



Mahatma Gandhi Vidyamandir's
Arts, Science and Commerce College, Manmad
Tal. Nandgaon, Dist. Nashik (Maharashtra), 423104

Syllabus For
Community College Diploma Course
In
Medical Laboratory & Molecular Diagnostic Technology

Under
National Skill Qualification Framework
(NSQF)

Details about Structure/Pattern of Syllabus:

1. **Title of the Course:** Medical Laboratory & Molecular Diagnostic Technology
2. **Course Level:** Diploma
3. **Syllabus to be implemented from the Academic year:** 2019-20
4. **Preamble of the Syllabus :-**
5. It has been a long felt necessity to align higher education with the emerging needs of the economy so as to ensure that the graduates of higher education system have adequate knowledge and skills for employment and entrepreneurship. The higher education system has to incorporate the requirements of various industries in its curriculum, in an innovative and flexible manner. The University Grants Commission (UGC) has launched a scheme on skills development based higher education as part of college/university education, leading to Community College, under the NSQF (National Skills Qualifications Framework). The course content is developed based on NVEQF (National Vocational Educational Qualification Framework), NSQF, CBCS (Choice Based Credit System) & Industry requirements.
6. **Faculty of the Course :** Science & Technology
7. **Eligibility for Admission :**10+2 pass
8. **Duration of the Course:** One Year
9. **Intake Capacity of Students:** 50
10. **Examination:**
 - I. **Pattern of Examination**Annual Pattern
 - i. Internal exam, Term end exam, Practical, Oral, Project.
 - ii. Pattern of the question paper: As per University rules
 - II. **Standard of Passing:**As per Pune University norms
 - III. **ATKT Rules:** As per Pune University norms
 - IV. **Award of Class:** The Certification Levels Will lead to Diploma

Award	Duration	Total Credits for Award
Diploma	2 Semester	60
 - V. **External Students:**Not permitted
 - VI. **Setting of Question Paper/Pattern of Question Paper:** As per Pune University norms
 - VII. **Verification/Revaluation:** As per Pune University norms
11. **Structure of the Course:**
 - I. **Compulsory Paper:** All Papers are Compulsory
 - II. **Optional Paper:** None
 - III. **Question Paper :** As per Pune University norms

Medium of Instructions: English, Marathi

COURSE: MEDICAL LABORATORY & MOLECULAR DIAGNOSTIC TECHNOLOGY

SEMESTER – I

Course Code	Title	Credits		Hours / Week	
		General Education (Theory)	Skill Component (Practical)	General Education (Theory)	Skill Component (Practical)
MLMDT - 11	Human General Anatomy&Physiology- I	4	6	4	12
MLMDT - 12	General Pathology - I	4	6	4	12
MLMDT - 13	Basics of Biochemistry - I	4	6	4	12
Total		12	18	12	36

SEMESTER – II

Course Code	Title	Credits		Hours / Week	
		General Education (Theory)	Skill Component (Practical)	General Education (Theory)	Skill Component (Practical)
MLMDT - 21	Human General Anatomy &Physiology- II	4	6	4	12
MLMDT - 22	General Pathology - II	4	6	4	12
MLMDT - 23	Basics of Biochemistry - II	4	6	4	12
Total		12	18	12	36

MLMDT= MEDICAL LABORATORY & MOLECULAR DIAGNOSTIC TECHNOLOGY

SYLLABUS FOR SEMESTER – I**MLMDT - 11: Human General Anatomy & Physiology - I****Course Contents:****Unit - 1**

1.1 Introduction: Human body, different parts and its anatomical studies.

1.2 Cardiovascular System: Heart-size, location, chambers, exterior & interior, Blood supply of heart, Systemic & pulmonary circulation, Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial, artery, superficial palmar arch, femoral artery, internal iliac artery, Peripheral pulse, Inferior venacava, portal vein, portosystemic anastomosis, Great saphenous vein, Dural venous sinuses, Lymphatic system- cisterna chyli & thoracic duct, Histology of lymphatic tissues, Names of regional lymphatics, axillary and inguinal lymph nodes in brief.

Unit- 2

2.1 Respiratory System: Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments, Histology of trachea, lung and pleura, Names of paranasal air sinuses.

2.2 Urinary System: Kidney, ureter, urinary bladder, male and female urethra, Histology of kidney, ureter and urinary bladder.

Unit - 3

3.1 Cell: Definition, Structure and function of cells and Cytoplasmic Organelles.

3.2 The important physico-chemical laws applied to physiology: Diffusion, Osmosis, Bonding, Filtration, Dialysis, Surface Tension, Adsorption and Colloid.

Unit - 4**Practicals:**

1. Histology of types of epithelium, Histology of serous, mucous & mixed salivary gland.
2. Histology of the 3 types of cartilage.
3. Study of heart and vessels in the body.
4. Study different parts of respiratory system.
5. Study of reflections.
6. Haemoglobinometry.

Reference Books:

1. William Davis, *Understanding Human Anatomy and Physiology*, McGraw Hill
2. Chaurasia's, *A Text Book of Anatomy*
3. Ranganathan, T.S., *A Text Book of Human Anatomy*
4. William Davis, *Understanding Human Anatomy and Physiology*, McGraw Hill.
5. Chaurasia's, *Practical of Human Anatomy*.
1. Guyton, Arthur, *Text Book of Physiology*, Prism Publishers

2. Chatterjee, C C, *Human Physiology*, Medical Allied Agency
- 3 A.K Jain, Practical Handbook of Human Physiology.
4. Nageshwari, Practical Workbook of Human Physiology.
5. Gupta, Medical Physiology Made Easy.

MLMDT 12: General Pathology: I**Course Contents:****Unit – 1**

1.1 Composition and function of blood: Study of different types of blood cells, differential counts, functions. Haemoglobin -Structure, function, concentration physiological variation. Methods of Estimation of Hb, Blood coagulation and Haemostasis – Definition, normal haemostasis, clotting factors, mechanism of clotting disorders of clotting factors. Blood Bank, Blood groups-A, B, O system, Rh system, Blood grouping & typing, Cross-matching, Rh system-Rh factor, Rh in Cross-matching, Blood transfusion – Indication, universal donor and recipient concept. Selection criteria of a blood donor.

1.2 Fundamental physiological study of Cardiovascular System.

Unit – 2

2.1 Histopathology: Introduction to Histopathology, Mounting Techniques – various Mounts, Use & care of Microscope, Various fixatives, Mode of action, Preparation and Indication.

2.2 Section Cutting, Tissue processing for routine paraffin sections, Decalcification of Tissues. Staining of tissues - H& E Staining. Bio-Medical waste management.

Unit – 3

3.1 Clinical Pathology: Introduction to Clinical Pathology and instrumentation

3.2 Urine Examination, Examination & importance of cerebro spinal fluid (CSF), Sputum Examination. Examination of feces. Gastric analysis, Liver function test, Renal function test.

Practicals:

1. White Blood Cell Count.
2. Red Blood Count.
3. Determination of Blood Groups.
4. Leishman's staining and Differential WBC count.
5. Urine Examination: Physical, Chemical and Microscopic
6. Hb Estimation, Packed Cell Volume [PCV], Erythrocyte Sedimentation rate{ESR}

Reference Books:

1. Rabbins & Cotran, Pathologic Basis & Diseases.
2. Harsh Mohan, Pathologic Basis & Diseases.
3. Todd & Sanford, Clinical Diagnosis by Laboratory Method.
4. Textbook of Pathology, 2014, 7th Edition, Harsh Mohan, Jaypee Brothers Medical Publishers (P) Ltd
5. Essentials in Hematology & Clinical Pathology, 2012, 1st Edition, Ramadas Nayak, Sharada Rai, Astha Gupta.

MLMDT 13: Basics of Biochemistry: I**Course Contents:****Unit- I**

Basic Biochemistry: Bonds –Types: Ionic, covalent, noncovalent bonds (hydrogen, hydrophobic, electrostatic, Van der Waal forces) and their functions in bio molecules.

Physico-chemical properties of water, Concept of Buffer-types of buffer, buffering capacity and buffers in biological system.

Unit- II

Specimen Collection: Types of Specimens, Method of specimen collection (Blood, serum, Urine and others), Pre-analytical & analytical variables, Use of preservatives in specimen collection, Use of proper Anticoagulants in specimen collection & Introduction to Laboratory Apparatus.

Unit- III

Carbohydrates: Definition and classification & estimation of carbohydrates, Isomerism - Structural and stereoisomerism, chemical properties, biological significance and clinical significance-hypoglycaemia and hyperglycaemia.

Unit- IV

Proteins: Definition and classification & estimation of essential and non-essential amino acids, Structure and classification of amino acids, Peptide bond, types of proteins.

Practicals :

1. Analysis of Normal Urine.
2. Liver Function tests.
3. Lipid Profile.

Reference Books:

1. Varley, Clinical Chemistry.
2. Kaplan, Clinical Chemistry.
3. Das, Debajyothi, Biochemistry, Academic, Publishers, Calcutta.
4. Principles of Biochemistry, 1993, 2nd Edn, Lehninger A. L. Nelson D.L. & Cox M.M.CBH Publisher and distributors, Delhi.

SYLLABUS FOR SEMESTER - II**MLMDT : 21 Human General Anatomy & Physiology: II****Course Contents:****Unit - 1**

1.1 Reproductive System: Parts of male and female reproductive system.

1.2 Fundamental physiological study of Reproductive System.

Unit-2

2.1 Endocrine Glands: Endocrine glands- pituitary gland, thyroid gland, parathyroid gland, suprarenal gland.

2.2 Fundamental physiological study of Endocrine System

Unit - 3

3.1 Nervous System: Neuron, Classification of NS, Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve, Ventricles & cerebrospinal fluid, Names of basal nuclei, Blood supply of brain.

3.2 Locomotion and Support: Cartilage – types with example & histology, Bone – Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of bones, vertebral column, inter vertebral disc, fontanelles of fetal skull, Joints – Classification of joints with examples, synovial joint (in detail for radiology), Muscular system- Classification of muscular tissue & histology, Names of muscles of the body.

Practicals:

1. Demonstration of parts of urinary system, Histology of kidney, ureter, urinary bladder, Radiographs of abdomen-IVP, retrograde cystogram.
2. Demonstration of section of male and female pelvis with organs in situ, Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tubes, ovary, Radiographs of pelvis – hysteron salpingogram.
3. Demonstration of the glands, Histology of pituitary, thyroid, parathyroid, suprarenal glands.
4. Histology of peripheral nerve & optic nerve, Demonstration of all plexuses and nerves in the body, Demonstration of all part of brain, Histology of cerebrum, cerebellum and spinal cord.
5. Histology of thin and thick skin, Demonstration and histology of eyeball, Histology of cornea & retina.

Reference Books:

1. William Davis, Understanding Human Anatomy and Physiology, McGraw Hill.
2. Chaurasia's, Practical of Human Anatomy.
3. Fattana, *Human Anatomy*, (Description and Applied), Saunder's& C P Prism Publishers, Bangalore
4. Ester. M. Grishcimer, *Physiology & Anatomy with Practical Considerations*, J.P. LippinCott. Philadelphia.

MLMDT 22 : General Pathology: II**Course Contents:****Unit – 1**

1.1 Haematology: Introduction to Haematology and study of different instruments, apparatus related to Haematology.

1.2 Sampling: Collection of different samples from different hospitals and clinics.

Unit - 2

2.1 Normal constituents of Blood, their structure and function. Collection of Blood samples, Various Anticoagulants used in Haematology, PCV, ESR, Normal Haemostasis, Prothrombin Time, Activated Partial Thromboplastin time, Blood grouping and Rh Types, Cross matching.

2.2 Total count of RBCs, WBCs and Differential count of WBCs and their significance. Examination of bone marrow. Hb%, bleeding time, clotting time and their significance, Basics of blood transfusion.

Unit – 3

3.1 Fundamental physiological study of Respiratory System

3.2 Basic study of Sphygmomanometer, ECG, Angiography, Angioplasty, Bypass Surgery.

Practicals:

1. Bleeding Time, Clotting Time.
2. Histopathology – Section cutting and H & E Staining.
3. Calculation of blood indices.
4. Blood pressure Recording.
5. Auscultation for Heart Sounds.
6. Artificial Respiration.

Reference Books:

1. Concise Book On Medical Laboratory Technology, 2005 reprint, 1st Edn., C. R. Maiti, New Central Book Agency (p) Ltd, Kolkata, India.
2. Introduction of Medical Laboratory Technique, 1998, 7th Edn., Baker F. J., Silverton R. E., Pallister C. J., Butterworth-Heinemann, UK

3. Concise Book On Medical Laboratory Technology, 2005 reprint, 1st Edn., C. R. Maiti, New Central Book Agency (p) Ltd, Kolkata, India.
4. Introduction of Medical Laboratory Technique, 1998, 7th Edn., Baker F. J., Silverton R. E., Pallister C. J., Butterworth-Heinemann, UK

MLMDT 23: Basics of Biochemistry: II**Course Contents:****Unit- 1**

1.1 Lipids: Definition, Introduction, classification and estimation of lipids, Clinical significance (obesity, atherosclerosis, myocardial infarction), Biological significance of lipids.

Unit- 2

Enzymes: Definition, classification, properties and estimation and of enzymes, Regulatory and non regulatory enzymes. Factors influencing enzyme activity (pH, temperature, substrate concentration, enzyme concentration), Clinical significance of enzymes.

Unit - 3

3.1 Biomolecules : Definition, Introduction , Biological significance of Biomolecules.

3.2 Genetics : Basics of Genetics.

Practicals:

1. Renal Function test.
2. Blood gas and Electrolytes.
3. Demonstration of Glucometer with strips.

Reference Books:

1. Chatterjee, A Text book of Medical Biochemistry.
2. Satyanarayan,U., Medical Biochemistry
4. Biochemistry, 1995 5th Edn. Zubay G. Wm, C.Brown Communications USA
5. Outline of biochemistry, 1995 5th Edn, Conn E.E., Stumph P.K. Bruening G &Doi R.H.John Wiley & Sons, USA and distributors Bangalore.