Enclosure - IIB

SAURASHTRA UNIVERSITY

RAJKOT – INDIA

CURRICULUM FOR

UGC - B.Voc. Under National Skills Qualification Framework (NSQF)

Bachelor of Vocational – Medical Laboratory and Molecular Diagnostics Technology

(B. Voc.- MLMDT)

(Sanctioned to Shree Manibhai Virani & Smt. Navalben Virani Science College-Rajkot)

(Semester I and Semester II)

Effective From June – 2014

Yogi Divine Society inspired,

Sarvodaya Kelavani Samaj managed,

Shree Manibhai Virani and Smt. Navalben Virani Science College, Rajkot

(Affiliated to Saurashtra University, Rajkot)

Re-Accredited at 'A' Level by NAAC

STAR college Scheme & Status by MST-DBT

UGC- College with Potential for Excellence (CPE)

UGC-DDU KAUSHAL Kendra

GAAA – Highest Grade A-1 by KCG, Government of Gujarat

GPCB-Government of Gujarat approved Environment Audit Center

UGC-Autonomous College

UGC

DEPARTMENT OF MICROBIOLOGY

B. Voc. Medical Laboratory and Molecular Diagnostic Technology

Shree Manibhai Virani and Smt. Navalben Virani Science College, Rajkot
AUTONOMOUS COLLEGE
(Affiliated to Saurashtra University, Rajkot)

UGC

DEPARTMENT OF MICROBIOLOGY

B. Voc. Medical Laboratory and Molecular Diagnostic Technology

SCHEME OF INSTRUCTION AND EXAMINATIONS FOR STUDENTS ADMITTED FROM A.Y. 2016-2017 & ONWARDS

B. Voc. - Medical Laboratory and Molecular Diagnostics Technology (Semester – I)

Sr. No.	Paper No.	Subject Name	Component	Credit
1	MLMDT 1.1	Fundamentals of Anatomy and Physiology	Skill	5
2	MLMDT 1.2	General Pathology	Skill	5
3	MLMDT 1.3	Basics of Biochemistry, Instrumentation and reagents	Skill	5
4	MLMDT 1.4	Practical	Skill	12
5	GMLMDT 1.5	Functional English and Communication Skills	General education	3
Total Credits of Semester - I				**30**
Ability enhancement Course				
6		Environmental science		**1**

MLMDT 1.1: Fundamentals of Anatomy and physiology				
No.	**Topics**	**Details**	**Marks**	**Min. Lec.**
1	Body as a whole and its constituents	The cells, tissues and organization of the body Tissues- epithelial, connective, muscle, nervous Cell regeneration, membranes, glands Organization of the body Bones of the skeleton, Axial skeleton, Appendicular skeleton Cavities of the body Cranial, thoracic, abdominal, pelvic		4
2	Blood	Composition of blood Erythrocytes-Structure and functions Leucocytes-Types, Structure and functions Platelets- Structure and functions, Hemostasis		5
3	Cardiovascular system	Heart-Functional anatomy Properties of heart muscle Heart as a pump Cardiac output and venous return Vascular system Systemic arterial blood pressure		7
4	Respiratory system	Functional anatomy Ventilation and its control Exchange of gases Applied and environmental physiology		6
5	Digestive system	Elementary functional anatomy Salivary glands Stomach and its secretion Liver, pancreas and their role in digestion Bile, Small and large intestine Movement of alimentary tract Gastrointestinal hormones and their functions		7
6	Excretory system	Functional anatomy of kidney Mechanism of formation of urine Water, electrolyte and acid-base balance Skin and its functions		6
7	Nervous system	Elementary neuroanatomy Properties of neurons Nerve impulse, Types of nerves Synapse and chemical transmitters Central nervous system-Neuroglia, membranes of brain and spinal cord, Ventricles of brain and cerebrospinal fluid Brain- cerebrum, cerebellum Spinal cord- structure Peripheral nervous system-Spinal nerves and cranial nerves Autonomic nervous system-Sympathetic NS Parasympathetic NS Functions of ANS Central visceral regulations		7

8	Special senses and overview of endocrine system	Ear and hearing Structure and physiology of hearing Eyes and sight Structure and physiology of sight Sense of smell and taste Overview of important endocrine glands and their functions		6
9	Muscular system	Muscles characteristics Properties of skeletal muscles Properties of smooth muscles		4
10	Reproductive system	Female reproductive system Anatomy- External and internal parts Puberty, menstrual cycle, Fertilization Male reproductive system Elementary anatomy Functions of male reproductive 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	Anatomy and physiology in health and illness	Wilson Katheen, Anne Waugh	Churchill livingstone
2	Concise medical physiology	Sujit Chaudhari	Central
3	Textbook of medical physiology	Arthur Guyton and Hall	W.B. Saunders
4	Understanding medical physiology	R. L. Bijlani	Jaypee

MLMDT 1.2 : General Pathology				
Sr. No.	**Topic**	**Detail**	**Mark**	**Lectures**
1.				10
2.	Haemodynamic disorders	Internal environment Normal water and electrolyte balance Disturbances of body fluids and electrolytes Oedema, overhydration, dehydration Disturbances in volume of circulating blood- Hyperemia and congestion Hemorrhage and shock Circulatory disturbances of obstructive nature- Thromobosis, Ischaemia, Infarction		10
3.	Inflammation and healing	Acute inflammation Vascular events, cellular events Inflammatory cells Morphology of acute inflammation Chronic inflammation General features Granulomatous inflammation Tuberculoma Healing Regeneration, repairs, wound healing Healing in specialized tissues		10
4.	Neoplasia	Nomenclature and classification Characteristics of tumors Local invasion and metastasis and its mechanism Prognostic markers Grading and staging of cancer Epidemiology and predisposition to neoplasia Carcinogenesis Etiology and pathogenesis of cancer Molecular pathogenesis of cancer Chemical, physical, biologic carcinogens Viruses and tumor Clinical aspects of neoplasia Tumor hot interrelationship Diagnosis of cancer		12
5	Genetic and pediatric diseases	introduction to Genetic diseases Developmental defects Cytogenetic abnormalities Single gene defects Storage diseases Disorders with multifactorial inheritance Other pediatric diseases		10
6	Environmental	Environmental pollution		8

	and nutritional diseases	Air pollution, tobacco smoking Chemical and drug injury Alcohol, lead and carbon monoxide poisoning, drug abuse Environmental chemicals Injury by physical agents Thermal and electrical injury Injury by radiation Nutritional diseases Obesity, Starvation Protein energy mal nutrition Disorders of vitamins Trace elements Diet and cancer		
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	Textbook of Pathology	Harsh Mohan	Jaypee
2	Basic Pathology	V.Kumar, S.Robbins	Harcourt
3	Pathology	Emanuel Rubin	Lippincot
4	Pathology	Ian Cree	Chapanmann Hall

MLMDT 1.3 : Basics of Biochemistry, Instruments and Reagents				
Unit	**Topic**	**Detail**	**Marks**	**Min Lec.**
1	Chemistry of carbohydrates & their related metabolism			12
2				8
3				8
4	Chemistry of Nucleic acid and metabolism	Introduction-Definition Elementary chemistry of DNA and RNA Structure of nucleotide DNA and RNA molecule and its structure Functions of nucleic acids Nucleotide metabolism- purines and pyrimidines		9

5				9
6				10
7				**4**
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	Text book of biochemistry for medical students	D M Vasudevan	Jaypee
2	Fundamentals of biochemistry	J L Jain	S Chand
3	Biochemistry	D Voet, J Voet	Wiley
4	TB of biochemistry and human biology	G P Talwar	Prentice Hall

MLMDT 1.4 : Practical	
Paper	**Marks**
MLMDT 1.1	**100**
MLMDT 1.2	**100**
MLMDT 1.3	**100**
GMLMDT 1.5	**50**
Total	**350**

GMLMDT 1.5 : Functional English and Communication Skills				
Sr. No.	**Topic**	**Detail**	**Marks**	**Min. Lect.**
1	**Grammar**	1. Determiners 2. Tenses □ Defining a Verb □ Chief forms of a Verb □ Tense and Time □ Further Division of Tenses o The Present Tense o The Past Tense o The Future Tense 3. Active – Passive Voice □ Introduction □ Defining the Voice □ Some General rules regarding the change of voice 4. Modals & Auxiliaries □ Introduction to Auxiliaries □ The Primary Auxiliaries □ Introduction to Modals □ The Most Commonly used Modals □ Important points about the Modals □ Modals and Their Uses 5. Prepositions / Prepositional Phrases		**10**
2	**Writing Comprehension**	**1. Business Letters :** □ Introduction □ Functions of a Business Letter □ Inward Structure / Layout of a Business Letter □ Other Important Parts of Business Letter □ Outward appearance of a business letter □ Arrangement Styles □ Salient Features of a Business Letter □ Legal Aspects of a business Letters □ Kinds of Business Letter Inquiry & Reply Order & Reply Cancellation of order Complaint / Adjustment Sales Letter **2. Report Writing :** □ Introduction □ The Nature of a Report □ The P's of an Effective Report □ Functions of a Report □ Preparing a Report □ Types of Reports □ Business report		**20**

		Press report **3. Job Application / Resume Writing.** Introduction A Cover Letter Curriculum Vitae / Resume **4. Letters of Appointment & Resignation.**		
3	**Conversation Skills**	Conversations based on everyday situation / Dialogue Writing. Introduction Nature of Conversations Purpose of conversation Guidelines for Effective Conversation Skills Proverbs used in Everyday Conversation with their Meanings / Explanations Comparisons used in Everyday Conversation Practical Conversations		**10**
4	**Communication Skills**	(1) Communication – Meaning, Features & Process (2) Verbal & Non – Verbal comm. Verbal Oral Communication Written Communication Non – Verbal Body language Space Para language Others (3) Group discussion skills Meaning Characteristic Do's & Don'ts Relevance Moderating a group discussion (4) Presentation skills Meaning Planning a presentation skills Preparing a presentation skills Delivering a presentation skills Presentation skills (5) Public Speaking Meaning Essential of effective public speaking (6) Facing Interviews Importance Do's & Don'ts		**20**
Total			**100**	**60**

Students' seminar - 5 Lectures
Expert Talk - 5 Lectures
Students Test - 5 Lectures

Total Lectures 60 + 15 = 75

Reference Book

No	Title	Author	Publisher
1	High School English Grammar and Composition	Wren & Martin	Churchill Livingstone
2	Anthology of English language and communication skills	Sharma S R, Jacob John	Mark
3	Handbook of practical communication skills		Jaico
4	Language and communication skills	Shastri, Rameshchandra	ABD

B. Voc.- Medical Laboratory and Molecular Diagnostics Technology (Semester – II)

Sr. No.	Paper No.	Subject	Component	Credit
1	MLMDT 2.1	Clinical Pathology & Parasitology	Skill	5
2	MLMDT 2.2	Hematology	Skill	5
3	MLMDT 2.3	General Microbiology	Skill	5
4	MLMDT 2.4	Practical	Skill	12
5	GMLMDT 2.5	Basic Computer Skills	General Education	3
Total Credits of Semester - II				**30**

MLMDT 2.1 : Clinical Pathology and Parasitology				
Sr. no	**Topics**	**Details**	**Marks**	**Min Lec.**
1	Urine analysis	Formation and Composition of urine Collection and preservation of urine Physical and chemical examination of urine Microscopic examination of urine Clinical significance of urine analysis		6
2	Cerebrospinal fluid analysis	Formation and composition of CSF Collection and preservation of CSF Physical and chemical examination of CSF Microscopic examination of CSF Clinical significance of CSF analysis		4
3	Semen analysis	Composition of semen Collection and preservation of semen Physical and chemical examination of semen Microscopic examination of semen Clinical significance of semen analysis		4
4	Sputum analysis	Composition of sputum Collection and preservation of sputum Physical and chemical examination of sputum Microscopic examination of sputum Clinical significance of sputum analysis		4
5	Introduction to cavity fluids	Transudates and exudates Synovial fluid analysis Peritoneal fluid analysis Pericardial fluid analysis		8
6	Parasitology			2
7				12

8				12
9				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	A Textbook of Parasitology	S.S. Kelkar	Bombay Popular P.
2	Medical Parasitology	Rajesh Karyakarte	Books & Allied ltd
3	Text book of medical laboratory technology	Praful Godkar	Bhalani
4	Clinical diagnosis and management by laboratory methods	Bernard Henry	W B Saunders

MLMDT 2.2 : Hematology				
Sr. No.	**Topics**	**Details**	**Marks**	**Min Lec.**
1.	Blood cell formation	Introduction to blood Functions of blood Formation of blood Haemopoeisis Erythropoeisis, leucopoesis and thrombopoeisis		8
2.	General aspects of anemia	Classification of anemia- Morphological and etiological Iron deficiency anemia- Iron absorption, causes of iron deficiency, lab findings Megaloblastic anemia Causes and lab findings Hemolytic anemia- Classification, causes and lab findings Genetic defects of hemoglobin Sickle cell anemia and thalasaemia		12
3.	General aspects of white cell disorders	Granulocytes and their disorders Monocytes and their disorders lymphocytes and their disorders		10
4.	Haematological malignancies	Acute leukemia Chronic leukemia Malignant lymphoma Multiple myeloma Myeloproliferative disorders		10
5.	Platelets	Blood coagulation Bleeding disorders due to vascular and platelet abnormalities Coagulation disorders		10
6.	Basic Hematological techniques	Preparation of blood collection Basic steps for drawing blood by vein, capillary and artery puncture Complications during and after blood collection Specimen rejection criteria for blood Anticoagulants- types and concentration Transport of blood sample Effect of storage on blood cell morphology Universal precautions		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	Essential haematology	A.V.Hoffbrand	Black well
2	De Gruchy's Clinical Haematology in medical practice	Frank Firkin, C Chester man	Black well
3	Principles of haematology	Peter Haen	WCB
4	Haematology	Emamanuel Besa	Harwal

MLMDT 2.3 :				
Sr. No	**Topics**	**Details**	**Marks**	**Min Lec.**
1				10
2				9
3	Control of microbes			9
4				8
5	Pure culture and cultural characteristics	Natural microbial population Selective methods Pure culture- methods of isolating pure culture Maintenance and preservation of pure culture Cultural characteristics		7
6		Simple, Grams staining, Ziehl-Neelsen staining or AFB staining, Negative staining		5
7		Methods of specimen collection Identification of microbes from specimen by		8

		1)Microscopy 2)Rapid methods of identification 3)Molecular methods		
8				4
			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	Microbiology	Michael Pelczar	Tata McGraw Hill
2	Microbiology	Prescott	Tata McGraw Hill
3	Principles of microbiology	R M Atlas	Tata McGraw Hill
4	Microbiology an introduction	Tortora, Funke	Pearson

MLMDT 2.4 : Practical	
Paper	**Marks**
MLMDT 2.1	**100**
MLMDT 2.2	**100**
MLMDT 2.3	**100**
GMLMDT 2.5	**50**
Total	**350**

GMLMDT 2.5 : Basic Computer Skills				
Sr. No.	**Topics**	**Details**	**Marks**	**Min Lec.**
1	Basics & Booting Procedure	Introduction to Computers, Characteristics, Data Processing Cycle History and Generations of Computers Classification of Computer by Processing Capabilities Micro, Mini, Mainframe and Super Computers Layered Approach of Operating System, booting process What is software? Types of Software		**10**
2	Hardware & Peripherals	What is hardware? Types of Input Devices, Output Device, Peripherals Types of Memory, Internal, External		**8**
3	Word Processing Using Ms Word	Introduction to Word, Font, Paragraph, Style, Editing, Pages, tables. Illustrations, bookmark, hyperlink, header footer, text, symbol , Page layout ribbon, Foot note End note, Caption, Mail merge, Spell check, comments, Document View, Show Hide, Zoom, Window and Office Button Options, Printing documents. Password Protection		**12**
4	Spread Sheet Using Ms Excel	Sheet Introduction, Selecting row, column, cell, changing height, and Formula bar. Cell Referencing - Relative, Absolute, Mixed, Calculative Examples like salary sheet, mark sheet etc. Conditional formatting, inserting, deleting row or column, Cell Changing height and width, Pivot table and Pivot chart, types of different chart, editing charts. Print Preview and Page Layout, Useful functions from Function Library. Data sorting and subtotaling, filter, Protecting sheet.		**8**
5	Presentation Using Ms Power Point	Inserting new slide, different layout of slide, Inserting date, slide number, movie, sound, object, header footer, Designing slide theme and background, custom animation, slide transition Rehearse timings, slide show , Setup slide		6

		show, hide slide, different views of slide Use of slide master, Printing handout, slide, etc		
6	Internet	Introduction to Internet What is Internet? Use of Internet? Applications of Internet World wide web(web page, web site, web client and web server) Web browsers Search engines Email Blogs and forums Social media and chatting E-commerce FTP Bookmarks Internet Search Basic search Tips and Tricks for search How to stay safe on internet? How to download and upload? IP addressing		8
7	HTML	Introduction HTML Block Structure Basic tags: Texts formatting tags Line breaks Link Color, Image List creation Table, Frame, Form HTML multimedia HTML Plug-in HTML Audio HTML Video Introduction to HTML 5		8
			100	**60**

Student Seminar – 5 Lectures
Expert Talk – 5 Lectures
Student Test – 5 Lectures

Total Lectures **60 + 15 = 75**

Reference Books:

No	Title	Author
1	Pc Software For Windows Made Simple	R.K. Taxali
2	Introduction To Information Technology	V. Rajaraman
3	Computer Fundamentals	P. K. Sinha.
4	Internet The Complete Reference	Young
5	World wide web design with HTML	Cxavier

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**

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	Value Education	General education	3
	Total Credits of Semester - IV		**30**
One month training in Pathological Laboratory			

B. Voc.- Medical Laboratory and Molecular Diagnostics Technology
(Semester –V)

Sr. No.	Subject	Component	Credit
MLMDT 5.1	Molecular biology and rDNA technology	Skill	05
MLMDT 5.2	Clinical genetics	Skill	05
MLMDT 5.3	Quality Laboratory management and Medical Ethics	Skill	05
MLMDT 5.4	Practical	Skill	12
GMLMDT 5.5	Laboratory / Hospital internship & report submission	Skill & General Education	03
	Total Credits of Semester - V		**30**

B. Voc.- Medical Laboratory and Molecular Diagnostics Technology
(Semester –VI)

Sr. No.	Subject	Component	Credit
MLMDT 6.1	Therapeutic Drug monitoring and toxicology	Skill	05
MLMDT 6.2	Molecular diagnostics	Skill	05
MLMDT 6.3	Small Research Projects / Dissertation based on Diagnostic techniques/Research Proposal/Review writing	Skill	09
MLMDT 6.4	Practical	Skill	08
GMLMDT 6.5	Molecular Tools in Forensic Sciences	Gen. Education	03
	Total Credits of Semester - VI		**30**