CURRICULUM FOR
ADVANCE DIPLOMA IN
MEDICAL LABORATORY TECHNOLOGY (LX)
SCHEME : E

DURATION: TWO YEARS **PATTERN:** FULL TIME -SEMESTER

(To be implemented from the Academic Year 2009 – 2010)

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION. MUMBAI
(AUTONOMOUS)
ISO 9001-2008 Certified
49, Kherwadi, Aliyawer Jung Marg, Mumbai – 400 051

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI.

TEACHING AND EXAMINATION SCHEME

COURSE NAME : ADVANCE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : LX

DURATION OF COURSE : THREE SEMESTERS/ ONE AND HALF YEAR **DURATION: 16 WEEKS**

SEMESTER : FIRST **WITH EFFECT FROM 2009-10**

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

SR. No.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME									
				TH	TU	PR	PAPER HRS	TH (1)		PR (4)		OR (8)		TW (9)		SW (16009)
								Max	Min	Max	Min	Max	Min	Max	Min	
1	Human Anatomy and Physiology $	HAB	13013	04	--	02	03	100	50	--	--	50 #	25	50@	25	50
2	Hematology And Blood Banking	HBB	13023	03	--	02	03	100	50	50#	25	--	--	50@	25	
3	Bio chemistry (Medical)	BCH	13024	05	--	04	03	100	50	50 #	25	--	--	50@	25	
4	Clinical Pathology	CLP	13025	04	--	04	03	100	50	50 #	25	--	--	50@	25	
5	Seminar and Professional Practices	SPP	13026	--	--	02	--	--	--	--	--	50@	25	--	--	
			TOTAL	**16**	**--**	**14**	**--**	**400**	**--**	**150**	**--**	**100**	**--**	**200**	**--**	**50**

STUDENT CONTACT HOURS PER WEEK (FORMAL TEACHING): **30 HRS.**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH

@ Internal Assessment, # External Assessment, Ø Common to All Conventional Diploma, #* Online Examination, [ ] No Theory Examination.

$ -COMMON WITH P.G. DIPLOMA IN DIETETICS

TOTAL MARKS - 900

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 and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

NOTE: No Ready made Printed Journal's are allowed. Journal's should be hand written by each student.

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI.

TEACHING & EXAMINATION SCHEME FOR

COURSE NAME : ADVANCE DIPLOMA IN MEDICAL LABORATORY

COURSE CODE : LX

DURATION OF COURSE : THREE SEMESTERS/ONE AND HALF YEAR **WITH EFFECT FROM 2009-10**

SEMESTER : SECOND **DURATION : 16 WEEKS**

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

SR. NO.	SUBJECT TITLE	Abbrev iation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME								
				TH	TU	PR	PAPER HRS	TH (1)		PR (4)		OR (8)		TW (9)		SW (16010)
								MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	
1	Bacteriology, Immunology and Serology	BIS	13077	05	--	03	03	100	50	50 #	25	--	--	50 @	25	50
2	Histopathology and Cytopathology	HPC	13078	04	--	02	03	100	50	50 #	25	--	--	50 @	25	
3	Advanced Techniques and Future Trends in Laboratory Science	LSC	13079	03	--	02	03	100	50	--	--	50#	25	50 @	25	
4	Laboratory Mana-gement and Ethics	LMG	13080	03	--	02	03	100	50	--	--	50 #	25	50 @	25	
5	Parasitology, Mycology and Virology.	PMV	13081	04	--	02	03	100	50	50 #	25	--	--	50 @	25	
6	Group Discussion & Seminar	GDS	13082	--	--	02	--	--	--	--	--	--	--	50 @	25	
			TOTAL	**19**	**--**	**13**	**--**	**500**	**--**	**150**	**--**	**100**	**--**	**300**	**--**	**50**

STUDENT CONTACT HOURS PER WEEK (FORMAL TEACHING): **32 HRS.**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

@ Internal Assessment, # External Assessment, Ø Common to All Conventional Diploma, #* Online Examination, [ ] No Theory Examination.

TOTAL MARKS - 1100

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 and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

NOTE: No Ready made Printed Journal's are allowed. Journals should be hand written by each student.

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

TEACHING AND EXAMINATION SCHEME

COURSE NAME : ADVANCE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : LX

DURATION OF COURSE : THREE SEMESTERS/ ONE AND HALF YEAR **WITH EFFECT FROM 2009-10**

SEMESTER : THIRD **DURATION : 16 WEEKS**

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

SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME									
				TH	TU	PR	PAPER HRS	TH (1)		PR (4)		OR (8)		TW (9)		SW
								MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	
1	Project and Seminar on Hospital Training	PHT	13115	--	--	48*	--	--	--	--	--	100#	50	100@	50	--
			TOTAL	**--**	**--**	**48**	**--**	**--**	**--**	**--**	**--**	**100**	**--**	**100**	**--**	**--**

STUDENT CONTACT HOURS PER WEEK (FORMAL TEACHING) : ***08 HRS/day for 16 weeks: 6 days a week, training.**

@ Internal Assessment, # External Assessment, Ø Common to All Conventional Diploma, #* Online Examination, ▭ No Theory Examination.

TOTAL MARKS : 200

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 and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

FIRST

SEMESTER

COURSE CODE : ADVANCE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : LX

SEMESTER : FIRST

SUBJECT NAME : HUMAN ANATOMY & PHYSIOLOGY

SUBJECT CODE : 13013

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
04	--	02	03	100	--	50#	50@	200

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:

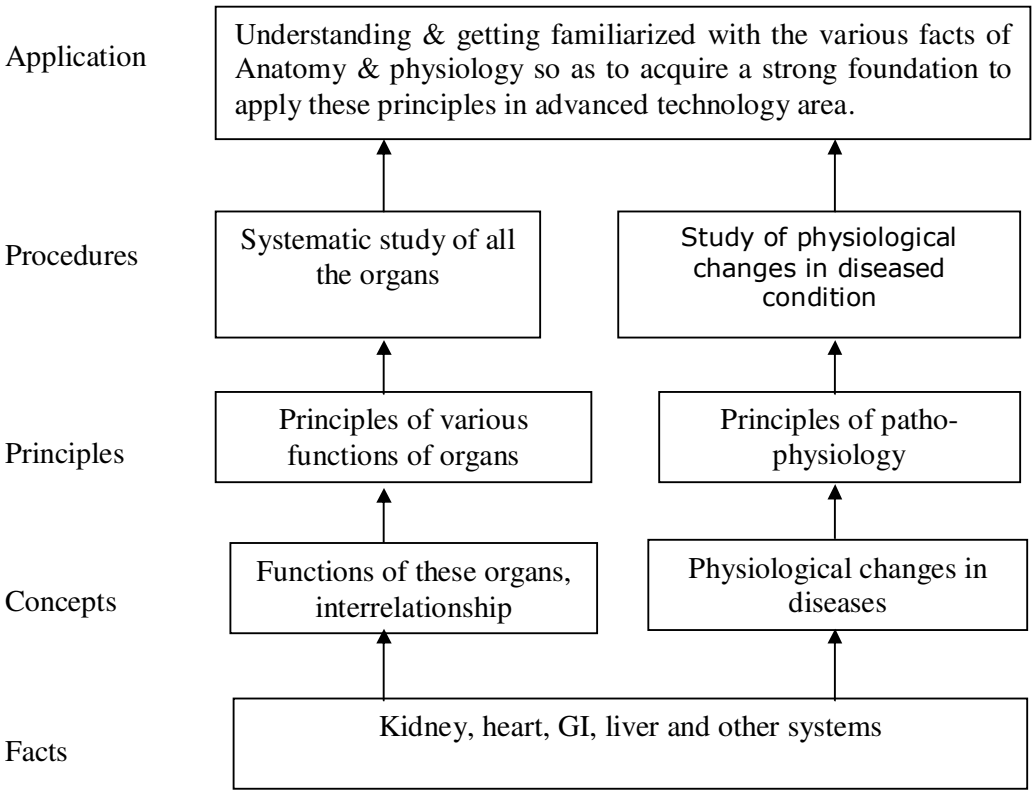
The purpose of including this subject is to provide the P. G. D. M. L. T. students with a knowledge of the structure and function of a healthy human body and the changes which take place when disease interferes with normal processes.

OBJECTIVES:

The student will be able to:

1. Identify various systems in Human Body
2. Use common anatomy terms
3. Describe working of various systems in Human Body and Organs

LEARNING STRUCTURE:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
1	**Introduction:** 1. Different system of Human body 2. Cell- Structure & function. 3. Body Tissue – their functions 4. Common anatomical terms (Anterior/Ventral, lateral, medial, median, posterior/dorsal etc.) 5. Anatomical Position & Planes (Supine, prone, recumbent, lithotomy) planes- coronal, sagittal.	05	08
2	**Cardio Vascular System:** 1. Structure of Heart & its coverings, major Blood vessels- arteries & veins 2. Structure of Blood vessels 3. Cardiac cycle, cardiac output 4. Blood pressure, factors affecting it. 5. Cardiovascular disease- hypertension, Congestive Cardiac Failure, Transplant, Ischaemic hert disease	10	16
3	**Respiratory System:** 1. Respiratory tract structure, Lungs structure, Mechanism of respiration, Vital Capacity. 2. Respiratory Diseases – Tuberculosis, Cystic fibrosis, Pneumonia, Asthma, Respiratory failure, Carcinoma	06	10
4	**Central Nervous System:** 1. Brain – Coverings 2. Parts of brain, function, Spinal cord, peripheral nerves, Autonomic nervous system- sympathetic parasympathetic. 3. Diseases- Stroke, Alzheimer's disease, epilepsy, Myasthenia Gravis Parkinson's disease.	05	08
5	**Digestive Systems (G. I. T)** 1. Teeth, Tonque, Salivary Glands, Tonsils, Stomach, Intestine: small, large 2. Rectum, Anal Canal, Liver, Pancreas, Gall Bladder 3. Digestion & Absorption of proteins, fats & carbohydrate. 4. Diseases- Dental Caries, periodontal diseases, Gastric ulcer, Carcinoma, Celiac disease, Inflammatory Bowel disease, 5. Liver-Cirrhosis & Encephalopathy Cholelithiasis, Pancreatitis.	09	16
6	**Genito Uninary System and Skin:** 1. Structure and functions of the Skin 2. Kidney –Ureter, Bladder 3. Kidney – Structure & Function of Nepuron 4. Mechanism of urine formation 5. Formation of erythropoietin and some common kidney diseases. 6. Maintainance of acid base balance and electrolyte balance. 7. Normal body temperature and mechanism of its	16	22

	maintenance. 8. Diseases- Urolithiasis, Renal failure & transplant, Hypo & hyperpyrexia. 9. Testis- Vas deferens, prostate, Seminal vesicles, 10. Ovaries, uterus, vagina Diseases- Menopause, carcinoma.		
7	**Endocrine System:** 1. Syndromes resulting from hypo and hyper activity of thyroid, parathyroid, adrenal, pituitary, pancreas. 2. Physiology of reproduction, menstruation, pregnancy and lactation.	08	10
8	**MUSCULO SKELETAL SYSTEM:** 1. Development of Bone tissue (osteogenesis) 2. Types of bones and joints 3. Development of bone Rickets, osteomalasia and osteoporosis 4. Muscle-Definition & types of muscle.	05	10
	TOTAL	**64**	**100**

List of Practical:–

1. Surface Anatomy for each system
2. TPR-BP Measurement.
3. Bones/ Dummy Models/ Charts/ Discussion/ Seminar.
4. Cardiac resuscitation, First Aid.
5. Visit to Anatomy Museum.

Learning resources:

Books:

Sr. No	Title of the Book	Author	Year of Publication	Edition	Publisher
1	Gray's Anatomy	Gray	--	--	--
2	Human Physiology (Vol. I, IV)	C.C. Chatterjee	1992	11th	Medical Allied Agencies Calcutta
3.	Anatomy & Physiology in health and illness	Ross & Wilson	1998	6th	ELBS, Churchill Livingstone, Medical Division of Longman group (FE) Ltd.
4.	Principles & practice of medicine	Davidson	1991	16th	--
5	Human Anatomy (3- Vol)	B.D. Chaurasia	1995	3rd	CBS. New Delhi
6	Surface Anatomy	Dr. Halim	--	--	--
7	Anatomy (3- Vol)	Sameer Mitra	2002	6th	Academic Publisher
8	Cunningham's Manual of Practical Anatomy (3- Vol)	Cunningham	1986	15th	ELBS Oxford University

COURSE CODE : ADVANCE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : LX

SEMESTER : FIRST

SUBJECT TITLE : HAEMATOLOGY AND BLOOD BANKING

SUBJECT CODE : 13023

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
03	--	02	03	100	50#	--	50@	200

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 laboratory science deals with study of blood, its components and changes it undergoes during illness.

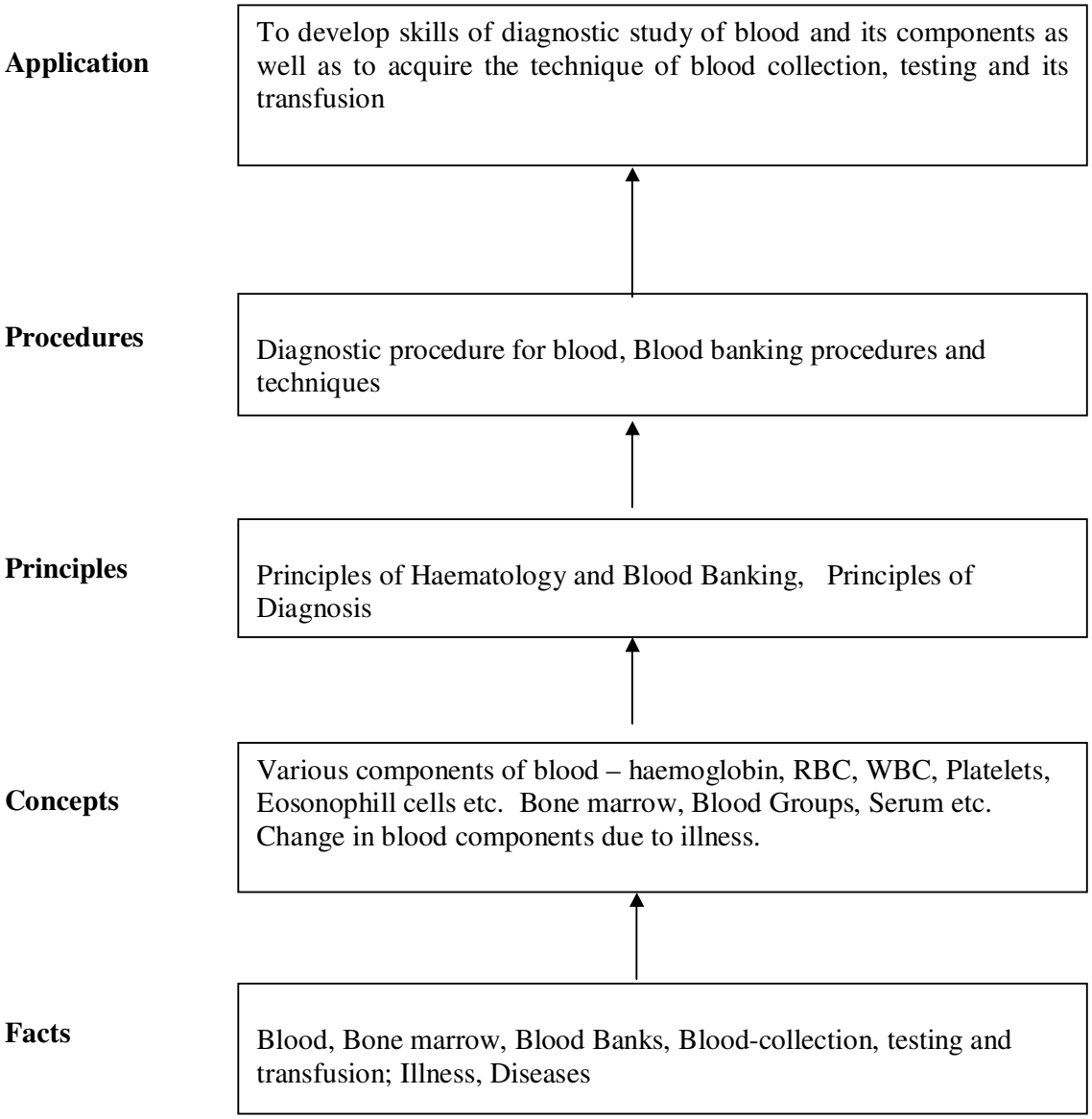
While blood banking is a science which deals with collecting, testing and transfusing blood and its products for replacement of lost blood.

OBJECTIVE:

Students will learn about normal formation & function of various types of blood cells, coagulation mechanism & various factors that cause the significant changes in the no. of specific cells & related clinical conditions.

Student will learn theoretical aspects of immuno-hematology and basic blood bank procedures.

Learning Structure:



CONTENTS: Theory

Chapter	Name of the Topic	Marks	Hours
01	**Haematology** 1.1 Introduction :- Composition of blood, its formation and functions 1.1.1 Collection of blood :- Different routes, difference between capillary and venous sample 1.1.2 Anticoagulants :- Different types, method of preparation and uses	08	05
02	**Haemoglobin** 2.1 Normal and abnormal values and Physiological variations 2.2 Estimation by (a) Colorimetric Method, (b) Chemical Method, (c) Specific Gravity Method, (d) Gasometric Method 2.3 Clinical importance	10	05
	2.4 Red Blood Cells :- 2.4.1 Total Count :- Normal, abnormal values, and Physiological variations, 2.4.2 Haemocytometer - method and calculation 2.4.3 Anemia – Classification 2.4.4 Sickle cell anemia – Slide Preparation 2.4.5 Haematocrit – Normal and abnormal values 2.4.6 Red Cell indices – Normal and abnormal values 2.4.7 Erythrocyte Sedimentation Rate 2.4.8 Westergrens & Wintrobe's Method 2.4.9 Factors affecting values 2.4.10 Limitations and Significance	12	05

	2.5 White Blood Cells :- 2.5.1 Differential Count :- Normal, abnormal values and physiological variation 2.5.2 Preparation of peripheral blood smear, Staining by different methods, Methods of examinations and reporting 2.5.3 Total White Blood Cell Count :- Normal and abnormal values, 2.5.4 Haemocytometer - method and calculation	10	05
	2.6 Reticulocytes :- Methods, Normal values and significance 2..7.1 Osmotic Fragility test	06	03
03	3.1 Haemostasis and Coagulation Mechanism 3.2 Coagulation Factors 3.3 Coagulation Test – (a) Bleeding time, (b) Clotting time, (c) Whole Blood Coagulation time, (d) Tourniquet test, (e) Clot retraction test (f) Prothrombin time (PT), (g) Activated Partial Thromo Plastin time (APTT) L. E. Cell test	12	05
04	4.1 Bone Marrow :- Smear Preparation, Staining, Examination and Report 4.2 An elementary knowledge of use of isotopes in haematology	06	04
05	**Blood Banking** Introduction : Immuno hematology Human blood group antigen and their inheritance ABO blood group system :- Sub groups, Source of antigens, Types of antibodies Rh blood rgoup system – Nomenclature, Types of antigen, Mode of inheritance, Types of antibodies	12	05

	Other blood group systems such as MNS, Kell, Bombay Blood group - complete knowledge of theory and genetics. Preparation and Preservation of grouping antisera Technique of blood grouping and cross matching Coomb's test (a) Direct and Indirect test, (b) Titration of antibodies - complete and incomplete Blood transfusion technique (a) Preparation and properties of anticoagulant solution, (b) Criteria for selection of donor, (c) Screening test for donor, (d) Method of collection of blood, (e) Clearing and assembling of blood transfusion apparatus	12	05
	Investigation of transfusion reaction. Hemolytic disease of newborn, Exchange transfusion, Transfusion transmitted diseases Cell preparation and transfusion of various components of blood Serum immunoglobulin and their significance in blood banking Organisation, operation, administration of bank and maintenance of records, Govt. Regulations (FDA)	12	06
	Total	**100**	**48**

Practical:

Skills to be developed:

Intellectual Skills: 1. Select method for testing

2. Choose appropriate chemicals for test

3. Choose proper equipment/apparatus

Motor Skills: 1. Accuracy in measurement

2. Follow proper procedure for the test

3. Check the instruments/apparatus/machine for any error

List of Practicals:

1. Haemoglobin Estimation – Sahali's Method
2. RBC Count
3. Total WBC Count
4. Differential WBC Count
5. Absolute Eosinophill Count
6. Reticulocyte count
7. E.S.R. determination
8. Platelet Count
9. Bleeding time and clotting time
10. Prothrombin time / Partial Thromboplastin time
11. L. E. Cell Preparation
12. Sickle Cell Preparation
13. Osmotic Fragility Test
14. Bone Marrow Smear Preparation, Staining and Examination
15. ABO Grouping – (a) Slide technique, (b) Tube technique, (c) Reverse and forward grouping
16. Cross matching – Major and Minor
17. Rh typing (a) Rapid tube test, (b) Saline antiD (c) One stage albumin technique, (d) Two stage albumin technique, (e) Coombs antihuman globulin technique
18. Coombs test (a) Direct coombs, (b) Indirect coombs
19. Antibody titre : Technique and significance.

Learning Resources:

Books:

Sr. No.	Author	Title	Edition	Year of Publication	Publisher
01	D. Penington, et. al.	Clinical Haematology in Medical practice	4th	1984	CBS Publishers & Distributor,
02	John Dacie & S. M. Lewis	Practical Haematology	8th	1995	Churchil Livingston
03	Maxwell M. Wintrobe	Clinical Haematology	8th	1981	Lea & Febiger - Philadephia
04	John B. Miale	Laboratory Medicine - Haematology	5th	1977	Mosby Company
05	G. Guru	Blood Bank Operations	1st	1991	NCERT, New Delhi.
06	Indian Society for Blood Banking	Blood Banking Training Manual	1st	1995	Dr. Dilip Wani, Janakalyan Bldg. ,Pune.
07	P.B. Godkar	Text Book of Medical Laboratory Technology	2nd	2003	Bhalani Publication.

COURSE CODE : ADVANCE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : LX

SEMESTER : FIRST

SUBJECT TITLE : BIOCHEMISTRY (MEDICAL)

SUBJECT CODE : 13024

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
05	--	04	03	100	50#	--	50@	200

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)**

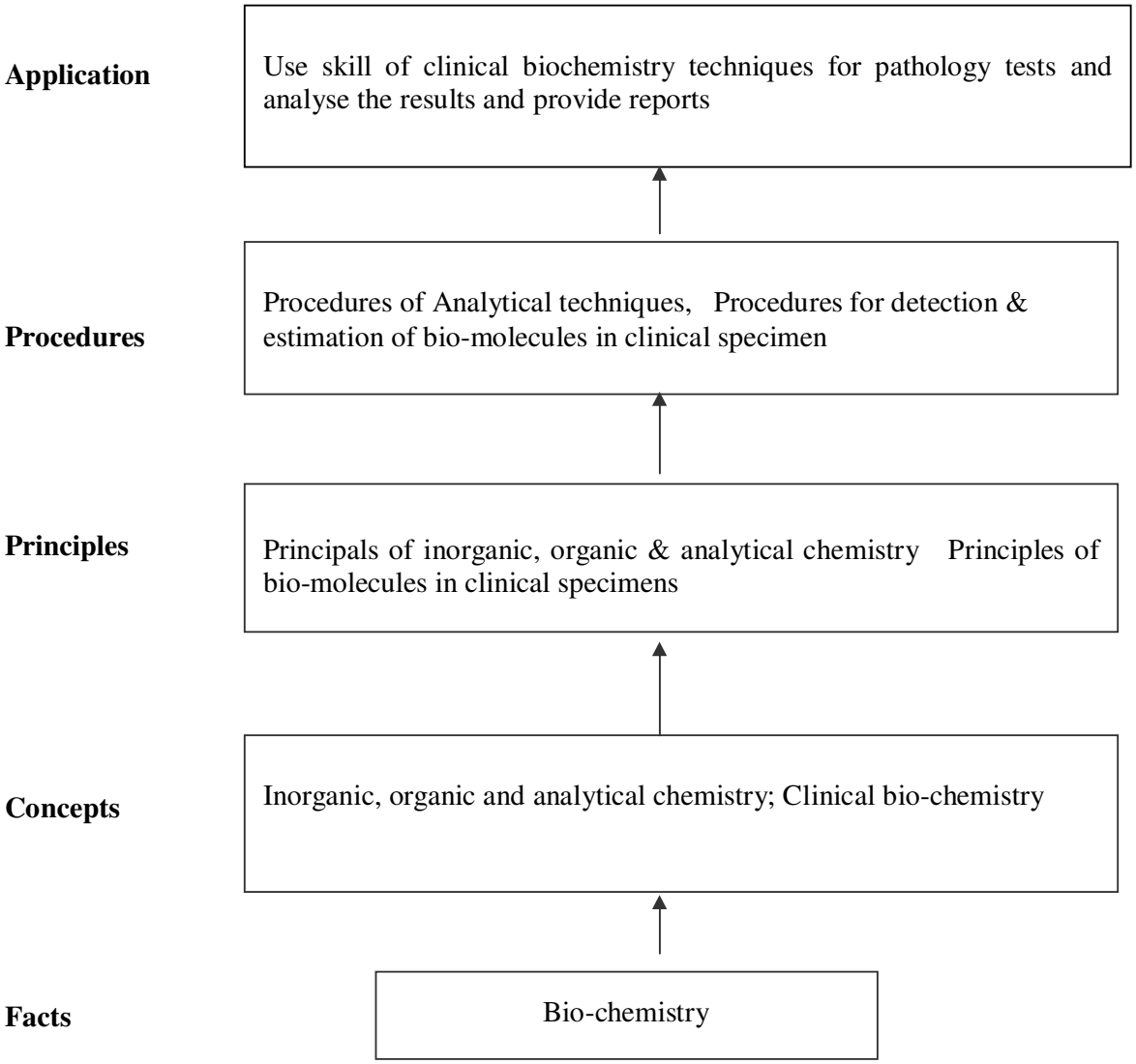
RATIONALE:

Biochemistry (medical) is a study of chemical components of human body. Estimation of chemical molecules is essential to know disease process at molecular level and thus biochemistry help us to identify abnormal function at earlier stage of diseases and it is also useful for prognostic purpose.

OBJECTIVE:

Student will learn aspects of normal chemical nature & chemical behaviour of human sales & how changes in this aspects lead to various clinical conditions.

Learning Structure:



Content: Theory

Chapter	Name of the Topic	Marks	Hours
01	**Biochemistry** 1.1 Elementary knowledge of inorganic chemistry 1.1.1 Structure of atom, atomic weight, molecular weight and equivalent weight 1.1.2 Acids, bases and salts 1.1.3 pH indicators - pH meter - pH measurement 1.1.4 Molar solutions 1.1.5 Normal solutions 1.1.6 Buffer solutions 1.1.7 Percent solution 1.1.8 Saturated solution 1.1.9 Standard solutions 1.2 Elementary knowledge of organic chemistry (Organic compounds, aliphatic, aromatic, alcohol, ethers, phenols, acids etc.) 1.3 Elementary knowledge of Physical Chemistry 1.3.1 Osmosis, osmotic pressure, diffusion, hypotonic, hypertonic and isotonic solutions 1.3.2 Definition and classification of some colloids and crystalloids	14	10
	1.4 Elementary knowledge of analytical chemistry 1.4.1 Principles, Instrumentation, working, uses, care, maintenance. (a) Balances : mono-pan, two-pan, top-pan (b) Centrifuges, (c) pH meter (d) Colorimeter, (e) Spectrophotometer, (f) Fluorimeter, (g) Flame-photometer, (h) Ion selective electrodes, (i) Urinometer, (j) Chromatograph, (k) Electrophoresis, (l) Densitometer	14	12
02	**Clinical Biochemistry** **Carbohydrates:** Dietary Sources, digestion, absorption, basic metabolism, regulation of blood glucose & its importance, glucose tolerance test, glucocylated Hb, other parameters and related disorders.	10	10

	Lipids: Dietary sources digestion, absorption, basic metabolism, lipid profile (cholesterol, triglyceride, lipoproteins, phospholipids) and its significance in various disorders.	10	09
	Proteins: Dietary sources digestion, absorption, fate of amino acids, nitrogen equilibrium, formation and detoxi- cation of ammonia, formation of urea, formation of non protein nitrogenous products e.g. uric acid, crea-tinine, disorders related to protein and nitrogen metabolism.	10	09
	Enzymes: Classification, properties, factors affecting enzyme activity, isoenzymes and coenzymes. Clinical enzymology: Therapeutic, diagnostic and analytical uses of enzymes with normal values of serum enzymes. **Hormones:** Chemical nature and biochemical functions. **2.7 Minerals and Electrolytes:** Na, K, Cl , Ca, Mg, I_2 P, , Fe and iron binding capacity.	14	12
03	**3.1 Therapeutic drug monitoring:** Barbiturate Phenobarbital, Phenytoine, lithium, lead, salicylate, mercury, digitalist.	12	10
	3.2 Acid Base Balance: Regulation of blood pH, Henderson Hasselbach equation, renal, respiratory and buffer system importance of arterial blood gases.		
04	**Organ Profiles** • Liver function test • Kidney function test • Thyroid function test • Cardiac function test	16	08
	• Pancreas function test • Hypertension profile • Diabetic profile • Gastric function test		
	Total	**100**	**80**

Practical:

Skills to be developed:
Intellectual Skills: 1. Select method for testing

2. Choose appropriate chemicals for test

3. Choose proper equipment/apparatus

Motor Skills: 1. Accuracy in measurement

2. Follow proper procedure for the test

3. Check the instruments/apparatus/machine for any error

List of Practical:

1. Principals and working of laboratory instruments
2. Importance and methods of cleaning of glass apparatus
3. Calibration of apparatus and glass-wares
4. Preparation and standardisation of volumetric solutions.
5. Basic titration such as acid Vs alkali, Silver Nitrate Vs Sodium Chloride
6. Preparation of buffer solution and measurement of their pH
7. Verification of Beer-Lambert's Law
8. Estimation of Blood sugar / glucose
9. Estimation of Urea,
10. Estimation of Plasma protein,
11. Estimation of serum Bilirubin
12. Estimation of serum Uric acid
13. Estimation of serum Creatinine
14. Estimation of serum Cholesterol
15. Estimation of serum HDL Cholesterol
16. Estimation of serum Triglyceride
17. Estimation of serum Calcium
18. Estimation of serum Inorganic Phosphorus
19. Estimation of serum Chloride
20. Estimation of serum Sodium and Potassium (by flame photometer)
21. Estimation of serum Transaminases (SGOT & PT)
22. Estimation of serum Amylase
23. Estimation of serum Acid phosphatase
24. Estimation of serum Alkaline phosphatase

Learning Resources:

Books:

Sr. No.	Author	Title	Edition	Year of Publication	Publisher
1	G. Guru	Clinical Biochemistry	1st	1989	Secretary, National Council of Educational Research & Training, New Delhi.
2	Cunningham's Manual of Practical Anatomy	Cunningham's	15th	1986	ELBS, Oxford University.
3	M. A. Siddique	Handbook of Biochemistry	8th	1993	Vijay Bhagat Scientific Book Co., Patna.
4	S. Ramkrishnan	Text book of Medical Biochemistry	1st	1980	Orient Longman Ltd., Madras.
5	K. Choudhary	Biochemical Techniques	1st	1989	Medical Publishers, New Delhi.
6	P.B. Godkar	Text book of Medical Laboratory Technology	2nd	2003	Bhalani Publication

COURSE CODE : ADVANCE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : LX

SEMESTER : FIRST

SUBJECT TITLE : CLINICAL PATHOLOGY

SUBJECT CODE : 13025

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
04	--	04	03	100	50#	--	50@	200

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)**

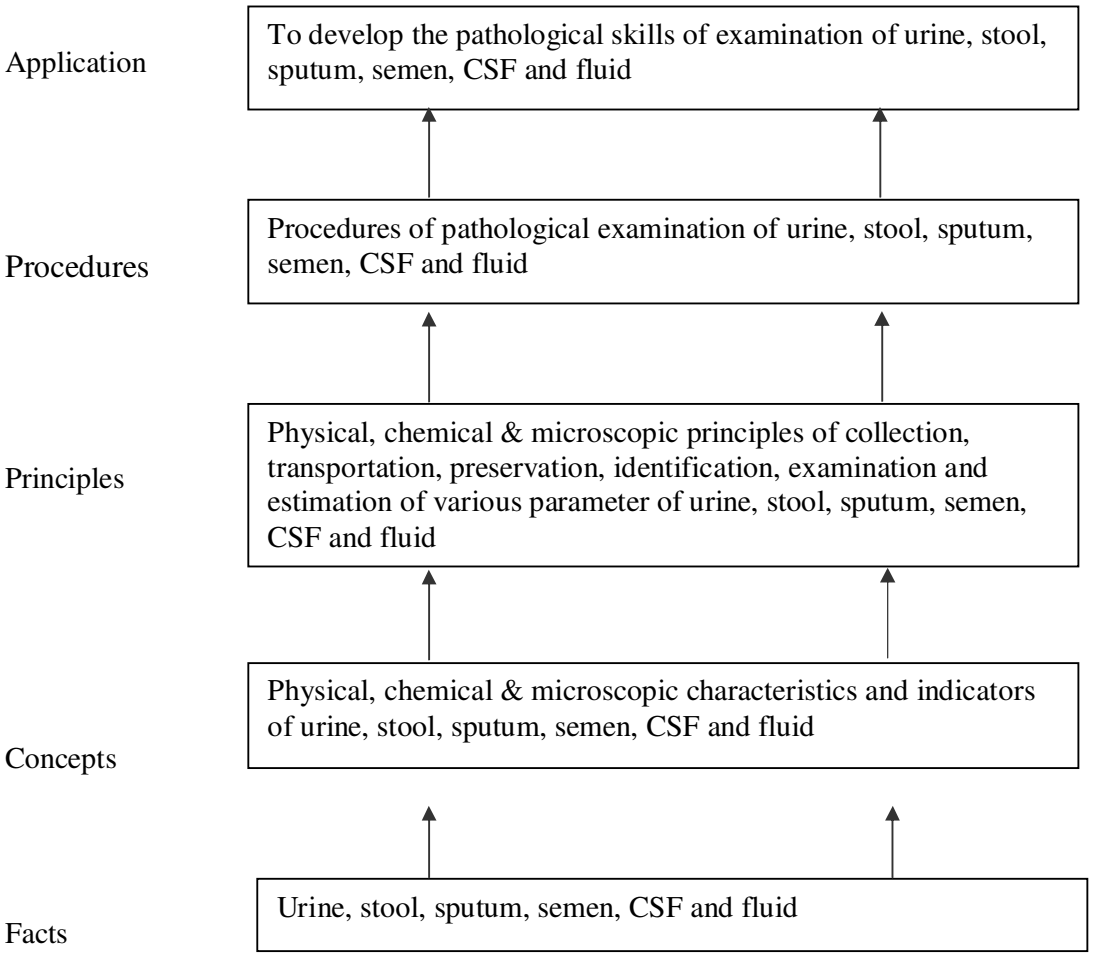
RATIONALE

It is a basic subject in laboratory science 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.

OBJECTIVE:

Student will learn the normal composition of various body fluids & feces & also the changes in their composition in various clinical conditions.

Learning Structure:



CONTENTS: Theory

Chapter	Name of the Topic	Marks	Hours
01	**Examination Of Urine** 1.1 Indication, Collection, Container, Transport, Preservation of urine for different types of urine analysis	04	03
	1.2 Physical examination and its significance	04	03
	1.3 Chemical examination and its significance	06	03
	1.4 Microscopic examination and its significance	04	03
02	**Examination Of Stool** 2.1 Indication, Collection, Container, Transport, Preservation for different types of fecal analysis	04	04
	2.2 Physical examination and its significance	04	03
	2.3 Chemical examination and its significance	06	03
	2.4 Microscopic examination and its significance	08	04
03	**Examination Of Sputum** 3.1 Indication, Collection, Container, Transport, Preservation for different types of sputum analysis	04	04
	Physical examination and its significance	04	03
	Chemical examination and its significance	04	03
	Microscopic examination and its significance	08	03
04	**Semen Analysis** 4.1 Indication, Collection, Container, Transport, Preservation for different types of semen examination	04	03
	4.2 Physical examination and its significance	04	03
	4.3 Chemical examination and its significance	06	03
	4.4 Microscopic examination and its significance	06	03

05	**Examination of CSF and Other Body Fluids Like Pleural Fluid, Pericardial Fluid, Peritoneal Fluid, Synovial Fluid, Ascitic Fluid.** 5.1 Indication, Collection, Container, Transport, Preservation for different types of CSF / Fluid analysis	04	04
	5.2 Physical examination and its significance	04	03
	5.3 Chemical examination and its significance	06	03
	5.4 Microscopic examination and its significance	06	03
	Total	**100**	**64**

Practical:

Skills to be developed:
Intellectual Skills: 1. Select method for testing

2. Choose appropriate chemicals for test

3. Choose proper equipment/apparatus

Motor Skills: 1. Accuracy in measurement

2. Follow proper procedure for the test

3. Check the instruments/apparatus/machine for any error

List of Practicals:

1.1 Routine examination of urine

2.1 Routine examination of stool

3.1 Routine examination of sputum

Routine examination of semen

Routine examination of CSF / Fluid

Learning Resources:

Books:

Sr. No.	Author	Title	Edition	Year of Publication	Publisher
1	K. Mukharji	Medical Laboratory Techniques, Vol - I, II & III	5th	1988	Tata McGraw Hill, Delhi.
2	G. Guru	Pathological Technology : Clinical Pathology	1st	1988	Sec - National Council of Educational Research & Training, New Delhi
3	S. S. Kelkar	Clinical pathology	1st	1993	Vora medical Publications, Mumbai
4	A. C. Sonnenwirth & Leonard Jarett	Gardwohl's Clinical Laboratory Methods & Diagnosis - Vol - I & II	8th	1980	C. V. Mosby Co., USA
5	J. Bernard Henry	Clinical Diagnosis & Management by Laboratory Methods	17th	1984	W. B. Saunders Co., London.
6	P.B. Godkar	Text Book of Medical Laboratory Technology	2nd	2003	Bhalani Publication.

COURSE CODE : ADVANCE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : LX

SEMESTER : FIRST

SUBJECT TITLE : SEMINAR AND PROFESSIONAL PRACTICE

SUBJECT CODE : 13026

Teaching and Examination Scheme:

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

RATIONALE:

This subject of conducting seminar is intended to equip the students with the necessary basic skills of Communications as well as to develop their ability to express the subject knowledge which they have acquired during the tenure of first semester of the program. This also helps to develop the confidence amongst the students which certainly help them in future to build their career as self developer and entrepreneur.

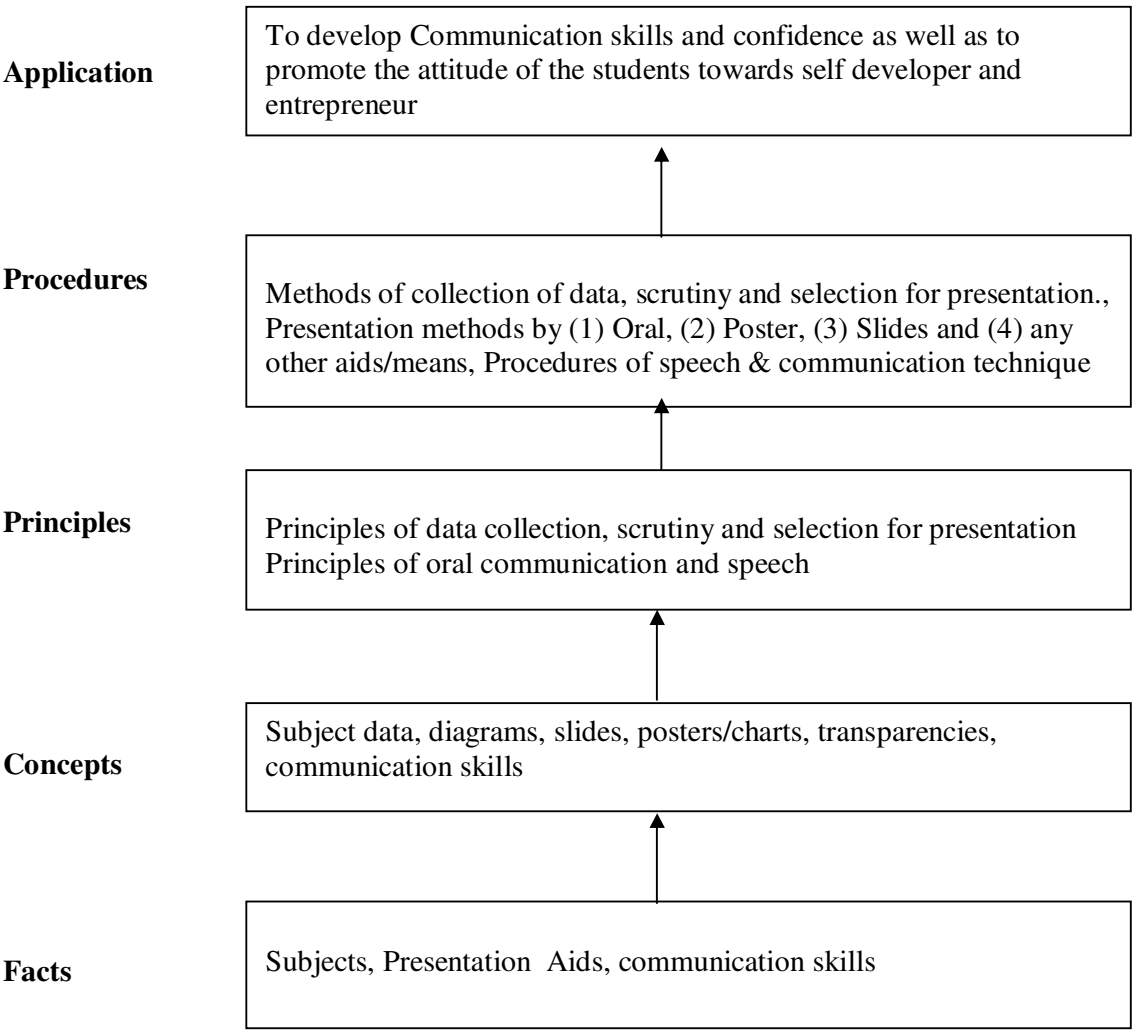
Professional practice is a visit to the Hospital as per the need of the subject and submission of the project as assigned.

OBJECTIVE:

The student will be able to:

1. Communicate with patients
2. Prepare report for seminar
3. Make good Presentation

Learning Structure:



Content:

The concerned teachers should teach the students the technique of presentation of seminar as well as explain the prose and cones of the same; so that students will get the correct idea of subject presentation with dignity and decorum, in the presence of group comprises of intellectuals and study class. The teacher may invite the other available experts at the time of delivery of seminar by students, as an observer.

The selection of topics by students may be made from the subjects of semester I of the course with the consent of concerned teacher. Student should collect the necessary data on the selected topics and discuss the same with the teacher before presentation.

The duration for delivering the seminar is 10 minutes for each student. The seminar should be delivered by the students for minimum two times and the marks are to be assigned out of 50 for each attempt (by internal examiner) and thereafter average of the two is taken and to be considered as the oral marks for seminar (out of maximum marks 50).

SECOND

SEMESTER

COURSE CODE : ADVANCE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : LX

SEMESTER : SECOND

SUBJECT NAME : BACTERIOLOGY, IMMUNOLOGY AND SEROLOGY

SUBJECT CODE : 13077

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
05	--	03	03	100	50#	--	50@	

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:

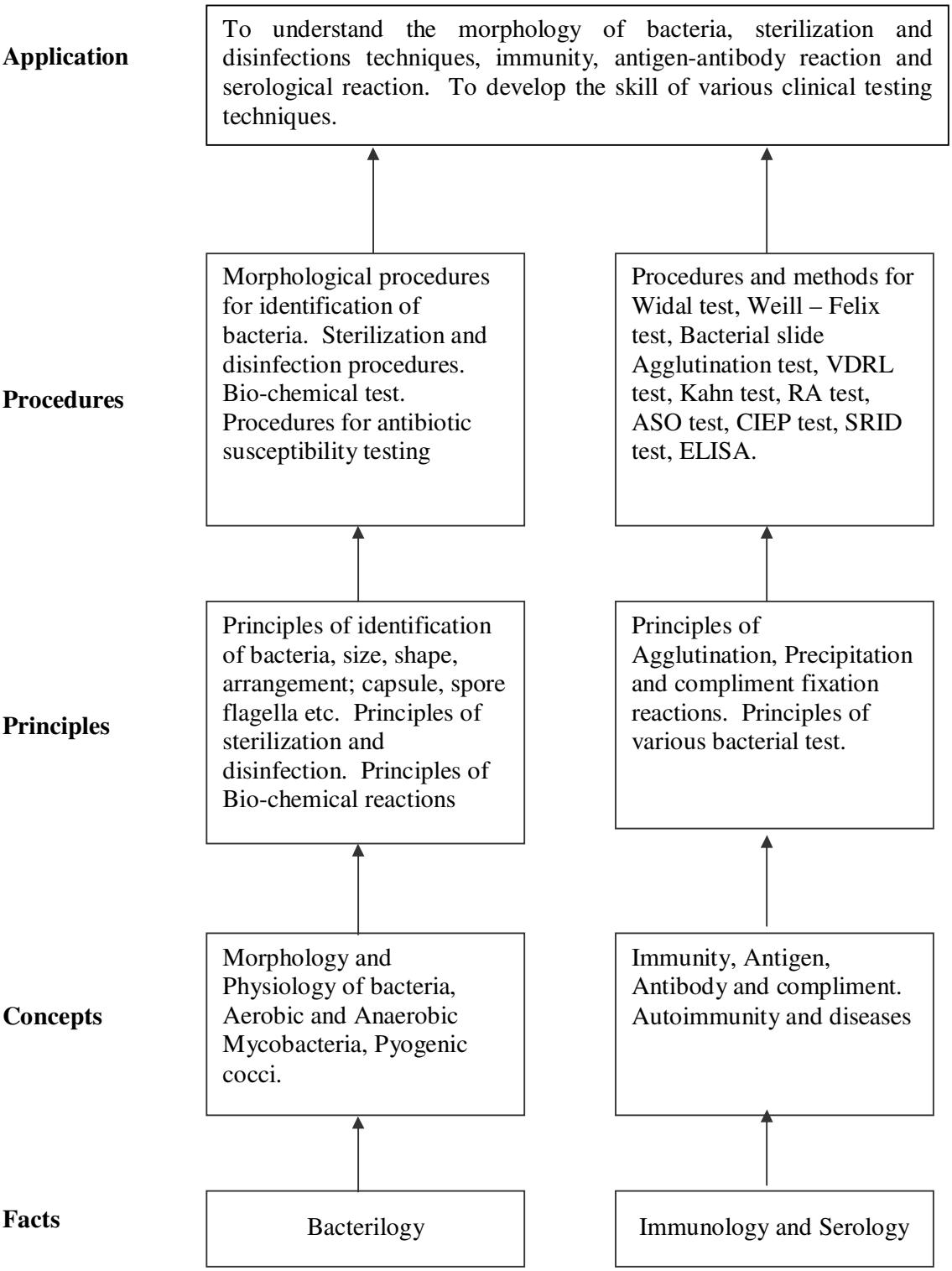
Bacteriology is a study of bacteria responsible for human illness. They are ubiquitous. Study of bacteriology helps in identification of infections / communicable diseases cause by them. It also helps in finding suitable anti microbial agent for treatment

Immunology and serology are closely associated subjects and are important from diagnostic point of view. Immunology is study of antigen or antibody produced in response to external invader while serology is invitro study of these changes.

OBJECTIVE:

To understand the morphology of bacteria, sterilization and disinfections techniques, immunity, antigen-antibody reaction and serological reaction. To develop the skill of various clinical testing techniques.

LEARNING STRUCTURE:



CONTENT: Theory

Chapter	Name of the Topic	Marks	Hours
1	**BACTERIOLOGY** 1.1 Introduction to microbiology – Classification, morpho- logy and physiology of bacteria. Normal flora of human body. 1.2 Common methods of sterilization and disinfections	**08**	**06**
	1.3 Cultivation of bacteria 1.3.1 Bacterial growth requirement – Aerobic and anaerobic and mycobacteria 1.3.2 Common media - Classification, preparation, sterilization and uses. 1.3.3 Culture methods – sample collection transportation, steps in processing the sample, choice of medium, methods of plating, and subcultures	**16**	**12**
	1.4 Pyogenic cocci – Morphology, pathogenicity and method of isolation 1.4.1 Staphyllococci 1.4.2 Strepto and pneumococci 1.4.3 Niesseriae 1.5 Gram Negative Bacilli – Morphology, pathogenicity and method of isolation 1.5.1 Esch coli, Klebsiella etc. 1.5.2 Proteus, Pseudomonas etc 1.5.3 Salmonellae, Shigella, Vibrio etc.	**16**	**14**
	1.6 Gram positive Bacilli and Anaerobes - Morphology, pathogenicity and method of isolation 1.6.1 Corynebacteria & Bacillus spp. 1.6.2 Clostriadial and Non- Clostriadial anaerobes	**10**	**08**
	1.7 Mycobacteria - Morphology, pathogenicity and method of isolation 1.7.1 M. tuberculosis, Atypical mycobacteria and M leprae 1.7.2 Actinomyces, Nocordia, Ricketssia, chlamydia etc.	**08**	**08**
	1.8 Spirochaetes - Treponema, leptospira and other miscellaneous microbes of medical importance, Kahn test, Rose-Waller test. 1.9 Antimicrobial susceptibility test 1.10Preservation of stock cultures	**10**	**08**

2	**IMMUNOLOGY AND SEROLOGY** 2.1 Immunity - Introduction, types of immunity Antigen, Antibody and Compliment 2.2 Antigen antibody reaction and common serological reaction	**16**	**12**
	2.3 Humoral and cell mediated immunity 2.4 Auto immunity and Auto-immune diseases 2.5 Immune deficiency diseases and it's investigation **(HIV).** 2.6 Common Lab. animals - use, care, different routes and site of injection.	**16**	**12**
	Total	**100**	**80**

Practical:

Skills to be developed:

Intellectual Skills: 1. Analysis

2. Interpretation

Motor Skills: 1. Accuracy in measurement

2. Follow standard test procedure

List of Practicals :

1. Microscope - Construction, Care & use and practice of Gram staining technique
2. Morphology of bacteria - Size, Shape, Arrangement, Capsule, Spore, Flagella etc.
3. Practice of Z. N. staining and Hanging drop method for motility
4. Sterilization and disinfection - Chemical disinfections, Operating room fumigation
5. Common Culture media - Liquid and solid :- Preparation, Sterilization, and uses
6. Biochemical reactions- Commonly used biochemical test including bacterial agglutination reaction
7. Antibiotic susceptibility testing Kirby-Bauer method
8. **Agglutination**, precipitation and complement fixation reaction
9. Widal test, Weil – Felix test, Bacterial slide Agglutination test, **VDRL test**, **R.A. test, CRP test, ASO test, Pregnancy test (Latex agglutination test),** Wasserman test, Mauntoux test.
10. Agar gell diffusion test (AGD), Counter immuno-Electrophoretic test (CIEP), Single Radial immuno- diffusion test (SRID)
11. Enzyme Linked Immuno Sorbent assay (ELISA)

Note : The experiments which are in bold letters and underlined are to be actually performed by the students; whereas rest of the experiments are to be demonstrated.

Learning Resources:
Books:

Sr. No.	Author	Title	Edition	Publisher & Address
01	R. Ananthnarayan & C. K. Jairam Panikar	Text book of Medical Microiology	5th	Orient Longman, Madras.
02	G. Guru	Microbiology	1st	NCERT, New Delhi.
03	Mackie - McCartney	Medical Microbiology – Vol.- I & II	13th	ELBS, Churchil Livingstone
04	Earnest Jawetz	Medical Microbiology	18th	Prentice - Hall International Inc - USA
05	Fair Brothers	Text book of Bacteriology	10th	William Heinemman Medical Books - USA
06	I. M. Roitt	Essential Immunology	6th	ELBS, London.
07	T. R. Bowry	Immunology Simplified	2nd	ELBS - Oxford university press, London
08	D. M. Weir	Immunology : An outline for students of medicine	5th	Edinburgh, Churchil, Livingston
09	G. P. Talwar	A Hand book of Practical Immunology	1st	Vikas Publishing House,
10	S. S. kelkar & D. M. Khare	General Immunodiffusion Techniques	1st	Popular Prakashan
11	G. Guru	Serology for Medical Laboratory Students	1st	NCERT, New Delhi.
12	Tulip Dignostic	Syphillis Serology	1st	Tulip Dignostic, Germany
13	Todd- Stanford	Clinical Diagnosis & Management	19^{th}	W.B. Saunders. Co. U.S.A.

COURSE CODE : ADVANCE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : LX

SEMESTER : SECOND

SUBJECT NAME : HISTOPATHOLOGY AND CYTOPATHOLOGY

SUBJECT CODE : 13078

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
04	--	02	03	100	50#	--	50@	200

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:

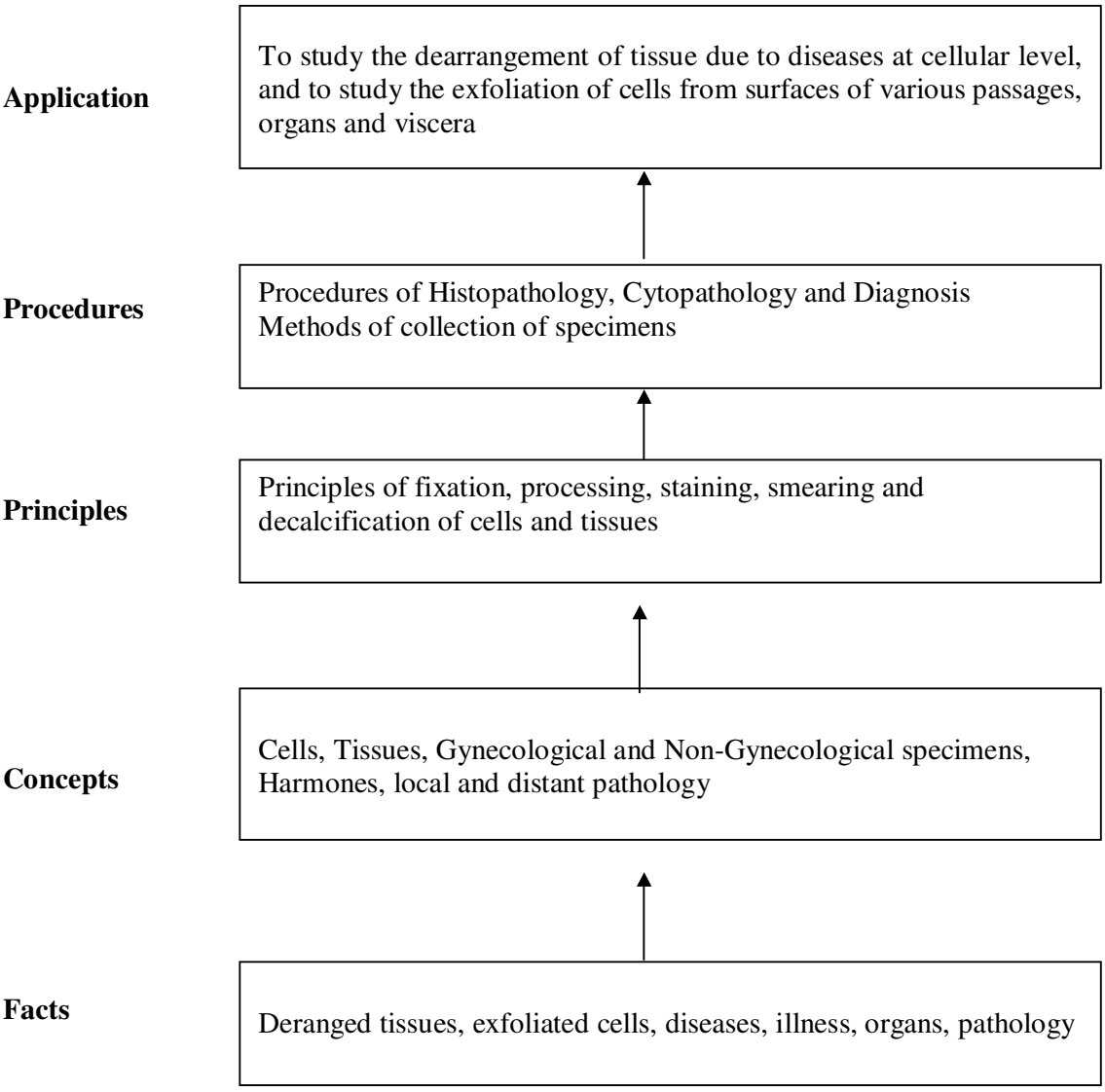
Histopathology is a study of tissue, which are dearranged due to disease process. This subject leads us to final diagnosis at cellular level.

Cytopathology is a study of exfoliated cells from surfaces of various passages, organs and viscera to find out local or distant pathology at earliest stage of development.

OBJECTIVE:

To study the derangement of tissue due to diseases at cellular level, and to study the exfoliation of cells from surfaces of various passages, organs and viscera

LEARNING STRUCTURE:



CONTENT: THEORY

Chapter	Name of the Topic	Marks	Hours
1	**Histopathology** 1.1 Introduction & importance of histopathology 1.2 Cell, tissue and their functions. 1.3 Methods of specimen collection (biopsies) and examination of tissues and cells.	**12**	**08**
2	**Tissues Fixative** 2.1 Simple Fixative and their properties 2.2 Simple Fixative and their properties 2.3 Micro anatomical fixative 2.4 Histochemical fixatives	**16**	**10**
3	**Tissue Processing** 3.1 Collection of specimen 3.2 Labeling and fixation 3.3 Dehydration 3.4 Clearing 3.5.Impregnation 3.6 Embedding	**10**	**07**
	3.7 Section Cutting 3.7.1 Microtome and microtome knives, sharpening and care 3.7.2 Technique of section cutting 3.7.3 Mounting of sections 3.7.4 Frozen sections and Cryostat	**10**	**07**
4	**Staining** 4.1 Dyes and their properties 4.2 Theory of staining 4.3 Types of staining 4.4 Basic staining – Hematoxylin and Eosin (H&E) 4.5 Mounting of sections 4.6. Common special stains **PAS, Masson trichrome, Fleugens, Geimsa, PTAH**	**16**	**11**

5	**Decalcification** Fixation 5.2 Decalcification 5.3 Detection of end point 5.4 Neutralisation and processing	**12**	**07**
6	**CYTOPATHOLOGY** 6.1 Introduction – cytology and cytopathology 6.2 Method of specimen collection and transportation 6.3 For gynaecological samples 6.4 Method of specimen collection, transportation and preservation of non-gynecological samples 6.5 Fixation and fixative 6.5.1Common fixative 6.5.2 Special purpose fixative 6.6 Fluid specimen 6.6.1 Preservation prior to processing 6.6.2Preparation for microscopy	**12**	**07**
7	7.1 The Papanicolaou stain 7.1.1 Main characteristics and modification 7.1.2 Preparation of stain and solutions 7.1.3 Factors influencing staining reaction 7.2 Mounting of cell sample 7.3 Other routine and special stains 7.3.1 Stains for histologic sections 7.3.2 Stains for hormonal evaluation Stains for sex chromatin, pigments, microorganism, parasites, carbohydrates, lipids and nucleic acid	**12**	**07**
	Total	**100**	**64**

Note: The names which are in bold letters and underlined are to be actually lectured in the Institute.

Practical:

Skills to be developed:

Intellectual Skills: 1. Analysis

2. Interpretation

Motor Skills: 1. Accuracy in measurement

2. Follow standard test procedure

List of Practicals:

1. Fixation, Processing, Embedding, Section cutting and preparation of slides
2. Sharpening of Knives
3. Preparation of fixative and decalcifying fluid
4. Preparation of adhesives to fix the sections on the slide
5. Collection, Preparation, Fixation and staining of cytological smears by papanicolaou's staining method

Learning Resources:
Books:

Sr. No.	Author	Title	Edition	Year of Publication	Publisher
01	G. Guru	Histotechnology	1st	1988	NCERT, New Delhi.
02	C. F. A. Culling	Hand Book of Histotechnological & Histochemcial Techniques	3rd	1974	Butterworth - London
03	G. G. Brown	An introduction to Histotechnology	3rd	1974	Century - Croft , New York.
04	L. G. Koss	Diagnostic Cytology, Vol - I & II	3rd	1979	J. B. Lippincott Co., Philadelhia.
05	E. G. Wachtel	Exfoliahre Cytolosy	1st	1964	Butterworth, London
06	Bancroft	Text Book of Histopathology	--	--	--
07	Laxmi Narayan	Technique	--	--	--
08	P.B. Godkar	Text Book of Medical Laboratory Technology	2nd	2003	Bhalani Publication.

COURSE CODE : ADVANCE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : LX

SEMESTER : SECOND

SUBJECT NAME : ADVANCED TECHNIQUES AND FUTURE TRENDS IN LABORATORY SCIENCE

SUBJECT CODE : 13079

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
03	--	01	03	100	--	50#	50@	200

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)**

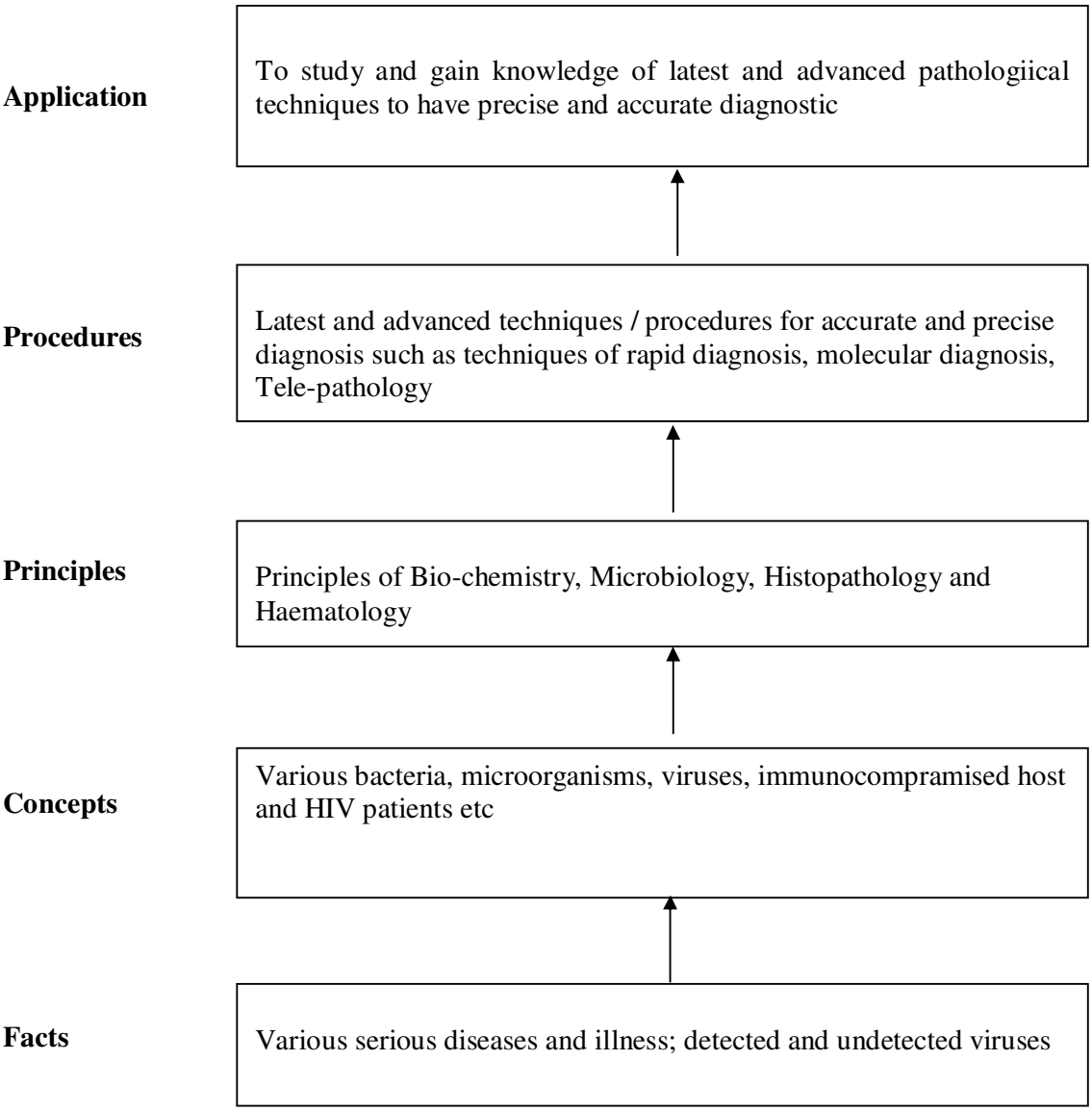
RATIONALE:

This section of study course will open a window for future. Science is advancing every minute. New concepts are formed, new techniques are evolved for better, accurate and precise diagnosis of diseases. Study of this subject today will make our tomorrow comfortable

OBJECTIVE:

To study and gain knowledge of latest and advanced pathological techniques to have precise and accurate diagnostic

LEARNING STRUCTURE:



CONTENT: Theory

Chapter	Name of the Topic	Marks	Hours
1	**BIOCHEMISTRY** 1.1 Electrophoretic techniques 1.2 Immunological Methods 1.3 Chromatographic technique 1.4 Radio-isotopic Technique 1.5 Automation in Bio-chemistry – wet and dry chemistry 1.6 Rapid diagnostic technique - Glucometer, Cholesterol strip	**16**	**08**
2	**MICROBIOLOGY** 2.1 Rapid diagnostic Technique 2.2 ELISA and its modification 2.3 Gel immuno electrophoretic technique 2.4 Electron-microscopy :- Transmission & Scanning 2.5 Fluorescence microscopy and its modification 2.6 Phase contrast microscopy and its modification 2.7 Hospital infection and it's laboratory investigation 2.8 Laboratory investigation of immunocompromised host and HIV Patient	**16**	**08**

3	**CLINICAL PATHOLOGY** 3.1 Rapid test in urine analysis – Dip stick / Multi stick / 3.2 Rapid test of urine culture – Dip slide culture etc. 3.3 Rapid test for stool analysis – Occult blood etc. 3.4 Rapid test for stool culture – Rota virus etc. 3.5 Rapid test for semen analysis – Total count etc. 3.6 Other resent advances in clinical pathology.	**16**	**06**
4	**HAEMATOLOGY AND BLOOD BANKING** 4.1 Automatic venipuncture and evacuated tubes 4.2 Automation in haematology (Cell counter and coagulometer) 4.3 Cell separation and cell component 4.4 Plasmapheresis	**16**	**08**
5	**HISTOPATHOLOGY AND CYTOLOGY** 5.1 Automatic Tissue Processor 5.2 Automatic Stainer and Screener 5.3 Flow Cytometry 5.4 Immuno Chemistry Technique 5.5 Chemiluminescent assay 5.6 Rate Nephelometry	**20**	**10**

6	**MOLECULAR DIAGNOSTIC TECHNIQUE & TELE PATHOLOGY** 6.1 Polymerase Chain Reaction (PCR) 6.2 Southern hybridisation analysis 6.3 Dot blot hybridisation analysis 6.4 Computerised medical application for data and image acquisition : Future of laboratory medicine	**16**	**08**
	Total	**100**	**48**

Assignments:

1) Visits to Hi-tech diagnostic laboratories to see the working of latest equipment
2) Participation in workshops, Seminar, Current updates, Training and Retraining Programmes, Conferences and Guest lecture series

Note: - During the visits the students are required to collect information and also collect the literature available on the advanced pathological techniques. The collection of the same is to be compiled and submitted and submitted as Term Work

Learning Resources:

Books:

Sr. No.	Author	Title	Edition	Year of Publication	Publisher
01	R. S. Weinstein et. al.	Advances in Pathology and Laboratory Medicine, Vol _ II, III, IV, V & VI	1st	1992	Moshy Year Book, Chicago.
02	M. K. Brenner & A. V. Hoffbrand	Recent Advances in Haemotology	1st	1993	Chirchil Livingstone
03	L. Poller	Recent Advances in Blood Cougulation , Vol - IV	1st	1985	Chirchil Livingstone
04	K. G. M. M. Aberti & C. P. Price	Recent Advances in Clinical Biochemistry	1st	1981	Chirchil Livingstone
05	A. Paul & W. Martin	Computer System in Medical Laboratory Science,	1st	1984	Chirchil Livingstone

06	G. D. Hsivung	Diagnostic Virology	3rd	1982	Yale University Press, London.
07	P. S. Gardner & I. McMillin	Rapid Viral Diagnosis	2nd	1980	Butterworth & Co., London.
08	Todd- Stanford	Clinical Diagnosis & Management	19^{th}	2000	W.B. Saunder Co. U.S.A.
09	P.B.Godkar	Text Book of Medical Laboratory Technology	2^{nd}	203	Bhalani Publication

COURSE CODE : ADVANCE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : LX

SEMESTER : SECOND

SUBJECT NAME : LABORATORY MANAGEMENT AND ETHICS

SUBJECT CODE : 13080

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
03	--	01	03	100	--	50#	50@	200

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:

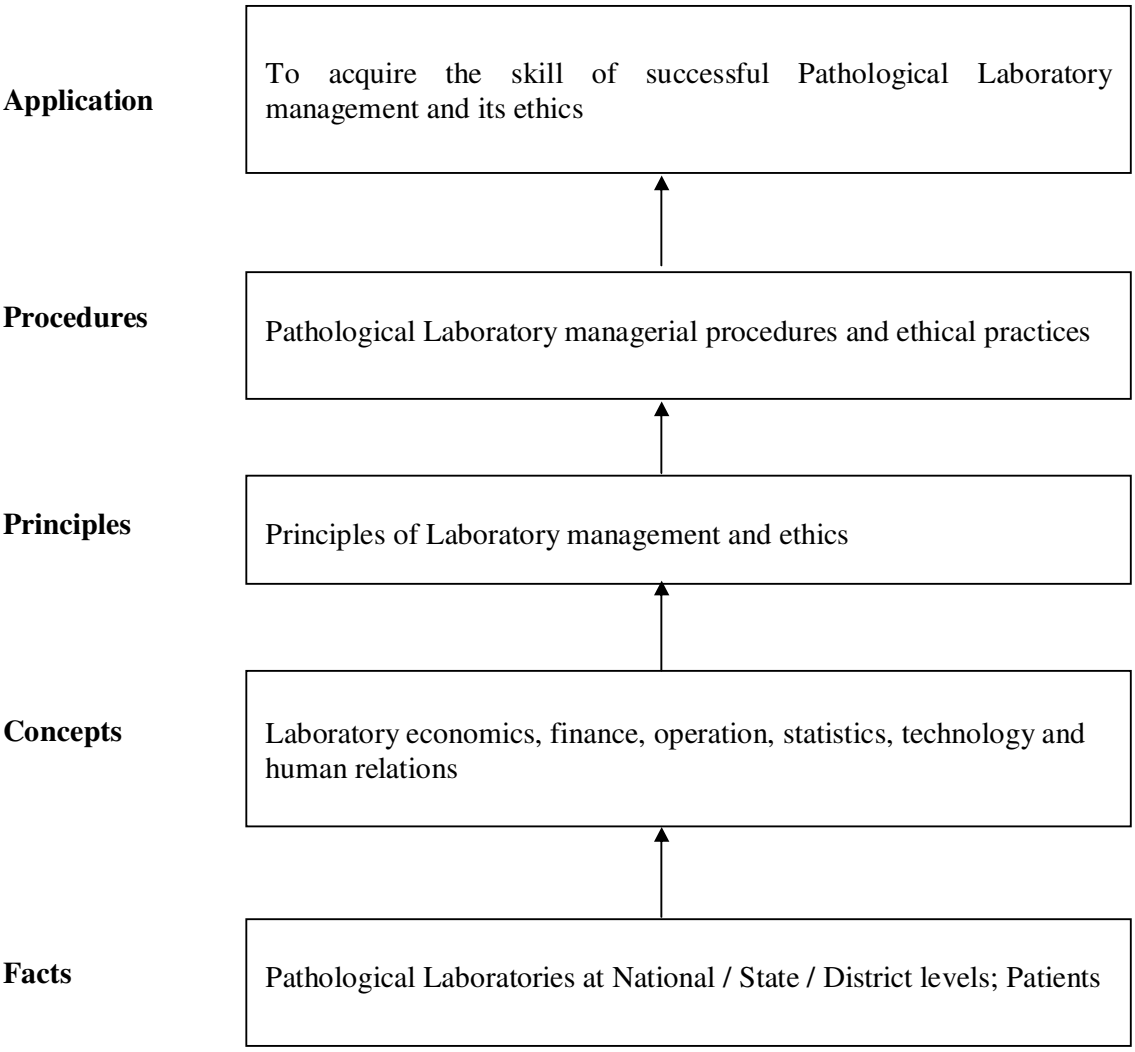
Laboratory management is specialty that requires comprehension of economics, accounting, finance, operation, statistics, technology, human relations and marketing. This subject is a key subject for successful laboratory practice.

Ethics are must for decent life style. Ethics exists in every subject, every religion and every profession.

OBJECTIVE:

To acquire the skill of successful Pathological Laboratory management and its ethics

LEARNING STRUCTURE:



CONTENT: Theory

Chapter	Name of the Topic	Marks	Hours
1	**LABORATORY** 1.1 Role of laboratory in human health and diseases 1.2 Human diseases and methods of diagnosis 1.3 Laboratory at different level (National / State / District) 1.4 Duties and responsibilities of laboratory personnel 1.5 Laboratory services are a backbone of health care delivery system.	**16**	**08**
2	**LABORATORY PLANNING** 2.1 General principles 2.2 Laboratory goals 2.3 Operational data – 2.3.1 Market potential, 2.3.2 Selection of area, 2.3.3 Competition, 2.3.4 Laboratory trends, 2.3.5 Space requirements, 2.3.6 Designing of laboratory sections, 2.3.7 Staff and their duties, 2.3.8 Work schedule and workload assessment	**16**	**06**
3	**CARE OF LABORATORY GLASSWARE, CHEMICALS EQUIPMENT AND INSTRUMENTS** 3.1 General Principles 3.2 Care and Cleaning of Glassware 3.3 Making Simple Glassware in the Laboratory 3.4 Care of equipment and apparatus 3.5 Laboratory chemicals – Proper use, care, storage and labelling	**16**	**08**
	3.6 Specimen handling 3.6.1 Appropriate container 3.6.2 Method of collection 3.6.3 Method of transportation 3.6.4 Method of preservation and disposal of laboratory waste	**20**	**06**
	3.7 Laboratory Safety 3.7.1 General principles of safety programmes 3.7.2 First aid and safety measures for Mechanical, Electrical, Chemical, Radioactive and Biological hazards 3.7.3 Universal safety precautions		

4	Quality control and quality assurance in following sections of laboratory (a) Biochemistry, (b) Microbiology, (c) Haematology and Blood Banking (d) Histopathology and Clinical Pathology	**16**	**10**
5	**APPLICATION OF COMPUTERS IN LABORATORY PRACTICE** 5.1 Introduction to Computers 5.1.1 Block diagram 5.1.2 Input and Output devices 5.1.3 Storage devices 5.2 Introduction to operating systems 5.2.1 Need of Operating systems (OS) 5.2.2 Function of OS 5.2.3 Windows 2000 – Utilities and basic operations 5.2.4 Microsoft office 2000 – MS Word, MS Excel	**16**	**10**
	Total	**100**	**48**

Note :-

The students are required to collect more information and also collect the literature available on the subject chapter 1 to 4 and compile the same for the submission as Term Work.

PRACTICE

1. First aid for chemical burns, poisonous gases, Electrical Shock and Glass injuries
2. Use of bandages, splints and demonstration of Cardio- pulmonary resuscitation, external cardiac massage.
3. Use of Windows Utilities – Explorer, Setting etc.
4. File operation – Copy, Move, Delete, Rename etc.
5. Document Creation, editing, printing using MS Word
6. Spreadsheets / charts, editing, printing, using MS Excel

Learning Resources:
Books:

Sr. No.	Author	Title	Edition	Year of Publication	Publisher
01	Eleanor M. Travers	Clinical Laboratory Management	1st	1997	Williams & Wilkens
02	K. Anand	Hospital Management	1st	1996	Vikas Publishing, New Delhi.
03	Govt. Publication	Hospital Administration Manual	1st	1976	Govt. of Maharashtra
04	G. Guru	Laboratory Setup & procedures	1st	1989	NCERT, New Delhi
05	Malven & T. Penn	Guide to Managing a Clinical Laboratory	1st	1999	Clinical Laboratory Mgt. Association, USA
06	A. S. Koenrg	Medical Laboratory Planning & Design	1st	1985	College of American Pathologist, USA.
07	V. Paul, Strike & J. Wright	Medical Laboratory Statistics	1st	1981	Tringle West - Bristol
08	WHO, Geneva	Biosafety Manual for laboratories	2nd	1993	WHO Publication, Geneva.

COURSE CODE : ADVANCE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : LX

SEMESTER : SECOND

SUBJECT NAME : PARASITOLOGY, MYCOLOGY AND VIROLOGY

SUBJECT CODE : 13081

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
04	--	02	03	100	50#	--	50@	200

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:

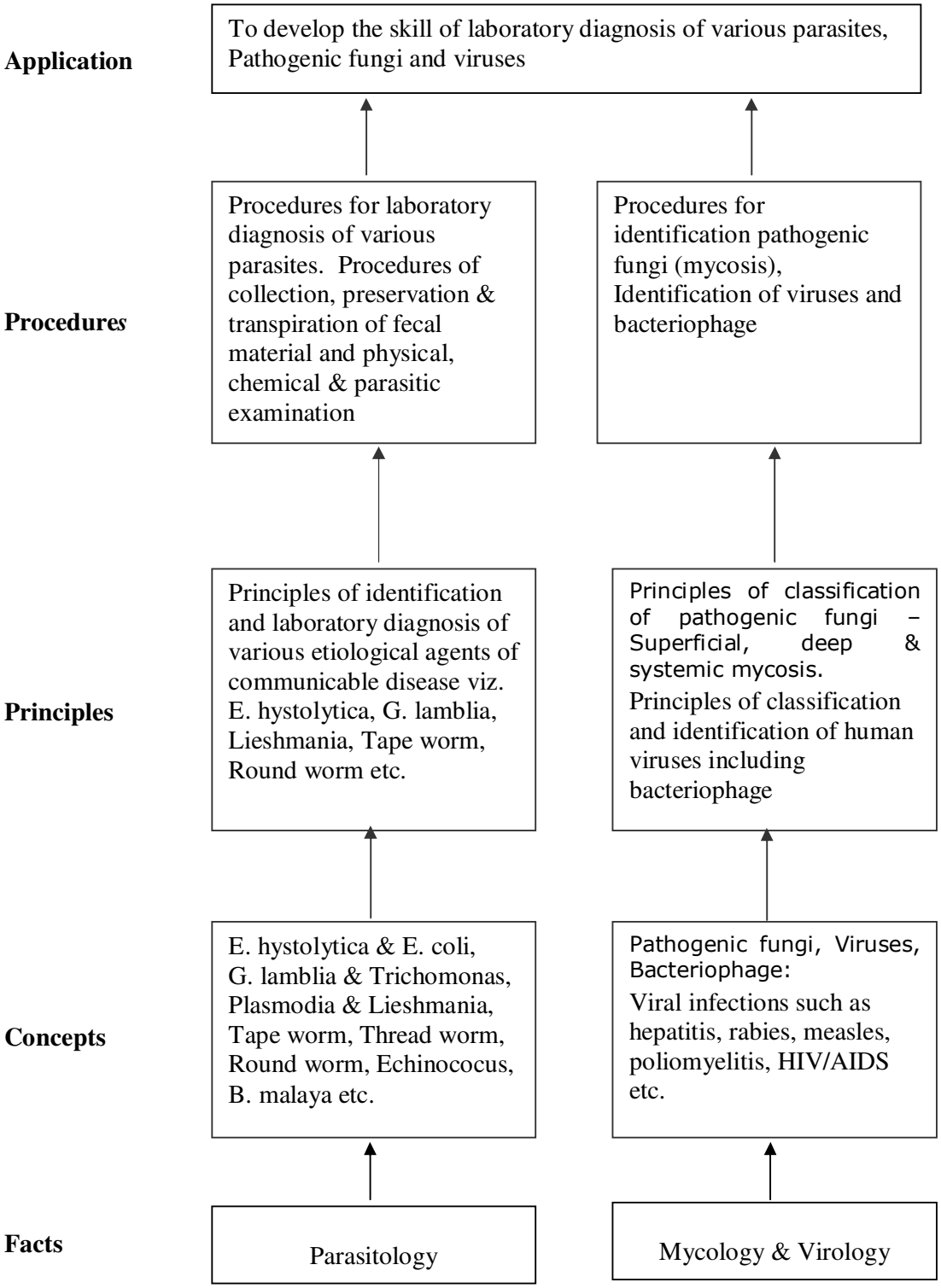
These are the microbes of various morphological features. They are responsible for variety of diseases. They may cause trivial infections such as amoebiasis, ringworm and influenza to dreaded and fatal disease like cerebral malaria, cerebral cryptococosis to AIDS.

Study of these microbes helps in pinpointing etiologic agent of infectious disease as well as for epidiomiology and vaccine preparation.

OBJECTIVE:

To develop the skill of laboratory diagnosis of various parasites, Pathogenic fungi and viruses

LEARNING STRUCTURE:



CONTENT: Theory

Chapter	Name of the Topic	Marks	Hours
1	**PARASITOLOGY** 1.1 Morphology, Life-Cycle, Pathogenicity and Laboratory diagnosis of protozoa such as :- (a) E. histolytica and E. coli, (b) Giardia, (c) Trichomonas, (d) Toxoplasma, (e) Plasmodia and Lieshmania	**16**	**12**
	1.2 Morphology, Life-Cycle, Pathogenicity and Laboratory diagnosis of following helminths and nematodes :- (a) Hook worm, Round worm, Whip worm, Thread worm, Pin worm. (b) Tapeworm and Echinococcus (c) Wucheria bancrofti and B. malayi	**16**	**12**
2	**MYCOLOGY** 2.1 Morphology and classification of pathogenic fungi 2.2 Morphology and laboratory diagnosis of fungi causing superficial mycosis 2.3 Morphology and laboratory diagnosis of fungi causing deep mycosis	**16**	**08**
	2.4 Morphology and laboratory diagnosis of fungi causing systemic mycosis 2.5 Morphology and laboratory diagnosis of fungi causing opportunistic fungal infections	**16**	**08**
3	**VIROLOGY** 3.1 Classification, general properties of viruses 3.2 Cultivation and propagation of human viruses 3.3 Bacteriophage and its significance	**20**	**12**
	3.4 Morphology, pathogenicity and laboratory diagnosis of hepatitis viruses 3.5 Morphology, pathogenicity and laboratory diagnosis of HIV / AIDS virus. 3.6 Oncogenic viruses.	**16**	**12**
	Total	**100**	**64**

Practical:

Skills to be developed:
Intellectual Skills: 1.

Motor Skills: 1.

List of Parcticals:

Para cytology:

1. Collection, Preservation and Transportation of fecal material and its Physical, Chemical & Parasitic examination
2. Preparation of stained and unstained slide for detection of larvae / ova or cysts
3. Concentration methods for Ova & Cysts.
4. Demonstration of gross specimen of Hookworm, Roundworm, Whip worm, Thread worm, Pin worm and Tape worm,
5. Demonstration of following parasites / ova / cyst under microscope :
6. G. lamblia, (b) T. vaganalis, (c) Malerial parasites, (d) Lieshmania, (e) Roundworm, (f) Whipworm, (g) Threadworm, (h) Pin worm and (i) Tapeworm.

Mycology:

1. Collection and processing of skin scrappings / nail clippings / hair pieces / clinical material for demonstration of fungal elements
2. Microscopy for fungal elements : unstained perpetration : Lactophenol cotton blue.
3. Microscopy for fungal elements : stained perpetration
4. Demonstration of common fungal media with and without growth

Virology:

1. Instruments / Equipments and glassware used in
2. viral diagnostic laboratory
3. Inoculation of chick-embryo and other cell / tissue culture media.

(**Note:** Both Practicals will be conducted with the help of audio, video-aids or by paying visit to virus culture laboratory.)

Learning Resources:

- **Books:**

Sr. No.	Author	Title	Edition	Year of Publication	Publisher
01	K. D. Chatterji	Parasitology	11th	1976	Chatterji Medical Publisher, Kolcata
02	J. W. Rippon	Medical Mycology	3rd	1988	W. B. Saunders Co., London.
03	G. M. More & D. M. Jacio	Mycology for clinical Laboratory	1st	1979	Reston Publishing co., USA.
04	D. O. White & F. Fenner	Medical Virology	3rd	1986	New York Academic Press, N. Y.
05	R. B. Bleshe, et. al.	Text book of Human Virology	2nd	1991	St. Louis Mosby, Year Book,

COURSE CODE : ADVANCE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : LX

SEMESTER : SECOND

SUBJECT NAME : GROUP DISCUSSION & SEMINAR

SUBJECT CODE : 13082

Teaching and Examination Scheme

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

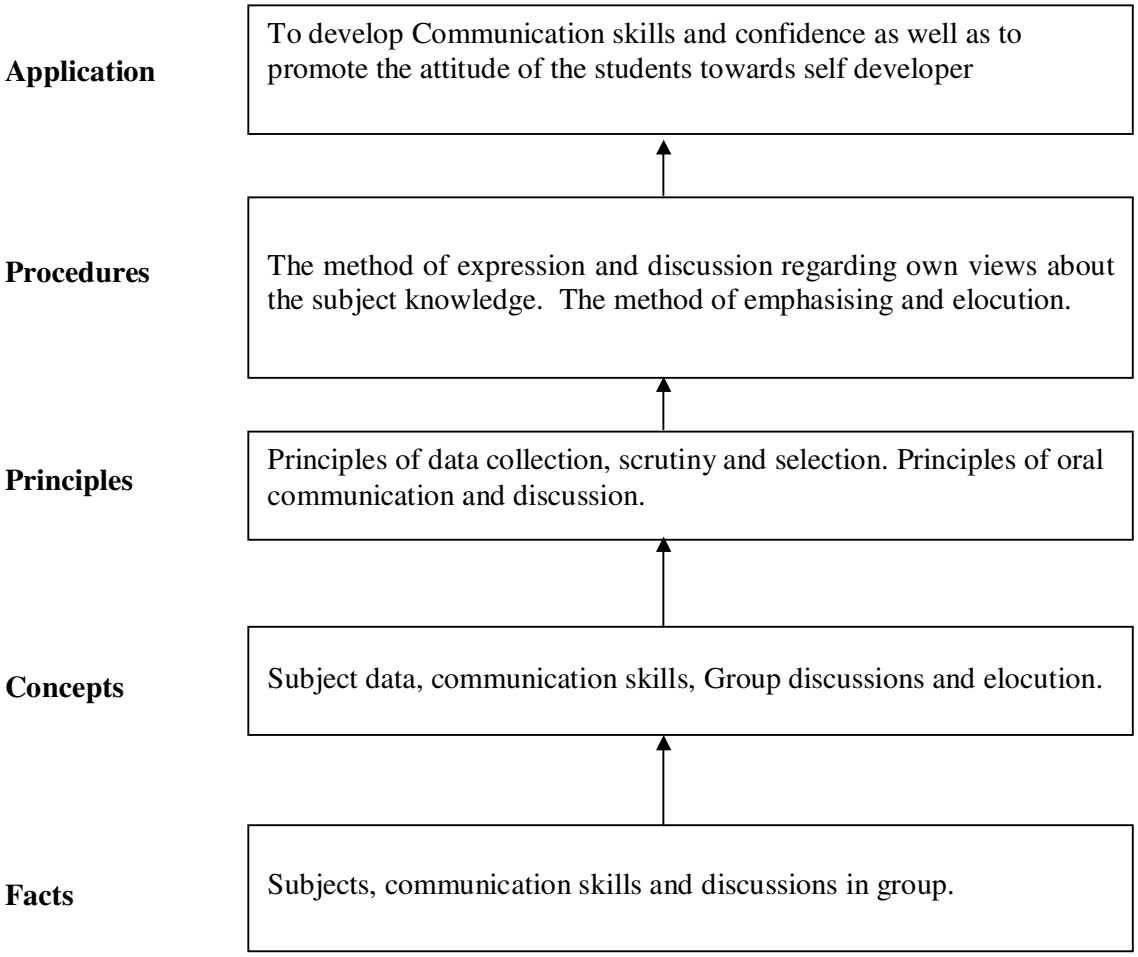
RATIONALE

This subject of conducting Group discussion is intended to equip the students with the necessary basic skills of Communications as well as to develop their ability to express their own views about the subject knowledge which they have acquired during the entire tenure of two semesters of the programme. This also helps to build the confidence amongst the students which certainly help them in future to make their excellent career as self developer.

OBJECTIVES:

1. Prepare report for the subjects for group discussion.
2. Manage to deliver the topics within stipulated time.
3. Work in Group.
4. Develop leadership qualities.

Learning Structure:



Procedure:

The concerned teachers should teach the students the technique of Group discussion on the selected topic of discussion. Teachers should convey the technique of Group discussion and also teach the skill how to collect more advanced information on the selected topic during group discussion.

The selection of topics by students for group discussion may be made from the subjects of semester I & II and any other allied subject of the course, with the consent of concerned teacher. The Group discussion is to made amongst the group of maximum 6 students and the entire group discussion process is to be observed by the teacher and the marks are to be assessed out of 50 marks for each participating student on the basis of his/her interaction and active participation during the group discussion.

Time duration for Group Discussion is 30 minutes for each group.

The above process of group discussion is to be carried out twice and the average of the marks obtained by the candidate is to be reported for total 50 marks as Oral marks.

THIRD

SEMESTER

COURSE CODE : ADVANCE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

COURSE CODE : LX

SEMESTER : THIRD

SUBJECT NAME : PROJECT AND SEMINAR ON HOSPITAL TRAINING

SUBJECT CODE : 13115

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
--	--	48*	--	--	--	100#	100@	200

Note: *08 HRS/day for 16 weeks: 6 days a week, training.

RATIONALE

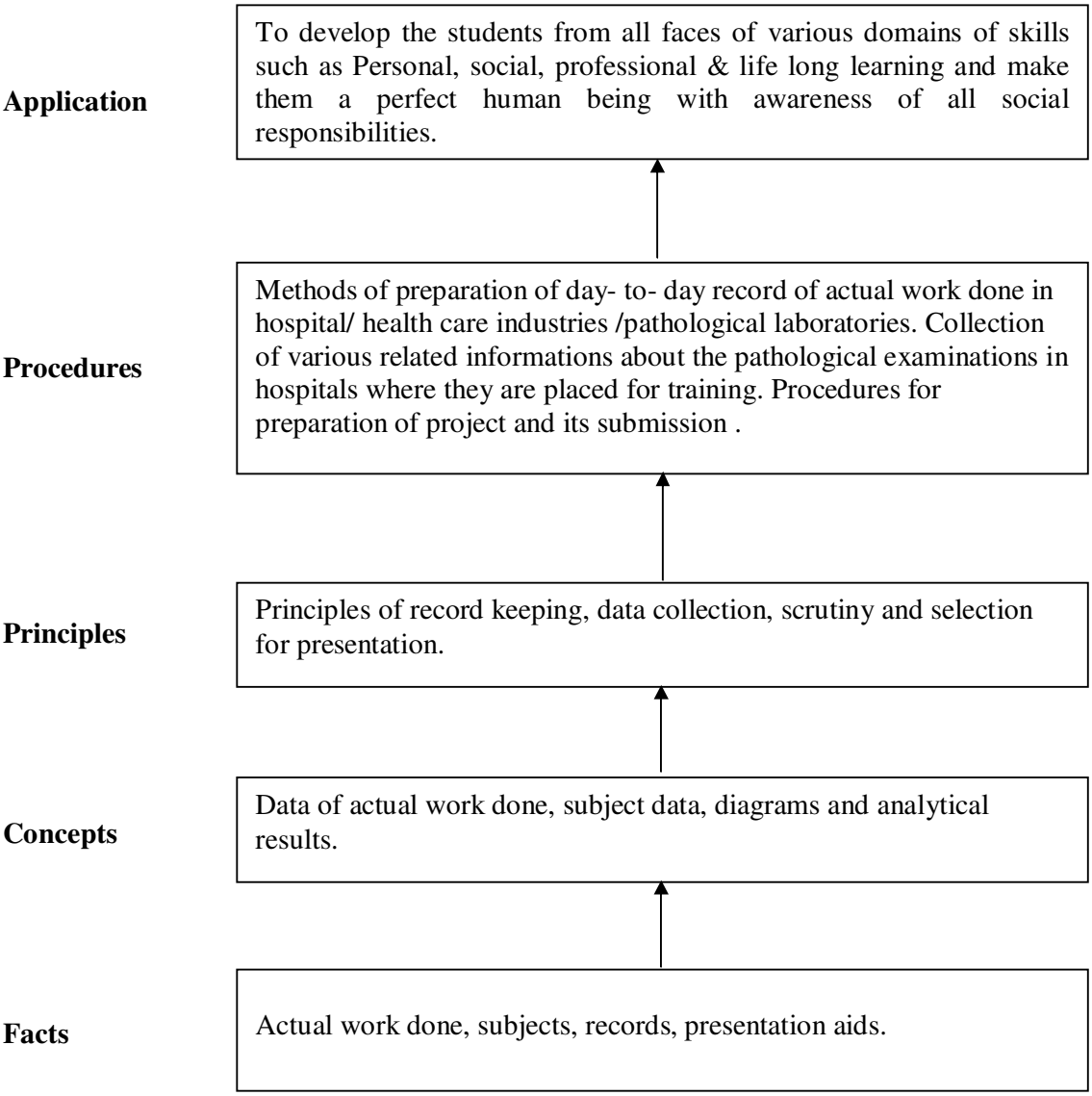
The main aim of the hospital training is to expose the students to hospital environment so that many faceted development of the students can be achieved under various skills of domains such as Personal, social, professional & life long learning. The students will be benefited lot by this exposure to various pathological and clinical activities conducted in hospitals and laboratories and this hospital training experience will add values in their attitudes such as value for health, work commitment, hard working , honesty, problem solving, punctuality, loyalty and independent study.

Seminar on the hospital training experiences is intended to equip the students with the necessary basic skills of Communications as well as to develop their ability to express the subject knowledge which they have acquired during the entire tenure of two semesters of classroom teaching and one semester of hospital training i.e. exposure to pathological laboratories / pathological department / hospitals / diagnostic centre environment. This also helps to build the confidence amongst the students which certainly help them in future to make excellent career as self developer and entrepreneur as well as for job opportunities.

OBJECTIVE:

1. To develop the students from all facets of various domains of skills such as Personal, social, professional & life long learning and make them a perfect human being with awareness of all social responsibilities.
2. To develop confidence as well as to promote the attitude of the students towards self developer and entrepreneur and also to developed the skill of presentation art.

LEARNING STRUCTURE:



Training Details:

The students are placed in research & development, pathological / clinical departments of various health care industries / hospitals / diagnostic centers / pathological laboratories / organisations for four months duration. During the hospital training tenure, the students are expected to gain actual pathological and clinical experience and try to make them familiar with the hospital environment.

The students have to keep day-to-day record of their actual work done during hospital training and same is to compiled along with the information about the hospital / pathological laboratory (in which they have been placed) in a bound volume which is to be submitted as a project report. The concerned teachers are supposed to guide the students for the preparation and presentation of the project report.

Seminar:

The students are required to deliver seminar on the topic of their pathological laboratory experiences i.e. actual work done by them in that pathological laboratories / pathological department / hospitals / diagnostic centre during their tenure of hospital training of 4 months duration.

The duration or time allotted for students for delivering a seminar is 10 minutes only and in this stipulated time period he/she has to present his/her pathological laboratory experiences about the actual work done by him/her in pathological laboratory during hospital training.