

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,
VISHNUPURI, NANDED.**

SCHOOL OF LIFE SCIENCES

**POSTGRADUATE DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY (PGDMLT)
PROGRAMME**

REVISED SYLLABUS FOR SEMESTER I TO II

**UNDER SKILL-BASED EDUCATION – NATIONAL SKILLS QUALIFICATIONS
FRAMEWORK**

2022-2023

SEMESTER-WISE COURSE INFORMATION

Program Objectives:

The PGDMLT program aims to:

1. Develop Competence in Laboratory Skills
2. Ensure Quality and Accuracy in Laboratory Practice
3. Promote Ethical and Professional Standards
4. Enhance Problem-Solving and Analytical Skills
5. Encourage Safe Laboratory Practices
6. Integrate Technology and Modern Techniques

Program Outcomes:

Upon successful completion of the PGDMLT program, the graduate will be able to:

1. Perform and Interpret Diagnostic Tests
2. Operate and Maintain Laboratory Instruments
3. Apply Quality Assurance and Control Measures
4. Follow Ethical and Legal Guidelines
5. Practice Laboratory Safety
6. Demonstrate Research and Analytical Skills

SEMESTER I

	Course Title	Credit Value	No. of Int. hrs/week	Marks		Total Marks
				CLA	ESA	
PGDMLT-T-1	Anatomy and Physiology	04	04	50	50	100
PGDMLT-T-2	Clinical Biochemistry	04	04	50	50	100
PGDMLT-T-3	Clinical Pathology, Hematology and Blood Banking-1	04	04	50	50	100
PGDMLT-T-4	Medical Microbiology	04	04	50	50	100
PGDMLT-L-1	Lab in Anatomy and Physiology	02	02	25	25	50
PGDMLT-L-2	Lab in Clinical Biochemistry	02	02	25	25	50
PGDMLT-L-3	Lab in Clinical Pathology, Haematology and Blood Banking-1	02	02	25	25	50
PGDMLT-L-4	Lab in Medical Microbiology	02	02	25	25	50
Total		24	24	300	300	600

CLA: Collegiate Learning Assessment ESA: End Semester Assessment

SEMESTER II

Course Number	Course Title	Credit Value	No. of Int. hrs/week	Marks		Total Marks
				CLA	ESA	
PGDML T-T-5	Clinical Pathology and Histology	04	04	50	50	100
PGDML T-T-6	Immunology and Serology	04	04	50	50	100
PGDML T-T-7	Haematology and Blood Banking-II	04	04	50	50	100
PGDML T-T-8	Medical Instrumentation	04	04	50	50	100
PGDML T-L-5	Lab in Clinical Pathology and Histology	02	02	25	25	50
PGDML T-L-6	Lab in Immunology and Serology	02	02	25	25	50
PGDML T-L-7	Lab in Haematology and Blood Banking-II	02	02	25	25	50
PGDML T-L-8	Lab in Medical Instrumentation	02	02	25	25	50
Total		24	24	300	300	600

CLA: Collegiate Learning Assessment ESA: End Semester Assessment

**POSTGRADUATE DIPLOMA IN MEDICAL LABORATORY
TECHNOLOGY (PGDMLT)**

Course-wise syllabus

SEMESTER-I

COURSE PGDMLT-T-1: ANATOMY AND PHYSIOLOGY

(4 Credits, Core Course)

UNIT-1

Circulatory System: Structure of the heart, the structure of major blood vessels-arteries & veins, pulmonary circuit, blood pressure and its regulation.

Respiratory System: Respiratory tract structure, nasal cavity, paranasal sinuses, NasoPharynx, larynx, trachea and chief bronchi, the mechanism of breathing.

UNIT-2

Digestive System: Gastrointestinal tract, teeth, tongue, salivary glands, tonsils, stomach, Intestine: small, large. Rectum, anal canal, liver, pancreas, and gall bladder. The process of digestion and absorption.

Urinary System: Kidney, ureter, bladder, urethra. kidney-structure & function of nephron. The physiological process involved in excretion. Mechanism of urine formation, and osmoregulation by the kidney.

UNIT-3

Nervous System: Central nervous system-brain meninges, brain structure, function, spinal cord, peripheral nerves. Neurons, neuroglial cells. Motor and sensory pathways.

Endocrine System: Endocrine system classification of hormones. Anatomy and physiology of endocrine glands. Mechanism of hormone action, structure and functions of the pituitary gland, thyroid gland, parathyroid gland, adrenal gland, pancreas, pineal gland, thymus and their disorders

Reproductive System: Structure, function and location of the organs of male and female reproductive systems. Major events of female reproductive cycle, the process of spermatogenesis, oogenesis and follicular development.

UNIT-4

The Blood & Lymph: Composition of blood and lymph. Hematopoiesis, primary lymphoid organs- structure & function of the thymus and bone marrow. Secondary lymphoid organs- structure & function of lymph nodes, spleen and tonsils.

Tissues: Definition & function of tissues, types of tissues-epithelial, connective, neural and muscular.

Cartilage, Skeletal & Muscular System: Hyaline cartilage, fibrocartilage, elastic cartilage. Ligaments, tendon, and regenerative ability of cartilage. Development of bone tissue (osteogenesis), types of bones and joints. Muscle definition & types of muscle. Cardiac muscle, skeletal muscle, and visceral muscle. The force exerted by muscles. Articulations-synarthroses, amphiarthroses and diarthroses.

Lab course- PGDMLT-L-1 Anatomy and Physiology

1. Determination of bleeding and clotting time
2. Measurement of human electrocardiogram (ECG) using the Biopac system
3. Analysis of human blood pressure
4. Investigation of human pulmonary function
5. Determining blood glucose level
6. Investigation of spontaneous behaviour under different experimental conditions.

Course Objective: Students will comprehend the principles of anatomy and physiology, which provide comprehensive teaching on the structure, function, and organization of the human body. In addition, students will learn anatomy, physiology, and pathology terminology for each bodily system and how these disciplines interact to preserve homeostasis.

Learning outcome: After successfully completing the reading, exercises, and visual lab provided in this course outline, students will be able to:

1. Discuss the human body's chemistry, cell structure, and tissues using the proper terminology.
2. Discuss the components and activities of blood and the creation and structure of blood cells using the appropriate terminology.
3. Identify the structure and functions of each bodily system and describe them.

4. Discuss frequent illnesses and conditions seen in healthcare professions.
5. Describe each biological system's function in maintaining homeostasis.
6. Describe the physiological ageing impacts on the human body.

References books

1. Chatterjee, C.C, Human Physiology. Medical Allied Agency, Kolkata.
2. Chaudhari S K. Concise Medical Physiology. New Central Book Agency (P) Ltd., Calcutta.
3. Godkar P.B and Godkar D.P, Textbook of Medical Laboratory Technology. Bhalani Publishing House, Mumbai.
4. Goyal, R.K, Patel, N.M. and Shah, S.A, Practical Anatomy, Physiology and Biochemistry. B. S. Shah Prakashan, Ahmedabad.
5. Tortora, G.J. and Grabowski, S.R, 2005. Principals of Anatomy and Physiology. Harper Collins College Publishers, New York.
6. Vander, A.J, Sherman, J.H, Human Physiology. McGraw-Hill Publishing Co, USA.
7. K. Sembulingam and P. Sembulingam, 2012. Essentials of Medical Physiology, JAYAPEE Publisher.
8. Sándor Borbély et al., Physiology Practical, Department of Physiology and Neurobiology, Eötvös Loránd University, 2013.

COURSE PGDMLT-T-2: CLINICAL BIOCHEMISTRY

(4 Credits, Core Course)

UNIT-1

Basic Knowledge of Chemistry – Definition of acids, bases and salts, pH – indicators, measurement, Preparation of different solutions – molar, normal, buffer, percent, saturated, percent, standard.

Carbohydrates- Dietary sources, digestion, absorption, basic metabolism. Glycolysis and Kreb's cycle, Glycogenesis, Glycogenolysis, Gluconeogenesis, regulation of blood glucose and its importance, glucose tolerance test, glucosylated Hb, other parameters and related disorders – Hyperglycemia, Hypoglycemia, Glycosuria, Diabetes mellitus.

UNIT-2

Amino Acids and Proteins - Dietary sources digestion, absorption, fate of amino acids, nitrogen equilibrium, formation and detoxication of ammonia, formation of non-protein nitrogenous products e.g. uric acid, creatinine, disorders related to protein and nitrogen metabolism.

Lipids - Definition, classification of lipids, digestion of lipids by pancreatic enzymes, degradation of triglycerols and cholesterol esters, the role of bile salts in the absorption of lipids, biological function, phospholipids.

UNIT-3

Enzymes: Classification, properties, factors affecting, isozymes and coenzymes

Clinical enzymology – Therapeutic, diagnostic and analytical uses of enzymes with normal values of serum enzymes.

Hormones – Non-steroidal hormones, steroidal hormones – physiological role and deficiency diseases.

Vitamins: Definition, classification. Rich sources of fat-soluble and water-soluble vitamins, their metabolic, therapeutic and clinical significance.

Minerals and Electrolytes – Na, K, Cl, Ca, Mg, I2, P, Fe and iron binding capacity.

UNIT-4

Important Organ Profile test –Kidney function test (KFT), Liver (FT), Thyroid (FT), Cardiac (FT), Pancreas (FT), Gastric (FT), Hypertension profile, Diabetic profile and Covid profile test.

Lab course- PGDMLT-L-2 Clinical Biochemistry

- 1 Glucose determination in urine
- 2 Determination of glucose in blood
- 3 Determination of urea
- 4 Determination of serum/urine creatinine
- 5 Determination of serum protein
- 6 Determination of serum albumin
- 7 Determination of serum alkaline phosphatase
- 8 Determination of SGOT
- 9 Determination of SGPT
- 10 Determination of TSH
- 11 Determination of T3T4

Course Objectives: Students will understand the diseases at the molecular level, the body's chemical components. To familiarize students with clinical elements, the study of biochemical test techniques, metabolic pathways, including disorders, and associated concepts.

Learning Outcome: Students will comprehend the operation of laboratory medicine, which involves the measuring of substances in blood, urine, and other bodily fluids.

- 1 Students will be able to investigate health issues, diagnose patients' conditions, and monitor diseases.
- 2 Students will have the conceptual framework necessary to comprehend events occurring inside live cells, how cells interact with one another, and how cells operate within tissues.

References books:

1. Nelson and Cox (2008), Principles of Biochemistry by A. Lehninger, W.H. Freeman and Company, New York, USA.
2. Berg Jeremy M., Tymoczko J. L. and Stryer L. (2003), Biochemistry, W.H. Freeman and Company, New York, USA.
3. Voet D., Voet J. and Pratt Charlotte W. (2006) Fundamentals of Biochemistry- Life at the molecular level, John Wiley and Sons, Asia Pvt. Ltd.
4. Satyanarayana, U. and Chakrapani, U., 2007. Biochemistry.

**COURSE PGDMLT-T-3: CLINICAL PATHOLOGY, HEMATOLOGY AND
BLOOD BANKING-1**

(4 Credits, Core Course)

UNIT-1

Physiology of blood: (i) Normal Erythropoiesis, (ii) Leucopoiesis, (iii) Formation and function of blood platelets.

Introduction: (i) Collection of blood samples for haematological studies, (ii) Types of anticoagulants. (iii) Capillary blood, venous blood and storage of samples.

UNIT-2

Blood group system – (i) ABO blood group system, subgroup of ABO, variants of ABO blood group system, (ii) Rh blood group system, (iii) Serological techniques for detection of ABO and Rh antigens, (iv) Technique for blood grouping and serological Techniques.

Blood collection: i) Screening of donor, (ii) Blood Collection, (iii) Storage and transportation of blood, (iv) Component preparation: a) Red cell concentrate, b) Washed red cells, c) FFP d) Cryoprecipitate, e) Platelet concentrate.

UNIT-3

Haematology: Methods of blood collection and anticoagulants, Haemoglobin estimation, Total R.B.C, Total W.B.C. count, Platelet count, Packed cell volume/ determination of haematocrit, bleeding time, whole blood coagulation time and prothrombin time. Osmotic fragility test.

UNIT-4

Blood banking: ABO cell grouping and serum grouping by slide and tube method. Rh typing – various techniques. Anti A/ anti B titer, Anti D titration by albumin and indirect antiglobulin technique, Test for HBsAg (Hepatitis B surface Antigen) ELISA and Rapid Test (Demonstration). Test for HIV Antibodies (ELISA and Rapid Test).

Lab course- PGDMLT-L-3 Clinical Pathology, Hematology, Blood Banking-1

1. Lab safety assessment

2. Physical examination of urine
3. Determination of protein and glucose in urine
4. Examination of throat and mouth specimen
5. Study of microtome
6. Preparation of specimen
7. Storage of specimen
8. Methods of blood collection and anticoagulants
9. Total R.B.C.
10. Total W.B.C. Count.
11. Platelet Count.
12. Blood grouping
13. Separation of serum and plasma from whole blood

Course Objectives: Students must understand how to assess laboratory and pathological testing, including specimen collection, handling techniques, and the competency of the professional doing the tests. A greater grasp of laboratory tests will not only let testing to be employed more efficiently but will also provide a deeper and more accurate comprehension of the nuances and interpretation of lab assessment.

Learning Outcome:

- 1 Students will comprehend the pathological foundation of sickness for which a certain test is done.
- 2 Students will comprehend the limitations of such studies in order to be able to pick the most appropriate diagnostic test for a specific diagnostic issue.
- 3 Students will be able to investigate health issues, diagnose patients' conditions, and monitor illnesses.

Reference book:

1. Medical Laboratory Technology, 5th reprint 1999, Vol. I, II & III, K.L. Mukharjee, Tata McGraw Hill
2. Text book of Medical Laboratory Technology, P.B. Godkar, 1994, Bhalani Publishing House, Mumbai.
3. Medical Laboratory Technology, Ramnik Sood, 4th ed., 1994, Jaypee Brothers.
4. Hand book of Medical Laboratory Technology, Bharucha, Meyerm, Mody, Carman.
5. Lynch's Medical Laboratory Technology, 3rd ed., Stanley S. Raphael, W. B. Saunders Company, Asian edition. 20.
6. Practical Haematology. J. A. Dacie & S. M. Lewis, The English Language Book Society, 8th ed., ELBS.

COURSE PGDMLT-T-4: Medical Microbiology-I

(4 Credits, Core Course)

UNIT-1

Morphology of Bacteria: Size, shape, arrangement, capsule, cell wall, the chemical structure of cell wall, gram-positive and gram-negative cell wall, cytoplasm, nucleus, flagella, spores etc.

UNIT-2

Smear Microscopy and Staining of Slides: Simple staining, Gram staining, Albert staining, Capsular staining, (India Ink), Hiss's method, Ziehl–Neelsen staining (AFB), Auramine –Rhodamine procedure.

UNIT-3

Identification and biochemical characterization of clinically significant bacteria: Microscopy of stained smear, motility test, culture character, biochemical reactions: sugar fermentation, indole production, catalase, oxidase coagulase test, urease production. Citrate utilization, nitrate reduction, H₂S production, PPA production, MR, VP test, bacitracin, optochin, polymyxin B sensitivity, Esculin hydrolysis.

UNIT-4

Methods of sterilization (Physical and Chemical), disinfection, decontamination of spills and universal precaution relative to patient care and disease. The definition of growth, growth curve, measurement of growth and maintenance of cultures. Different modes of nutrition in bacteria, bacterial reproduction, generation time, bacterial count.

Lab course- PGDMLT-L-4 Medical Microbiology-1

1. Preparation of sterile swabs / sterile tubes and bottles
2. Preparation of smear
3. Staining: Germ & Ziehl – Neelson staining
4. Preparation of culture media
5. Principle and working of instruments commonly used in Microbiology laboratory
6. Identification of common microbes including *E. coli*, *S. aureus* and *C. albicans*
7. Antibiotic sensitivity test

8. Carbohydrate fermentation tests for common bacterial pathogens
9. Pure culture techniques (serial dilution, streaking, spread plating technique)
10. Staining techniques (Gram staining, Negative staining, Endospore staining, Acid fast staining)

Course Objective: To give a basic understanding of the microbial world, the underlying structure and activities of microorganisms, their metabolism, nutrition, diversity, physiology, and their link to the environment and human health. To offer practical skills for isolating and modifying their propagation circumstances.

Learning Outcomes (LO):

1. Students will be able to define microbiology, its evolution, and its significance to human welfare.
2. Understand some of the general approaches used to research microorganisms.
3. Identify and compare the structure and function of microorganisms as well as the variables that govern their development.
4. Demonstrate aseptic microbiological procedures in the laboratory and investigate the origins and control of microbial contamination.

Reference book:

1. General Microbiology. Roger Y. Stainer, Edward A. Adelberg and John L. Ingraham, 4th ed., Prentice Hall Inc.
2. Bailey and Scott's Diagnostic Microbiology. Sydney M. Finegold and Ellen Jo Tenover, 7th ed., The C.V. Mosby Company.
3. Microbiology, 5th edition, Lansing M. Prescott, John P. Harley, Donald A. Klein, McGraw Hill.
4. Microbiology. Pelczar, Reid Chah. 5th ed., Tata McGraw Hill Publishing co, Ltd.
5. Mackie and McCartney Medical Microbiology. A Guide to Laboratory Diagnosis and control of Infection. 13th ed., J.P. Duguid, B.P. Marmion and R.H.A. Swain, The English Language Book Society and Churchill Company.
6. Pelczar Jr., M.J., Chan, E.C.S. and Krieg, Noel R., Microbiology, McGraw Hill (2003) 5th ed.
7. Stanier, R.Y., Ingraham, J.L. and Wheelis, M.L., General Microbiology, MacMillan (2007) 5th ed. Reference Books
8. Tortora, G.J., Funke, B.R., and Case, C.L., Microbiology- An Introduction, Pearson Education (2007) 8th ed.
9. Brock -Biology of Microorganisms by Michael T. Madigan, John M. Martinko, Jack Parker.

SEMESTER-II

COURSE PGDMLT-T-5: CLINICAL PATHOLOGY AND HISTOLOGY

(4 Credits, Core Course)

UNIT-1

Urine Analysis:

Anatomy and physiology of urine formation, Composition of urine, Collection, preservation and Transportation of urine. Routine examination of physical, chemical and microscopic. Correlation of urinary findings in various diseases.

Stool Analysis:

Collection, preservation and transportation of stool. Routine examination of physical, chemical and microscopic. Correlation and significance in various diseases.

UNIT-2

Cerebrospinal Fluid:

Formation of C.S.F., Collection, preservation and transportation of C.S.F., Composition of CSF. Physical, chemical and microscopic examination. Correlation of abnormal C.S.F. findings in various diseases.

Sputum Analysis:

Anatomy and physiology of respiratory system. Collection, preservation and Transportation of sputum. Physical, microscopic and Bacteriological examination.

UNIT-3

Examination of Body Fluid:

Transudate and exudate, Indications, collection and examination-physical, chemical and microscopic of the following, body Fluids, Pleural, Peritoneal, Pericardial, Synovial fluid.

UNIT-4

Histopathology Techniques:

Routine and special stains, Museum- Technique and specimen preservation, Tissue processing and staining, Micro tomes-types, Tissues processing technique cry tome, Fixative cleaning agents, Automation in histopathology- Tissue processors cryotome, Sample preparation- glossing techniques, H and E stain, staining methods.

Lab course- PGDMLT-L-5 Clinical Pathology and Histology

1. Urine Analysis: Physical, Chemical, and Microscopic examination.
2. Stool Analysis: Physical, Chemical, and Microscopic examination.
3. Cerebrospinal Fluid: Physical, Chemical, Microscopic examination.
4. Sputum examination: Physical, Microscopic
5. Gastric Analysis: Chemical examination of gastric juice.
6. Body fluids (each separately): Physical, Chemical, and Microscopic examination.
7. Cutting, Fixation and processing of tissues (Demonstration).
8. Staining – (i) Haematoxylin and Eosin for paraffin sections. (ii) PAP Stain for cytology.

Course Objective:

The course will provide a detailed understanding of clinical pathology and histology, the underlying knowledge about the clinical specimens, collection and the rationale behind the same which can be important to understand to perform a diagnosis of any illness.

Learning Outcomes (LO):

1. Students will be able to understand and perform diagnosis which will be significantly important to human welfare.
2. Understand some of the general approaches used in clinical pathology lab.
3. Demonstrate standard operating procedures in the laboratory and investigate the origins and diagnosis.

Reference book:

1. Text Book of Medical Laboratory Technology, P.B.Godkar, 1994, Bhalani Publishing House,Mumbai
2. Medical Laboratory Technology,Vol I & II, 1999, K.L.Mukharjee.Tata MacGraw Hill.
3. Medical Laboratory Technology, Ramnik Sood, 4th ed., 1994,Jaypee Brothers.
4. A Hand Book Of Clinical Pathology , Chakraborty & Battacharya, Academic Publisher.
5. Parasitology, K.D.Chatterjee, Chatterjee Medicaal Publisher.
6. Clinical Diagnosis and management by laboratory methods 20th Edition John Bernard Henry Saunders 2005.
7. Medical Parasitology 2nd edition, D.R.Arora, B.Arora, CBS Pub.& Distributer.
8. Text book Of Medical Parasitology, P. Chakraborty, New Central book Agency.
9. District laboratory practice in tropical countries VOL-2, Monica Cheesbrough, Cambridge University Press.
10. Concise Clinical pathology, Ila M. Vora, Pradeep Vaideeswar, Bhalani publishing House, Mumbai, India.

COURSE PGDMLT-T-6: IMMUNOLOGY AND SEROLOGY

(4 Credits, Core Course)

UNIT-1

Immunity: Introduction, Classification of immunity, Innate immunity, Acquired immunity, Active and Passive immunity, Cell-mediated immunity, Humoral immunity

Components of the Immune system: Phagocytic cells, T cells, B cells

UNIT-2

Antigen: Introduction, Types – Immunogens & Haptens, Heterophile & Forssman antigen, Antigenic Determinants, Immunogenicity

Antibody: Structure & Diversity of antibody, Monoclonal Antibodies and their production, Polyclonal antibody

UNIT-3

Infections: Definition, routes of infection and spread, source and reservoir of infections, definition: Parasite, Host, Vector, Contagious diseases, Infectious diseases, Epidemic, Endemic, Pandemic, Zoonosis, Epizootic. Basic knowledge of organisms and their identification causing UTI, sore throat, wound infection, diarrhea, dysentery, food poisoning, septicemia, meningitis, Enteric fever, Tuberculosis, Leprosy and Sexually Transmitted Disease (STD).

UNIT-4

Fungal Detection: Identification of *Candida albicans*, *Cryptococcus neoformans*, *Aspergillus fumigatus*. Antimicrobial susceptibility testing: Diffusion method and dilution method, Interpretation of results, Drug resistance spectrum of antibiotics.

General Study of Human pathogens: *V. cholerae* and related genera, *Campylobacter* spp., *H. pylori* spp., Study of Hospital Associated (Nosocomial) Infections, safety measure & control policy. Definition of Virus, the composition of viruses in general, Basic concept of Hepatitis Virus, Retrovirus, Polio Virus,

Chicken Pox virus. Acquired Immune Deficiency Syndrome (AIDS), HIV-I & HIV-II infection, Safety measures & Control policy.

Lab course- PGDMLT-L-6 Immunology and Serology

1. WIDAL test
2. VDRL test
3. Identification of *Vibrio cholera*
4. Isolation of hospital associated microflora
5. Identification of *Candida albicans*
6. ELISA test
7. PCR test
8. Antibiotic susceptibility test

Course Objective: To make students familiar with the concept of immunology and infectious agents. To understand the type and characteristics of immunology and clinically important microorganisms and related diseases.

Learning Outcomes (LO):

1. Students will be able to understand the basic concepts related to human infections
2. Students will be able to understand the nature of bacterial, fungal, viral and protozoan diseases in humans
3. Students will be able to understand the basic concepts of immune system and serological techniques used in disease diagnosis

Reference book:

1. Text Book of Immunology. James T. Barrett. 5th ed., The C.V. Mosby co.
2. Essential Immunology. Irvan M. Roitt. 6th ed., ELBS and Blackwell Scientific Publication.
3. Immunology. Richard M. Hyde. 3rd ed., (NMS) Indian Edition, Williams and Wilkins, Baltimore, Maryland.
4. Modern Immunology A. Dasgupta. 2nd ed., 1992, Jaypee Brothers Medical Publishers.
5. Immunology. Weir. 7th ed., ELBS, Churchill Livingstone, ELBS students Edition.
6. Goldsdy A., Thomus J. K., Barbara A. O. and Kuby J. Immunology
7. Peter Patham, The immune system, 3rd Edition, Garland Sc, 2009
8. Janeway C., Traverse, Walport and Shlomchik Immunobiology, 6th Edition, Garland Sc.
9. Gangal S.G. and Sontakke S.D. Basic and clinical immunology, Universities press, 2012, in press

COURSE PGDMLT-T-7: HAEMATOLOGY AND BLOOD BANKING-II

(4 Credits, Core Course)

UNIT-1

Introduction To Haematology

Composition of the blood, its formation and function, Transformation and preservation of blood, Anticoagulants definition and their different types, Difference between serum and plasma

Haemoglobin

Structure and function of haemoglobin, Normal and abnormal forms of haemoglobin hemoglobin derivatives.

UNIT-2

Blood Group System –I

ABO blood Group system, subgroup of ABO, Variants of ABO blood group system., Rh blood group system. Serological techniques for detection of ABO and Rh antigens. Gel technique for blood grouping and serological Techniques. AHG test.

Blood Group System – II

Other Blood Group systems, Importance of Atypical antibodies, their detection and clinical significance.

UNIT-3

Blood Collection

Screening of Donor, Blood Collection, Storage and transportation of blood, Component preparation: Red cell concentrate, Washed red cells, FFP, Cryoprecipitate, Platelet concentrate.

UNIT-4

Haemolytic Disease of New-born

Haemolytic disease of the newborn due to - ABO incompatibility, Rh incompatibility, and other blood group incompatibility.

Automation and Biosafety in Blood Banking.

Quality Control in Blood Banking.

Lab course- PGDMLT-L-7 Haematology and Blood Banking-II

1. ABO cell grouping and serum grouping by slide and tube method.
2. Rh typing – Various Techniques.
3. Test for HBsAg (Hepatitis B surface Antigen) ELISA and Rapid Test (Demonstration).
4. Test for HIV Antibodies (ELISA and Rapid Test) (Demonstration).
5. Methods of Blood Collection and Anticoagulants
6. Total R.B.C.
7. Total W.B.C. Count.
8. Differential Count.
9. Platelet Count.
10. Packed cell volume/ Determination of Haematocrit.
11. Bleeding time, Whole Blood Coagulation time and Prothrombin time.

Course Objective: Students will know the normal formation and function of various types of blood cell population mechanisms and various factors that cause significant changes in the number of specific cells and related clinical conditions.

Learning Outcomes (LO):

1. Students will be able to understand the pathological basis of the disease for which a particular test is performed
2. Students will understand the limitation of such studies in order to be able to critically select the proper test suited to a particular diagnostic problem
3. Students will be able to Investigate health problems, Diagnosis of patients' illnesses and Monitor diseases.

Reference book:

1. Clinical Haematology. M.M.Wintrobe. Kothari's Indian Edition.
2. Practical Haematology. J.A.Dacei & S.M.Lewis The English Language Book Society. 8th ed., ELBS
3. Handbkook of Medical Laboratory Technology. Bharucha, Meyerm, Moody, Carman, Vellore.
4. Technical Manual, Americal Association of Blood Banks.1996.

5. Compendium Transfusion Medicine, Dr. R.N. Makroo, J. Mitra.
6. A Hand Book of Clinical Pathology, Chakraborty & Bhattacharya, Academic Publishers.
7. Parasitology, K.D. Chatterjee, Chatterjee Medical publishers.
8. Collection and Handling of Laboratory Specimens – A Practical Guide, 1988
Editor T.M. Slockbower & T.A. Bhumenfeld, J.B. Lippincott Company, USA.
9. Basic laboratory Method in Medical Parasitology, WHO, 1991.

COURSE PGDMLT-T-8: MEDICAL INSTRUMENTATION

(4 Credits, Core Course)

UNIT-1

Basic Laboratory Instrument – Principle, Components, Working, calibration and Uses of following instruments – Compound microscope, digital pH meter, Hot air oven, Autoclave, Incubator, Centrifuge, Anaerobic culture jar.

UNIT-2

Spectroscopy and Chromatography based lab Instruments/techniques - Principle, Components, Working, calibration and Uses of following instruments – Spectrophotometer, Colorimeter, Biochemistry analyser, Paper Chromatography, TLC, HPTLC, HPLC, Wet and dry chemistry analyser, Glucometer

UNIT-3

Electrophoresis and Radio isotopic based lab Instruments/techniques - Principle, Components, Working, calibration and Uses of following instruments – Paper electrophoresis, Gel electrophoresis (for DNA and Protein), Immuno electrophoresis and its types, RIA for detection of T3, T4, TSH.

UNIT-4

Laboratory Management - Role of the laboratory in human health and diseases, Laboratory at different level (National/State/District), Duties and responsibilities of laboratory personnel, Laboratory Planning – General principles, laboratory goals, Operational data – Market potential, Selection of area, competition, Laboratory trends, Space requirements, Designing of Laboratory sections, Staff and their duties, Work schedule and workload assessment

Quality Control – Quality control and quality assurance in following sections of laboratory – (a) Biochemistry (b) Microbiology (c) Haematology and Blood banking (d) Histopathology and Clinical pathology

Lab course- PGDMLT-L-8 Medical Instrumentation

1. Operation of pH meter, Single pan Balance, Spectrophotometer, Colorimeter,
2. Autoanalyzer, Electrophoresis. (Demonstration)

3. Serum Protein Electrophoresis and Lipoprotein electrophoresis (Demonstration).
4. Cardiac Troponin T (Demonstration)
5. Cardiac Troponin I (Demonstration)
6. T3 ,T4, TSH ELISA (Demonstration)

Course Objective: Lab management is a speciality that requires comprehension of economics accounting, finance, operation technology human relation and marketing. This subject is a key subject for successful laboratory practice.

Learning Outcomes (LO):

1. Students acquire the skills of successful pathological laboratory management and its ethics.
2. The student will be made aware of the basic ethics, good lab practices awareness/safety in a clinical lab as well as student will aware about instrument and its working.

Reference book:

1. Medical Laboratory Technology, 5th reprint 1999, Vol. I, II & III, K.L.Mukharjee, Tata McGraw Hill.
2. Medical Laboratory Technology – Methods & Interpretation, Sood, 4th ed., Jaypee Brothers.
3. Textbook of Medical Laboratory Technology, P.B.Godkar, 1994,Bhalani Publishing House, Mumbai.
4. Hand Book of Medical Laboratory Technology. Chitra
5. Bharucha, H.Meyer R.H.Carman, C.M.College & Hospital, Vellore. Fundamental of Biochemistry A.C.Deb, New Central Book Agency.
6. Clinical Biochemistry. 3rd ed., L.A.Kaplan & A.J.Pesce, The C.V.Mosbey Co.
7. Fundamental of Clinical chemistry.4th ed., Edited by N.W.Tietz, W.B.Saunders Company.
8. Clinical guide to laboratory Tests. 3rd ed., 1995, Tietz.