## DEPARTMENT OF ADVANCED ZOOLOGY AND BIOTECHNOLOGY

**M. Sc MEDICAL LABORATORY TECHNOLOGY** (Self Supporting)

### PG SYLLABUS

Effective from the Academic Year 2006 - 07

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**LOYOLA COLLEGE**

Autonomous
College Conferred with Potential for Excellence by UGC
Accredited at A+ by NAAC
Chennai - 600 034
ML 1808 CLINICAL BIOCHEMISTRY

SEMESTER : I  CREDITS : 04
CATEGORY : MC  NO OF HOURS PER WEEK : 05

Objectives: To impart knowledge on the importance of principles of clinical biochemistry to the students.

Unit I. Basic principles and practices of clinical chemistry

Patient management, prognosis and diagnosis. Laboratory safety – toxic chemicals and biohazards – computers in the clinical chemistry lab for a reliable report.

Unit II: Basic physiology, analytical procedures and clinical correlations

Amino acids and proteins, Enzymes- cardiac markers (LDH, SGOT, SGPT, alkaline phosphatase etc.), Blood Gases, pH (acid base balance) and Buffer systems, Electrolytes, Carbohydrate metabolism.

Unit III. Endocrinology

Thyroid function, Tumor Markers, Chemical Assessment of Hemostasis, Therapeutic drug monitoring, Toxicology.

Unit IV. Biochemical procedures

Lipids and lipoproteins, Vitamins (fat soluble and water soluble and their deficiency disorders), Porphyrins, Haemoglobin and Myoglobin, Non-protein Nitrogen, Renal function, Liver function, Pancreatic (exocrine and endocrine) functions, gastrointestinal function.

Unit v. Paediatric clinical chemistry

Diseases of the newborn and their complications, Gastric clinical chemistry, Future directions in clinical chemistry.

REFERENCES:

ML 1809 MOLECULAR BIOLOGY

SEMESTER : I  CREDITS : 04
CATEGORY : MC  NO. OF HOURS PER WEEK : 06

Objectives: To provide a good foundation in molecular biology where importance is laid on the master molecule which is an emerging discipline with a broad conceptual approach that transcends all sections of anatomic and clinical pathology.

Unit I : Basic principles in molecular diagnostics

Organizations of molecular diagnostic laboratory-Bio-membranes and the sub-cellular organization of eukaryotic cells.

Unit II : Nucleic acid organelle - DNA-the genetic code and the synthesis of macromolecules-structure of nucleic acids –synthesis of biopolymers- nucleic acid synthesis-the role of RNA in protein synthesis-stepwise formation of proteins on ribosome.

Unit III : Molecular structure of genes and chromosomes—organization of cellular DNA into chromosomes –morphology and functional elements of eukaryotic chromosomes—chromosomal organization of genes and non-coding DNA.

Unit IV : DNA replication –repair-recombination—mutation - Regulation of the eukaryotic cell cycle-gene control in development-Cellular energetics-Types of syndromes - Cystic fibrosis.

Unit V : Molecular oncology including DNA assay for T and B-cell rearrangement- analysis for translocation, oncogene analysis -translocation gene mutation in various cancer, In situ hybridization-Blood group, molecular histocompatibility testing, forensic identity testing by DNA analysis.

REFERENCE BOOKS:
Objective: To understand the mechanism of blood formation and their abnormalities in various types of disorders.

Unit I. Composition of Blood:
Components of the blood (Plasma and Cellular elements) and their functions – Haemopoietic system of the body (Leucopoiesis, erythropoiesis and thrombopoiesis).

Unit II. Haemostasis – disorders and regulation – Types of Anaemia (deficiency of iron, B12 and folic acid, hemolytic, aplastic and genetic disorders), Bleeding disorders of man.

Unit III. Coagulation of blood:
Coagulation system- recalcification time, activated partial thromboplastin time and thrombin time, Clotting time, Bleeding time, Prothrombin time, Partial Prothrombin time, Mechanism of coagulation of blood.

Unit IV. Haemogram

Unit V. Special Haematological tests:

RECOMMENDED BOOKS:
2. GradWohl, Clinical Laboratory-methods and diagnosis, Vol-I

ML 1804 - HAEMATOLOGY LAB COURSE

Haemogram: Blood Pressure, Pulse rate, Clotting time, Bleeding time, Haemoglobin estimation, Erythrocyte Sedimentation Rate, Packed cell volume.


Special Investigations: Osmotic fragility, Heinz body preparation, Sickle cell preparation, Lupus erythematosus(LE) cell preparation and cytochemical tests.

RECOMMENDED BOOKS:
2. GradWohl, Clinical Laboratory-methods and diagnosis, Vol-I

ML 1802 - BIOCHEMISTRY LAB COURSE

GENERAL PROFILE:
Blood sugar, Urea, Uric acid, Creatinine, Cholesterol, triglyceride, High Density Liproteins, Low Density Lipoproteins, Very Low Density Lipoproteins.

CARDIAC PROFILE:
- Creatine Kinase (Myocardium), Lactate Dehydrogenase, Serum Glutamic Oxalacetic transaminase, serum glutamic Pyruvic transaminase.

ELECTROLYTES:
- Sodium, Potassium, Calcium, chloride, bicarbonate, phosphorus and magnesium.
**LIVER FUNCTION TEST:**

Serum bilirubin, Total protein, AG Ratio, Gamma GT, Electrophoretic separation of protein, alkaline phosphatase, acid phosphatase and amylase.

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**ML 1952 - MEDICAL TRANSCRIPTION**

**Objective:** To understand the essential aspects of medical terminology and transcriptional guidelines.

**Unit I:** Introduction and Medical Terminology:

IT enabled services, Need of medical transcription, Equipments used. Medical terminology-Word root, combining form, Suffixes-prefixes, Formation and defining medical words.

**Unit II:** Organ systems:

Orthopedics, Neurology, Ophthalmology, Endocrinology, Otorhinolaryngology, Pulmonology, Dermatology, Gastroenterology, Cardiology, Urology, Gynecology and obstetrics

(Anatomy and physiology, Pathology, Lab procedures, Drug used Vocabulary, Abbreviation)

**Unit III:** Blood system

Immune system, Lymphatic system, Hematology. Psychiatry-Representative diseases, Diagnostic procedures, treatments. Pharmacology.

**Unit IV:** Marketing of medical transcription:

Market research and analysis, Target marketing. Editing and phonetic problem solving-Types of errors, Editing, Proofreading.

**Unit V:** Tools for medical transcription

Transcription Guidelines, Formatting of reports, English Grammar-Parts of Speech, Subject verb agreement, Tense, Punctuation.

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**REFERENCE BOOKS:**

1. The language of medicine, Fifth edition, WB Saunders Company, Devi-Ellen Chabner BA, MAT.
5. Medical Transcription made easy, Alok jha, Prinyanka arora, Macmillan India Ltd.

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**ML 1951 - HOSPITAL MANAGEMENT**

**Objective:** To impart knowledge about the functioning and maintenance of various departments in the hospital.

**Unit I:** Principles of Hospital Management


**Unit II:** Human Resource Management

Manpower planning - Recruitment procedures - Training and Development, Educational institutions and consultants - Principles and methods of executive development programmes - Performance appraisals, Job satisfaction.

**Unit III:** Inventory management

Manpower planning - Recruitment procedures - Training and Development, Educational institutions and consultants - Principles and methods of executive development programmes - Performance appraisals, Job satisfaction.

**Unit IV:** Marketing of medical transcription:

Market research and analysis, Target marketing. Editing and phonetic problem solving-Types of errors, Editing, Proofreading.

**Unit V:** Tools for medical transcription

Transcription Guidelines, Formatting of reports, English Grammar-Parts of Speech, Subject verb agreement, Tense, Punctuation.
Unit IV: Book Keeping

Meaning and Objectives – Double entry system, Trial balance, Profit and loss account, Preparation of balance sheet, Medical records Maintenance.

Unit V: Limitations

Hospital hazards and infections - Nosocomial infections - Safety measures to be carried out in Hospital environment, Hospital waste management.

REFERENCE BOOKS:
1. Gupta, Hospital & Health care Administration, 2000, Jaypee Brothers Medical Publishers, New Delhi

ML 2801 - HUMAN PATHOGENS

SEMESTER : II CREDITS : 3
CATEGORY : MC NO. OF HOURS / WEEK : 4

Objective: To impart knowledge on identification, life cycle, host-pathogen relationships, pathogenicity and laboratory diagnosis of pathogens of man.

Unit I: Bacteriology
Classification – Diseases caused by Staphylococcus, Streptococcus, Pneumococcus, Neisseria, Corynebacterium, Mycobacterium, Clostridium, Bacillus, Enterobacteria, Spirochaeta, Rickettsia, Chlamydia.

Unit II: Virology
Classification, Human viruses, Bacteriophage.

Unit III: Mycology
Dimorphic fungi causing Systemic Mycoses, Diamataeaceous Fungi, agents of Zygomycosis, Fungi causing Eumycotic mycetoma.

ML 2807 - SEROLOGY AND BLOOD BANK LAB COURSE

SEMESTER : II CREDITS : 3
CATEGORY : MC NO. OF HOURS / WEEK : 6

Objective: To impart hands-on training on the methodologies for identification of infectious human diseases.

Unit I: Widal for Typhoid and RPR (Rapid Plasma Reagin)

Unit II: Inflammatory Disorders
General inflammatory marks and specific therapeutic bioindicators. CRP (C reactive protein), RA (Rheumatoid Arthritis), ASO (Anti Streptolysin O)

Unit III: Immunological Methods
Immunological test for pregnancy, Haemagglutination, Compliment fixation, Precipitation and Immunodiffusion

Unit IV: Blood Bank
Basic principle involved in Immunohaematology as prior to blood transfusion, Blood collection procedure, Blood grouping (Slide 0/
method, tube method), Rh typing, Forward and Reverse grouping techniques, Cross matching (Major and Minor types), Separation of Blood components, Coombs test

Unit V : Screening Test
HbsAg, HCV, HIV (ELISA, Western Blot tests), TPHA (*Treponema pallidum* haemagglutination), Malarial parasites.

REFERENCE BOOKS

**ML 2808 - MICROBIOLOGY LAB COURSE**

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**Objective**: To impart the skill in essential microbiological techniques related to human samples.

**Unit I**: Sterilization of glassware & culture media; preparing & dispensing culture media-establishing pure cultures.

**Unit II**: Preparation of wet mount, mobility test –Simple stain-gram’s stain-Acid Fast stain-Capsule stain.

**Unit III**: Physiological reaction of bacteria –Catalase test –Coagulates test –Oxidase Test- Nitrate test –Carbohydrate Fermentation test –IMVIC test –TSI test.

**Unit IV**: Identification of *Staphylococcus aureus, Streptococcus pneumoniae*; lactose&non lactose fermentation; members of *Enterobacteriaceae-Pseudomonas aeruginosa*

**Unit V**: Antibiotic sensitivity test-Qualitative: Kirby Bauer’s methods, Quantitative, MIC

**Unit VI**: Gram’s stain of yeast like fungal cells-India ink preparation-study of Lactophenol cotton blue mount –Potassium hydroxide mount.

**REFERENCE BOOKS**

**ML 2809 - IMMUNOLOGY**

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**Objective**: To understand the immune components, their organization and measures to gain immunity against infections.

**Unit I**: Immune components and their functions
Cellular components (B & T lymphocytes, macrophages/monocytes, neutrophils, eosinophils, killer and natural killer cells);
Humoral components (antibodies, complement system, cytokines, interferons and interleukins)

**Unit II**: Organisation of internal immune system
Lymphoid organs- Primary and secondary lymphoid organs (anatomical locations, structure and role) – bone marrow-thymus, bursa of fabricius-lymph node- spleen payer’s patches and kupffer cells – differentiation of cells into immunological component cells-basic structure and their role in immunity.

**Unit III**: Immunity against infections
Immunity against viral, bacterial and parasitic infections-immunological basis of hypersensitivity and graft rejections; Major Histocompatibility Complex (MHC)

**Unit IV**: Clinical immunology
Vaccines, types and their uses – immunization schedule for children— prevention of new born diseases like tetanus, diphtheria, whooping cough, typhoid, cholera, yellow fever and measles – time schedule.
Unit V: Serological investigation

To differentiate various diseases in man caused by different pathogens (bacterial and viral infections)

REFERENCE BOOKS

ML 2951 - METHODOLOGY OF MEDICAL LABORATORY RESEARCH

SEMESTER : II CREDITS : 3
CATEGORY : SE NO. OF HOURS / WEEK : 4

Objective: To create an awareness regarding the important of scientific approach in understanding Laboratory Techniques in medical through systematic and experimental approaches.

Unit I: Identification of areas of research field- problems and needs for experimental approach, Good laboratory practices.

Unit II: Review of Literature - biological and medical abstracts, current contents, CD Rom, Internet, Website, Citation Index- Peer-reviewed publications.

Unit III: Selection of suitable methodology and statistical techniques for controlled and unbiased experimentation – designing of experiments.

Unit IV: Guidelines for analysis and discussions – preparation of the manuscript for scientific publications, ethics in research.

Unit V: Preparation of project proposal-Thrust areas-Funding agencies (National and International) – Kinds of research program in India and abroad; Career development in laboratory research.- Impact factors, principle and method of patenting.

REFERENCE BOOKS

ML 2952 - ADVANCED MEDICAL LABORATORY TECHNIQUES

SEMESTER : II CREDITS : 3
CATEGORY : SE NO. OF HOURS / WEEK : 4

Objective: To understand the current trends in advanced medical technology for a better insight into the pathogenesis of diseases at molecular level.

Unit I: Introduction to Molecular Pathology

Laboratory application of nucleic acid technologies to elucidate, diagnose, monitor disease state and to evaluate non-disease status-techniques for the detection of DNA, and RNA structures at the molecular level.

Unit II: Molecular Diagnostics

Basic principles and techniques-nucleic acid biochemistry-Relation to laboratory evaluation of disease and establishing a molecular diagnostic laboratory facilities, equipment, personnel. Clinical testing process, quality assurance, clinical validation and accreditation.

Unit III: Molecular Genetics

Unit IV : Hybridization

Tissue in situ hybridization; relationship of in situ hybridization to other molecular methods of immunohistochemistry, technical consideration and methodology; HLA DNA polymorphism, and parentage testing.

Unit V : Forensic Identity Testing

DNA analysis; historical aspects advantage of DNA over traditional serology; impact of DNA specimen collection, DNA degradation and environmental damage, quality assurance, standard, databank, legal challenge.

REFERENCE BOOKS


ML 3800 - BODY FLUID ANALYSIS

SEMESTER : III CREDITS : 3
CATEGORY : MC NO. OF HOURS / WEEK : 4

Objective: To impart knowledge about the production, composition, normal & abnormal characteristics and lab evaluation techniques of body fluids.

Unit I : Physical properties of body fluids

Body fluid compartments, Solutes in body fluid, Clinical abnormalities of fluid volume regulation, Measurements of body fluid compartments, Movement of body fluids.

Unit II : Amniotic fluid

Formation and function of amniotic fluid, Chemical composition, Collection, Testing – Alpha fetoprotein, Acetyl cholinesterase, Neural tube defects, Chromosomal abnormalities, Haemolytic disease of newborn, Gestation age, Fetal maturation.

Unit III : Cerebrospinal fluid

Formation, Specimen collection, Causes of CSF pressure changes, Gross examination, Chemical analysis, Microbiologic examination, Immunologic tests, Cytological examination and clinical correlation.

Unit IV : Synovial fluid


Unit V : Serous fluid & other body fluids

Formation, Collection, Classes of effusions, Cell types and clinical correlations. Lymph, Gastric fluid, Urine, Faeces, Seminal fluid, Sputum and sweat, Biomarker evaluation in body fluids for specific therapeutic prognostic and /or diagnostic potential.

REFERENCES:


ML 3801 - HUMAN PHYSIOLOGY

SEMESTER : III CREDITS : 3
CATEGORY : MC NO. OF HOURS / WEEK : 4

Objectives: To understand the anatomical organization of organs, its coordination and integrated physiological functions and disorders in human body.

Unit I : Integumentary system: Basic structure and functions of glands, layers and hair follicles. Gastrointestinal system: Dentition –types, Gastro-intestinal enzymes, Structure, absorption
Unit II: Respiratory system: Structure and function of respiratory organs, Gas exchange, Respiratory volume and capacities, Cardiovascular system: Structure and function of circulatory system: Human heart, blood vessels, lymphatics, Control of heart beat, Cardiac cycle.

Unit III: Endocrine system: Glands and types of hormone, Functions and metabolic disorder.


Unit IV: Urino-genital system: Structure and function of kidney: Mechanism of urine formation, micturition, male and female reproduction systems-Menstrual cycle, infertility and menopause, Control of growth and reproduction.

REFERENCE BOOKS:
Unit II: Microscopic Examination: Sperm count, Sperm morphology count, Sperm motility test, Sperm viability test

Unit III: Staining Methods: Eosin staining, Giemsa Staining, Carbol fuchsin and Methylene blue staining, Basic fuchsin staining.

SPUTUM EXAMINATION

Unit IV: Introduction to handling and disposing sputum, Physical examination; Identification of Eosinophils-wet mount method, Eosin method, Identification of Aspergillus-Potassium Hydroxide method.

Unit V: Gram staining of sputum, AFB staining of sputum, preparation of LJ medium, Petroff’s method, Culture inoculation, culture grading.

REFERENCE BOOKS:

ST 3901 - STATISTICAL APPLICATIONS IN BIOLOGICAL SCIENCES

Objective: To imbibe statistical techniques applicable in biological/environmental sciences and to demonstrate the statistical methods using MS Excel.

Unit I: Descriptive statistics – Diagrammatic representation, Measures of location, Measures of dispersion, skewness and Kurtosis

Unit II: Correlation and regression-Bivariate frequency table – Rank correlation – Multiple linear Regression.

Unit III: Statistical inference – Point and interval estimation, Hypothesis testing, Test for assigned proportion, Equality of proportions, Assigned mean, Equality of means.

Unit IV: Chi – Square test for goodness of fit, Contingency table, test for independence of two attributes.

Unit V: Analysis of variance – One way classification, Two way classification

Note: Emphasis will be on concepts and applications to biological data.

REFERENCES:
3. Gupta, P. K., Cytology, Genetics, Bio technology and Biostatics, Rastogi Publishers, Meerut, 1996

ML 3875 - PHARMACEUTICAL CHEMISTRY AND TOXICOLOGY

Objective: To understand the influence of pharmacological activity and to impart knowledge on drug designing and screening.

Unit I: Drug Classification and nomenclature, some medicinally important inorganic and organic compounds and (any four with structure) and their biological role. Chemical structure and pharmacological activity: effects of some functional group- unsaturation, chain length, isomerism, halogens, amino group, nitro and nitrite compounds, nitrite acidic groups, aldehyde and ketone group, hydroxyl group, alkyls. etc. Pharmaceutical aids: organic pharmaceutical aids-preservatives, stabilizing and suspending agents, ointment bases and related agents and solvents.

Unit II: Drug designing and screening

Physiological properties evolved in the design and preparation of dosage forms-hydrogen ions concentration, pH and buffers-colloidal state, membrane phenomena, osmosis, adsorption, surface tension, viscosity, ionization constants, chelation-importance of chelation in medicine, design of antibacterial and antifungal agents. Biological...
testing of drugs: testing drugs in-vitro enzyme inhibition, receptor studies, safety and efficacy, microbiological testing, screening and testing by NMR, testing drugs in vivo: test systems drug potency, therapeutic ratio. Use of cell lines and animal models. Placebo-controlled studies. Safety evaluations, followed by efficacy studies.

Unit III : Analytical techniques

Radio pharmacy: Labelling studies, isotopes, synthesis-incorporation of D or T or C isotopes, Radio active isotopes, units of radioactivity, measurements- Gieger Muller counter, scintillation counters, radio immunoassay. Cancer chemotherapy-radioactive isotopes. X ray crystallography, comparison of physiochemical data with bioactivity. Standard operating procedures while handling radioactive materials.

Unit IV: General and Systemic Toxicology

General toxicology: Mechanism of toxic effect, toxicokinetics - chemical carcinogens and teratogens, treatment of intoxication. Response of respiratory system, reproductive system, liver, kidney to toxic agents. Toxic effects of metals, solvents, environmental pollutants.

Unit V: Pharmacokinetic analysis


REFERENCE BOOKS:


ML 3925 - HUMAN REPRODUCTIVE PHYSIOLOGY & PATHOLOGY
(to any PG student other than MLT)

SEMESTER : III  CREDITS : 3
CATEGORY : GE  NO. OF HOURS / WEEK : 5

Objective: To impart the basic knowledge and the functions of human reproductive system and their related disorders with the causal factors to non MLT students.

Unit I: Male Reproductive System & Hormonal Function:
Physiologic anatomy, spermatogenesis, male sexual act, testosterone and other male sex hormones, Abnormalities of male sexual function, male infertility.

Unit II: Female reproductive system and the hormonal functions:
Physiologic anatomy, female hormonal system, ovarian cycles, function of estradiol and progesterone, female sexual act, female infertility; Hormone replacement therapy (HRT), Menopause and post menopause.

Unit III: Pregnancy:
Maturation and fertilization of the ovum, early nutrition of the embryo, function of the placenta, hormonal factors in pregnancy, response of the mothers body to pregnancy, parturition.

Unit IV: Fetal and neonatal physiology and pediatric diseases:
Growth and functional development of the fetus, adjustment of the infant to extrauterine life, special functional problems in the neonate, problems of prematurity, congenital anomalies, perinatal infections, syndrome of the newborn, immune hydrops, tumors and tumor like lesions of infancy and childhood. The role of fetal factors in programming adult- onset diseases.

Unit V: Pathology:

REFERENCES BOOKS:

ML 4801 - NON INVASIVE TECHNIQUES

Objective: To impart the knowledge on various Non Invasive Techniques used for the diagnosis of human diseases.

Computerized Tomography: Basic principles, diagnostic methods, Positron Emission Tomography (PET).

Unit II: Nuclear medical imaging: Fundamentals of Radioactivity, Diagnostic Methods, EEG-Recording, ECG, EMG, Single Photon Emission Computed Tomography (SPECT).


Unit IV: Ophthalmological examination: Visual acuity test, Fluorescein angiography; Ophthalmoscopy, Oculopletysmography-Transcranial Doppler studies, Evoked potential studies.

Unit V: Mammography: Mammographic unit, breast dose, low-dose mammography. Electrocardiography, Electroencephalography.

REFERENCE BOOKS:

ML 4807 - HISTOPATHOLOGY AND ESSENTIALS OF LAB

Objective: To impart knowledge on processing the autopsy and biopsy samples to observe tissue abnormalities for the diagnosis of disease.

Unit I: General introduction of histopathology, Reception, recording, handling and labeling of histology specimens, fixation and various fixatives and their preparation.

Unit II: Tissue processing - processing of histological tissues, dehydration, clearing, wax preparation, paraffin embedding and embedding media, decalcification and block preparation.

Unit III: Microtomes - various types, their working principle and maintenance. Microtomes knives and knife sharpening procedure, practical section cutting, cutting fault and remedies.

Unit IV: Staining preparation - preparation of slide, deparaffinization and routine staining procedures, Identification and Demonstration of different metabolic compounds, mounting and mounting media.

Unit V: Essentials of lab - The metric system, acid base equilibrium, pH, buffer, preparation of reagents and solutions. (Percentage, normal, molar).

ML 3902 - PATHOGENS OF HUMAN IMPORTANCE
(for M.A. Med. Soci.)

Objective: To impart knowledge on host pathogen relationship and diagnosis and prevention.

Unit I: Introduction
Sterilisation procedure – physical, chemical and gaseous, Disinfection, Antiseptics. infections, community acquired infections.
Unit II: Air borne infections
- Tuberculosis, Whooping cough, Influenza, Pneumonia, streptococcal infections, Diphtheria, Measles, Chicken pox, Mumps.

Unit III: Food and water borne infections
- Cholera, Typhoid, Shigellosis, Brucellosis, Gastroenteritis, Amoebiasis, Taeniasis Poliomyelitis, Jaundice.

Unit IV: Sexually transmitted diseases
- AIDS, Syphilis, Gonorrhoea, Lymphogranuloma venereum, Genital Herpes, Trichomoniasis.

Unit V: Vector borne diseases
- Plague, Rickettsia, Malaria, Filariasis, Rabies, Leptospirosis.

TEXT BOOKS

REFERENCE BOOKS

ML 2901 - HUMAN ANATOMY AND PHYSIOLOGY
(offered to M.A. Medical Sociology)

SEMESTER: II            CREDITS: 3
CATEGORY: SU             NO. OF HOURS / WEEK: 4

Objective: To understand the essential aspects of organ systems in man, their functions and related disorders.

Unit I: Integumentary system
- Layers, hair follicles, glands, Digestive system- structure, dentition-types, gastrointestinal hormones-enzymes—absorption-liver and gastric function tests.

Unit II: Respiratory system
- Structure and function of respiratory organs, mechanism of respiration—transport of respiratory gases—lung functions tests. Human heart, blood vessels—Lymphatic systems—working of heart; Cardiac function tests.

Unit III: Neuromuscular system
- Structure of central autonomic and peripheral nervous systems—sense organs, reflexes, types of muscles—transmissions of nerve impulse; muscle function tests.

Unit IV: Endocrine System
- Types of glands and their secretions, functions and metabolic disorders

Unit V: Genitourinary system
- Structure and functions of kidney; mechanism of urine formation; renal functions tests; structure and function of male and female reproductive systems; menstrual cycle and related disorders; Types of family planning procedures.

Unit VI: Pre and postnatal diagnosis
- Amniocentesis; prenatal and postnatal disorders.

REFERENCE BOOKS:
Objectives: The course provides to the MLT basic knowledge in separation principles and to keep in pace with the rapid progress in the developing techniques of separation, advancing in the field of biotechnology.

Unit I: Basic principles and concepts
Principles and fundamental Instrumentation in separation techniques, significance of various separation techniques and their applications.

Unit II: Centrifugation techniques
Basic principles, procedure and working mechanism of centrifugation- different methods of centrifugation techniques(zonal, differential, density gradient and isopyenic centrifugation).

Unit III: Chromatographic techniques
Principle, working methods and advantages of various chromatographic techniques (Adsorption and partition) -paper chromatography-column, ion exchange, Gas –liquid, affinity, molecular- exclusion, thin layer and HPLC.

Unit IV: Electrophoretic techniques
Principles and procedures of electrophoresis, gel electrophoresis (vertical, horizontal)- polyacrylamide gel electrophoresis (PAGE)- SDS and isoelectric focussing.

Unit V: Molecular techniques
Isolation of DNA, RNA, Plasmids amd protoplast. Blotting techniques (Southern, Northern and western), PCR techniques and their applications.

TEXT BOOKS:

REFERENCES:
1. PA sewell and B clarke(1991), Chromatographic separations, John Wiley & sons