Enclosure - IB

Bachelor of Vocation – Medical Laboratory and Molecular Diagnostic Technology
(Semester –III & IV)
Saurashtra University
Effective from June - 2015

B. Voc. - Medical Laboratory and Molecular Diagnostics Technology

(Semester – III)

Sr. No.	Subject	Component	Credit
MLMDT 3.1	Immunology & Serology	Skill	5
MLMDT 3.2	Endocrinology, Tumor & Cancer markers	Skill	5
MLMDT 3.3	Clinical Biochemistry	Skill	5
MLMDT 3.4	Practical	Skill	12
GMLMDT 3.5	Introduction to Bioinformatics & Biostatistics	General education	3
Total Credits of Semester - III			**30**

MLMDT 3.1 : Immunology and serology				
Unit	**Topic**	**Detail**	**Marks**	**Min Lec.**
1	Introduction to immune system	Innate and adaptive immunity Cells and tissues of immune system Functions of lymphoid tissue Antigen: Immunogenicity versus antigenicity Properties of immunogen Hapten, adjuvants, epitopes		10
2	Antibody and MHC	Basic structure of antibody Major classes and their biological activity Antigenic determinants Structure, function relationships in antibody Major histocompatibility complex-MHC Structure and properties of class I and II MHC Expression of MHC molecule Overview of monoclonal antibody		12
3	Immune response	Antigen processing and presentation Cytosolic pathway for exogenous antigen Endocytic pathway for exogenous antigen Cell mediated immune response T-cell activation and differentiation Cytotoxic T cells and its functions Humoral response B-cell activation and differentiation Complement system		12
4	Immune system in health and disease	Dysfunctional immunity Hypersensitivity reactions- Type I to Type IV reactions Immunodeficiency diseases Autoimmune diseases Transplantation immunology		10
5	Vaccine	Active and passive immunization Designing of vaccine for active immunization Live attenuated vaccine, Inactivated vaccine DNA vaccine, Recombinant vector vaccine Cancer and immune system Immune response to tumors Immunotherapy		8
6	Serological reactions	Antigen antibody reactions Precipitation reactions Agglutination reactions Radioimmunoassay and ELISA Western blotting reactions		8

		Immunofluorescence Flowcytometry		
		Total	**100**	**60**

Student Seminar – 5 Lectures
Expert Talk – 5 Lectures
Student Test – 5 Lectures
Total Lectures **60 + 15 = 75**

Reference Books:

No	Title	Author	Publisher
1	Serology and immunology-A clinical approach	Willium Stanford	MacMillan
2	Immunology	Jennis Kuby	WH Freeman
3	Cellular and Molecular Immunology	Abul Abbas	Saunders
4	Basic and clinical immunology	Daniel Stites	Lange

MLMDT 3.2 : Endocrinology, tumor and cancer markers				
Unit	**Topic**	**Detail**	**Marks**	**Min Lec.**
1	Introduction to Endocrinology	Definition of hormone, Endocrine gland, Exocrine and paracrine glands Chemical nature of hormones Classification Mode of hormone action-receptors, secondary Messengers-cAMP, GMP Hormone assay and analysis		8
2	Hypothalamus and pituitary gland	Anatomy, Chemistry and functions of hypothalamus Regulations and diseases related to hormones of these gland TRH, GHRH, GnRH, CRH, Somatostatin, dopamine Pituitary gland- Anatomy, Chemistry and functions-GH, Prolactin, FSH, LH, ADH Neurohypophyseal hormones Pineal gland- Morphology and hormones		12
3	Thyroid and parathyroid glands	Anatomy, Chemistry and functions, secretion and metabolism of thyroid and parathormones Regulation of thyroid hormones Pathophysiology of the thyroid hormones- Diseases related to these glands		10
4	Adrenal gland	Anatomy, Chemistry and functions and regulations of Adrenocortical hormones Adrenal medulla hormones Pathophysiology of these hormones Addison's disease, Cushing's syndrome		8
5	Gastrointestinal and pancreatic hormones	Structure and cell types of islets of langehans of pancreas Secretion of insulin, glucagon and other hormones- Functions and Pathophysiology of these hormones- Diabetes mellitus Gastrointestinal hormones- Gastrin, CCK, Secretin- Functions and regulation		6
6	Reproductive hormones	Male and female reproductive hormones Testosterone, Estrogen, Progesterone and others synthesis and functions Human chorionic gonadotropin Functions, regulation and Pathophysiology related to reproductive hormones		7
7	Tumor and cancer markers			9

MLMDT 3.3 : Clinical Biochemistry				
		Total	**100**	**60**

Student Seminar – 5 Lectures
Expert Talk – 5 Lectures
Student Test – 5 Lectures
Total Lectures **60 + 15 = 75**

Reference Books:

No	Title	Author	Publisher
1	Basic and clinical endocrinology	Francis Greenspan	Prentice-Hall
2	Textbook of medical biochemistry	M N Chatterjea	Jaypee
3	Textbook of endocrinology	Mala Dharmalingam	Jaypee
4	Concise book of medical laboratory technology-Methods and interpretations	Ramnik Sood	Jaypee

Unit	Topic	Detail	Marks	Min Lec.
1	Metabolic disorders of carbohydrates	Overview of carbohydrate metabolism Hyperglycemia- metabolic defect Type I and II Diabetes mellitus Causes, incidence, risk factors, biochemical basis and diagnosis, Complications Hypoglycemia- metabolic defect Diabetes profile		12
2	Metabolic disorders of lipid	Hypercholesterolemia, hypertryglyceridaemia Atheroma and heart disease, coronary artery disease Causes, incidence, risk factors, biochemical basis and diagnosis Lipid profile		12
3	Metabolic disorders of protein and nucleic acid	Phenyl ketone uria and alkaptonuria Maple syrup urine disease Hyperuricemia Gout- Metabolism defect, symptoms and diagnosis		8
4	Liver function and renal function test	Functions of liver and diseases of liver Jaundice, hepatitis, cirrhosis Liver function test-plasma proteins, bilirubin, SGPT, SGOT, Alkaline phosphatase,gamma glutamyl transferase, Prothrombin time Renal function test Kidney diseases- Glomerulonephritis, nephrotic syndrome, diabetic nephropathy GFR, Urine analysis, serum urea, creatinine		12
5	Clinical enzymology and biomarkers	Introduction to enzymes Clinical significance of enzyme assays Serum enzymes in heart diseases Serum enzymes in muscle diseases Serum enzymes in GI tract diseases, bone diseases and malignancies Isoenzymes- significance of different isoenzymes LDH, CPK,ALP Biomarkers-Proteins as biomarkers in cardiac diseases- troponin, natriuretic peptide		9
6	Water-electrolyte and acid-base balance and imbalance	Water homeostasis Assessing fluid and electrolyte status Disturbances of plasma sodium and potassium Acid, base and buffers		9

		Classification of acid-base disorders Respiratory acidosis and alkalosis Metabolic acidosis and alkalosis		
7	Disorders of calcium, phosphate and Mg homeostasis			8
		Total	**100**	**60**

Student Seminar – 5 Lectures
Expert Talk – 5 Lectures
Student Test – 5 Lectures
Total Lectures **60 + 15 = 75**

Reference Books:

No	Title	Author	Publisher
1	Clinical biochemistry	Nessar Ahmed	Oxford
2	Textbook of medical biochemistry	M N Chatterjea	Jaypee
3	Clinical Chemistry	M N Chatterjea	Jaypee
4	Lehninger Principles of Biochemistry	Nelson LD and Cox MM	

MLMDT 3.4 : Practical

Paper	Marks
MLMDT 3.1	100
MLMDT 3.2	100
MLMDT 3.3	100
GMLMDT 1.5	50
Total	350

GMLMDT 3.5 : Introduction to Bioinformatics & Biostatistics				
Unit	**Topic**	**Detail**	**Marks**	**Min**

				Lec.
1	Introduction to biostatistics	Origin of the word Applications of biostatistics Important terms used in biostatistics		4
2	Data Collection and presentation	Sampling methods Random and nonrandom sampling Graphical presentation of data		10
3	Probability distributions	Concept of probability Laws of probability Normal distribution Binomial distribution Poisson distribution		8
4	Measures of central tendency and dispersion	Characteristics of a good average Mean, median and mode Measures of dispersion- Range, mean deviation, standard deviation, variance		8
5	Hypothesis testing	Tests of hypothesis Types of hypothesis Tests of significance for small samples- student's t test, F test, Chi-sqaure test ANOVA test		12
6	Correlation and regression analysis	Utility of correlation test, types of correlation Methods to study correlation analysis Use of regression analysis Methods of regression analysis		8
7	Introduction to bioinformatics	Introduction and importance of Bioinformatics Database and DBMS: Introduction, File formats, Primary and Secondary biological databases, Structure databases, miscellaneous databases Information retrival from Biological database : ENTREZ, SRS and DBGET Sequence Alignment : BLAST and FASTA Introduction to OMICS technology Introduction to Drug discovery		10
		Total	**100**	**60**

Student Seminar – 5 Lectures
Expert Talk – 5 Lectures
Student Test – 5 Lectures
Total Lectures **60 + 15 = 75**

Reference Books:

No	Title	Author	Publisher
1	Applied statistics in health sciences	Nsn Rao	Jaypee
2	Fundamentals of biostatistics		
3	Introduction to Bioinformatics	Attwood & Parry. D.J	
4	Bioinformatics	Andreas. D., & Baxevanis	

B. Voc. - Medical Laboratory and Molecular Diagnostics Technology

(Semester – IV)

Sr. No.	Subject	Component	Credit
MLMDT 4.1	Immunohaematology & Blood Banking Techniques	Skill	5
MLMDT 4.2	Histopathology & Cytology techniques	Skill	5
MLMDT 4.3	Systemic Bacteriology, Mycology & Virology	Skill	5
MLMDT 4.4	Practical	Skill	12
GMLMDT 3.5	**Universal Human Values**	General education	3
	Total Credits of Semester - IV		**30**
	One month training in Pathological Laboratory		

MLMDT 4.1 : Immunohematology and blood banking				
Unit	**Topic**	**Detail**	**Marks**	**Min Lec.**

1	Concept of immunohematology			12
2	Blood group system	ABO blood group system and ABO variant Genetics and inheritance of blood groups Rh blood group system and other blood group systems Laboratory detection of antibodies and antigen- Blood grouping techniques-		12
3	Blood transfusion practice	Types of transfusion, main objective of blood transfusion, Special transfusion practice Hazards of transfusion –transfusion transmitted diseases, Hemolytic disease of new born		8
4	Blood banking	Functions of blood bank, Design, components of blood bank Blood donor- screening criteria, collection of blood and post collection processing Storage, preservation- various anticoagulants Cross matching techniques Issue of blood in emergency life saving situation Issue of blood in neonate and infants		12
5	Blood component separation and use	Apharesis procedure Blood components-red cells, white cells, platelets, coagulation factors, FFP, Cryoprecipitate etc. Advantages of blood component therapy		9
6	Quality control in blood bank	Quality building blocks, Potential problems and errors, Documents and record QC of reagents, equipments, QC in blood collection, storage of blood, Medical audit Personal care and hygiene, Handling, transfer and shipment of samples, disposal of wastes and discard		9
7	HLA system			8
		Total	**100**	**60**

Student Seminar – 5 Lectures
Expert Talk – 5 Lectures
Student Test – 5 Lectures
Total Lectures 60 + 15 = 75

Reference Books:

No	Title	Author	Publisher
1	Modern blood banking and transfusion practice	Denise Harmening	Jaypee
2	Blood transfusion a basic text	Anthony Britten	AITBS
3	A textbook of blood banking and transfusion medicine	VH Talib	CBS
4	A textbook of blood bank and transfusion medicine	Satish Gupte	Jaypee

MLMDT 4.2 : Histopathology and cytology				
Unit	**Topic**	**Detail**	**Marks**	**Min Lec.**

1		Fundamentals of normal histology and histopathology Overview of tissue seen in normal histology Epithelium, muscle, nervous and connective tissue Basic histopathology- non tumor pathology Tumor pathology		8
2				12
3				10
4				8
5	Enzyme histochemistry	Immunohistochemistry and the various immunohistochemical stains in the diagnosis of various disorders Tissues of special interest – nervous system, Hard tissue, Endocrine cells		8
6				6
7				8
		Total	**100**	**60**

Student Seminar – 5 Lectures
Expert Talk – 5 Lectures
Student Test – 5 Lectures
Total Lectures **60 + 15 = 75**

Reference Books:

No	Title	Author	Publisher
1	Manual of histological techniques and their diagnostic application	John Bancroft	Churchill livinstone
2	Concise book of medical laboratory technology-Methods and interpretations	Ramnik Sood	Jaypee
3	Clinical diagnosis and management by laboratory methods	John Bernard henry	Saunders
4	Textbook of medical laboratory technology	Praful Godkar	Bhalani

MLMDT 4.3 : Systemic Bacteriology, Mycology & Virology				
Unit	**Topic**	**Detail**	**Marks**	**Min Lec.**
1	Gram positive and gram	Staphylococci, pneumococci, streptococci N. gonorrhoeae, N. meningitides		12

	negative cocci	Morphology, cultural characteristics, biochemical reaction, pathogenesis/disease caused & lab diagnosis		
2	Gram positive bacilli	Corynebacteria, Mycobacteria, Clostridia, Actinomycetes , Bacillus Morphology, cultural characteristics, biochemical reaction, pathogenesis/disease caused & lab diagnosis		12
3	Gram negative bacilli	Enterobactericeae, Pseudomonas, Vibrio, Brucella, Bordetella, Haemophilus, Yersinia Morphology, cultural characteristics, biochemical reaction, pathogenesis/disease caused & lab diagnosis		8
4	Miscellaneous bacteria	Spirochetes – Treponema, Leptospira, Borrelia Rickettsiae, Chlamydiae Morphology, cultural characteristics, biochemical reaction, pathogenesis/disease caused & lab diagnosis		12
5	Introduction to Virology	Classification and general properties of viruses – interferon, inclusion bodies Cultivation of viruses and laboratory diagnostic methods of viral diseases		9
6	Viral diseases	Pox virus, herpes virus, myxoviruses, enteroviruses Rabies, Arbo viruses, hepatitis, HIV, viruses causing gastro enteritis, miscellaneous viruses		9
7	Mycology	General properties of fungi, cultivation methods, laboratory methods of diagnosing fungal infection.		8
8	Fungal diseases	Superficial and deep fungal infections, opportunistic fungal infection. Mycotoxins		
		Total	**100**	**60**

Student Seminar – 5 Lectures
Expert Talk – 5 Lectures
Student Test – 5 Lectures
Total Lectures **60 + 15 = 75**

Reference Books:

No	Title	Author	Publisher
1	Medical microbiology	David Greenwood	ELBS
2	Medical Microbiology	Michel Ford	IBMS
3	Diagnostic microbiology	Ellen Baron	Mosby

4	Medical Microbiology	Anant Narayan	Jaypee
5	Essentials of medical microbiology	Rajesh Bhatia	Jaypee

MLMDT 4.4 : Practical	
Paper	**Marks**
MLMDT 4.1	**100**
MLMDT 4.2	**100**
MLMDT 4.3	**100**
Total	**300**