of glassware.</li> <li>• Care of equipment and apparatus.</li> <li>• Containers for specimen collection.</li> </ul>	07	10
<b>Topic 3: Specimen Collection</b> <b>Specific Objectives</b> <ul style="list-style-type: none"> <li>➤ Enlist names and collection procedure for various specimen analysed in the laboratory</li> <li>➤ Write transportation and disposal procedure for different specimen.</li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• General principle.</li> <li>• Types of specimen.</li> <li>• Collection technique.</li> <li>• Specimen preservation and disposal.</li> <li>• Specimen transport.</li> </ul>	07	16
<b>Topic 4: Introduction to Quality Control</b> <b>Specific Objectives</b> <ul style="list-style-type: none"> <li>➤ Define quality control and quality management.</li> <li>➤ List quality control material.</li> <li>➤ Draw quality control charts.</li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• Introduction and importance of quality control.</li> <li>• Total quality management and quality control material</li> <li>• Definition of external and internal quality control</li> <li>• Quality control charts.</li> </ul>	07	10
<b>Total</b>	<b>32</b>	<b>50</b>

**Skills to be developed****Intellectual Skills:-**

1. Understand lab safety and its preventive measures.
2. Analyze and interpret basic principles of working of various instruments.
3. Select proper instruments and study the working principle.



- Understand advance technique and modern trends.

**Motor Skills:**

- Handle instruments properly.
- Analyze routine work by various instruments.
- Detect, analyze and estimate various parameters by using proper instrument.
- Care of lab glassware, equipments and chemicals.
- Clean, store and handle various specimen and chemicals.

**List of Practical:**

- To study different parts of compound microscope
- To separate plasma and serum from whole blood by using centrifuge.
- To sterilize petri dishes, test tubes, pipettes and other glass ware by using hot air oven
- To prepare anticoagulant bulb for blood sugar determination (EDTA, Fluoride and double oxalate).
- To draw quality control charts from the given data
- Cleaning of glass ware, preparation of cleaning solutions.
- Demonstration of working of Glucometer.

**Learning Resources:****Books:**

Sr. No.	Title	Author	Publisher
01	Medical Laboratory Technology	A.H. Patel	Navneet Prakashan
02	Instrumental Method of Chemical Analysis	Chatwal Anand	Himalaya Publishing House
03	Vogel's Textbook of Quantitative Inorganic Analysis	J. Basset, R.C. Demmy, G.H. Jeffery, J. Mendhm	ELBS
04	Practical Pharmaceutical Chemistry	A.H. Beckett, J.B. Stenlake	The Athlone Press of London

**Websites**

- Basic laboratory instruments  
[www.ehow.com...895\\_basic laboratory instruments.html](http://www.ehow.com...895_basic_laboratory_instruments.html)
- General specimen collection guidelines  
[www.dhhs.saccountly.net/-atory\Document\specimen](http://www.dhhs.saccountly.net/-atory\Document\specimen)
- Types of specimen collection

www.webcrawier.com\

4. Quality control standards

www.inorganicventures.com

5. Instrumentation basic

www.ika.in\overhead \_stirrers

6. Daily quality control standards

www.auditmicro.com

**List of equipment:**

<b>Sr. No.</b>	<b>Name of equipment/M/C</b>	<b>Technical specifications</b>	<b>Total Quantity</b>
1	Centrifuge	With speed regulator, tubes & glass tubes.	02
2	Compound Microscope	10x Eye piece + 3 Objective lenses 10x, 45x, 100x with mechanical stage.	10
3	Autoclave	Alluminium alloy with double safety valve, kW heater & pressure regulator.	01
4	Hot Air Oven.	18*18*18 inches, mild steel with thermostat & shelves.	01
5	Glucometer	Having digital display.	01
6	Glass wares	Test tubes, Beaker, Volumetric flask, Measuring cylinder, Graduated pipette.	Sufficient.

**Course Name : Diploma in Medical Laboratory Technology****Course Code : ML****Semester : Third****Subject Title : Community Medicine****Subject Code : 19319****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
04	02	--	03	100	--	--	--	100

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

**Rationale:**

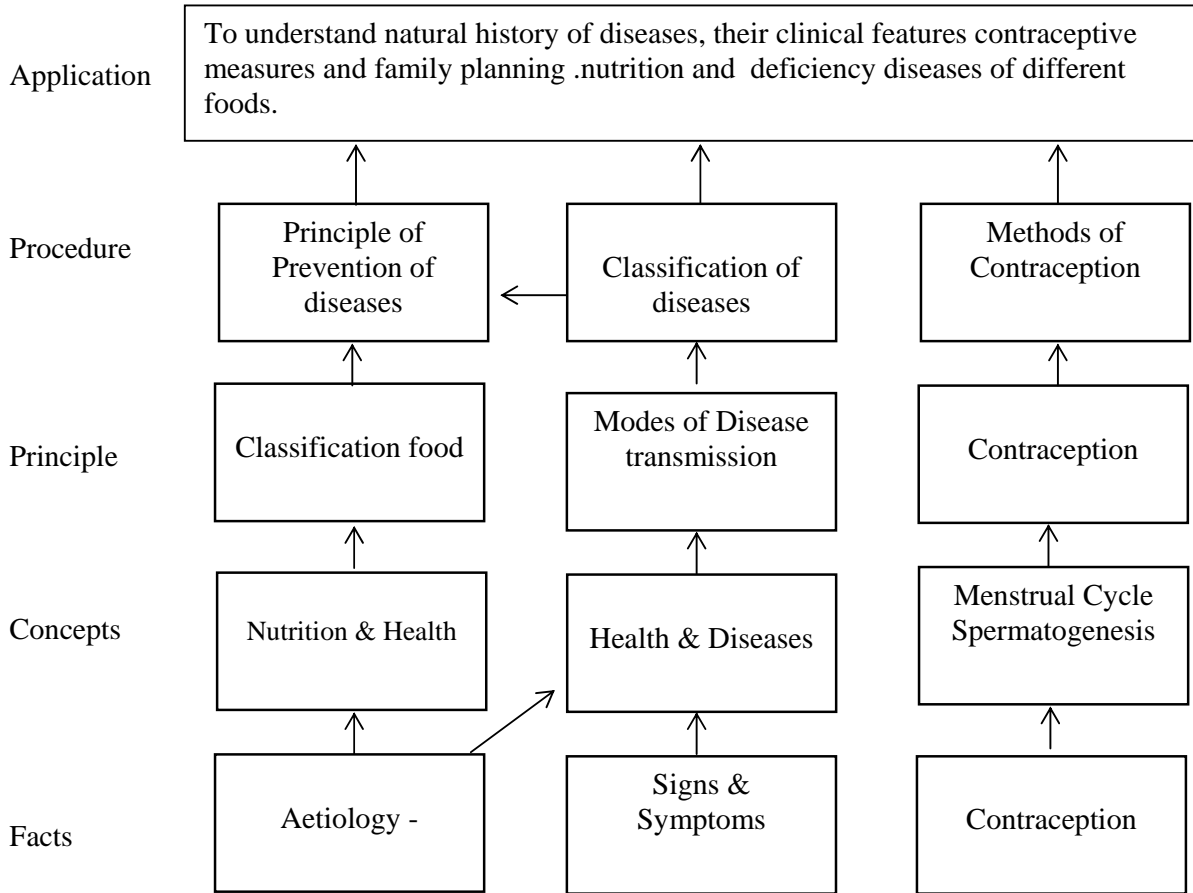
A Laboratory technician should be aware about the common diseases. He should know the basic preventive measures also he should aware about the first aid. Hence to impart the knowledge of medical concepts for logical approach & thinking of laboratory investigations, this subject is included.

**General objectives:**

Students will be able to

- 1) Understand basic concepts of disease.
- 2) Expose the students to first aid procedure.
- 3) Understand awareness of health hazards due to epidemics.

**Learning Structure:**



**Contents: Theory**

<b>Topic and Contents</b>	<b>Hours</b>	<b>Marks</b>
<p><b>TOPIC: 1 CONCEPT OF HEALTH</b></p> <p><b>Specific objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Define physical, mental and social health.</li> <li>➤ Enumerate determinants of health.</li> <li>➤ Write indicators of health.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Definition of health as per W.H.O. <ul style="list-style-type: none"> <li>✚ Physical health</li> <li>✚ Mental health</li> <li>✚ Social health</li> <li>✚ Spiritual health</li> </ul> </li> <li>• Determinants of health &amp; indicators of health.</li> </ul>	10	10
<p><b>TOPIC: 2 CONCEPT OF DISEASE</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Define disease.</li> <li>➤ Write natural history and Concepts of prevention of diseases.</li> <li>➤ Explain epidemiological triad.</li> <li>➤ Classify disease.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Definition of disease</li> <li>• Natural history of disease</li> <li>• Epidemiological triad.</li> <li>• Concepts of prevention of diseases</li> <li>• Levels of prevention of disease</li> <li>• Modes of intervention.</li> <li>• Classification of disease <ul style="list-style-type: none"> <li>✚ Infectious disease.</li> <li>✚ Communicable disease.</li> </ul> </li> </ul>	15	22
<p><b>TOPIC 3: NUTRITION &amp; HEALTH</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Classify food.</li> <li>➤ Write sources &amp; functions of food.</li> <li>➤ Write &amp; deficiency disorders of protein, fat, vitamin &amp; minerals.</li> <li>➤ Define balanced diet.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Classification of food.</li> <li>• Sources, Functions &amp; Deficiency disorders of protein, fat, vitamin &amp; minerals like Calcium, Iron, Fluorine, Iodine only</li> <li>• Balanced diet.</li> </ul>	18	28

<p><b>TOPIC 4: FAMILY PLANNING</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Define family planning.</li> <li>➤ Write methods of contraception.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Definition of family planning.</li> <li>• Methods of contraception. <ul style="list-style-type: none"> <li>a) Barrier method - Physical Chemical</li> <li>b) Hormonal method</li> <li>c) IUCD method</li> <li>d) Miscellaneous methods - Abstinence, coitus interrupts, safe period etc.</li> </ul> </li> </ul>	12	24
<p><b>TOPIC 5: INTRODUCTION TO CLINICAL MANIFESTATIONS</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Define infection &amp; incubation period.</li> <li>➤ Enumerate signs &amp; symptoms.</li> <li>➤ Measure pulse rate, respiratory rate, body temperature.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Definition of infections, aetiology, incubation period, signs, symptoms, Definitions of infestation.</li> <li>• Pulse rate, respiratory rate, body temperature (Normal value &amp; Clinical significance only)</li> </ul>	09	16
<b>Total</b>	<b>64</b>	<b>100</b>

**Tutorials:**

Two assignments on each chapter

**Learning Resources:****Books:**

Sr. No.	Title	Name of Author	Name of Publisher	Year of Publication
01	Park's text book of preventive & social medicine	K. Park	M/s Banarsidas Bhanot Publications Jabalpur	20th edition Jan 2012
02	David son's Principle & Practice of medicine	John Macleod Christopher Edward Ian Bouchier	Long Man group	20012
03	Medicine for students	Aspi Golwala	Dr. A.F. Golwala Eross building Churchgate Mumbai - 400020	2012
04	Practical Medicine	P.J. Mehta	--	2012
05	Text book of preventive and social medicine	Mahajan B. K.	Jaypee Brothers New Delhi	2012

**Links:**

1. [www.en.wikipedia.org/wiki/health](http://www.en.wikipedia.org/wiki/health)
2. [www.en.wikipedia.org/wiki/disease](http://www.en.wikipedia.org/wiki/disease)
3. [www.en.wikipedia.org/wiki/nutrition](http://www.en.wikipedia.org/wiki/nutrition)
4. [www.en.wikipedia.org/wiki/familyplanning](http://www.en.wikipedia.org/wiki/familyplanning)

**Course Name : Diploma in Medical Laboratory Technology**

**Course Code : ML**

**Semester : Third**

**Subject Title : Computer Application**

**Subject Code : 19040**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
02	--	02	--	--		--	25@	25

**Rationale:**

Increasing number of clinical investigation tests and urgency of reporting requires automation of procedures to reduce response time, minimize errors and control the cost of investigation. Thus, introduction of Computerization in Medical laboratories is the need of modern times. This subject intends to acquaint future medical laboratory technologists with modern techniques and software packages used in Pathology, Haematology, Biochemistry & Microbiology laboratories.

**General Objectives:**

Students will be able to:

- 1) Understand procedures in automation of a computerized medical laboratory.
- 2) Use the basic function of an operating system.
- 3) Set the parameter required for effective use of hardware combined with and application software's.
- 4) Compare major OS like Linux and MS-Windows.
- 5) Understand operating system and different application software.
- 6) Prepare program in BASIC.
- 7) Prepare & operate a simple software.
- 8) Understand packages used in Haematology, CASA, Metabolic analysis, & biochemical investigations.
- 9) Use the Internet to send generated patients report on mail.

**Contents: Theory**

<b>Topic and Contents</b>	<b>Hours</b>
<p><b>TOPIC 1: HARDWARE AND SOFTWARE</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Differentiate between Operating Systems.</li> <li>➤ Enlist types of software.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Hardware, Basic components, peripherals.</li> <li>• Software and types of software.</li> <li>• Operating systems, DOS and Unix. (review)</li> </ul>	08
<p><b>TOPIC 2: LANGUAGES</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Enlist high level languages.</li> <li>➤ Enlist application software.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Language processors and utilities.</li> <li>• High level, low level languages.</li> <li>• HLL used for software like BASIC, C, C<sup>++</sup> etc. (<b>features only</b>)</li> <li>• Application software, Graphics, multimedia, presentation software</li> </ul>	08
<p><b>TOPIC 3: PROGRAMMING</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Perform problem analysis.</li> <li>➤ Select method of solution.</li> <li>➤ Prepare algorithm &amp; flow chart.</li> <li>➤ Prepare a program for given task.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Programming methodology.</li> <li>• Problem solving using BASIC language.</li> <li>• Algorithm, flowchart.</li> <li>• To RUN the program.</li> </ul>	08
<p><b>TOPIC 4: APPLICATION IN MEDICAL LAB</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Write a report on computerization in clinical laboratory.</li> <li>➤ Write report on application of computers in Haematology.</li> <li>➤ Write report on Biochemical investigations.</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Computerisation in Medical Laboratory.</li> <li>• Application in Haematology</li> <li>• CASA and fluid assay.</li> <li>• Metabolic analysis</li> <li>• In Biochemical investigations.</li> </ul>	08
<b>TOTAL</b>	<b>32</b>



**Practical:****Skill to be developed****Intellectual Skills**

1. Select proper hardware & software for problem solving.
2. Use proper logic in program preparation.
3. Understand syntax of the given HLL.
4. Understand application packages and their use in Medical laboratories.

**Motor Skills**

1. Operate Window 7.
2. Operate a software packages.
3. Use multimedia, Graphics.
4. Use proper function keys.

**List of Practical:**

1. To submit a report on database approach to computerized Medical laboratory.
2. Running a basic program. (demonstration)
3. Prepare a program in BASIC for temperature conversion from Celsius scale to Fahrenheit scale.
4. Prepare a program in BASIC for Addition of three numbers.
5. Prepare a program in BASIC for Factorial of a number.
6. Prepare a program in BASIC for solution of a Quadratic equation.
7. Report automated methods in Haematology.
8. Report application of computer in Cytology, Histology, CASA & Chromosome analysis.

**Learning Resources:****1. Books:**

Sr. No.	Title	Name of Author	Name of Publisher
01	Computers Today	Donald Sanders	McGraw Hill Book Company
02	Windows 3.1 made easy	Tom Shelders	Tata McGraw Hill
03	Programming in BASIC	E. Balguruswamy	Tata McGraw Hill
04	Computers in Medicine	R. D. Lele	Tata McGraw Hill

**2. Links:**

1. <http://www.psexam.com>
2. <http://www.geflearnfree.org/office>
3. <http://www.softwaretrainingtutorials.com/ms-project-2010.php>
4. <http://www.7tutorials.com>

**3. List of Equipments /Tool:****Hardware:**

1. Computer system (Pentium-IV or higher version)
2. Printer
3. Modem
4. Pen drive, Floppy disk, CD.

**Software:**

1. Windows-7 (Operating System).
2. MS-Office 2010
3. Internet Explorer/Mozilla/Chrome/Firefox
4. MS- Project 2010

**Course Name : Diploma in Medical Laboratory Technology**

**Course Code : ML**

**Semester : Third**

**Subject Title : Professional Practices-I**

**Subject Code : 19041**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	03	--	--	--	--	50@	50

**Rationale:**

The field of Medical laboratory Science has undergone tremendous changes in the last twenty years. The practice of Medical laboratory Science has already witnessed several fundamental changes. The continuous arrival of innovative automated and computerized instruments and machines and the new trends in the areas of automation and computerization, introduction of new technologies all these factors requires more exposure of the students to the field work.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence, ability to communicate and to develop learning to learn skills.

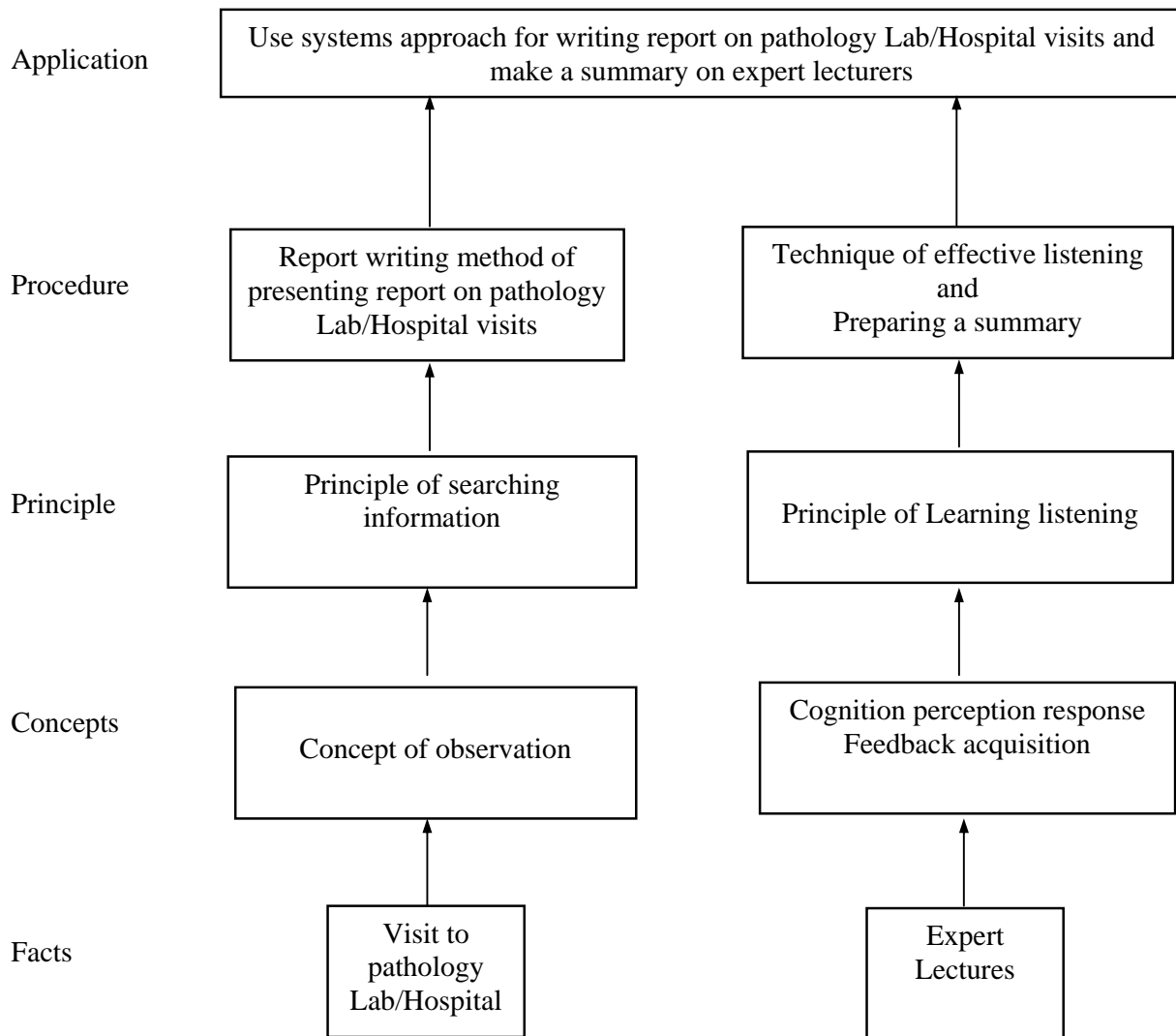
Visits to pathology laboratories/Hospitals, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

**General Objectives:**

Students will be able to:

- 1) Acquire information from different sources.
- 2) Prepare notes for given topic.
- 3) Present given topic in a seminar
- 4) Interact with peers to share thoughts.
- 5) Prepare a report on pathology laboratory/Hospital visit, expert lectures.

**Learning Structure:**



**Contents: Theory**

Activity	Hours
<b>1) INDUSTRIAL VISITS - VISITS TO PATHOLOGY LAB</b> Structured visits to pathology laboratory should be arranged and report of the same should be submitted by the individual student, to form part of the term work.	<b>12</b>
<b>2) LECTURES OF FIELD EXPERTS</b> To be organised on any <b>Three</b> topics of the following suggested areas or any other suitable topics. <ul style="list-style-type: none"> <li>• Recent Advances in Bacteriological diagnosis.</li> <li>• Safety precautions/first aid in the laboratory.</li> <li>• Automation in laboratory use of computers in lab.</li> <li>• Stress management.</li> <li>• Problems in adolescent age group.</li> <li>• Construction of Biomolecules using ball and stick model (ORCHEM TEACH AID)</li> </ul>	<b>12</b>
<b>3) INFORMATION SEARCH</b> Assignments on search for information from journals, websites, reference books be given	<b>12</b>
<b>4) GROUP DISCUSSION</b> The students should discuss in group of six to eight students and write a brief Report on the same as a part of term work. The topic for group discussions may be selected by faculty members. Some of the suggested topics are <ul style="list-style-type: none"> <li>• Sports</li> <li>• Current topics related to Medical field.</li> <li>• Yoga and pranayam awareness to Health.</li> <li>• Quality assurance system</li> <li>• Naturopathy</li> </ul>	<b>12</b>
<b>Total</b>	<b>48</b>

**Students shall prepare the write up for all above activities and submit as a Term work**

**Course Name : All Branches of Diploma in Engineering & Technology**

**Course Code : AE/CE/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/EX/IC/IE/IS/ME/  
MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/AU/FG/AA/DD/GT/  
ML/FC/PN/PC/SC/TR Sixth for PC**

**Semester : Fourth**

**Subject Title : Environmental Studies**

**Subject Code : 17401**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
01	--	02	01	50#*	--	--	25@	75

**#\* Online Theory Examination**

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

**Rationale:**

Environment essentially comprises of our living ambience, which gives us the zest and verve in all our activities. The turn of the twentieth century saw the gradual onset of its degradation by our callous deeds without any concern for the well being of our surrounding. We are today facing a grave environmental crisis. The unceasing industrial growth and economic development of the last 300 years or so have resulted in huge ecological problems such as overexploitation of natural resources, degraded land, disappearing forests, endangered species, dangerous toxins, global warming etc.

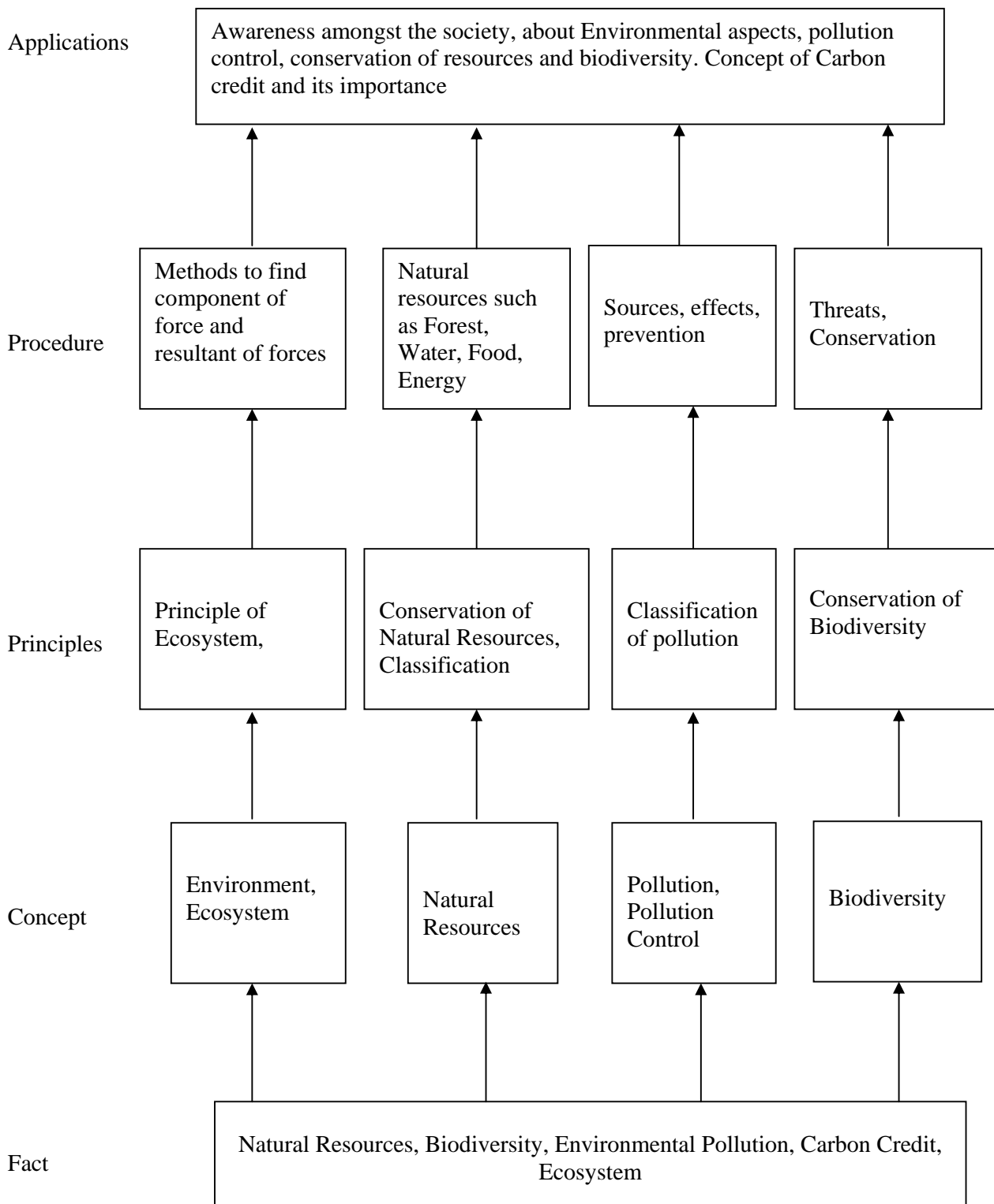
It is therefore necessary to study environmental issues to realize how human activities affect the environment and what could be possible remedies or precautions which need to be taken to protect the environment.

The curriculum covers the aspects about environment such as Environment and Ecology, Environmental impacts on human activities, Water resources and water quality, Mineral resources and mining, Forests, etc.

**General Objectives:** The student will be able to,

1. Understand importance of environment
2. Know key issues about environment
3. Understands the reasons for environment degradation
4. Know aspects about improvement methods
5. Know initiatives taken by the world bodies to restrict and reduce degradation

**Learning Structure:**



**Theory:**

<b>Topic and Contents</b>	<b>Hours</b>	<b>Marks</b>
<p><b>Topic 1: Nature of Environmental Studies</b> Specific Objectives:</p> <ul style="list-style-type: none"> <li>➤ Define the terms related to Environmental Studies</li> <li>➤ State importance of awareness about environment in general public</li> </ul> <p><b>Contents:</b></p> <ul style="list-style-type: none"> <li>• Definition, Scope and Importance of the environmental studies</li> <li>• Importance of the studies irrespective of course</li> <li>• Need for creating public awareness about environmental issues</li> </ul>	01	04
<p><b>Topic 2: Natural Resources and Associated Problems</b> Specific Objectives:</p> <ul style="list-style-type: none"> <li>➤ Define natural resources and identify problems associated with them</li> <li>➤ Identify uses and their overexploitation</li> <li>➤ Identify alternate resources and their importance for environment</li> </ul> <p><b>Contents:</b></p> <p>2.1 Renewable and Non renewable resources</p> <ul style="list-style-type: none"> <li>• Definition</li> <li>• Associated problems</li> </ul> <p>2.2 Forest Resources</p> <ul style="list-style-type: none"> <li>• General description of forest resources</li> <li>• Functions and benefits of forest resources</li> <li>• Effects on environment due to deforestation, Timber extraction, Building of dams, waterways etc.</li> </ul> <p>2.3 Water Resources</p> <ul style="list-style-type: none"> <li>• Hydrosphere: Different sources of water</li> <li>• Use and overexploitation of surface and ground water</li> <li>• Effect of floods, draught, dams etc. on water resources and community</li> </ul> <p>2.4 Mineral Resources:</p> <ul style="list-style-type: none"> <li>• Categories of mineral resources</li> <li>• Basics of mining activities</li> <li>• Mine safety</li> <li>• Effect of mining on environment</li> </ul> <p>2.5 Food Resources:</p> <ul style="list-style-type: none"> <li>• Food for all</li> <li>• Effects of modern agriculture</li> <li>• World food problem</li> </ul>	04	10
<p><b>Topic 3. Ecosystems</b></p> <ul style="list-style-type: none"> <li>• Concept of Ecosystem</li> <li>• Structure and functions of ecosystem</li> <li>• Energy flow in ecosystem</li> <li>• Major ecosystems in the world</li> </ul>	01	04
<p><b>Topic 4. Biodiversity and Its Conservation</b></p> <ul style="list-style-type: none"> <li>• Definition of Biodiversity</li> <li>• Levels of biodiversity</li> <li>• Value of biodiversity</li> <li>• Threats to biodiversity</li> <li>• Conservation of biodiversity</li> </ul>	02	06



<b>Topic 5. Environmental Pollution</b> <ul style="list-style-type: none"> <li>• Definition</li> <li>• Air pollution: Definition, Classification, sources, effects, prevention</li> <li>• Water Pollution: Definition, Classification, sources, effects, prevention</li> <li>• Soil Pollution: Definition, sources, effects, prevention</li> <li>• Noise Pollution: Definition, sources, effects, prevention</li> </ul>	03	08
<b>Topic 6. Social Issues and Environment</b> <ul style="list-style-type: none"> <li>• Concept of development, sustainable development</li> <li>• Water conservation, Watershed management, Rain water harvesting: Definition, Methods and Benefits</li> <li>• Climate Change, Global warming, Acid rain, Ozone Layer Depletion, Nuclear Accidents and Holocaust: Basic concepts and their effect on climate</li> <li>• Concept of Carbon Credits and its advantages</li> </ul>	03	10
<b>Topic 7. Environmental Protection</b> Brief description of the following acts and their provisions: <ul style="list-style-type: none"> <li>• Environmental Protection Act</li> <li>• Air (Prevention and Control of Pollution) Act</li> <li>• Water (Prevention and Control of Pollution) Act</li> <li>• Wildlife Protection Act</li> <li>• Forest Conservation Act</li> </ul> Population Growth: Aspects, importance and effect on environment <ul style="list-style-type: none"> <li>• Human Health and Human Rights</li> </ul>	02	08
<b>Total</b>	<b>16</b>	<b>50</b>

**Practical:****Skills to be developed:****Intellectual Skills:**

1. Collection of information, data
2. Analysis of data
3. Report writing

**Motor Skills:**

1. Presentation Skills
2. Use of multi media

**List of Projects:**

**Note:** Any one project of the following:

1. Visit to a local area to document environmental assets such as river / forest / grassland / hill / mountain
2. Visit to a local polluted site: Urban/Rural/Industrial/Agricultural
3. Study of common plants, insects, birds
4. Study of simple ecosystems of ponds, river, hill slopes etc

**Prepare a project report on the findings of the visit illustrating environment related facts, analysis and conclusion. Also suggest remedies to improve environment.**

**Learning Resources:****Books:**

<b>Sr. No.</b>	<b>Author</b>	<b>Title</b>	<b>Publisher</b>
01	Anindita Basak	Environmental Studies	Pearson Education
02	R. Rajgopalan	Environmental Studies from Crises to Cure	Oxford University Press
03	Dr. R. J. Ranjit Daniels, Dr. Jagdish Krishnaswamy	Environmental Studies	Wiley India

**Course Name : Diploma in Medical Laboratory Technology**

**Course Code : ML**

**Semester : Fourth**

**Subject Title : Medical Bacteriology**

**Subject Code : 19408**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	03	03	100	50#	--	25@	175

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

**Rationale:**

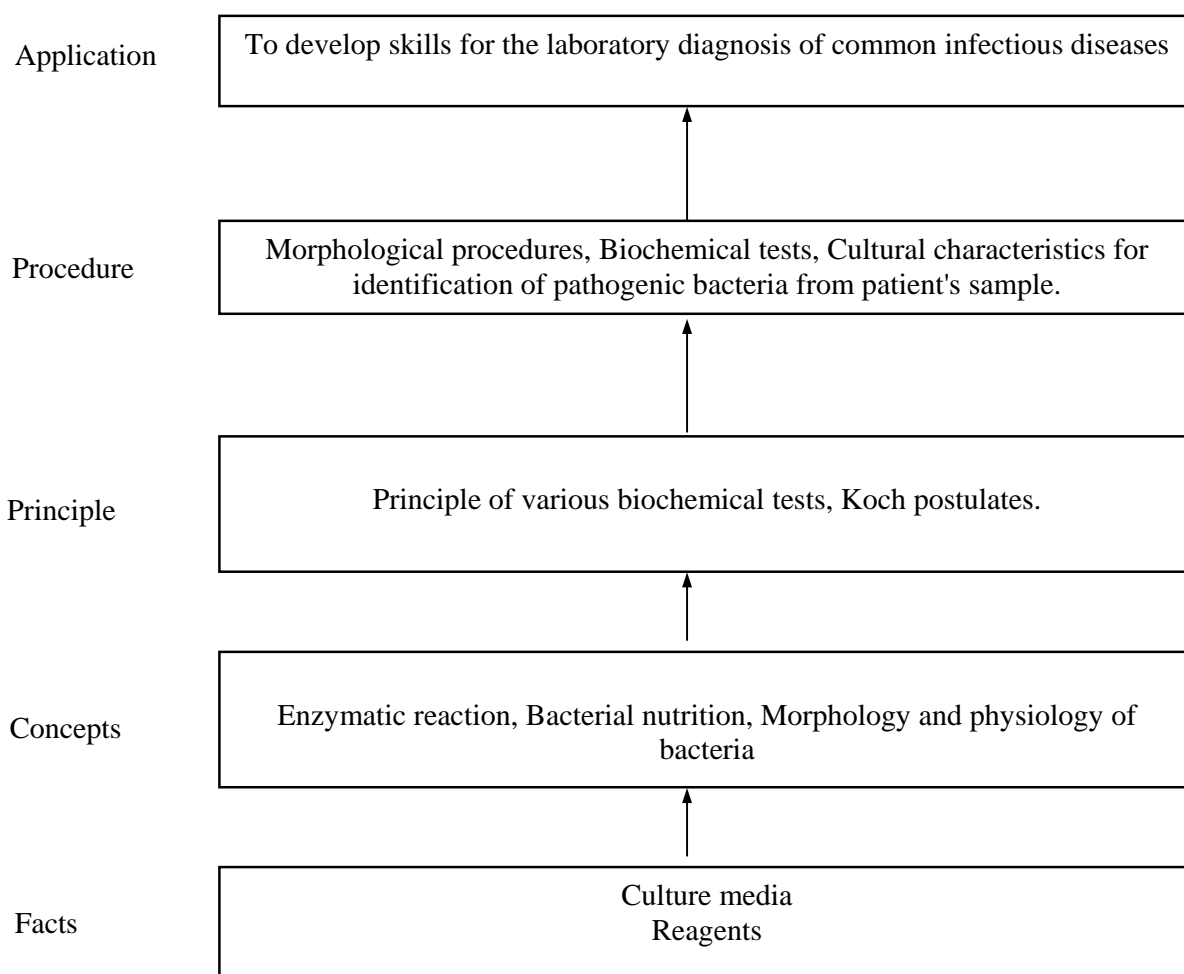
The principles of microbiology have wide applications in many branches of medicine. In a pathology laboratory, successful identification of pathogenic bacteria helps in Laboratory diagnosis of various communicable diseases. It also helps in finding suitable antimicrobial agent for treatment.

**General objectives:**

Students will be able to:

- 1) Understand basic principles in microbiology.
- 2) Identify various infectious bacteria.
- 3) Assist the physician in the diagnosis and treatment of patient with infectious disease.
- 4) Find Bacterial resistance to antimicrobial agents.

**Learning Structure:**



**Content: Theory**

<b>Topic and Contents</b>	<b>Hours</b>	<b>Marks</b>
<p><b>Topic 1:INTRODUCTION TO MEDICAL BACTERIOLOGY</b></p> <p><b>Specific objectives:</b></p> <ul style="list-style-type: none"> <li>➤ Write normal bacterial flora of the body.</li> <li>➤ State Safety code of practice for a microbiology Laboratory.</li> <li>➤ Describe Koch's postulates.</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Description of Normal Bacterial Flora of the Body.</li> <li>• Understanding of Safety Code In Microbiology Laboratory.</li> <li>• Description of Koch's Postulates.</li> </ul>	04	08
<p><b>Topic 2 : SPIROCHAETES</b></p> <p><b>Specific objective:</b></p> <ul style="list-style-type: none"> <li>➤ Write Morphology &amp; Cultural Characteristics of Treponema Pallidum, Leptospira</li> <li>➤ Describe Pathogenicity and Laboratory Diagnosis of Treponema Pallidum, Leptospira</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Morphology, Cultural Characteristics, Pathogenicity and Laboratory Diagnosis of Treponema pallidum</li> <li>• Morphology, Cultural Characteristics, Pathogenicity and Laboratory Diagnosis of Leptospira.</li> </ul>	12	16
<p><b>Topic 3: PATHOGENIC COCCI</b></p> <p><b>SPECIFIC OBJECTIVE:</b></p> <ul style="list-style-type: none"> <li>➤ Write Morphology &amp; Cultural Characteristics of Pyogenic cocci and Nesseria</li> <li>➤ Describe Pathogenicity and Laboratory Diagnosis of Pyogenic cocci and Nesseria</li> </ul> <p><b>Content:</b></p> <p><b>3.1 Gram Positive cocci</b></p> <ul style="list-style-type: none"> <li>• Morphology ,Cultural Characteristics, Pathogenicity, and Laboratory Diagnosis of <b>Pyogenic cocci</b> (staphylococcus aureus, Streptococcus pyogenes and pneumococci) <b>(Marks 16)</b></li> </ul> <p><b>3.2 Gram Negative cocci</b></p> <ul style="list-style-type: none"> <li>• Morphology, Cultural Characteristics, Pathogenicity and Laboratory Diagnosis of <b>Neisseria</b> (Meningococci and Gonococci). <b>(Marks 08)</b></li> </ul>	16	24
<p><b>Topic 4: PATHOGENIC BACILLI</b></p> <p><b>Specific Objective</b></p> <ul style="list-style-type: none"> <li>➤ Write Morphology &amp; Cultural Characteristics of Gram Positive and Gram Negative Bacilli</li> <li>➤ Describe Pathogenicity and Lab. Diagnosis of Anaerobic and Acid Fast Bacilli</li> </ul> <p><b>Content:</b></p> <p><b>4.1 Gram negative bacilli</b></p> <ul style="list-style-type: none"> <li>• Morphology, Cultural Characteristics, Pathogenicity and Laboratory Diagnosis of Escherichia Coli, Pseudomonas, Salmonella, Shigella, and Vibrio cholerae. <b>(Marks 08)</b></li> </ul>	20	32

<p><b>4.2 Gram positive Bacilli</b></p> <ul style="list-style-type: none"> <li>Morphology, Cultural Characteristics, Pathogenicity and Laboratory Diagnosis of <i>Corynebacterium diphtheriae</i> (<b>marks 08</b>)</li> </ul> <p><b>4.3 Gram positive anaerobes</b></p> <ul style="list-style-type: none"> <li>Morphology, Cultural Characteristics, Pathogenicity and Laboratory Diagnosis of <i>Clostridium tetani</i>, <i>Clostridium welchii</i>. (<b>Marks 08</b>)</li> </ul> <p><b>4.4 Acid fast Bacilli</b></p> <ul style="list-style-type: none"> <li>Morphology, cultural Characteristics, Pathogenicity and Laboratory Diagnosis of <i>Mycobacterium tuberculosis</i>, <i>Mycobacterium leprae</i>. (<b>Marks 08</b>)</li> </ul>		
<p><b>Topic 5: DIAGNOSTIC BACTERIOLOGY</b></p> <p><b>Specific Objective</b></p> <ul style="list-style-type: none"> <li>➤ Write about the processing of Urine, Stool, CSF, Pus and Throat swab for isolation of pathogenic bacteria.</li> <li>➤ Describe the methods for isolation of pathogenic bacteria from blood.</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>Collection, Storage, Processing and Disposal of Urine, and Stool Sample.</li> <li>Collection, Storage, Processing and Disposal of CSF, Pus, Throat swab sample.</li> <li>Collection, Storage, Processing and Disposal of Sputum sample.</li> <li>Collection, Storage, Processing and Disposal of Blood sample.</li> </ul>	12	20
<b>Total</b>	<b>64</b>	<b>100</b>

**Practical:****Skills to be developed****1) Intellectual Skills**

1. Isolate and identify disease causing agents.
2. Select antimicrobial drugs based on antimicrobial susceptibility tests.
3. Capacity to demonstrate immunological responses to the infection.
4. Select differential biochemical and confirmatory tests to be done to complete full identification.

**2) Motor Skills**

1. Collect and process various lab specimens.
2. Isolate pathogen in pure culture form, from patient's sample.
3. Examine specimen Macroscopically and Microscopically

**Practical:**

1. To perform antibiotic sensitivity test by disc diffusion method.
2. To perform VDRL test.
3. To perform slide Widal test.
4. To perform slide and tube coagulase test.
5. To perform bile solubility test.
6. Demonstration of important characteristics of pathogenic bacteria mentioned in Theory.
7. Collection and processing of
  - a) Blood
  - b) Urine
  - c) Stool

d) Sputum

8. To perform acid fast staining of sputum smear to detect M. tuberculosis.

**Learning Resources:****Books:**

Sr. No.	Title	Name of Author	Name of Publisher	Year of Publication
01	Medical Bacteriology	Dr. N.C.Dey and Dr. T.K.Dey	Allied agency Calcutta	2012
02	Text book of Microbiology	R.Ananthnarayan	Tata Mc Graw Hill Publishing company New Delhi	2010
03	Medical Lab. Tech.	Ramnik Sood	Jaypee Brothers Medical Publishers(p)Ltd	2009
04	Medical Lab. Science Theory and Practice	J. Ochi A. Kolhatkar	Tata Mc Graw Hill Publishing company New Delhi	2012

**Links:**

1. [www.en.wikipedia.org/wiki/ Safety Code](http://www.en.wikipedia.org/wiki/Safety_Code)
2. [www.en.wikipedia.org/wiki/ spirochaetes](http://www.en.wikipedia.org/wiki/spirochaetes)
3. [www.en.wikipedia.org/wiki/ pathogenic cocci](http://www.en.wikipedia.org/wiki/pathogenic_cocci)
4. [www.en.wikipedia.org/wiki/ pathogenic bacilli](http://www.en.wikipedia.org/wiki/pathogenic_bacilli)
5. [www.en.wikipedia.org/wiki/ diagnostic bacteriology](http://www.en.wikipedia.org/wiki/diagnostic_bacteriology)

**Equipments:**

Sr. No.	Name of equipment/M/C	Technical specifications	Total Quantity
1	Compound Microscope	10x Eye piece + 3 Objective lenses 10x, 45x, 100x with mechanical stage.	10
2	Centrifuge	With speed regulator, tubes & glass tubes.	02
3	Autoclave	Alluminium alloy with double safety valve, kW heater & pressure regulator.	01
4	Hot Air Oven.	18*18*18 inches, mild steel with thermostat & shelves.	01
5	Staining Racks	-----	05
6	Steam Steriliser	30x30x50 cms. stainless steel covered with asbestos.	01
7	Inspissator	45x35x50 cms for 50 tubes.	01
8	Incubator.	45x45x45 cms mild steel temperature range 05* C. to 60*C.	01
9	Analytical Balance	Capacity 0.2mg to 200 g.	02

**Course Name : Diploma in Medical Laboratory Technology****Course Code : ML****Semester : Fourth****Subject Title : Biochemistry- II****Subject Code : 19409****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	03	03	100	50#	--	25	175

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

**Rationale:**

Biochemistry is a science concerned with the chemical constituents of living cells and with the reactions and processes they undergo. Abnormalities in the chemical constituents are exhibited by various diseases. Therefore a technologist must have the knowledge of Clinical Biochemistry. So that he can understand the principle behind the biochemical reactions and can work in the laboratory with confidence.

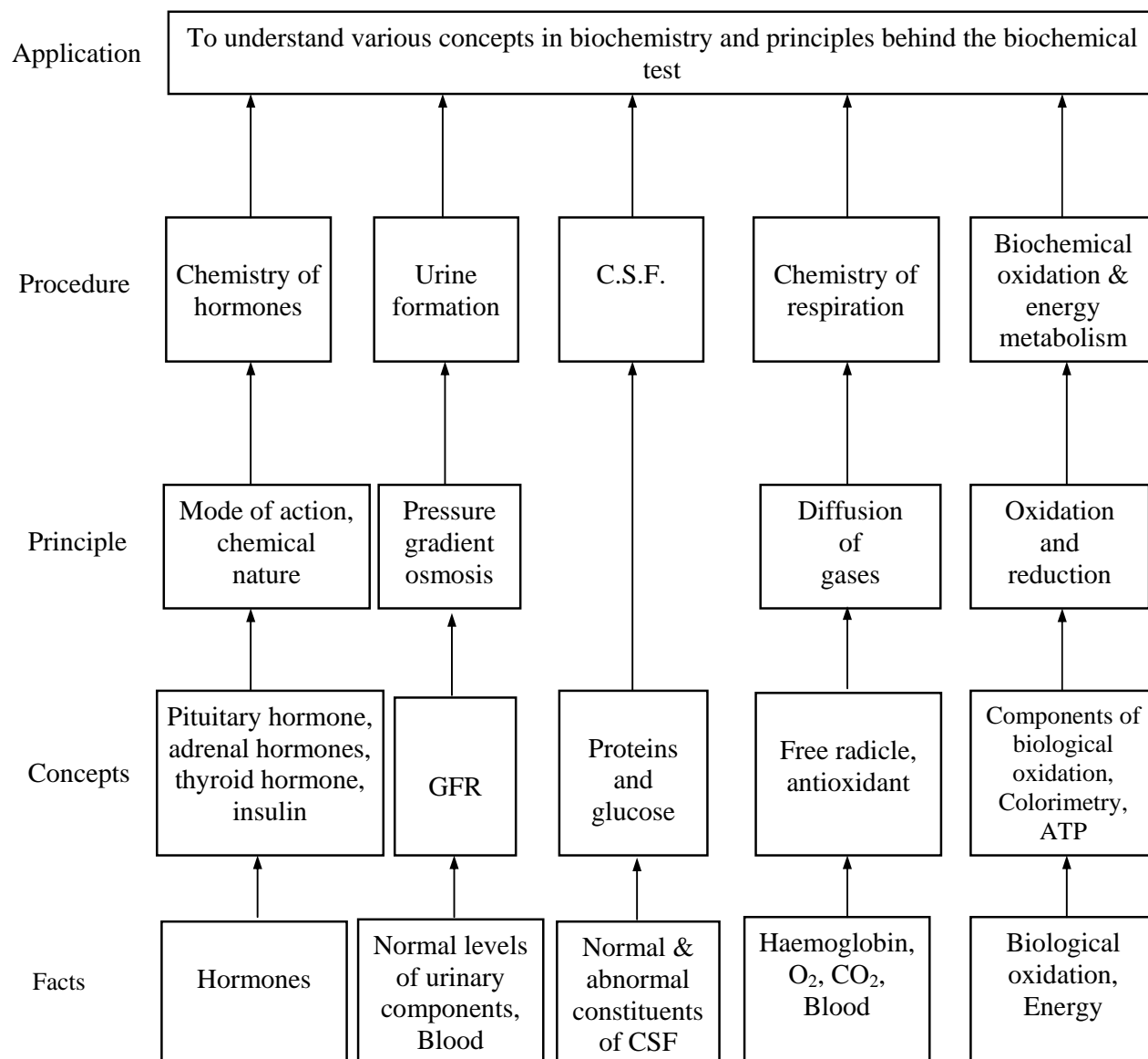
**General Objectives:**

The student will be able to:

- 1) Know disease at molecular level.
- 2) Study the chemical components of the body.
- 3) Estimate various chemical molecules, the level of which affects the normal and abnormal functions of body systems.
- 4) Find out the abnormal function at earlier stage of the disease and also helpful for prognostic purpose.



**Learning Structure:**



**Contents: Theory**

<b>Topic and Content</b>	<b>Hours</b>	<b>Marks</b>
<b>Topic 1: Urine Formation</b> <b>Specific Objective</b> <ul style="list-style-type: none"> <li>➤ <b>Enlist parts of nephron.</b></li> <li>➤ <b>Describe urine formation.</b></li> <li>➤ <b>Enlist constituents in urine.</b></li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• Structure of nephron and blood supply to the kidney and nephron.</li> <li>• Process of formation of urine (glomerular filtration, tubular reabsorption, tubular secretion)</li> <li>• Physical characteristics of urine (normal and abnormal). Normal and abnormal chemical constituents of urine and their clinical significance.</li> </ul>	08	18
<b>Topic 2: Non Steroidal Hormones</b> <b>Specific Objectives:</b> <ul style="list-style-type: none"> <li>➤ <b>Define hormones.</b></li> <li>➤ <b>State functions and deficiency diseases of hormones.</b></li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• Definition of Hormone and hormonal receptors.</li> <li>• Insulin- Structure, synthesis, physiological role and deficiency disease</li> <li>• Thyroid hormones- Synthesis, transport. Physiological role and deficiency diseases.</li> </ul>	08	18
<b>Topic 3: Steroidal Hormones</b> <b>Specific Objective</b> <ul style="list-style-type: none"> <li>➤ <b>Enlist adrenal, male and female hormones.</b></li> <li>➤ <b>State physiological role and deficiency diseases hormones.</b></li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• Adrenal hormones (medulla and cortex)—Physiological role and deficiency diseases.</li> <li>• Male and female sex hormones- Physiological role and abnormalities</li> </ul>	08	18
<b>Topic 4: Normal and Abnormal Constituent of Cerebro Spinal Fluid.</b> <b>Specific Objectives</b> <ul style="list-style-type: none"> <li>➤ <b>List normal and abnormal constituent.</b></li> <li>➤ <b>State significance of these constituents.</b></li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• Collection of c. s. f. and precaution to be taken while handling and processing.</li> <li>• Physical characteristics and functions.</li> <li>• Normal and abnormal constituents and their significance.</li> </ul>	04	10
<b>Topic 5: Chemistry of Respiration</b> <b>Specific objectives</b> <ul style="list-style-type: none"> <li>➤ <b>Write mechanism of diffusion of gases.</b></li> <li>➤ <b>Write process of O<sub>2</sub> and CO<sub>2</sub> transport.</b></li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• Define respiration, composition of inspired and expired air and partial pressure of gases in air.</li> <li>• Diffusion of gases (CO<sub>2</sub>, O<sub>2</sub>) in lung and tissue.</li> <li>• Transport of O<sub>2</sub> in blood, Transport of CO<sub>2</sub> in blood.</li> </ul>	10	18
<b>Topic 6: BIOLOGICAL OXIDATION</b>	10	18

<b>Specific Objectives</b> <ul style="list-style-type: none"> <li>➤ Enlist components of respiratory chain.</li> <li>➤ Write formation of A.T.P.</li> <li>➤ Define Basal Metabolic Rate (B.M.R)</li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• Definition and various components of respiratory chain. Its role in A.T.P. formation.</li> <li>• Definition of basal metabolism, basal conditions, Definition of B.M.R., its determination and factors affecting.</li> <li>• Definition of calorie, calorific value and its determination.</li> </ul>		
<b>Total</b>	<b>48</b>	<b>100</b>

**Practical:****Skills to be developed****Intellectual Skills**

1. Understand lab safety and its preventive measures.
2. Analyze and interpret of basic principles of working of various instruments.
3. Select proper instruments and study the working principle.
4. Test varies macromolecules in body sample.
5. Detect, estimate and interpret of abnormal constituents.

**Motor Skills**

1. Handle instruments properly.
2. Prepare reagents, solutions and Clean glassware
3. Develop experimental technique.

**List of Practical:**

1. Detection of Sugar and Protein in urine.
2. Estimation of sugar in urine
3. Estimation of uric acid in blood.
4. Detection of bile pigment (bilirubin and urobilinogen), bile salts and Bence Jones proteins in urine.
5. Estimation of Protein in CSF by Sulphosalicylic acid method
6. Estimation of Sugar in CSF by Folin- Wu method.
7. Estimation of Chloride in CSF by method of Schale.

**Learning Resources:****Books:**

Sr. No.	Title	Name of Author	Name of Publisher	Year of Publication
01	Fundamentals of Biochemistry	Deb and Deb	New Central Agency chinamanidas Lane, Calcutta	--
02	Text book of Biochemistry (2nd)	Ramkrishnan, Prasannan, Rajan	Orient Longman Ltd. 160, Anna Salai, Madras.	1994
03	Test book of (8th) Biochemistry	Rama Rao	L.K. & S. Publication Visakhapatnam	1998
04	Concise book of medical laboratory technology	Ramnik Sood	J.P.brothers, Medical publishers (p) Ltd., New Delhi	
05	Comprehensive viva	Deb and Deb	New central agency	1997

	and practice in biochemistry		Chinasamanidas Lane Calcutta	
06	Fundamental of Biochemistry	J.L. Jain	S. Chand & Company Ram Nagar, New Delhi	1999
07	Practical Biochemistry for students	Malhotra Varun Kumar	Jaypee Brothers, New Delhi	1989

**Web Sites:**

Wikipedia.org/wiki/hormones

Wikipedia.org/wiki/urine\_formation

Wikipedia.org/wiki/respiration

Wikipedia.org/wiki/cerebrospinal\_fluid

**Equipments:**

Sr. No.	Name of equipment/M/C	Technical specifications	Total Quantity
1	Colorimeter	With seven filters.	01
2	Centrifuge	With speed regulator, tubes & glass tubes.	01
3	Serological water bath.	With thermostat.	02
4	PH meter	Having PH range of PH 0.1 to 14, with automatic calibration & temperature control	01
5	Analytical Balance	Capacity 0.2mg to 200 g.	02

**Course Name : Diploma in Medical Laboratory Technology****Course Code : ML****Semester : Fourth****Subject Title : Medical Laboratory Instruments****Subject Code : 19410****Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
02	--	02	02	50		--	25@	75

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

**Rationale:**

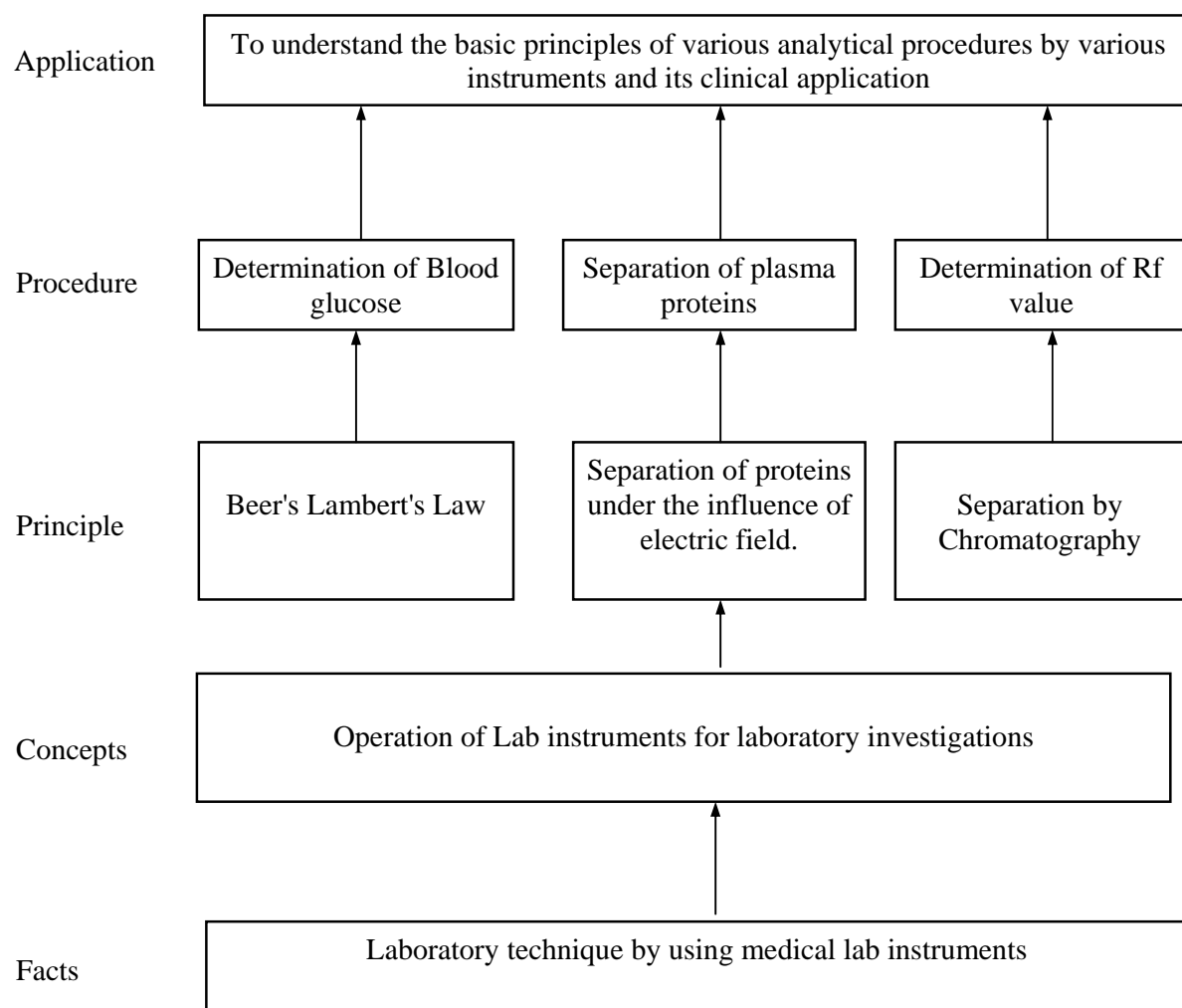
Modern pathology laboratories are using advanced techniques and fully automation in every department of laboratory. This subject will provide advanced instrumentation part including component, principle of working and procedure of routine analytical work by advanced instruments.

**General Objectives:**

The student will be able to:

- 1) Use automatic instruments.
- 2) Handle advanced instruments, its care and maintenance.
- 3) Work in Hi-Tech laboratories with full automation in haematology and blood banking, histopathology and biochemistry.

**Learning Structure:**



**Contents: Theory**

<b>Topic and Content</b>	<b>Hours</b>	<b>Marks</b>
<b>Topic 1: SPECTROPHOTOMETER AND COLORIMETER.</b> <b>Specific objectives</b> <ul style="list-style-type: none"> <li>➤ Define spectroscopy , photometer , colorimeter , spectrophotometer</li> <li>➤ Write statement of Beers and Lamberts law.</li> <li>➤ List applications of colorimeter and spectrophotometer</li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• Basic principle</li> <li>• Beer &amp; Lambert's Law (excluding derivations)</li> <li>• Basic components of Spectrophotometer and Applications</li> </ul>	10	14
<b>Topic 2 :FLAME PHOTOMETER</b> <b>Specific objectives</b> <ul style="list-style-type: none"> <li>➤ Define Photometer</li> <li>➤ Write components of Photometer</li> <li>➤ Write uses of Photometer</li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• Principle</li> <li>• Components</li> <li>• Use</li> </ul>	08	10
<b>Topic 3: Thin Layer Chromatography and Paper Chromatography</b> <b>Specific objectives</b> <ul style="list-style-type: none"> <li>➤ Define Thin Layer Chromatography (TLC)</li> <li>➤ Write principle of TLC</li> <li>➤ Write procedure of TLC.</li> <li>➤ List applications of TLC.</li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• Principle</li> <li>• Experimental technique</li> <li>• Applications</li> <li>• Principle of paper chromatography</li> <li>• Experimental technique</li> <li>• Applications</li> </ul>	08	16
<b>Topic 4: Electrophoresis (Gel Electrophoresis and Paper Electrophoresis)</b> <b>Specific objectives</b> <ul style="list-style-type: none"> <li>➤ Define Electrophoresis</li> <li>➤ Write principle of Gel Electrophoresis &amp; Paper Electrophoresis</li> <li>➤ Write procedure of Gel Electrophoresis &amp; Paper Electrophoresis.</li> <li>➤ List applications of Gel Electrophoresis &amp; Paper Electrophoresis.</li> </ul> <b>Content:</b> <ul style="list-style-type: none"> <li>• Principle</li> <li>• Working</li> <li>• Application</li> </ul>	06	10
<b>Total</b>	<b>32</b>	<b>50</b>

**Practical:**  
**Skills to be developed**

**Intellectual Skills**

1. Understand lab safety and its preventive measures.
2. Analyze and interpret of basic principles of working of various instruments.
3. Select proper instruments and study the working principle.
4. Understand advance technique and modern trends.

**Motor Skills**

1. Handle instruments properly
2. Analyze routine work by various advanced instruments.
3. Detect analysis and estimate various parameters by using proper instrument.
4. Develop experimental technique.

**List of Practical:**

1. To standardize colorimeter
2. To calculate unknown concentration of given solution using colorimeter
3. To make correct choice of filter in colorimeter
4. To demonstrate working of paper chromatography.
5. To demonstrate the relationship between optical density and transmittance
6. To detect pheno and Penta Barbitone by Thin Layer Chromatography
7. To demonstrate working of Gel Electrophoresis

**Learning Resources:**

**Books:**

Sr. No.	Title	Name of Author	Name of Publisher	Year of Publication
01	Medical Laboratory Technology	A.H. Patel	Navneet Prakashan	1994
02	Instrumental Method of Chemical Analysis	Chatwal Anand	Himalaya Publishing House	1995
03	Vogel's Textbook of Quantitative Inorganic Analysis	J. Basset, R.C. Demmy, G.H. Jeffery, J. Mendhm	English Language Book Society	5th edition 1995
04	Practical Pharmaceutical Chemistry	A.H. Beckett, J.B. Stenlake	The Athlone Press of London	1996

**Websites:**

1. Medical laboratory instruments, blood bank equipments  
[www.skylabinstrument.com](http://www.skylabinstrument.com)
2. Laboratory instruments  
[www.shriagencies.co.in/lab\\_instruments](http://www.shriagencies.co.in/lab_instruments)
3. Spectroscopy  
[www.britannica.com/...eched/topic558901/spectroscopy](http://www.britannica.com/...eched/topic558901/spectroscopy)
4. Medical laboratory instruments  
[www.ehow.com/....\\_6676686med lab instruments.html](http://www.ehow.com/...._6676686med_lab_instruments.html)



**Equipments:**

<b>Sr. No.</b>	<b>Name of equipment/M/C</b>	<b>Technical specifications</b>	<b>Total Quantity</b>
1	Colorimeter	With seven filters.	01
2	Distillation unit	With boiler, condenser and receiver.	01
3	Glass ware	Test tubes, Pasteur pipette and cuvette	sufficient

**Course Name : Diploma in Medical Laboratory Technology**

**Course Code : ML**

**Semester : Fourth**

**Subject Title : Clinical Medicine**

**Subject Code : 19411**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	02	--	03	100	--	--	50@	150

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of test marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

**Rationale:**

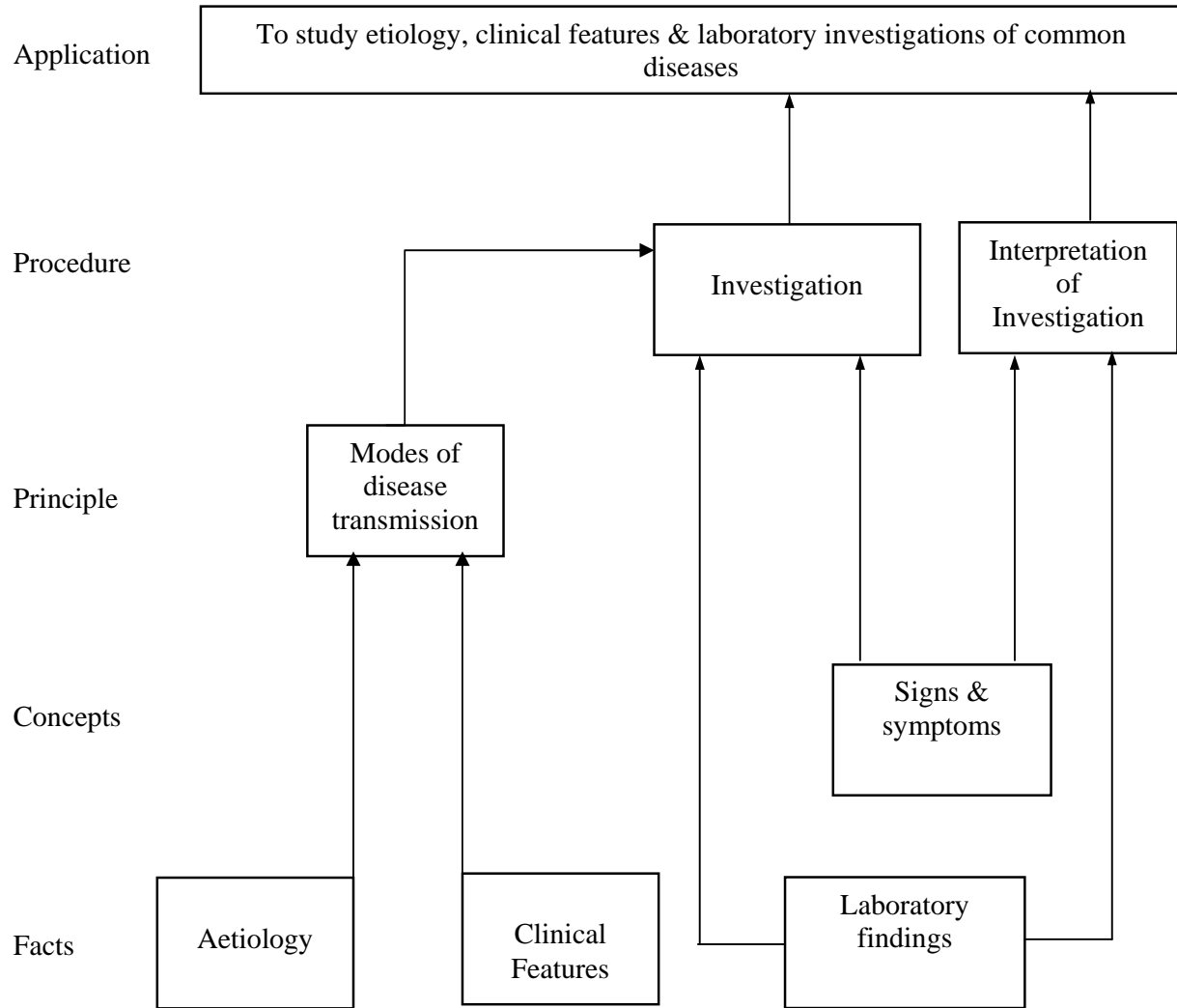
Clinical medicine is the backbone of all medical technology courses. Students come in regular & repeated contact with patient and he/she has to act as medical counselor. Hence, he/she should have elementary knowledge of common diseases.

**General objectives:**

Students will be able to:

- 1) Understand aetiology & clinical features of various disease.
- 2) Understand laboratory investigations of various diseases.

**Learning Structure:-**



**Content: Theory**

Topic and Content	Hours	Marks
<p><b>Topic 1: Bacterial Diseases</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ State aetiology of tuberculosis, cholera, typhoid, rheumatic fever and meningitis.</li> <li>➤ Write clinical features of tuberculosis, cholera, typhoid, rheumatic fever and meningitis.</li> <li>➤ Enlist the investigations for diagnosis of tuberculosis, cholera, typhoid, rheumatic fever and meningitis.</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Aetiology, clinical features and enlisting the investigations of <b>Tuberculosis.</b></li> <li>• Aetiology, clinical features and investigations of <b>Cholera.</b></li> <li>• Aetiology, clinical features and investigations of <b>Typhoid fever.</b></li> <li>• Aetiology, clinical features and investigations of <b>Rheumatic fever.</b></li> <li>• Aetiology, clinical features and investigations of <b>Meningitis.</b></li> </ul>	16	24
<p><b>Topic 2 : Viral &amp; Protozoal Diseases</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ State aetiology of Measles, Malaria, Amoebiasis and Poliomyelitis.</li> <li>➤ State clinical features of Measles, Malaria, Amoebiasis and Poliomyelitis.</li> <li>➤ Enlist lab investigation of Measles, Malaria, Amoebiasis and Poliomyelitis.</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Aetiology, clinical features and enlisting the investigations of <b>Measles.</b></li> <li>• Aetiology, clinical features and enlisting the investigations of <b>Malaria.</b></li> <li>• Aetiology, clinical features and enlisting the investigations of <b>Amoebiasis.</b></li> <li>• Aetiology, clinical features and enlisting the investigations of <b>Poliomyelitis.</b></li> </ul>	15	20
<p><b>Topic 3: Worm Infestations &amp; Std</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ State aetiology of Ankylostomiasis, Gonorrhoea, Filariasis, Syphilis and AIDS.</li> <li>➤ State clinical features of Ankylostomiasis, Gonorrhoea, Filariasis Syphilis and AIDS.</li> <li>➤ Enlist lab investigation of Ankylostomiasis, Gonorrhoea, Filariasis Syphilis and AIDS.</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Aetiology, clinical features and enlisting the investigations of <b>Ankylostomiasis.</b></li> <li>• Aetiology, clinical features and enlisting the investigations of <b>Filariasis.</b></li> <li>• Aetiology, clinical features and enlisting the investigations of <b>Gonorrhoea.</b></li> <li>• Aetiology, clinical features and enlisting the investigations of <b>Syphilis.</b></li> <li>• Aetiology, clinical features and enlisting the investigations of <b>AIDS.</b></li> </ul>	15	20

<p><b>Topic 4: Common Non Infectious Diseases-I</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ State aetiology of Peptic ulcer, Pneumonia, Hypertension.</li> <li>➤ State clinical features of Peptic ulcer, Pneumonia, Hypertension.</li> <li>➤ Enlist lab investigation of Peptic ulcer, Pneumonia, Hypertension.</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Aetiology, clinical features and enlisting the investigations of <b>Peptic ulcer.</b></li> <li>• Aetiology, clinical features and enlisting the investigations of <b>Pneumonia.</b></li> <li>• Aetiology, clinical features and enlisting the investigations of <b>Hypertension.</b></li> <li>• Aetiology, clinical features and enlisting the investigations of <b>Ischaemic Heart Disease.</b></li> </ul>	09	16
<p><b>TOPIC 5: Common Non Infectious Diseases-II</b></p> <p><b>Specific Objectives:</b></p> <ul style="list-style-type: none"> <li>➤ State aetiology of Rheumatoid Arthritis, Acute glomerulonephritis, Gout and Diabetes Mellitus.</li> <li>➤ State clinical features of Rheumatoid Arthritis, Acute glomerulonephritis, Gout and Diabetes Mellitus.</li> <li>➤ Enlist lab investigation of Rheumatoid Arthritis, Acute glomerulonephritis, Gout and Diabetes Mellitus.</li> </ul> <p><b>Content:</b></p> <ul style="list-style-type: none"> <li>• Aetiology, clinical features and enlisting the investigations of <b>Rheumatoid Arthritis.</b></li> <li>• Aetiology, clinical features and enlisting the investigations of <b>Acute glomerulonephritis.</b></li> <li>• Aetiology, clinical features and enlisting the investigations of <b>Gout.</b></li> <li>• Aetiology, clinical features and enlisting the investigations of <b>Diabetes Mellitus.</b></li> </ul>	09	20
<b>Total</b>	<b>64</b>	<b>100</b>

**Tutorial:**

Two assignments on each topic

**Learning Resources:****Books:**

Sr. No.	Title	Name of Author	Name of Publisher	Year of Publication
01	Park's text book of preventive & social medicine	K Park	M/S Banarsidas Bhanot Publications Jabalpur	20th edition June 2012
02	David Sons Principle & practice of medicine	John Macleod Christopher Edward Ian Bouchier	ISBN-0443-40567 Long man group	2012
03	Medicine for Students	Aspi Golwala	Dr. A. F. Golwala Eros building Churchgate Mumbai - 400020	2012
04	Practical of Medicine	P. J. Mehta	--	2012

**Links:**

1. [www.en.wikipedia.org/wiki/bacterial diseases](http://www.en.wikipedia.org/wiki/bacterial_diseases)
2. [www.en.wikipedia.org/wiki/ \*\*viral & protozoal diseases\*\*](http://www.en.wikipedia.org/wiki/viral_%26_protozoal_diseases)
3. [www.en.wikipedia.org/wiki/ \*\*worm infestations & std\*\*](http://www.en.wikipedia.org/wiki/worm_infestations_%26_std)
4. [www.en.wikipedia.org/wiki/noninfectiousdiseases](http://www.en.wikipedia.org/wiki/noninfectiousdiseases)

**Course Name : Diploma in Medical Laboratory Technology**

**Course Code : ML**

**Semester : Fourth**

**Subject Title : Professional Practices-II**

**Subject Code : 19059**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
--	--	03	--	--	--	--	50@	50

**Rationale:**

Most of the diploma holders join Pathology laboratory /Hospitals. Due to globalization and competition in the Pathology laboratory /Hospital and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence, ability to communicate and to develop learning to learn skills.

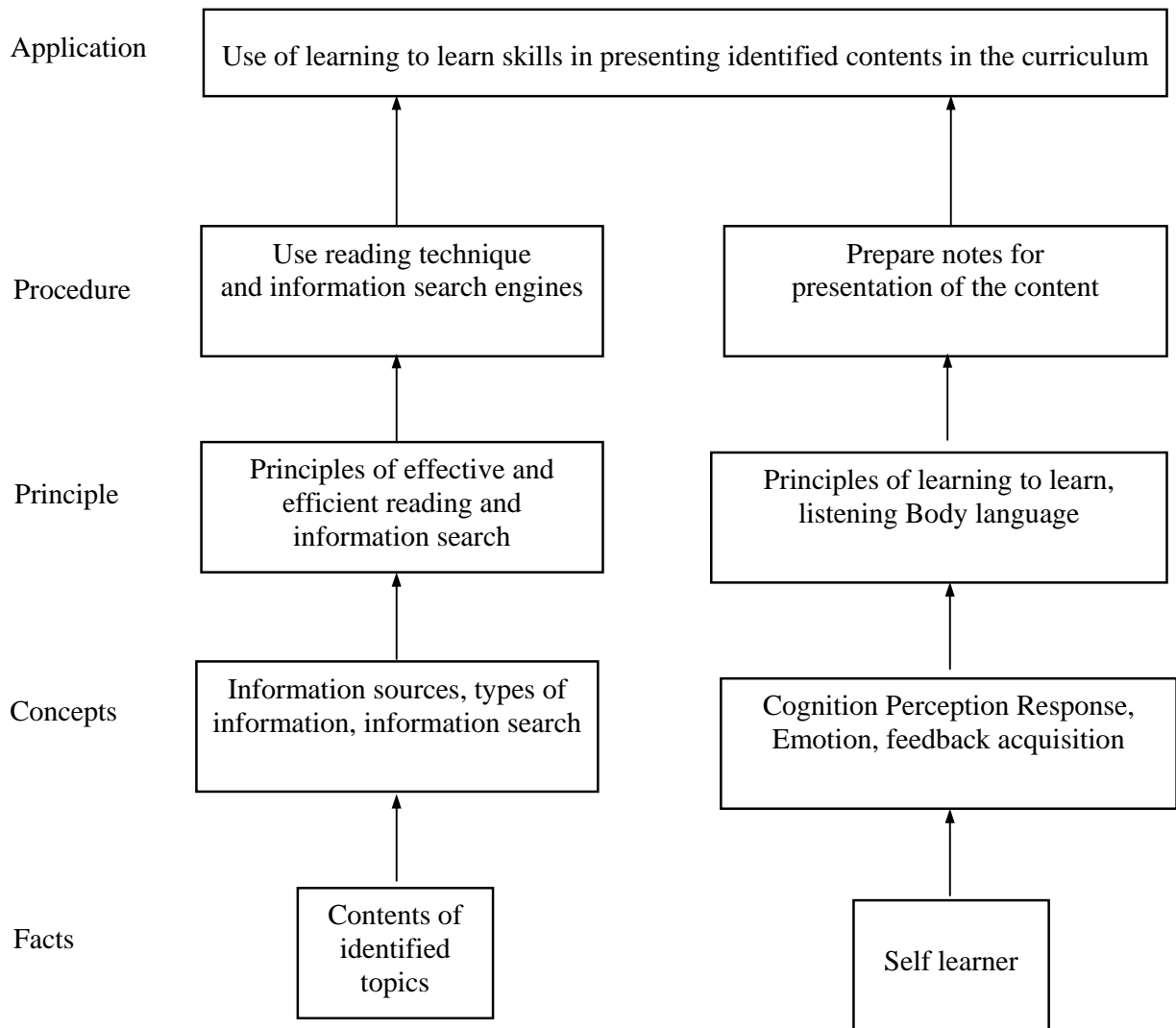
Visits to Pathology laboratories/ Hospitals, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

**General Objectives:**

Students will be able to:

1. Acquire information from different sources.
2. Prepare notes for given topic.
3. Present given topic in a seminar.
4. Interact with peers to share thoughts.
5. Prepare a report on pathology laboratory/Hospital visit, expert lectures.

**Learning Structure:**





**Contents: Theory**

Activity	Hours
<p>❖ <b>INDUSTRIAL VISITS - VISITS TO PATHOLOGY LAB</b></p> <p>Structured visits to pathology laboratory should be arranged and report of the same should be submitted by the individual student, to form part of the term work. Visits to any one of the following</p> <ul style="list-style-type: none"> <li>• Pathology laboratory</li> <li>• Hi-tech pathology laboratory</li> <li>• Hospitals (different laboratories)</li> </ul>	12
<p>❖ <b>LECTURES OF FIELD EXPERTS</b></p> <p>To be organised on any three topics of the following suggested areas or any other suitable topics.</p> <ul style="list-style-type: none"> <li>• AIDS Awareness</li> <li>• Time management.</li> <li>• Body language.</li> <li>• Communication skill and professional ethics.</li> </ul>	12
<p>❖ <b>GROUP DISCUSSION</b></p> <p>The students should discuss in group of six to eight students and write a brief Report on the same as a part of term work.</p> <p>The topic for group discussions may be selected by faculty members some of the suggested topic</p> <ul style="list-style-type: none"> <li>• Global warming.</li> <li>• Recent discoveries in Medical field</li> <li>• First Aid.</li> <li>• Any other topics of the students interest from the subject of fourth semester with the consent of the teacher.</li> </ul>	12
<p>❖ <b>SEMINAR</b></p> <p>Seminar topics should be related to the subjects of Fourth semester each student shall submit a report of at least ten pages and deliver a seminar for ten minutes.</p>	12
<b>Total</b>	<b>48</b>

**Students shall prepare the write up for all above activities and submit as a Term work**