MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

COURSE NAME : DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : ML

DURATION OF COURSE: SIX SEMESTERS **WITH EFFECT FROM 2014-15**

SEMESTER : FIFTH **DURATION : 16 WEEKS**

PATTERN : FULL TIME - SEMESTER **SCHEME : G**

SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME								SW (19500)
							PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)	
				TH	TU	PR		Max	Min	Max	Min	Max	Min	Max	Min
1	Medical Virology & Mycology	MVM	19512	03	--	03	03	100	40	--	--	--	--	50@	10	
2	Clinical Biochemistry	CBI	19513	03	--	03	03	100	40	50@	20	--	--	--	--	
3	Histopathology & Cytopathology	HCY	19514	03	--	03	03	100	40	50@	20	--	--	--	--	**50**
4	Basic Hematology	BHE	19515	03	--	03	03	100	40	50#	20	--	--	25@	10	
5	Serology	SER	19516	03	--	03	03	100	40	50#	20	--	--	25@	10	
6	Behavioral Science $	BSC	17075	01	--	02	--	--	--	--	--	25#	--	25@	10	
			TOTAL	**16**	**--**	**17**	**--**	**500**	**--**	**200**	**--**	**25**	**--**	**125**	**--**	**50**

Student Contact Hours Per Week: **33 Hrs.**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks **: 900**

@ Internal Assessment, # External Assessment, $ - Common to All Conventional Diploma, [ ] No Theory Examination.

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Termwork, SW- Sessional Work.

- 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).
- Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- Code number for TH, PR, OR & TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

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TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

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PATTERN : FULL TIME - SEMESTER **SCHEME : G**

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							PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)		
				TH	TU	PR		Max	Min	Max	Min	Max	Min	Max	Min	
1	Medical Parasitology	MPA	19612	03	--	03	03	100	40	--	--	--	--	50@	20	**50**
2	Applied Biochemistry	ABI	19613	03	--	03	03	100	40	50#	20	--	--	25@	10	
3	Clinical Pathology	CPA	19614	03	--	03	03	100	40	50#	20	--	--	25@	10	
4	Advance Haematology	AHA	19615	03	--	03	03	100	40	50@	20	--	--	--	--	
5	Immunology	IMM	19616	03	--	03	03	100	40	--	--	--	--	50@	20	
6	Professional Practices – III	PPR	19902	--	--	03	--	--	--	--	--	--	--	50@	20	
			TOTAL	**15**	**--**	**18**	**--**	**500**	**--**	**150**	**--**	**--**	**--**	**200**	**--**	**50**

Student Contact Hours Per Week: **33 Hrs.**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks **: 900**

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Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Termwork, SW- Sessional Work.

- 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).
- Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- Code number for TH, PR, OR & TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

Course Name : Diploma in Medical Laboratory Technology

Course Code : ML

Semester : Fifth

Subject Title : Medical Virology & Mycology

Subject Code : 19512

Teaching and Examination Scheme:

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

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:

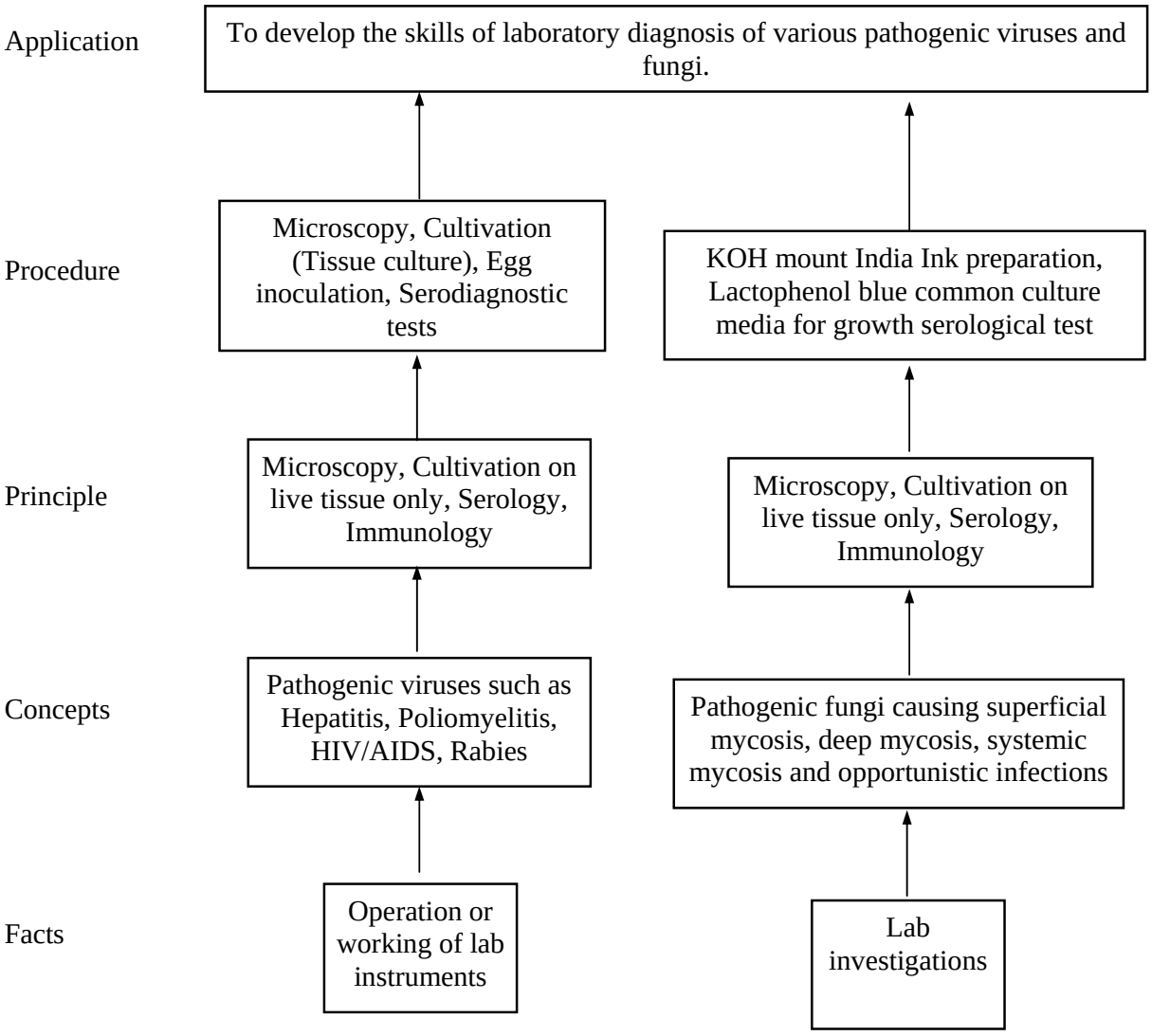
The medical importance of viruses and fungi lies in their capacity to cause a wide variety of Human diseases ranging from minor ailments such as common cold, ringworm infections to Highly fatal diseases such as AIDS, yellow fever or cerebral cryptococosis respectively. Study of these microbes helps in pinpointing etiological agents of infectious diseases as well as for epidemiology and vaccine preparation.

General objectives:

The students will be able to

1. Understand application of basic principles in virology and mycology.
2. Understand laboratory diagnosis of common viral and mycotic diseases.

Learning Structure:



Contents: Theory

Topic and Content	Hours	Marks
Topic 1: Introduction of Viruses **Specific Objectives:** ➢ Describe properties of viruses ➢ Write methods of cultivation of viruses ➢ Describe laboratory Diagnosis of viral infection **Content:** • Definition, general properties of viruses. • Methods of cultivation, identification of viral growth in cell culture by various method • Methods of Lab diagnosis of viral infections.	05	20
Topic 2: Herpes, Picorna, Rhabdo and Arboviruses **Specific Objective:** ➢ Write Morphology, cultivation, Pathogenesis and lab diagnosis of Herpes and Picorna virus ➢ Write Morphology, cultivation, Pathogenesis and lab diagnosis of Rhabdoviruses and Arboviruses **Content:** • Morphology, cultivation, Pathogenesis and lab diagnosis of Herpes virus - Herpes simplex virus (type I and type II) • Morphology, cultivation, Pathogenesis and lab diagnosis of Varicella - zoster virus. • Morphology, cultivation, Pathogenesis and lab diagnosis of Picorna virus - Poliovirus • Morphology, cultivation, Pathogenesis and lab diagnosis of Rhabdovirus - Rabies virus. • Morphology, cultivation, Pathogenesis and lab diagnosis of Yellow fever and Dengue virus.	10	16
Topic 3: Hepatitis, Hiv, Myxoviruses **Specific Objective:** ➢ Write Morphology, cultivation, Pathogenesis and lab diagnosis of Hepatitis A&B, and HIV virus ➢ Write Morphology, cultivation, Pathogenesis and lab diagnosis of Influenza, Measles and Mumps virus **Content:** • Morphology, cultivation, Pathogenesis and lab diagnosis of Hepatitis A and B virus. • Morphology, cultivation, Pathogenesis and lab diagnosis of HIV virus • Morphology, cultivation, Pathogenesis and lab diagnosis of Myxovirus. i) Orthomyxovirus - influenza virus ii) Paramyxovirus - Measles virus and mumps virus.	10	16
Topic 4: General Mycology and Superficial Mycosis **Specific Objective :** ➢ Write Morphology of Medically important Fungi ➢ Classify Medically important Fungi ➢ Write Pathogenesis, Lab. Diagnosis of Medically important **Fungi** **Content:** **4.1 <u>General Mycology</u> (Marks 12)** • Fungus (Introduction, Classification)	10	24

• Fungal Infections (Classification) • Laboratory Techniques: 1. Collection & transportation of specimens 2. Direct Examination(KOH Preparation, 3. Negative Staining with India ink &10% Nigrosin), 4. common culture media SAB, BHIA, BHIBA, cornmeal 5. Processing of clinical specimen(Microscopy, Media inoculation, Incubation, Identification, Growth rate, colony morphology, Wet mount, Tape Technique, slide culture, Germ tube test) **4.2 <u>Superficial Mycoses</u> (Marks 12)** • Morphology and Laboratory diagnosis of **Surface Infections** Tinea Versicolor, Tinea Nigra, Piedra • Morphology and Laboratory diagnosis of **Cutaneous Infections** (Dermatophytosis) Trichophyton, Microsporum Epidermophyton		
Topic 5: Subcutaneous, Systemic, Opportunistic, Mycosis **Specific Objective :** ➢ Write Morphology of Medically important Fungi ➢ Classify Medically important Fungi ➢ Write Pathogenesis, Lab. Diagnosis of Medically important Fungi **Content:** **5.1 <u>Subcutaneous Mycoses</u> (Marks 08)** • Morphology and Laboratory diagnosis of Mycetoma • Morphology and Laboratory diagnosis of Rhinosporidiosis **5.2 <u>Systemic Mycosis</u> (Marks 08)** • Morphology and Laboratory diagnosis of Blastomycosis • Morphology and Laboratory diagnosis of Histoplasmosis. **5.3 <u>Opportunistic Mycoses</u> (Marks 08)** • Morphology and Laboratory diagnosis of Aspergilosis • Morphology and Laboratory diagnosis of Zygomycosis. • Morphology and Laboratory diagnosis of Cryptomycosis • Morphology and Laboratory diagnosis of Candidiasis	13	24
Total	**48**	**100**

Practical:
Skills to be developed

Intellectual Skills

1. Understand immunological and serological tests to confirm lab diagnosis.
2. Interpret Results.

Motor Skills

1. Perform microscopy of stained and unstained preparation.
2. Isolate and identify the pathogenic fungi on artificially prepared media.
3. Record the distinguishing morphological features of pathogenic fungi.
4. Perform a technique to identify the unknown virus by known specific antibody or detection of unknown antibodies with the help of known viral antigens.

List of Practical:

1. Preparation of Giemsa stain and detection of inclusion body by it.
2. Demonstration of various methods of cultivation of virus (tissue culture and egg inoculation).
3. Collection and transportation of virological specimens.
4. Demonstration of negri bodies in Brain smear.
5. Australia antigen test (kit method).
6. Detection of Australia antigen by chromatographic immunoassay method.
7. Demonstration of HIV antibody by ELISA.
8. Demonstration of fungus by
    a) Wet mount in water.
    b) Wet mount in 10% KOH solution.
    c) Lactophenol blue.
    d) Slide culture technique.
9. Demonstration of cryptococcus neoformans by India Ink Preparation.
10. Preparation of **Sabraud's Dextrose Agar, corn meal Agar**, and **potato dextrose Agar** for the growth of yeast, yeast like fungi and filamentous moulds.

Learning Resource:
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	1984
02	Text book of Microbiology	Anantnarayan, Chakrawarti	Tata Mc Graw Hill Publishing company New Delhi	--
03	Medical laboratory Technology	Ramnik Sood	Jaypee Brothers, Medical Publishers(p)Ltd	2009
04	Medical Lab science Theory and practice	J. Ocheri, A. Kolhatkar	Tata Mc Graw Hill Publishing company New Delhi	2000

Links:

1. www.en.wikipedia.org/wiki/virus
2. www.en.wikipedia.org/wiki/herpes
3. www.en.wikipedia.org/wiki/rna/virus
4. www.en.wikipedia.org/wiki/mycology

List of 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	Tissue culture bottle.	Borosil glass bottle with square base, narrow neck & four walls	05
4	Seitz filter.	Stainless steel with asbestos disc.	01
5	Inoculation Hood Cabinet.	Used for safe methods of inoculation.	01
6	Incubator.	45x45x45 cms mild steel temperature range 05* C. to 60*C.	01
7	Test kits	Australia antigen, HIV, Dengue DAY 1.	01 each
8	Stains	Giemsa, Lactophenol cotton blue, Indian ink.	01each
9	Agars	Sabraud's dextrose agar, Cornmeal agar	01each

Course Name : Diploma in Medical Laboratory Technology

Course Code : ML

Semester : Fifth

Subject Title : Clinical Biochemistry

Subject Code : 19513

Teaching and Examination Scheme:

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

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:

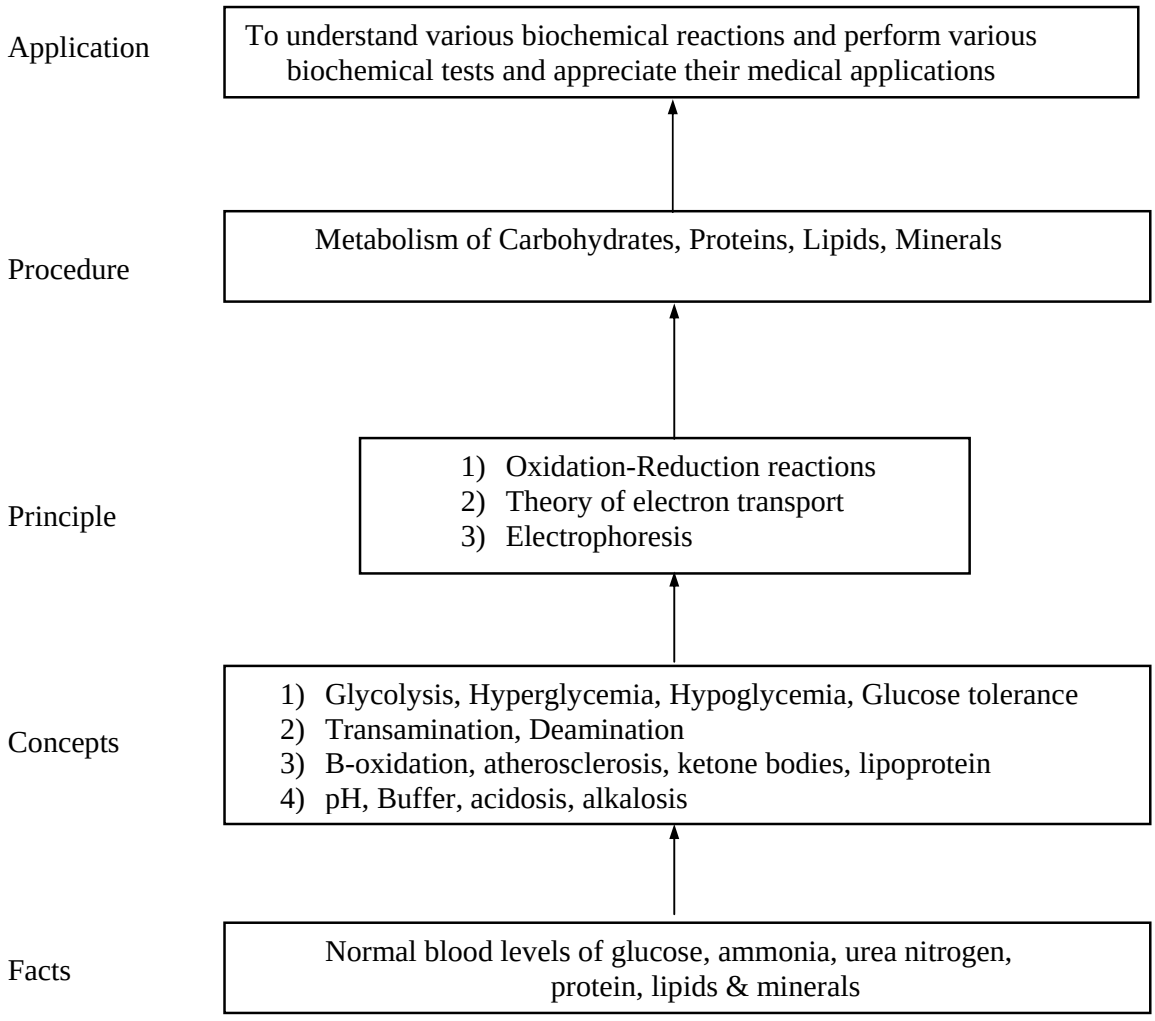
Biochemistry is a science concerned with the chemical constituents of living cells and with the reactions and processes they undergo. Abnormalities in the chemical constituents are exhibited by various diseases. Therefore a technologist must have the knowledge of Clinical Biochemistry. So that he can 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 is at molecular level.
2. Know chemical components of the body.
3. Understand detection of biomolecules in clinical specimen like blood, urine, CSF and other body fluids.
4. Detect abnormal constituent for the diagnosis of diseases.

Learning Structure:



Contents: Theory

Topic and Content	Hours	Marks
Topic 1: Metabolism Of Carbohydrates. (Structures Not Necessary) and blood and urine sugar. **1.1 Carbohydrate metabolism 16 Marks** **Specific objectives-** ➢ **Draw and describe various pathways.** ➢ **State importance of pathways** ➢ **Write mechanism of blood sugar regulation.** ➢ **Write causes of abnormalities.** **Contents:** • Draw and describe Glycolysis & Krebs's cycle • Draw and describe Glycogenesis • Draw and describe Glycogenolysis • Draw and describe Gluconeogenesis **1.2 Blood and urine sugar 12 Marks** • Sources of blood sugar, normal blood sugar level and regulation of it's concentration in blood, • Hyperglycemia, Hypoglycemia, Glycosuria, Glucose tolerance test, Diabetes mellitus, glycosylated hemoglobin.	12	28
Topic 2: Metabolism of Protein (Structures Not Necessary) and nitrogenous substances in blood and urine. **2.1 Metabolism of proteins 12 Marks** **Specific Objectives** ➢ State mechanism of urea synthesis. ➢ Write reactions in protein metabolism. ➢ Enlist nitrogenous substances in blood and urine. ➢ Write significance of their value in blood and urine. **Contents:** • Transamination- Definition and reaction. • Oxidative deamination – Definition and reaction. • Ammonia transport in blood • Urea synthesis(Ornithine cycle) **2.2 Nitrogenous substances in blood and urine. 12 Marks** • Nitrogen Balance- Definition, positive, negative nitrogen balance and endogenous nitrogen. • Nitrogen constituents of Blood (Protein and non Protein) and their clinical importance. • Normal and abnormal nitrogenous substances in urine.	12	24
Topic 3: Metabolism of Lipids (Structures not Necessary) and lipoproteins. **3.1 Metabolism of lipids. 12 Marks** **Specific objectives-** ➢ Draw and explain various pathways. ➢ Write causes of cholesterolemia. ➢ Enlist lipoproteins and prostaglandins. ➢ Write method of lipoprotein separation. **Contents:** • Plasma lipids and their normal levels • B - Oxidation of Fatty acids and ketone bodies formation.	12	24

• Cholesterol Synthesis, cholesterolemia, and atherosclerosis **3.2 Lipoproteins and Prostaglandins. 12 Marks** • Lipoprotein - Definition, classification, method of separation, electrophoretic pattern and abnormalities. • Prostaglandin - Definition , major types and important clinical functions		
Topic 4: Water and Mineral Metabolism and acid base balance. **Specific Objectives:** ➢ Enlist routes of water intake and output. ➢ Write abnormalities of water. ➢ Write sources and functions of electrolytes. ➢ Write abnormalities of electrolytes ➢ Define pH, acidosis and alkalosis. ➢ Write mechanism of acid base balance in blood. **Contents:** **4.1 Water metabolism --08 Marks** • Routes of water intake • Routes of water output. • Abnormalities – Dehydration and toxicity of water. **4.2 Mineral metabolism--08 Marks** • Sodium, potassium, chloride—Sources, daily requirement, blood level, functions and abnormalities. **4.3 Acid base balance -- 08 Marks** • Blood pH—Definition, sources of acid and bases in blood, Hander son - Hasselbach equation. • Role of buffer, kidney and lungs in the regulation of blood pH • Abnormalities of blood PH-- Acidosis and Alkalosis.	12	24
Total	**48**	**100**

Practical:
Skills to be developed

Intellectual Skills

1. Identify normal and abnormal constituent of body fluids.
2. Select proper instruments for analysis, estimation.
3. Interpret of the results.

Motor Skills

1. Prepare and standardize of volumetric solutions.
2. Apply Principle and follow the procedure of various estimation.
3. Plot the graph and find out normal and abnormal values.

List of Practical:

1. Determination of blood sugar (fasting and post meal) by GOD, POD method.
2. Determination of blood sugar by Glucometer
3. Determination of Glycosylated Haemoglobin
4. Estimation of Albumin to globulin ratio (A : G Ratio) by Biuret method.
5. SGOT determination.
6. SGPT determination
7. Estimation of serum triglyceride
8. Estimation of total cholesterol

9. Estimation of HDL cholesterol

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 chinasamanidas Lane Calcutta	2009
02	Text book of Biochemistry (2nd)	Ramkrishman, 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 M.L.T.	Ramnik Sood	J.P. Brothers, Medical publishers , P .Ltd., New Delhi.	1993
05	Comprehensive viva and practice in biochemistry	Deb and Deb	New central agency Chinasamanidas Lane Calcutta	1997
06	Text book of M.L.T.	P.B.Godkar D.P.Godkar	Bhalani Publishing house, Mumbai-12	2008
07	Practical Biochemistry for students	Malhotra Varun Kumar	Jaypee Brothers New Delhi	1989
08	Text book of Biochemistry	Agrawal G.R.	Goel Publisher	1984

Links:

1) Wikipedia.org/wiki/carbohydrate metabolism
2) Wikipedia.org/wiki/protein metabolism
3) Wikipedia.org/wiki/lipid metabolism

List of 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.	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
6	Glucometer	Having digital display.	01
7	Biochemistry Analyzer	Semi automated	01

Course Name : Diploma in Medical Laboratory Technology

Course Code : ML

Semester : Fifth

Subject Title : Histopathology and Cytopathology

Subject Code : 19514

Teaching and Examination Scheme:

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

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:

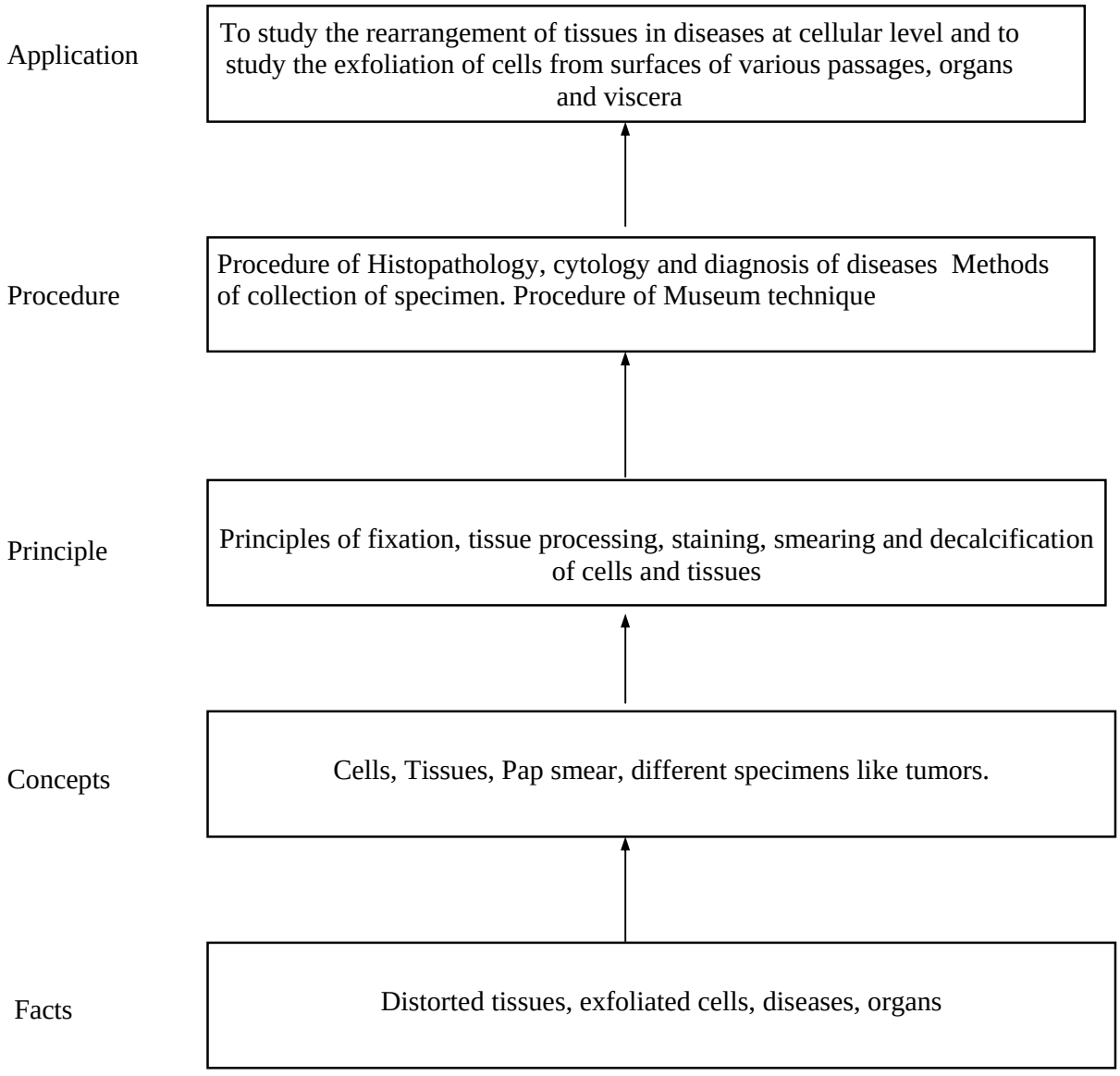
Histopathology is a study of tissues which are distorted due to various diseases. Histopathology & cytology leads us to final diagnosis of the disease pathology at the cellular level at the earliest.

General Objectives:

The Student will be able to:

1. Understand Histopathological techniques.
2. Prepare tissue blocks, histopathological slides
3. Perform routine staining techniques.
4. Understand cytopathological techniques.

Learning Structure:



Content: Theory

Topic and Content	Hours	Marks
Topic1: Sample Collection And Grossing. **Specific Objectives:** ➢ Draw a well labeled diagram of cell. ➢ Describe the method of specimen collection. ➢ Define Fixation. **Content:** • Introduction & Importance of Histopathology. Arrangement and working of Histopathology Laboratory. Cell, Tissue & their functions. Various definitions like fixation, tissue processing. • Different methods of specimen collection biopsies & ways of examinations of tissues & cells. General outline of arrangement of instruments & working and safety in Histopathology laboratory.	05	20
Topic2: Fixation. **Specific Objectives:** ➢ Write the criteria of ideal fixative. ➢ Classify Fixative. **Content:** • Definition, aim, criteria of Ideal fixative. Classification of Fixatives. Simple fixatives and their properties. • Compounds fixatives, their composition & properties Bouin's fluid, Zenker's fluid Helly's fluid, Carnoy's fluid Advantage & disadvantages of various fixatives.	05	18
Topic 3: Decalcification **Specific Objectives:** ➢ Define Decalcification. ➢ Describe the tests for Decalcification. **Content:** • Definition of Decalcification properties of decalcifying fluids. Indications for Decalcification. Study of composition, advantages, disadvantages of different solutions used for decalcification like formic acid, Aqueous Nitric acid, Perenyi's fluid, Ebner's fluid, Trichloroaceic acid, ion exchange resins and chelating agents like EDTA. • Different & tests for detection of end point (completion of Decalcification)	10	16
Topic 4: Tissue Processing. **Specific Objectives:** ➢ Describe the process of dehydration in tissue processing. ➢ Define impregnation and embedding. **Content:** • Dehydration technique and properties of different dehydrating chemicals schedules of dehydration & Tissue processing. • Properties and uses of different clearing agents. Technique of Impregnation and Embedding (Paraffin Wax block preparation) Qualities Wax and paraffin Wax additives Trimming of block. • Frozen section apparatus. A Theoretical knowledge of its applications, construction and use.	10	16

Topic 5: Microtomy (Section Cutting) **Specific Objectives:** ➢ **Write the process of section cutting by microtome.** ➢ Define honing and stropping. **Content:** • The manipulation study & use of Rotary, Rocking and sledge microtomy. The sharpening (Honing) and polishing (stropping) of microtomy knives. Actual section cutting by using Rotary microtomy. • Preparation of Histopathological slide, i.e., Manipulation of cut paraffin section and their attachment to glass slide. (Floating out Technique) • Recognition and correction of common faults in section cutting.	10	14
Topic 6: Cytopathology and Staining. **Specific objectives:** ➢ Describe the procedure of haematoxylene and eosin staining. ➢ Describe Papanicolaou Stain. ➢ Name the steps of Museum Techniques. **Content:** • The principles of staining. The preparation and use of the Haematoxylene and Eosin stains. Composition & Preparation of Ehrlich's and Delafield's Haematoxelene and 1% Eosin %. Staining procedure of haenatoxylene and Eosin stain. • Introduction to cytology and Cytopathology. The Papanicolaou Stain. Suitable media and method for mounting paraffin sections. Storage of sections. Museum Techniques. The steps of Museum Techniques and various chemicals required in museum like Kaiserling's - I, II, III solutions.	08	16
Total	**48**	**100**

Practical:
Skills to be developed

Intellectual Skills

1. Understand skills of preparation of various tissue processing fluids in different concentrations.
2. Understand searching of information regarding various diseases which can be diagnosed by Histopathlogical techniques.
3. Interpret results.

Motor Skills

1. Use & Manipulate various instruments like microtome, Honing plate, tissue cutting knife etc.
2. Collect tissue specimen & cytological specimens.
3. Perform of staining technique.
4. Set up Histopathology laboratory and Pathology Museum.

List of Practical:

1. Preparation of different chemicals required in Histopathology laboratory. Study of instruments required in Histopathology. Instruments like Microtome, Histokinette, Paraffin Wax bath, etc.
2. Chemical Test (Clayden's test)
   - Part of Tissue processing.
3. Manual Tissue Processing.
   a) Fixation b) Dehydration c) Decalcification (optional) d) Clearing e) Impregnation
4. Paraffin Wax Embedding (Block Preparation)
5. Honing and Stropping
6. Microtomy i.e. section cutting
7. Floating out & Preparation of slide
8. Mounting the section
9. Haematoxylene & Eosin Staining
10. Papanicolaou Staining

Learning Resources:

Books:

Sr. No.	Title	Name of Author	Name of Publisher	Year of Publication
01	Introduction to Medical laboratory Technology	By Baker F.J. R. E. Silverton	EIBS London	5th edition 1980-82
02	Manual of Histopathology	Medical college Nagpur	Students store GMC Nagpur	--
03	Hand book of Histotechnology & Histochemical Techniques	Butterworth London CFA Culling	Dr. A. F. Golwala Eros building Churchgate Mumbai - 400020	3rd edition 1974
04	Diagnostic Cytology Vol. I & II	By L. G. Koss	J. B. Lippincott Co. Philadelphia	3rd Edition 1979
05	Medical lab Manual for tropical countries	By Monica Cheesbrough	EIBS London	1987
06	Medical Lab Technology Vol. I, II, III	By Kanai Mukherjee	Tata N. C. Graw Hill	1988

Links:

1. www.en.wikipedia.org/wiki/fixatives
2. www.en.wikipedia.org/wiki/tissue/ processing
3. www.en.wikipedia.org/wiki/rna/microtomy
4. www.en.wikipedia.org/wiki/cytopathology/staining

List of 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	Honing and Stropping plate.	Green stone 6" *2 &1/2" & Glass plate, Leather strop.	03
3	Microtome.	Rotary microtome with moving block holder & accessories	02
4	Paraffin wax bath with copper cups	Double walled with inner chamber of stainless steel & outer chamber of mild steel with 12 copper cups & 12 tubes.	02
5	Staining Racks and stains.	Haematoxylene & Eosin, Papanicolaou stain, PAS stain	500ml each
6	Tissue capsule	Stainless steel 28*28*09mm with pores.	20
7	Tissue cutting knife	Stainless steel 120mm in length.	04
8	Leukhardt's L Embedding blocks.	16*16*12mm made of brass.	20 pair.

Course Name : Diploma in Medical Laboratory Technology

Course Code : ML

Semester : Fifth

Subject Title : Basic Haematology

Subject Code : 19515

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:

This branch of Medical Lab Technology deals with study of blood, its composition & changes that occurs during illness.

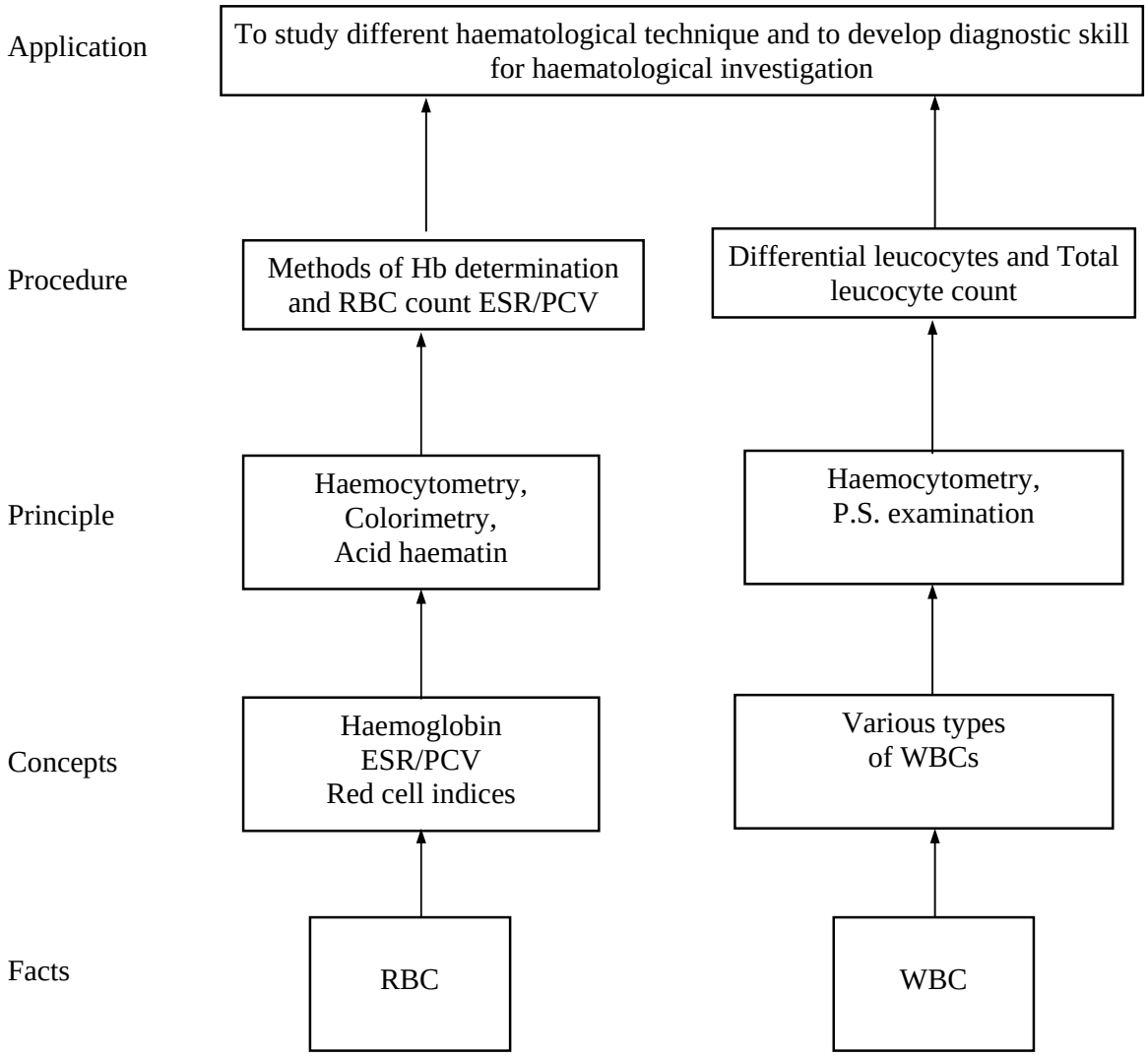
It is also helpful for the diagnosis & prognosis of various communicable & non communicable diseases & to study the therapeutic uses of the blood.

General Objectives:

The student will be able to:

1. Understand the technique of phlebotomy.
2. Understand haematological diseases.
3. Interpret the haematological investigations.

Learning Structure:



Contents: Theory

Topic and Content	Hours	Marks
Topic 1: Blood **Specific Objectives:** ➢ Define Blood. ➢ Write composition of Blood. ➢ State Functions of Blood. **Contents:** • Definition of Blood. • Composition of blood. • Functions of blood.	04	10
Topic 2: Erythrocyte / Red Blood Corpuscles (RBC) **Specific Objectives:** ➢ Write Morphology, Composition of RBC ➢ State Physiological variations of RBC count ➢ Describe Erythropoesis **Contents:** • Morphology of RBC. • Composition of RBC. • Normal value of RBC count. • Physiological variation in RBC Count. • Erythropoiesis a) Definition. b) Site of development. c) Stages of development given by extravascular theory. • Fate of RBC (Disintegration of RBCs). • Functions of RBC.	09	20
Topic 3: HAEMOGLOBIN **Specific Objectives:** ➢ Write structure of Haemoglobin ➢ State functions of Haemoglobin **Contents:** • Structure of haemoglobin A, A2, F,S • Functions of haemoglobin • Normal value of haemoglobin. • Different methods of haemoglobin estimation : a) Sahli's Acid Haematin method. b) Cyanomethaemoglobin method. c) Specific gravity method.	09	20
Topic 4: Anaemia **Specific Objectives:** ➢ Define Anaemia ➢ Classify Anaemia **Contents:** • Definition of anaemia • Classification of anaemia a) Morphological b) Aetiological i. Blood loss ii. Nutritional (Iron deficiency, Megaloblastic)	08	14

iii. Aplastic iv. Haemolytic		
Topic 5: Erythrocyte Sedimentation Rate (ESR) & Packed Cell Volume (PCV) & Red Cell Indices **Specific Objectives:** ➢ Define ESR, PCV, Red cell Indices. ➢ Determine ESR and PCV. **Contents:** • Definition of ESR. • Clinical significance of ESR. • Methods of determination of ESR a) Wintrobe method. b) Westergren method. • Factors affecting ESR • Definition of PCV. • Clinical significance of PCV. • Determination of PCV by Wintrobe method. • Red cell indices a) Mean Corpuscular Volume (MCV), b) Mean Corpuscular Haemoglobin (MCH), c) Mean Corpuscular Haemoglobin Concentration (MCHC) d) Colour Index.	09	16
Topic 6: Leucocyte / White Blood Corpuscles (WBC) **Specific Objectives:** ➢ Classify WBC. ➢ Describe Leucopoiesis. ➢ State Functions of WBC. **Contents:** • Classification of WBC. • Morphology of WBC. • Normal count of WBC. • Physiological variations of WBC Count. • Leucopoesis : a) Definition. b) Site and Stages of development. • Functions of Leucocytes.	09	20
Total	**48**	**100**

Practical:
Skills to be developed

Intellectual Skills

1. Understand blood collection techniques.
2. Understand routine haematological investigation.

2) Motor Skills

1. Handle instruments properly.
2. Collect haematological samples.
3. Follow quality control in haematological investigations.

List of Practical:

1. Collection of blood (Capillary puncture method, vein puncture method)
2. Determination of erythrocyte count by haemocytometer method.
3. Haemoglobin estimation by Sahli's method (Acid haematin method)
4. Haemoglobin estimation by Cyanomethaemoglobin method (Colorimetric method)
5. Determination of ESR.
6. Determination of PCV.
7. Total leucocyte count by haemocytometer method.
8. Differential Leucocyte count.

Learning Resources:
1.Books:

Sr. No.	Title	Name of Author	Name of Publisher	Year of Publication
01	Human Physiology Volume 1	Dr. C.C. Chatterjee	Medical Allied Agency	8th edition 2012
02	Practical Haematology	John Dacie	Longman group Ltd, New york	8th edition 2012
03	Text book of Blood Banking & Transfusion Medicine	Talib V. H.	C.B.S Publishers & Distributors New Delhi	1995
04	Medical Lab Technology	Ramnik Sood	Jaypee Brothers New Delhi	2009
05	District Lab Practice in Tropical countries	Monica Cheesbrough.	Cambridge University Press	4th edition 12012
06	Medical Laboratory Technology Vol. - I	Kanai L. Mukherjee	Tata McGraw Hill Pub. Co. Ltd. New Delhi	14th edition 2003
07	Text book of Medical Lab Technology	P B Godkar	Bhalani Publication house Hyderabad.	2nd edition 2012

2. Links:

1. www.en.wikipedia.org/wiki/blood
2. www.en.wikipedia.org/wiki/erythrocyte
3. www.en.wikipedia.org/wiki/haemoglobin
4. www.en.wikipedia.org/wiki/anaemia
5. www.en.wikipedia.org/wiki/esr
6. www.en.wikipedia.org/wiki/leucocyte

3. List of 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	Sahli's Haemoglobinometer	Containing calibrated tube, Sahli's pipette, small bottle, brush & stirrer.	10
4	Haemocytometer	Containing Neubaur's chamber, RBC & WBC pipette.	10
5	Colorimeter	With seven filters.	01
6	Wintrobe tube	Calibrated tube, 11cm in length, 03mm bore, two markings.	20
7	Wintrobe stand	For keeping Wintrobe tube for ESR & PCV.	05
8	Westergren tube with stand	Calibrated tube, 30cm in length, used for ESR both ends are open.	20
9	Analytical Balance	Capacity 0.2mg to 200 g.	02
10	Mechanical Cell Counter	For differential WBC count.	01

Course Name : Diploma in Medical Laboratory Technology

Course Code : ML

Semester : Fifth

Subject Title : Serology

Subject Code : 19516

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:

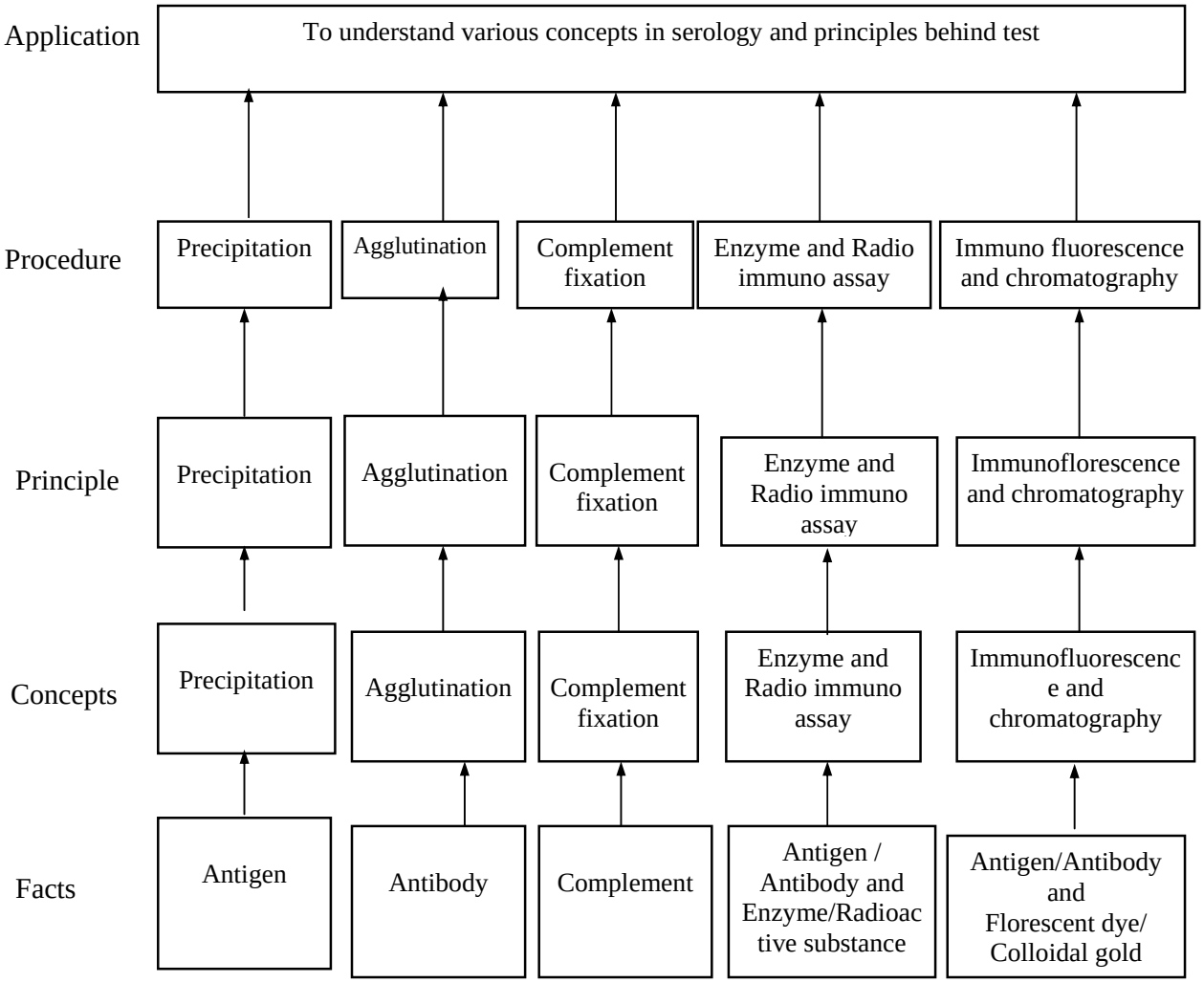
Serology is the study of antigen and antibody reactions in vitro. Understanding of the principles of serological tests is required for logical approach, performance and analysis of laboratory investigations.

General Objectives:

The student will be able to:

1. Understand applications of basic principles in serology.
2. Understand serological diagnosis of common diseases.

Learning Structure:



Contents: Theory

Topic and Content	Hours	Marks
Topic 1 : ANTIGEN **Specific objectives**: ➢ **Define Antigen.** ➢ **Classify Antigen.** ➢ **Describe Determinants of antigenecity**. **Contents**: • Definition of Antigen. • Classification of Antigens. • Determinants of antigenecity.	06	08
Topic 2 : Antibody **Specific objectives :** ➢ **Define Antibody.** ➢ **Write types of Antibody.** ➢ **Describe structure of Immunoglobulins** ➢ **Classify Immunoglobulins**. **Contents**: 2.1 Antibody **(Marks 08)** • Definition of Antibody. • Types of Antibody. 2.2 Immunoglobulins **(Marks 16)** • Structure of immunoglobulins. • Immunoglobulins classes.	12	24
Topic 3 : Antigen - Antibody reactions **Specific objectives** ➢ **Define Antigen-Antibody reaction.** ➢ **Write general features of Antigen-Antibody reactions**. **Contents**: • Definition of Antigen-Antibody reactions. • General features of Antigen-Antibody reactions.	03	08
Topic 4 : Serological tests **Specific objectives** ➢ Define Precipitation and Agglutination. ➢ Describe methodology of Precipitation, Agglutination. ➢ Describe methodology of Complement Fixation Test. **Contents**: 4.1 Precipitation reaction **(Marks 12)** • Definition of Precipitation and Flocculation. • Zone Phenomenon and Mechanism of Precipitation. • Applications of Precipitation. 4.2 Agglutination reactions **(12 Marks)** • Definition of Agglutination. • Types of Agglutination. • Applications of Agglutination. 4.3 Complement fixations test **(08 Marks)** • Principle of Complement Fixation Test. • Reagents and Steps of Complement Fixation Test. • Applications of Complement Fixation Test.	12	32

Topic 5 : Modern Serological Tests **Specific objectives** ➢ Principles of Immunofluorescence, Radio Immuno Assay, Enzyme Linked Immuno Sorbent Assay and Chromatographic Immuno Assay. ➢ Applications of I.F., R.I.A., E.L.I.S.A. and C.I.A. **Contents**: 5.1 Immunofluorescenc **(08 Marks)** • Definition of Fluorescence. • Principle of Immunofluorescence. • Types of Immunofluorescence. • Applications of Immunofluorescence. 5.2 Radio Immuno Assay **(08 Marks)** • Principle of Radio Immuno Assay. • Steps in the methodology of R.I.A. • Applications of R.I.A. 5.3 Enzyme linked immunosorbent Assay**.(06 Marks)** • Principle of ELISA. • Enzymes and Substrates used in ELISA. • Types of ELISA. • Applications of ELISA. 5.4 Chromatographic Immuno Assay **(06 Marks)** • Principle of C.I.A. • Types of C.I.A. • Uses of C.I.A.	15	28
Total	**48**	**100**

Practical:

Skills to be developed for practical

Intellectual Skills

1. Analyze laboratory investigation.
2. Understand antigen antibody reaction.
3. Interpret results.

Motor Skills

1. Follow the procedure of test.
2. Analyse, confirm and report finding.

List of the practical:

1. Blood grouping and Rh typing
2. Widal test
3. R.A. test
4. Aso titre
5. C- reactive protein test
6. HIV test
7. Pregnancy test
8. Australia antigen test
9. RPR test
10. Dengue IgG ,IgM and NS 1 Antigen

NOTE:

Immunology and serology are major backbones of the pathology laboratory. These are closely associated subjects and important from diagnostic points of view. Therefore due attention must be given while teaching these subjects. Immunology and serology complement and confirm bacteriological findings. The teachers are required to conduct all the tests in practical.

Learning Resources:

Books:

Sr. No.	Title	Name of Author	Name of Publisher	Year of Publication
01	Text book of Microbiology	R. Ananth Narayan	Hyderabad orient Longman,	6th Edition 2000
02	Park's text books of preventive and social medicine	K. Park	Jabalpur M/S. Banarasidas Bhanot	15th Edition 1997
03	Essential Immunology	Ivan. M. Roitt	Oxford Blackwell scientific publication	10th Edition 2000

Links:

1. www.en.wikipedia.org/wiki/
2. www.en.wikipedia.org/wiki/
3. www.en.wikipedia.org/wiki/rna/
4. www.en.wikipedia.org/wiki/

List of 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	Test kits	For Blood grouping & Rh typing, Widal test, R.A. test, A.S.O. Titre, C.R.P .test, HIV test, Pregnancy test, HBsAg test, RPR test, and TB IgG & IgM test.	01 each
4	Incubator.	45x45x45 cms mild steel temperature range 05* C. to 60*C.	01

Course Name : All Branches of Diploma in Engineering & Technology

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

Semester : Fifth for EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/CE/CS/CR/CO/CM/IF/ EE/EP/CH/PS/AU/ML/FC/PN/SC/TR and Sixth for CD/MH/IU/CV/FE/FG/MI/ED/ EI/DC/TC/TX

Subject Title : Behavioural Science

Subject Code : 17075

Teaching and Examination Scheme:

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

Rationale:

With increased globalization and rapid changing business expectations, employers are looking for wide cluster of skills to cater to the changing demand. Personality traits and soft skills are playing a key role in a student's career in this changing scenario. Corporate houses look for soft skills that supplement hard skills.

Addition of behavioural science in curriculum is intended to enhance the efficiency of a person so that he can contribute to overall growth of organisation. It aims at developing insight into leadership, team building, motivation, interpersonal relationship, problem solving, decision making and aspects of personality in a technician's profile. Addition of the topic of organizational culture will further mould him/ her in the organisational role.

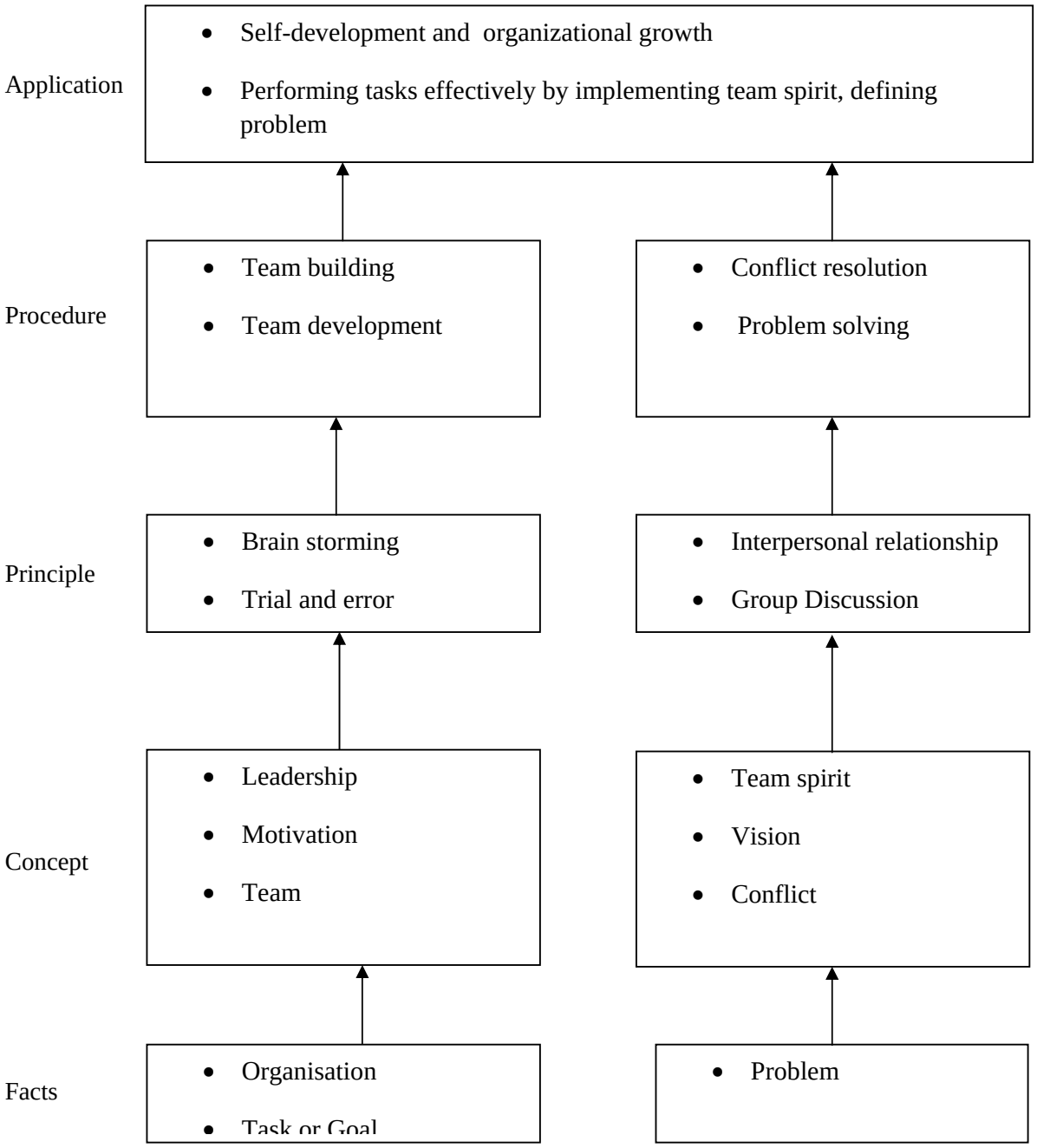
This subject of 'Behavioural Science' provides a broad base in which a technician can develop a successful career in the world of work.

General Objectives:

After studying this subject, the students will be able to:

1. Develop him/her as Team leader.
2. Use self-motivation and motivate others.
3. Build a team and develop team spirit among the team members.
4. Improve the interpersonal relationship skills.
5. Learn Problem solving and decision making skills.
6. Discuss a particular topic in a group and face the interview.

Learning Structure:



Theory:

Topic and Contents	Hours
Topic 1: Leadership 1.1 Management Education-History, Development, Importance, Areas of specialization, need and importance of behavioural science 1.2 Meaning and Types of Leaders, Qualities of leader, Examples 1.3 Leadership- Definition, importance, leadership in various organizations 1.4 Leadership styles-task -people matrix. Persuasive, Authoritative, Democratic, Delegative Leadership styles. Maturity of followers, situational leadership	02
Topic 2: Motivation 2.1 Meaning 2.2 Importance of Motivation 2.3 Types of Motivation- Intrinsic, Extrinsic, Examples 2.4 Maslow's motivation theory- pyramid of needs, individual and industrial applications 2.5 Tips for Motivation	02
Topic 3: Emotional Intelligence 3.1 Major concepts - emotion, families of emotion, components of emotional expressions 3.2 Emotional intelligence, cognitive intelligence 3.3 Basic emotional competencies	02
Topic 4: Team Building 4.1 Team- Need, Definition, Difference between group and team 4.2 Characteristics of a good team 4.3 Steps in team formation- forming, norming, storming, performing, adjourning 4.4 Roles of team members 4.5 Characteristics of a good team member 4.6 Types of teams-Work, mgmt, cross functional, quality circle, self-managed team	03
Topic 5: Conflict Resolution 5.1 Definition, types (interpersonal, intrapersonal, groups), indicators of conflicts 5.2 Sources of conflict - ego, poorly defined authority and responsibility, power, interests, greed, difference in value system, complex work situations 5.3 Skills for conflict resolution 5.4 Steps in conflict management -Mapping of conflict, negotiation- steps in negotiation, 5.5 Styles of conflict management- collaborating, competing, cooperating, avoiding, compromising	03
Topic 6: Decision Making 6.1 Importance of decision making 6.2 Definition Characteristics of good decision 6.3 Characteristics of good decision	02

6.4 Types of decisions- programmed, non programmed, strategic, tactical, impulsive 6.5 Group decision making 6.6 Steps of decision making	
Topic 7: Interview Techniques 7.1 Job search opportunities 7.2 Development of résumé´ and cover letter- essentials of a good résumé´, contents of Résumé´, layout of résumé´, cover letter 7.3 Group discussion- objectives, do's and don'ts for effective participation, evaluation parameters, suggested topics 7.4 Psychometric tests- Aptitude test, guidelines for preparations for aptitude test, Personality test 7.5 Personal interview-guidelines for preparing for job interviews, common questions	**02**
Total	**16**

Practical:
Skills to be developed:

Intellectual Skills:

- Develop ability to find his strengths
- Select proper source of information.
- Follow the technique of time and stress management.
- Set the goal.

Motor Skills:

- Follow the presentation of body language.
- Work on internet and search for information.
- Prepare slides / transparencies for presentation.

List of Assignments:

01	Case study: Employee motivation and leadership.
02	To build a tower from a given material as a team activity
03	To prepare Jigsaw puzzles (common shapes) from the given jigsaw pieces as a team.
04	Case study on conflict Resolution
05	Assess your style of conflict resolution
06	Decision making activity: of Selection of the best suitable company.
07	Participate in a guided group discussion
08	Assessment of self-aptitude in numerical computation, estimation, data interpretation, mechanical, spatial and abstract reasoning
09	Assessment of self-aptitude in Verbal ability and data checking.
10	Development of résumé´ and covering letter

Note: Subject teacher shall guide the students in completing the assignments based on above practicals.

Learning Resources:
Books:

Sr. No.	Author	Name of Book	Publication
1	Subject Experts-MSBTE	Handbook and assignment book on Development of Life Skills-II	MSBTE
2	Dr. Kumkum Mukherjee	Principles of management and organizational behaviour	Tata McGraw Hill Education Pvt Ltd.
3	Dr.T.Kalyana Chakravarti Dr.T.Latha Chakravarti	Soft Skills for Managers	Biztantra
4	Barun K Mitra	Personality Development and soft skills	Oxford University Press
5	Priyadarshini Patnaik	Group discussion and interview skills	Foundation Books

Course Name : Diploma in Medical Laboratory Technology

Course Code : ML

Semester : Sixth

Subject Title : Medical Parasitology

Subject Code : 19612

Teaching and Examination Scheme:

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

Rationale:

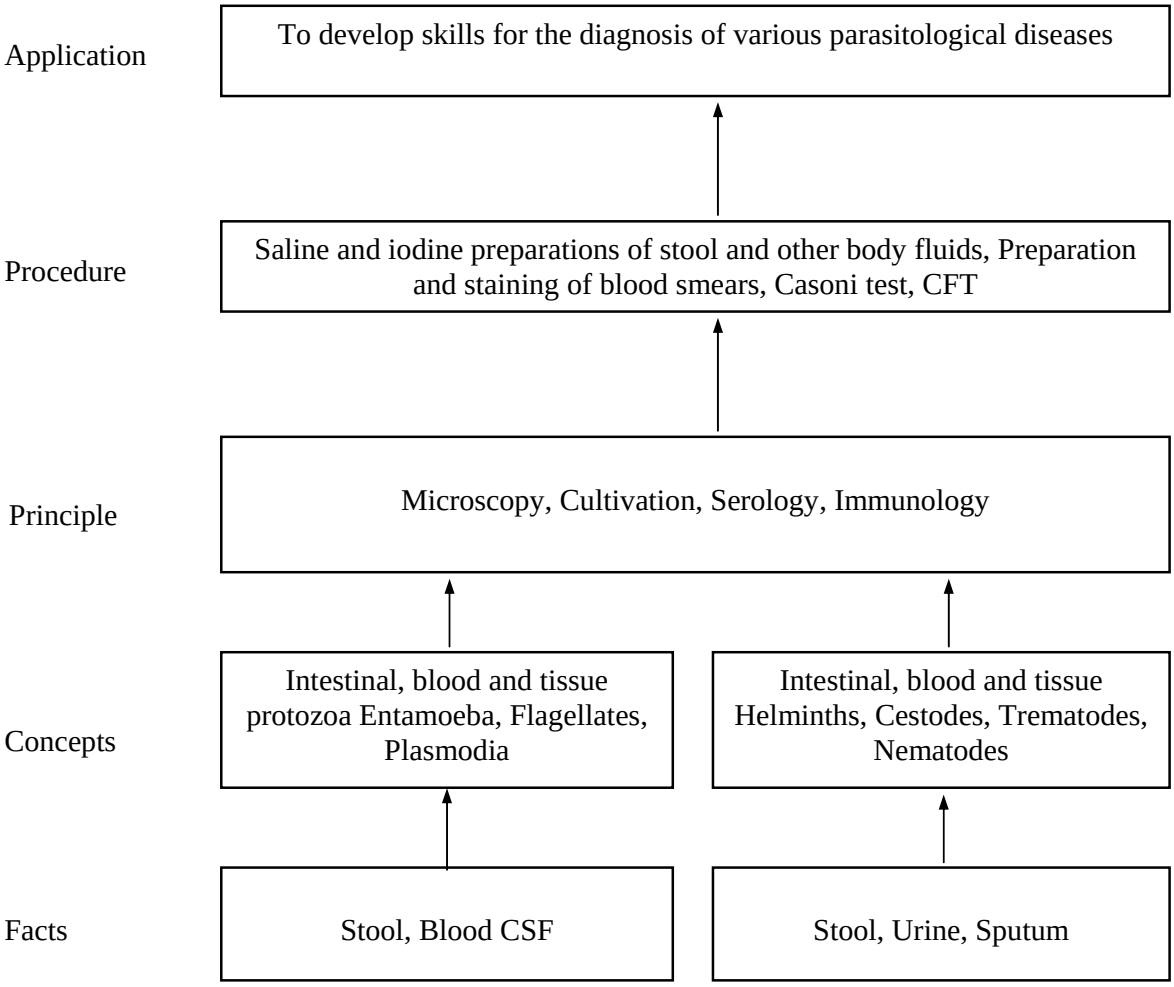
A knowledge of medical parasitology is essential to many branches of medicine as well as to all life sciences. Since the pathogenic parasites cause variety of Human diseases ranging from a protozoal Amoebiasis to fatal cerebral malaria, involving imp organs like intestine but also urogenital tract, liver muscle and other organs. Therefore a Technologist must have the thorough knowledge of various tests performed in the lab for diagnosis of various diseases so that he can help to physician to find out the cause of disease and also can help society to prevent spread of epidemics.

General Objectives:

The student will be able to:

1. Understand laboratory diagnosis of common parasitological diseases.
2. Understand routine pathological investigations.

Learning Structure:



Topic and Content	Hours	Marks
Topic 1: Protozoa **Specific Objectives:** ➢ **Write morphology, Life Cycle of Protozoa.** ➢ **Write pathogenesis and Laboratory Diagnosis of Protozoa.** **Contents:** 1.1 Entamoeba hystolytica and Entamoeba coli (08 Marks) • Morphology, Life Cycle, Pathogenesis and Laboratory Diagnosis. 1.2 Intestinal and genital flagellates (04 Marks) • Giardia intestinalis : Morphology, Life Cycle, Pathogenesis and Laboratory Diagnosis.. • Trichomonas vaginalis. Morphology, Life Cycle, Pathogenesis and Laboratory Diagnosis.. 1.3 Blood Protozoa (12 Marks) • Leishmania donovani: Morphology, Life Cycle, Pathogenesis and Laboratory Diagnosis.. • Trypanosoma cruzi: Morphology, Life Cycle, Pathogenesis and Laboratory Diagnosis.. • Plasmodium vivax and Plasmodium falciparum: Morphology, Life Cycle, Pathogenesis and Laboratory Diagnosis.	12	24
Topic 2: Cestodes **Specific Objectives:** ➢ **Write morphology, Life Cycle of Cestodes.** ➢ **Write pathogenesis and Laboratory Diagnosis of Cestodes.** **Contents:** 2.1 Taenia solium and Taenia saginata **(12 Marks)** • Morphology, Life Cycle, Pathogenesis and Laboratory Diagnosis. 2.2 Echinococcus granulosus **(08 Marks)** • Morphology, Life Cycle, Pathogenesis and Laboratory Diagnosis. 2.3 Hymenolepis nana **(04 Marks)** • Morphology, Life Cycle, Pathogenesis and Laboratory Diagnosis.	12	24
Topic 3 TREMATODES **Specific Objectives** ➢ **Write morphology, Life Cycle of Trematodes.** ➢ **Write pathogenesis and Laboratory Diagnosis of Trematodes** **Contents:** 3.1 Intestinal trematode fasciola hepatica **(08 Marks)** • Morphology, Life Cycle, Pathogenesis And • Laboratory Diagnosis. 3.2 Blood and tissue trematodes**.(16 Marks)** • Paragonimus westermani : Morphology, Life Cycle, Pathogenesis And Laboratory Diagnosis. • Schistosoma(haematobium, Mansoni, Japonicum) Morphology, Life Cycle, Pathogenesis And Laboratory Diagnosis.	12	24
Topic 4 NEMATODES **Specific Objectives** ➢ Write morphology, Life Cycle of Nematodes. ➢ Write pathogenesis and Laboratory Diagnosis of Nematodes. **Contents:** 4.1 Intestinal Nematodes **(16 Marks)** • Ascaris Lumbricoides : Morphology, Life Cycle, Pathogenesis and	12	28

Laboratory Diagnosis.. • Ancylostoma duodenale: Morphology, Life Cycle, Pathogenesis and Laboratory Diagnosis.. • Enterobius Vermicularis Morphology, Life Cycle Pathogenesis and Laboratory Diagnosis. • Trichuris trichiura: Morphology, Life Cycle, Pathogenesis and Laboratory Diagnosis.. • Strongyloides stercolaris: Morphology, Life Cycle Pathogenesis and Laboratory Diagnosis. 4.2 Blood and tissue nematodes **(12 Marks)** • Wuchereria bancrofti: Morphology, Life Cycle, Pathogenesis and Laboratory Diagnosis.. • Drancunculus medinensis: Morphology, Life Cycle, Pathogenesis and Laboratory Diagnosis.		
Total	**48**	**100**

Practical:
Skills to be developed

Intellectual Skills
1. Understand morphology, life cycle and pathogenesis of pathogenic parasites.
2. Understand various laboratory tests.
3. Interpret test Results.

Motor Skills
1. Identify and differentiate stained and unstained preparation.
2. Conduct immunological and serological tests for confirmation parasitic diseases.

List of Practical:
1. Collection and handling of faecal specimen.
2. Gross examination of faecal specimen for parasites.
3. Concentration methods of stool for ova and cyst(Formol ether sedimentation technique)

4 Concentration methods of stool for ova and cyst (Zinc sulphate floatation technique)

5. Preparation of stained and unstained slide for detection of larvae / ova or cyst of parasites.
6. Peripheral Smear for Malarial parasite
7. Detection of malarial Antigen
8. Demonstration of following parasites. Ova/cyst under microscope
   a) Giardia Lamblia b) T. Vaginalis c) Roundworm d) Hookworm e) whipworm
   f) Tapeworm g) Threadworm

Learning Resources
Books:

Sr. No.	Title	Name of Author	Name of Publisher	Year of Publication
01	Medical laboratory manual for tropical countries vol. I and II	Monica Cheesbrough	Bitterworth and co. (publisher) Ltd. Borough Green sevenoaks Kent	1985

02	A text book of microbiology	P. Chakraborti	New central book agency (p) Ltd. 8/1 Chitamony Das Lane Kolkata	2009 13th edition
03	Medical lab technology vol. I and vol. IIs	Robert Cruikshank	Churchill Livingstone Edinburgh London and New York.	1998 12th Ed.
04	Medical lab Technology	Dr. Ramnik Sood	Jaypee Brothers, New Delhi	2009

Links:

1. www.en.wikipedia.org/wiki/protozoa
2. www.en.wikipedia.org/wiki/cestodes
3. www.en.wikipedia.org/wiki/trematodes
4. www.en.wikipedia.org/wiki/nematodes

List of equipments:

S.N.	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	Specimens	Formalin preserved adult worms (Tape worm, Liverfluke, Round worm, thread worm)	01each
4	Incubator.	45x45x45cms mild steel temperature range 05* C. to 60*C.	01
5	Test kits	Malarial antigen,	01
6	Stains	Lugol's Iodine, 0.85% Nacl., Leishman stain Giemsa.	01each

Course Name : Diploma in Medical Laboratory Technology

Course Code : ML

Semester : Sixth

Subject Title : Applied Biochemistry

Subject Code : 19613

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

Rationale:

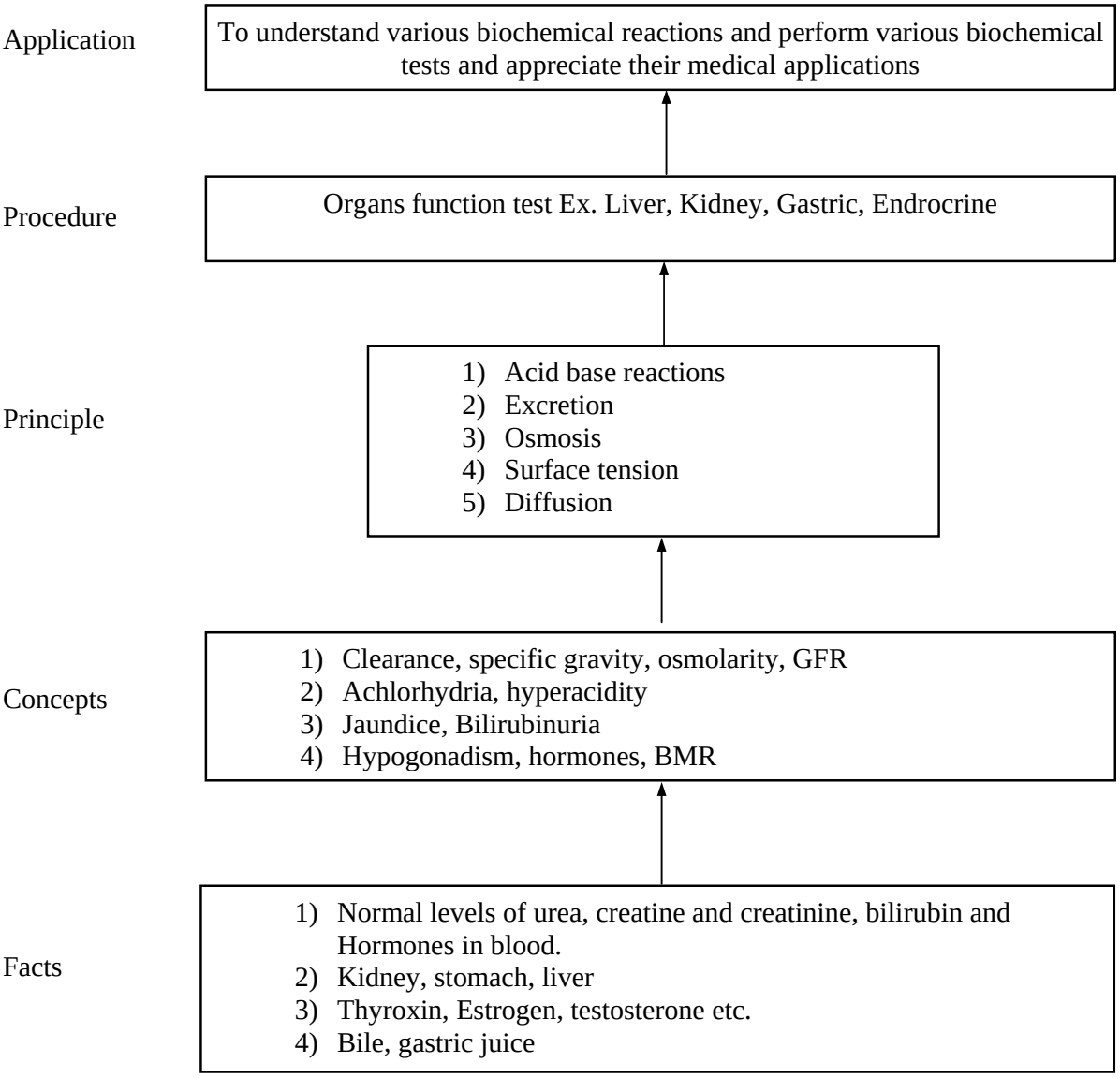
Biochemistry is a science concerned with the chemical constituents of living cells and with the reactions and processes they undergo. Abnormalities in the chemical constituents are exhibited by various diseases. Therefore a technologist must have the knowledge of Clinical Biochemistry. So that he can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

General Objectives:

Students will be able to:

1. Understand disease at molecular level.
2. Understand the chemical components of the body.
3. Understand procedure and application of detection of biomolecules in clinical specimen like blood, urine, CSF and other body fluids.
4. Understand detection abnormal constituents for diagnosis of diseases.

Learning Structure:



Contents: Theory

Topic and Content	Hours	Marks
Topic 1: Kidney Function Test **Specific objectives-** ➢ Define clearance and specific gravity. ➢ Write procedure of clearance test **Contents:** 1.1 Clearance - Definition. **(12 Marks)** Inulin clearance test, creatinine clearance test, urea clearance test (in brief). 1.2 Water function Test- Specific gravity (by urinometer) and Osmolarity of Urine. **(4 Marks)** 1.3 Determination of Non Protein Nitrogen (NPN) in blood. **(4 Marks)** 1.4 Foreign substance Test- Phenol Sulf Pthalein clearance test. **(4 Marks)**	12	24
Topic 2: Hepatic Function Test **Specific objective-** ➢ Define jaundice, Bilirubinuria ➢ Classify jaundice ➢ Write various liver function test **Contents:** 2.1 Test based on role of liver in carbohydrate. Lipid and protein metabolism. **(4 Marks)** 2.2 Bilirubin formation and excretion, serum bilirubin level and its estimation and Icteric index. **(8 Marks)** 2.3 Jaundice—Definition and classification. **(8 Marks)** 2.4 Bilirubinuria **(4 Marks)**	12	24
Topic 3: Cardiac Profile Test **Specific objective** ➢ **Enlist test used for risk evaluation and cardiac injury** ➢ **Write in brief about various cardiac markers** **Contents:** 3.1 Structure of heart and its working (in brief) **(4 Marks)** • Ischemic heart disease and myocardial infarction (in brief). **(4 Marks)** 3.2 Cardiac risk evaluation test -1) Serum Lipid profile 2) Homocystein. **(4 Marks)** 3.3 Cardiac injury panel test—1) CKMB 2) S GPT 3) LDH **(4 Marks)** 3.4 Biochemical Cardiac Markers-1) Myoglobin 2) Troponin T and Troponin I 4) BNP and Pro BNP 5) hs-CRP. **(8 Marks)**	12	24
Topic 4 -ENDOCRINE FUNCTION TEST **Specific objectives** ➢ **Enlist hormones of endocrine glands** ➢ **State functions and abnormalities of endocrine glands**. **Contents**: 4.1 Pituitary gland hormone and their functions. **(8 Marks)** 4.2 Thyroid hormone , Abnormality and function test **(8 Marks)** 4.3 Adrenal Hormone (cortex and medulla), Abnormalities and function test, VMA estimation and its significance, 17– Ketosteroids-its estimation and significance. **(4 Marks)** 4.4 Ovarian hormones, abnormalities and pregnancy test. **(8 Marks)**	12	28
Total	**48**	**100**

Practical:
Skills to be developed

Intellectual Skills

1. Understand normal and abnormal constituent of body fluids.
2. Select proper instruments for analysis, estimation.
3. Interpret the results.

Motor Skills

1. Prepare and standardize volumetric solutions.
2. Follow Principle, Procedure for various estimation.
3. Plot the graph and find out normal and abnormal values.

List of Practical:

1. Determination of blood urea nitrogen by Diacetyl monoxime method.
2. Determination of blood creatinine.
3. Determination of urine creatinine.
4. Determination of Alkaline phosphatase activity.
5. Determination of acid phosphatase activity.
6. Estimation of direct and indirect bilirubin.
7. Pregnancy Test.
8. Detection of Porphobilinogen in urine by Watson- Schwartz test.
9. Estimation of total Calcium in serum.

Learning Resources:
Books:

Sr. No.	Title	Name of Author	Name of Publisher
01	Fundamentals of Biochemistry	Deb and Deb	New central agency chinasamanidas Lane Calcutta
02	Text book of Biochemistry (2nd)	Ramkrishman, Prapannan, Rajan	Orient Longman Ltd. 160, Anna Salai, Madras.
03	Test book of (8th) Biochemistry	Rama Rao	L.K. & S. Publication Visakhapatnam
04	Text book of M.L.T.	P.B.Godkar D.P.Godkar	Bhalani publishing house,Mumbai-12
05	Comprehensive viva and practice in biochemistry	Deb and Deb	New central agency Chinasamanidas Lane Calcutta
06	Fundamental of Biochemistry	J.L. Jain	S. Chand & Company Ram Nagar, New Delhi
07	Practical Biochemistry for students	Malhotra Varun Kumar	Jaypee Brothers New Delhi

LINKS:

1. Wikipedia.org/wiki/hormones
2. Wikipedia.org/wiki/kidney function test
3. Wikipedia.org/wiki/liver function test
4. Wikipedia.org/wiki/cardiac profile test

List of 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	Biochemistry Analyzer	Semi automated	01
6	Analytical Balance	Capacity 0.2mg to 200 g.	02

Course Name : Diploma in Medical Laboratory Technology

Course Code : ML

Semester : Sixth

Subject Title : Clinical Pathology

Subject Code : 19614

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:

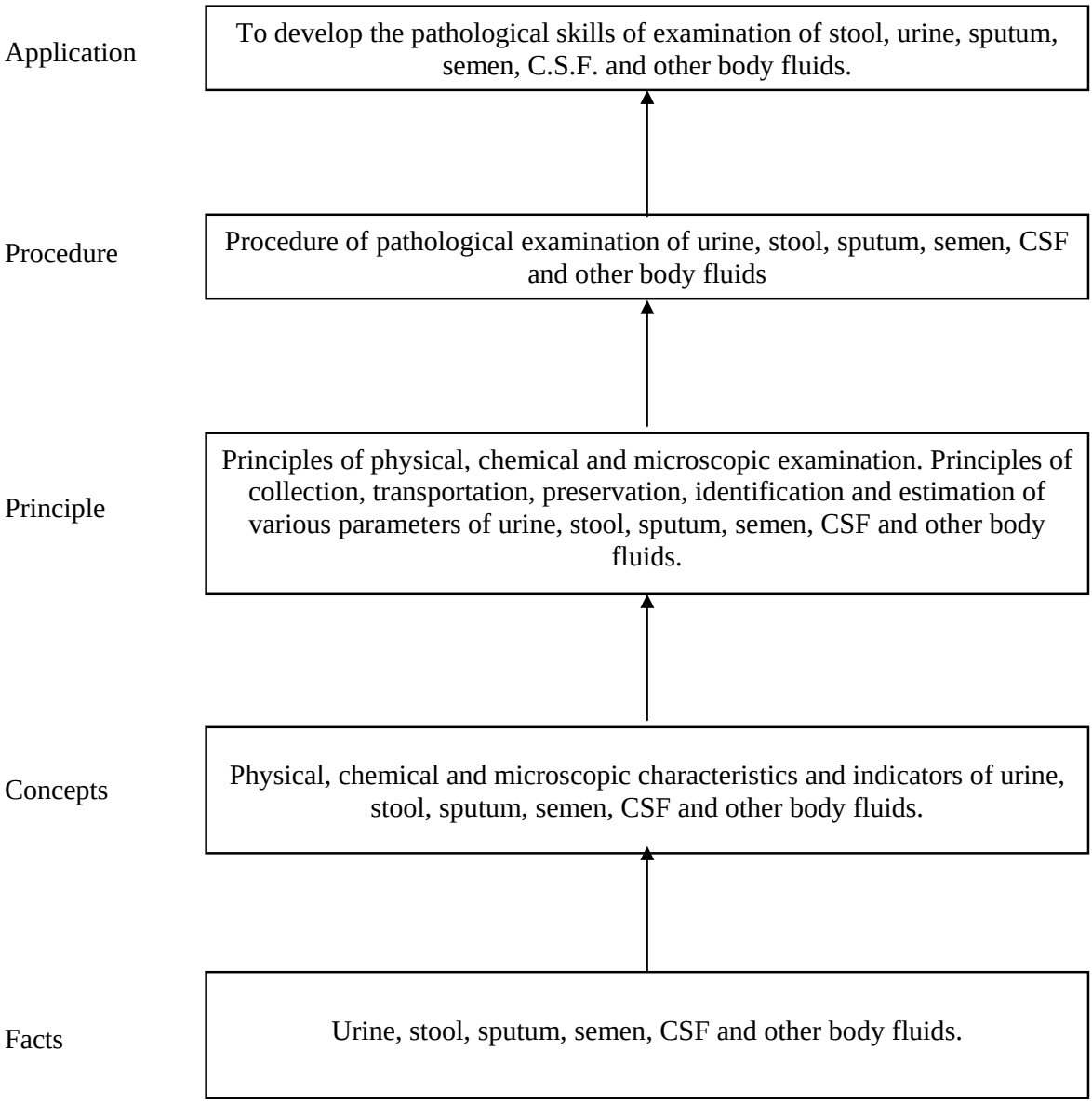
The principles and techniques of Pathology have a wide application in many branches of medicine. It is a basic subject which deals with examination of various body Fluids/ Excreta for presence of multiple factors like chemical, biological and Physical as cause or effect of illness.

General Objectives:

The student will be able to:

1. Understand routine pathological investigation.
2. Understand clinical pathological techniques.
3. Interpret various results.

Learning Structure:



Contents: Theory

Topic and Content	Hours	Marks
Topic 01: Examination of Urine **Specific Objectives:** ➢ Write method of collection and transportation of urine. ➢ Perform physical, chemical and microscopic examination of urine. ➢ State significance and interpret findings of analysis. **Contents:** • Indication, collection, container transportation, preservation of urine for different types of urine analysis. Physical examination of urine and its significance. • Chemical examination of urine and its significance Microscopic examination of urine and its significance.	08	20
Topic 02: Examination of Stool **Specific Objectives:** ➢ Write method of collection and transportation of stool. ➢ Perform physical, chemical and microscopic examination of stool. ➢ State significance and interpret findings of analysis. **Contents:** • Indications, collection, container, transportation, preservation for different types of stool analysis Physical examination of stool and its significance • Chemical examination of stool and its significance Microscopic examination of stool and its significance.	10	20
Topic 03: Examination of Sputum **Specific Objectives:** ➢ Write method of collection, transportation and preservation of sputum. ➢ State indications for sputum analysis. ➢ Perform physical, chemical and microscopic examination of sputum. ➢ State significance and interpret findings of analysis. **Contents:** • Indications, collection, container, transportation, preservation for different types of sputum analysis Physical examination of sputum and its significance • Chemical examination of sputum and its significance Microscopic examination of sputum and its significance. Gram staining and Zeihl - Neelsen staining procedure.	10	20
Topic 04: Examination of C.S.F. And other body fluids like pleural fluid, peritoneal fluid, synovial fluid, pericardial fluid and ascitic fluid. **Specific Objectives:** ➢ Write method of collection, transportation and preservation of C.S.F, pleural peritoneal, synovial, pericardial and ascitic fluid. ➢ State indications for body fluid analysis. ➢ Perform physical, chemical and microscopic examination of C.S.F and other body fluids. ➢ State significance and interpret findings of analysis. **Contents:** 4.1 Indications, collection, container, transportation, preservation for different types of examination of C.S.F/other body fluids **(Marks 08)**	12	24

4.2 Physical and Chemical examination of C.S.F. and body fluids and its its significance **(Marks 08)** 4.3 Microscopic examination of C.S.F. and other body fluids and its significance **(Marks 08)**		
Topic: 05 : Semen Analysis **Specific Objectives:** ➢ Write method of collection, transportation and preservation of semen ➢ State indications for semen analysis. ➢ Perform physical, chemical and microscopic examination of semen ➢ State findings of semen analysis. **Contents:** • Indications, collection, container, transportation, preservation for different types of semen examination. Physical examination of semen and its significance • Chemical examination of semen and its significance Microscopic examination of semen and significance	08	16
Total	**48**	**100**

Practical:
Skills to be developed:

Intellectual Skills

1. Understand examination of urine, stool, sputum, semen, C.S.F., Fluid
2. Interpret test report.

Motor Skills

1. Operate instruments like microscope and microtome.
2. Collect, transport and preserve different specimens.
3. Examine and estimate various parameters of urine, stool, sputum, semen, CSF, and Fluids.

List of Practicals:

1. Routine physical and chemical examination of urine specimen.
2. Routine microscopic examination of urine specimen.
3. Physical and chemical examination of stool.
4. Microscopic examination of stool for demonstration of OVA and CYSTS.
5. Physical examination and Gram staining of sputum.
6. Microscopic examination and Zeihl -Neelsen staining of sputum.
7. Routine examination of CSF and other body fluids.
8. Routine examination of semen.

Learning Resources:
Books:

Sr. No.	Title	Name of Author	Name of Publisher	Year of Publication
01	Medical laboratory techniques vol. I, II and III	K. Mukherjee	Tata. McGraw Hill, Delhi, 5th Edition	2012
02	Pathological technology : clinical Pathology	G. Guru	Sec. National council of educational research and training, New Delhi, 1st Edition	2012
03	Clinical Pathology	S.S. Kelkar	Voral Medical Publications	2008

			Mumbai, 1st Edition	
04	Manual of Medical Laboratory Technology	Ramnik Sood	Jaypee Brothers, New Delhi.	2012

Links:

1. www.en.wikipedia.org/wiki/urine exam.
2. www.en.wikipedia.org/wiki/stool exam.
3. www.en.wikipedia.org/wiki/sputum exam.
4. www.en.wikipedia.org/wiki/body fluids.

List of 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	pH meter	Digital with combined glass electrodes.0 to14 pH value.	02
4	Haemocytometer	Containing Neubaur's chamber, RBC & WBC pipette. Used for sperm counting.	10
5	Stains and racks.	Gram's stain, Zeihl Neelsen stain, Leishman stain, Lugol's iodine	500ml each

Course Name : Diploma in Medical Laboratory Technology

Course Code : ML

Semester : Sixth

Subject Title : Advance Haematology

Subject Code : 19615

Teaching and Examination Scheme:

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

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:

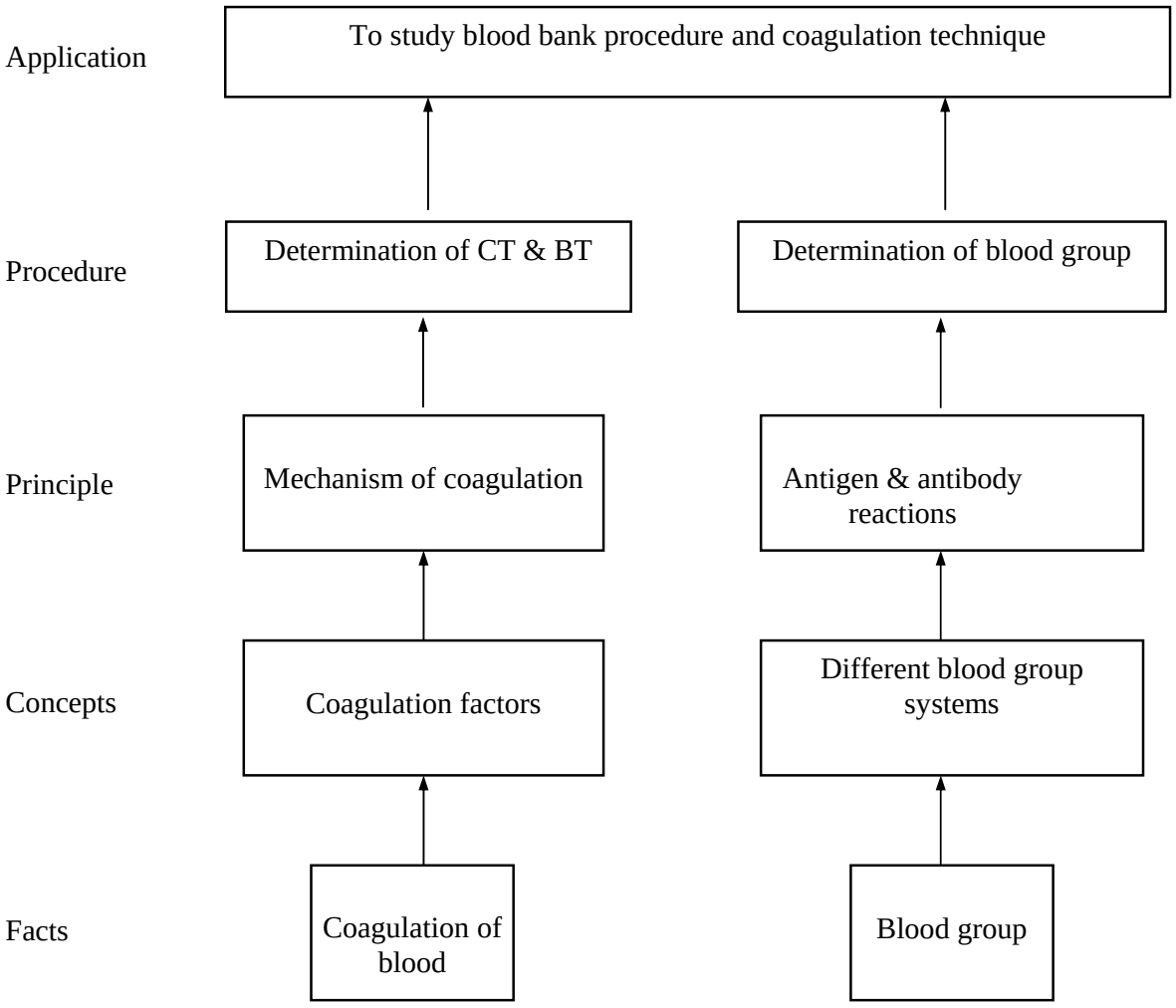
Blood Banking is a science which deals with collection, testing & transfusion of blood & its products. It also deals with common blood bank procedures.

General Objectives:

The student will be able to:

1. Understand routine blood bank procedures.
2. Understand common blood bank documentation.
3. Identify blood groups.
4. Understand coagulation technique.

Learning Structure:



Contents: Theory

Topic and Content	Hours	Marks
Topic 1 : Thrombocyte (Platelets) **Specific Objectives:** ➢ Write Properties &Functions of Platelets. ➢ Describe Thrombopoiesis. **Contents:** • Morphology of platelets. • Properties of platelets. • Functions of platelets • Thrombopoiesis a) Definition. b) Site of development. c) Stages of development.	03	08
Topic 2 : Coagulation of Blood **Specific Objectives:** ➢ Describe Mechanism of Coagulation. ➢ Describe Haemophilia. ➢ Determination of Platelet count and Prothrombin Time. **Contents:** **2.1 Coagulation (Marks 16)** • Definition of coagulation. • Coagulation factors • Mechanism of Coagulation • Factors preventing and hastening coagulation • Diseases that occur due to defect in coagulation a) Deficiency of prothrombin, b) Haemophilia, **2.2 Investigations in haemorrhagic disorder (Marks 12)** • Investigations in haemorrhagic disorder a) Hess Capillary Resistance (tourniquet) test b) Platelet count by haemocytometer. c) Determination of Prothrombin Time d) Partial Thromboplastin Time.	12	28
Topic 3 : Haemoglobinopathies **Specific Objectives:** ➢ Define Haemoglobinopathies. ➢ Describe sickling test, Haemoglobin solubility test and Haemoglobin Electrophoresis. ➢ Define and classify Thalassaemia. **Contents:** • Definition • Sickle haemoglobinopathies • Investigations in sickle Haemoglobinopaties a) sickling test. b) Haemoglobin solubility test. c) Haemoglobin Electrophoresis. • Thalassaemia a) Definition. b) Classification.	10	16

Topic 4 : Blood Group **Specific Objectives:** ➢ Name different Blood grouping system. ➢ Describe ABO blood group, Bombay blood group and Rh Factor. **Contents:** **4.1 : Blood group systems (Marks 20)** • Different blood grouping systems. • ABO blood group system. • Bombay blood group. • Rh factor. **4.2 : Clinical applications (Marks 08)** • Clinical significance of blood group a) Blood transfusion. b) Paternity testing. • Complications of mismatched blood transfusion.	13	28
Topic 5 : Blood Banking Procedure **Specific Objectives:** ➢ Write criteria for donor selection. ➢ State Preparation & uses of blood components. **Contents:** • Planning of a blood bank • Documentation of blood banks. • Criteria for donor selection. • Collection of blood in blood banks. • Storage of blood in blood banks. • Preparation of blood components. • Uses (Indications) of blood components. • Apheresis.	10	20
	48	**100**

Practical:
Skills to be developed

Intellectual Skills

1. Understand routine procedures of a blood bank.
2. Understand documentation in blood bank.
3. Interpret results and report.

Motor Skills

1. Perform blood grouping and cross matching.
2. Perform sickling test.

List of Practical:

1. Determination of Bleeding time
2. Determination of Clotting time
3. Haemoglobin solubility test
4. Sickling test
5. ABO grouping - cell grouping
6. ABO grouping - serum grouping
7. Rh typing.

8. Cross matching test.

Learning Resources:
Books:

Sr. No.	Title	Name of Author	Name of Publisher	Year of Publication
01	Medical Laboratory Technology Vol.- I	Kanai L. Mukherjee	Tata McGraw Hill Pub. Co. Ltd. New Delhi	14th edition 2010
02	Haematology	John Dacie	Longman group Ltd , New York	8th edition 1995
03	Text book of Medical Lab technology	Profulla B. Godkar	Bhalani Publications house, Hyderabad	3rd edition 2012
04	Human Physiology volume 1	Dr. C.C. Chatterjee	Medical allied agency.	12th edition2012
05	Text Book of blood banking and transfusion medicine.	Talib V. H.	C.B. S. Publications and distributors. New Delhi.	2008

2. Links:

1. www.en.wikipedia.org/wiki/thrombocyte
2. www.en.wikipedia.org/wiki/coagulation of blood
3. www.en.wikipedia.org/wiki/haemoglobinopathies
4. www.en.wikipedia.org/wiki/blood groups
5. www.en.wikipedia.org/wiki/blood bank

3. List of 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	Blood grouping antisera	Anti A, Anti B, Anti D.	10ml each
4	Sodium metabisulphite powder	Reducing agent used for Sickling test.	50g
5	Working sodium dithionite solution.	Used for Haemoglobin solubility test.	500m1
6	Normal saline.	0.85% Nacl solution	500m1
7	Analytical Balance	Capacity 0.2mg to 200 g.	02

Course Name : Diploma in Medical Laboratory Technology

Course Code : ML

Semester : Sixth

Subject Title : Immunology

Subject Code : 19616

Teaching and Examination Scheme:

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

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:

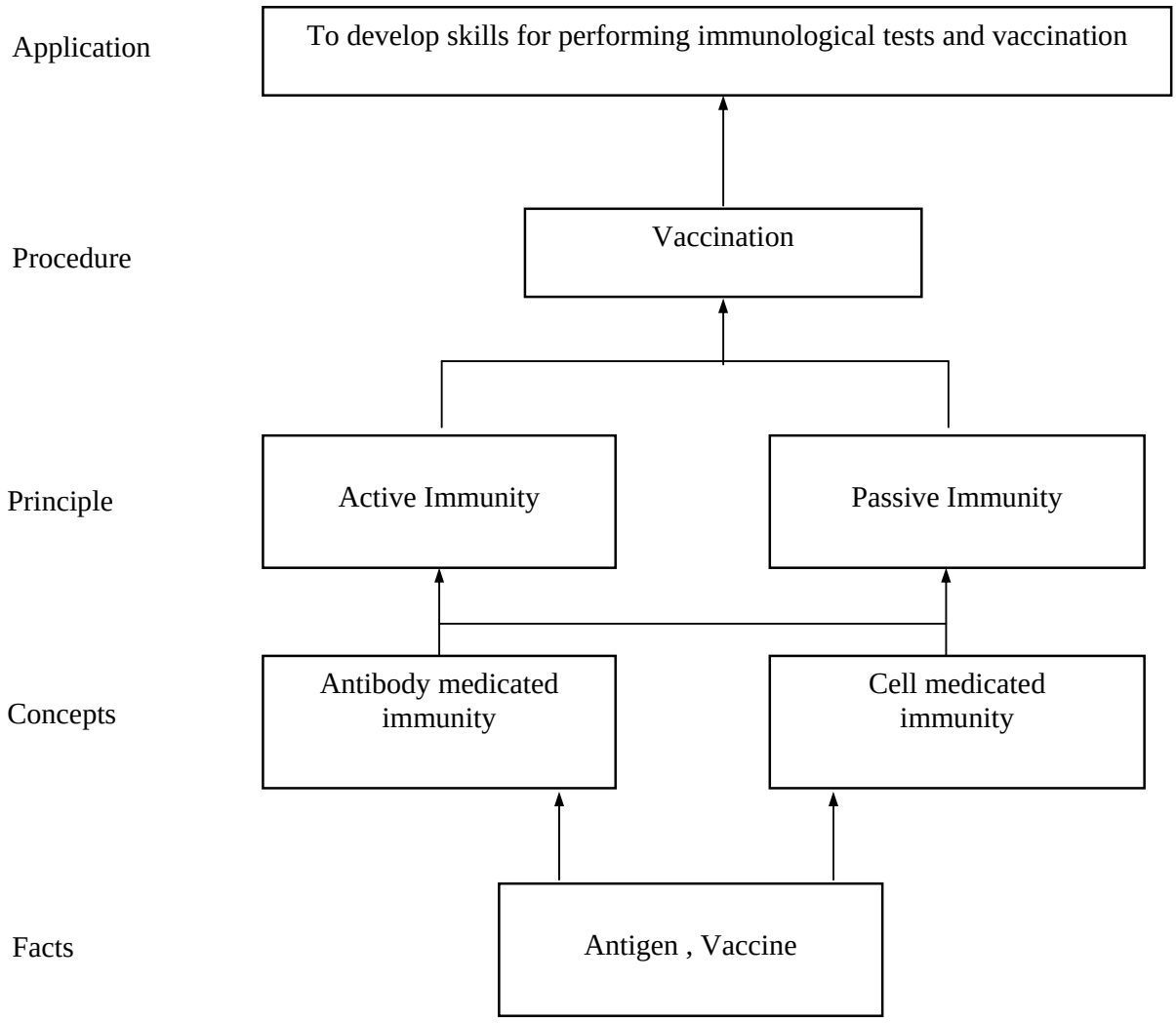
Immunology is a back bone of most of the medical subjects. Understanding of the concepts is required for logical approach and analysis of laboratory investigations.

General objectives:

The student will be able to:

1. Understand applications of basic principles in immunology.
2. Understand Immunisation schedule and methods of Immunisation.

Learning Structure:



Contents: Theory

Topic and Content	Hours	Marks
Topic 1: Essentials of Immunology **Specific objectives** ➢ **Define Immunity and Immune Response.** ➢ **Classify Immunity and Immune Response.** ➢ **Describe structure and function of Immune System.** **Contents:** 1.1 Immunity **(Marks 12)** • Definition, types, factors influencing the level of innate immunity. • Mechanisms of innate immunity. • Acquired immunity, Measurement of immunity, Local immunity, Herd immunity. 1.2 Immune system **(04 Marks)** • Introduction, • Central lymphoid organs. • Cells of immune system. 1.3 Immune response **(Marks 08)** • Definition, • Hormonal Immune response, • Cellular Immune system.	08	24
Topic 2: Hypersensitivity **Specific objectives** ➢ **Define Hypersensitivity.** ➢ **Classify Hypersensitivity reactions**. **Contents:** • Definition, • Classification of Hypersensitivity reactions • Mechanisms of Hypersensitivity reactions. • Practical applications.	08	16
Topic 3 : Autoimmunity **Specific objectives** ➢ Define Autoimmunity. ➢ Describe mechanisms of autoimmunization. ➢ Classify autoimmune diseases. **Contents:** • Definition, • Mechanism of autoimmunisation • Classification of autoimmune diseases.	04	16
Topic 4 : Immunology of Transplantation **Specific objectives** ➢ Define Transplant. ➢ Classify Transplant. ➢ Describe allograft reaction and graft versus host reaction. ➢ Define Histocompatibility antigens. **Contents:** • Definition, • Classification of transplants. • Allograft reaction. • Mechanism of allograft rejection.	08	10

• Histocompatibility antigens. • Graft versus Host reaction.		
Topic 5 : Vaccination **Specific objectives** ➢ Define Vaccine. ➢ Classify vaccines. ➢ Describe Universal programme of immunization followed in India **Contents:** 5.1 Vaccines **(Marks 12)** • Definition of vaccine. • Types of vaccines. • Antisera and antitoxins. • Cold chain. • Hazards of immunisation 5.2 Immunisation **(Marks 06)** • Universal programme of immunisation followed in India. 5.3 Vaccination **(Marks 16)** • Type, Age, Route of administration, Reaction, Immunity and Contraindications of the following vaccines. 1) Measles Vaccine 2) DPT Vaccine 3) BCG Vaccine 4) Polio vaccine 5) Hepatitis A and B vaccine. 6) Typhoid vaccine. 7) Cholera vaccine 8) Antirabies vaccine.	20	34
Total	**48**	**100**

Practical:
Skills to be developed

Intellectual Skills

- Understand Type, Age, Route of administration, Reaction, Immunity and Contraindications of the vaccines.

Practical:
Study of the following vaccines

a) Measles
b) DPT
c) BCG
d) OPV
e) Hepatitis B
f) Typhoid Vaccine
g) Antirabies Vaccine
h) Tetanus Toxoid
i) Hepatitis A Vaccine

Learning Resources:
Books:

Sr. No.	Title	Name of Author	Name of Publisher
01	Text Book of Microbiology	R. Ananth Narayan	Orient Longman Hyderabad
02	Text Book of Preventive and Social Medicine	K. Park	M/S Banarasidas Banot Jabalpur
03	Essential Immunology	Ivan M Raitt	Oxford Blackwell scientific publication

Links:

1. www.en.wikipedia.org/wiki/
2. www.en.wikipedia.org/wiki/
3. www.en.wikipedia.org/wiki/rna/
4. www.en.wikipedia.org/wiki/

List of 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	Test kits	PPD 10 TU/0.1ml (5 ml),Measles, DPT,OPV, HBV,TAB, Antirabies, TT and HAV vaccines.	01 each

Course Name : Diploma in Medical Laboratory Technology

Course Code : ML

Semester : Sixth

Subject Title : Professional Practices-III

Subject Code : 19902

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. Students will be benefited by their exposure to various pathological and clinical activities conducted in laboratories and this experience will add values in their attitude such as value for health, work commitment, hard working, problem solving, punctuality, loyalty and independent study.

General Oobjectives:

The student 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.

Activity	Hours
❖ **INDUSTRIAL VISITS - VISITS TO PATHOLOGY LAB** 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 i) Blood bank ii) Hi-tech pathology laboratory iii) Hospitals (different laboratories)	12
❖ **LECTURES OF FIELD EXPERTS** To be organised on any three topics of the following suggested areas or any other suitable topics. 1) Bio waste management. 2) Blood banking. 3) Recent advances and use of blood components. 4) Automation in Haematology. 5) Interview technique. 6) Career options in Medical laboratory technology. 7) Microbial biotechnology.	12
❖ **GROUP DISCUSSION** Students should discuss in group of six to eight students and write a brief Report on the search/collected information through literature survey, visits and discussion with experts/concerned persons. student should write a brief report on the same and submit it as a part of term work. 1) Automation in pathology laboratory. 2) Yoga and Health awareness. 3) Topics of students interest with the consent of teacher.	12
❖ **SEMINAR** Seminar topics should be related to the subjects of sixth semester each student shall submit a report of at least ten pages and deliver a seminar for ten minutes.	12
Total	**48**

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