Mahatma Gandhi University
MEGHALAYA
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SYLLABUS MANUAL

PARAMEDICAL PROGRAMME
PROGRAMME CODE --- 707

Master of Science in Medical Lab Technology (MSCMLT)

SEMESTER I

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Detailed Syllabus

SEMESTER-I

MSCMLT11 --- Human Anatomy and Physiology

UNIT I: Human Anatomy & Physiology
Cell structure, division & function, Cell organelles.

UNIT II: Tissue
Tissue: Types of tissues and their functions, Skeletal system.

UNIT III: Digestive system
Physiology and anatomy of mouth, stomach, intestine, Absorption of food and its excretion, Role of Bile in digestion and excretion, Liver function and a brief description of liver and biliary tree.
UNIT IV: Respiratory system
Brief description of larynx, bronchi, lungs.

UNIT V: Cardiovascular system
Anatomy and Physiology of heart, arteries and veins.

UNIT VI: Irrigation
Systematic and pulmonary (in brief), brief review of chamber.

UNIT VII: Urinary system
Structure and Function of the kidney, uterus, bladder, urethra and nephron. Give special emphasis on formation of Urine Physiology and Anatomy of male and female reproductive organs.

UNIT VIII: Endocrine
Pituitary, thyroid, parathyroid, thymus, adrenals and pancreas.

UNIT IX: Central nervous system
Brain, spinal cord and meninges explain with its functions. Skins: Structure and Functions, Study and give small project on bones and cartilages, HLA system.

UNIT X: Organization of the Human Body:
Introduction and Orientation, Chemical Level of Organization, Cellular Level of Organization, Tissue Level of Organization.

UNIT XI: Principles of Support and Movement:
Integumentary System, Bone Histology and Development, Axial and Appendicular Skeleton, Joints/Articulations, Muscle Tissue, Muscle Classification

UNIT XII: Regulation and Integration of the Body:

Reference Books:-
1. Human anatomy & physiology by Elaine Nicpon Marieb, Katja Hoehn
2. Anatomy & Physiology by Elaine Nicpon Marieb, Katja Hoehn

MSCMLT12 --- Basics of Biochemistry and Instrumentation

UNIT I: Introduction
Bioenergetics, Entropy, Enthalpy & their basic introduction, Concept of free energy, Thermodynamics 1st & 2nd Law.

UNIT II: Terms
Carbohydrate Structure, properties, chemical reactions & functions.

UNIT III: Amino Acids
Essential & non Essential amino acids with structure & function.

UNIT IV: Proteins
Introduction, Primary, Secondary, tertiary & quaternary view.

UNIT V: Lipids
Introduction, Structure, Classification & properties, Enzymes: Classification, enzyme action & their mechanism.

UNIT VI: Enzyme inhibition
Introduction, Mode of action of chymotrypsin & related enzymes,

UNIT VII: Nucleic Acids

UNIT VIII: Instruments Microscope
Light, phase contrast, interference, fluorescence, polarization and electron microscopy (principle,
parts and its application).

UNIT IX: Photometry
Basic principal UV-Vis spectrometry and colorimetry instrumentation and its application. Fluorimetry: Principal, instrumentation and application Electrophoresis: Principal, types and application (agarose gel electrophoreses, starch gel and Polyacrylamide electrophoresis).

UNIT X: Centrifuge
Basic principle, type analytical and preparative centrifuges, different density gradient centrifuge and analytical with its application Blood analyzer: Principal, instrument and its application.

UNIT XI: Microtome
Principal, instruments and its uses. Incubator, hot air oven and autoclave: Principal, instrument and its application.

UNIT XII: Radioactivity
Radioisotopes, half lifeUNITs, Geiger Mueller counter, gamma counter and Scintillation, PH meter (principle types, types of electrodes and application).

Reference Books:-
2. Modern physical methods in biochemistry by Albert Neuberger, Laurens L. M. van Deenen.

MSCMLT13 --- Introductory Biology

UNIT I: Living World
Biology & its Branches; relationships with other sciences; scientific methods in Biology; historical breakthroughs; scope of biology and career options;

UNIT II: Role of Biology
role of Biology in dispelling myths and misbelieves; characters of living organisms, (elementary idea of metabolism, transfer of energy at molecular level, open and closed systems, omoeostasis, growth and reproduction, adaptation, survival, death).

UNIT III: Origin and evolution of life
Theories of evolution; evidence of evolution; sources of variations( mutation, recombination, genetic drift, migration, natural selection); concept of species; specification and isolation (geographical and reproductive); origin of species.

UNIT IV: Diversity of Life
Variety of living organisms, Systematic; need, history and types of classification (artificial,natural, polygenetic); biosystematics; binomial nomenclature; Two kingdom system.

UNIT V: Five kingdom System
Five kingdom System, their merits and demerits, status of bacteria and virus; botanical gardens and herbia; zoological parks and museums.

UNIT VI: Cell and Cell Division
Cell as a basic UNIT of life - discovery of cell, cell theory, cell as a self - contained UNIT; procaryotic and eukaryotic cell; unicellular and multicellular organisms; tools and techniques( compound microscope, electron microscope and cell fractionation); Ultrastructure of prokaryotic and eukaryotic cell - cell wall, cell organelles.

UNIT VII: Functions
Functions of nucleus, mitochondria, plastids, endoplasmic reticulum, Golgi complex, lysosomes,lysosomes, microtubules, centrioile, vacuole, cytoskeleton, cilia and flagella, ribosomes. Molecules of cell.

UNIT VIII: Inorganic and organic materials
inorganic and organic materials - water, salt, mineral ions, carbohydrates, lipids, amino acids,
proteins, nucleotides, nucletic acids (DNA and RNA); Enzymes (Properties, chemical nature and mechanism of action); vitamins, hormones and steroids.

UNIT IX: Genetics
Continuity of life - heredity, variation; mendel's laws of inheritance, chromosomal basis of inheritance; other patterns of inheritance - incomplete dominance, multiple allelism, quantitative inheritance. Chromosomes - bacterial cell and eukaryotic cell; parallelism between genes and chromosomes; genome, linkage and crossing over; gene mapping; recombination; sex chromosomes; sex determination; sex linked inheritance; mutation and chromosomal aberrations;

UNIT X: Human genetics
Introduction and methods of study, genetic disorders. DNA as a genetic material - its structure and replication; structure of RNA and its role in protein synthesis. Gene expression - transcription and translation in prokaryotes and eukaryotes; regulation of gene expression.

UNIT XI: Induction and repression
Housekeeping genes; nuclear basis of differentiation and development; oncoenes. Basics of Recombinant DNA technology; cloning; gene bank; DNA fingerprinting; genomics - principles and applications, transgenic plants, animals and microbes.

UNIT XII: Morphology of Plants and Animals
Morphology - root, stem and leaf, their structure and modification; Inflorescence, flower, fruit, seed and their types; Description of Poaceae, Liliaceae, Fabaceae, Solanaceae, Brassicaceae and Asteraceae. Morphology of animals - salient features of earthworm, cockroach and rat; tissue systems, structure and function of tissues - epithelial, connective, muscular and nervous.

Reference Books:
1. Introductory biology by Philip Weinstein.

MSCMLT14P --- Management Lab

UNIT I: Pathological clinics
Ethics of the pathological clinics.

UNIT II: Pathology laboratory
Organization of a pathology laboratory under board of quality control.

UNIT III: Development
Personality development and patient relationship.

UNIT IV: Reports writing
Pathology reports writing.

UNIT V: Computer application
Computer application in pathological clinics.

UNIT VI: Accountancy
Accountancy in clinical pathology.

UNIT VII: Hospital Management
Introduction, Hospital Management.

UNIT VIII: Operation ethics
Introduction, Operation ethics.

UNIT IX: Social ethics
Introduction, techniques, Social ethics of pathology.

UNIT X: Instruments
Proper handling of instruments.

UNIT XI: Administration of Laboratories
UNIT XII: Operation Hazardous compound
chemicals, solvents, poisons, isotopes, explosives and Biological strains

Reference Books ::
1. Laboratory Management: "Principles & Processes" Denise M. Harmening, Ph.D. MT(ASCP), CLS (NCA)
2. Clinical Lab Management by Williams & Wilkins

MSCMLT15P --- Biology Practical

UNIT I: Scientific Techniques
Study parts of a dissecting microscope and compound microscope.

UNIT II: Physiology
Food tests: test for starch, glucose, sucrose, proteins and fats.

UNIT III: Effect of beet root cells.
To demonstrate the effect of thawing, heat and alcohol on permeability of beet root cells.

UNIT IV: Effect of heat
To demonstrate the action of an inorganic catalyst (MnO2) and enzyme (catalase) from potato/ liver on hydrogen peroxide and effect of heat on their activity.

UNIT V: Effect of temperature
Demonstration of the effect of temperature on enzyme (diastase) action on starch solution.

UNIT VI: Morphology
Study of different modifications in root, stem and leaves.

UNIT VII: Preparation of temporary slide
Preparation of temporary slide of Mucor / Rhizopus.

UNIT VIII: Cytology
Preparation of - Stages of Mitosis in onion root tips, Stages of Meiosis in grasshopper testes.

UNIT IX: Spotting
Spotting: (Three minutes to be given for each spot. Separate continuation sheets should be used which need to be collected at the end of spotting).

UNIT X: Comment and identify
Stages of mitosis, Stages of meiosis.

UNIT XI: Identification of plants
Study of stained preparations/specimen of the following: --Identification of plants - Bacteria, Model of TMV, Model of bacteriophage, Rust, Liverworts, Moss, Fern, Pinus, Spirogyra, Mushroom, Yeast, Lichen.

UNIT XII: Identification of animals -

MSCMLT16P --- Biology Project

SEMESTER-II

MSCMLT21 --- Instrumentation

UNIT I: Microscope
Introduction, Light, phase contrast, interference, fluorescence, polarization and electron

UNIT II: Microscopy
Introduction, microscopy, principle, parts and its application.

UNIT III: Photometry
Definition, Basic principal UV-Vis spectrometry.

UNIT IV: Colorimetry instrumentation
colorimetry instrumentation introduction, uses and its application.

UNIT V: Fluorimetry
Fluorimetry: Principal, Instrumentation and application.

UNIT VI: Electrophoresis
Introduction, Principal, types and application (agarose gel electrophoreses, starch gel and polycrylamideelectrophoresis).

UNIT VII: Centrifuge
Centrifuge: Basic principle, type analytical and preparative centrifuges, different density gradient centrifuge and analytical with its application.

UNIT VIII: Blood analyzer
Blood analyzer: Principal, instrument and its application.

UNIT IX: Microtome
Microtome: introduction, Principal, instruments and its uses.

UNIT X: Incubator, hot air oven and autoclave
Incubator, hot air oven and autoclave: Principal, instrument and its application.

UNIT XI: Radioactivity
Radioactivity: Radioisotopes, half life UNITS, Geeger Mueller counter, gamma counter and Scintillation.

UNIT XII: PH meter
PH meter: introduction, principle types, types of electrodes and application.

Reference Books:
1. Medical instrumentation: application and design by John G. Webster.

MSCMLT22 --- Human Anatomy and Physiology---II

UNIT I: Blood and Chemistry of respiration:
Blood composition, plasma proteins and their diseases, blood counting and its significance, Blood coagulation, clotting factors, laboratory test to measure coagulation, abnormal hemoglobin and their disorders.

UNIT II: Chemistry of respiration
Chemistry of respiration: Gas transport and pH regulation, transport of oxygen, carbon dioxide and H+ by Hb, buffer system of plasma.

UNIT III: Acid
Introduction, base balance and it’s maintenance, interstitial fluid, Anion gap.

UNIT IV: Digestive system
Composition, functions and regulation of saliva, gastric, pancreatic intestinal and bile secretions – digestion and absorption of carbohydrates, lipids, proteins nucleic acids, minerals and vitamins.

UNIT V: Excretory system

UNIT VI: The Muscular System and Nervous System
Types of muscles and their functions; Structure of neuron, function and organization of nervous system, Nerve impulse transmission, neurotransmitters.

UNIT VII: Hormones
Communication among cells & tissues, General mechanism of action of hormones; Chemistry, functions and synthesis of steroid hormones, peptide hormones & thyroid hormones; local hormones, clinical disorders of hormones, hormone receptors, Hormonal regulation of carbohydrate metabolism.

UNIT VIII: Upper Extremity
Scapular Region, Pectoral Region, Axillary Region, Arm, Flexor Region of the Forearm, Palm of the Hand, Extensor Region of Forearm and Dorsum of Hand, Joints of the Upper Extremity.

UNIT IX: Lower Extremity

UNIT X: Thorax
Thoracic Wall, Pleural Cavities and Lungs, Heart, Mediastinum.

UNIT XI: Head and Neck

UNIT XII: Abdomen
Anterior Abdominal Wall, Inguinal Region, Scrotum and Testes, Abdominal Cavity, Stomach, Spleen and Liver, Intestines and Pancreas, Posterior Abdominal Wall.

Reference Books :-
2. Human physiology ... by Robley Dunglison.

MSCMLT23---- Blood Banking

UNIT I: Introduction
Reception, labeling and recording of laboratory.

UNIT II: Cleaning of glassware
Cleaning of glassware, pipettes, E.S.R tubes and Preparation of capillary pipette, distilled water, reagents.

UNIT III: blood smear
Collection of blood, preparation of blood smear.

UNIT IV: Measurement of hemoglobin
Introduction, counting of leucocytes.

UNIT V: Blood cells
Recognition of blood cells in peripheral blood smear.

UNIT VI: Determination of haematocrite
Determination of haematocrite and E.S.R, preperationalkali resistant hemoglobin, paper electrophoresis of hemoglobin.

UNIT VII: Sickle celling
Test for sickle celling, bleeding time, coagulation clotting time.

UNIT VIII: Coombs test
Abo blood grouping and Rh typing Performance of direct and indirect coombs test, bunnel test).

UNIT IX: L.E. Cell phenomenon
Preparation for the demonstration of L.E. Cell phenomenon.

UNIT X: Blood collection
UNIT XI: principal of clearing tubing sets
Principal of clearing tubing sets – preparation, composition of anticoagulant – preservative solutions.

UNIT XII: Transfusion
Transfusion reaction and their investigations.

Reference Books:
1. Blood banking and transfusion medicine by Sally V. Rudmann

MSCMLT24 --- Histopathology

UNIT I: Histopathology
Theory of Histopathology, Reception of specimens, Histopathology of Tumor cell, Histopathology of Liver, Kidney, Adrenal, Ovary, Testies.

UNIT II: Method of preparing stains
Method of preparing stains & Fixatives. Theory of Tissue processing and embedding, Theory of H & E staining.

UNIT III: Use of Microtome Tissue section
Introduction, cutting, embedding and preparation of blocks, Fixation of Tissue with DPX mount Theory of frozen section preparation.

UNIT IV: Preparation of smear
Preparation of smear for Fine needle aspiration cytology, Pap’s smear theory and identification of cells in a normal vaginal smear.

UNIT V: Stool examination
normal, abnormal constituent. Normal and abnormal constituent of Urine, Normal and abnormal constituent of amniotic fluid, Normal and abnormal constituent of Semen analysis.

UNIT VI: Constituent of Urine
Normal and abnormal constituent of Urine

UNIT VII: Constituent of amniotic fluid
Normal and abnormal constituent of amniotic fluid.

UNIT VIII: Constituent of Semen analysis
Normal and abnormal constituent of Semen analysis.

UNIT IX: Skeletal system
Skeletal system: Structure and function of all individual bones and joints, movement of joints, Skeletal muscles.

UNIT X: Urinary system
Structure and Function of the Kidney, uterus, bladder, urethra and nephron. Give special emphasis on formation of Urine, Physiology and Anatomy of male and female reproductive organs.

UNIT XI: Endocrine
Pituitary, thyroid, parathyroid, thymus, adrenals and pancreas.

UNIT XII: Central nervous system
Brain, spinal cord and meninges explain with its functions. Skins: Structure and Functions, Study and give small project on bones and cartilages, HLA system.

Reference Books:
3. Theory and Practice of Histological Techniques by John D. Bancroft and Marilyn Gamble

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MSCMLT26P --- Instrumentation Practical

UNIT I: Hospital X-Ray machine
Operation and function of all the controls of hospital X-Ray machine (visit at hospital).

UNIT II: Dental X-Ray machine
Operation and function of all the controls of dental X-Ray machine (Visit to Hospital).

UNIT III: Identification of different block
Identification of different block/sub system of circuits in X-Ray machine.

UNIT IV: Skin contact impedance
Measurement of skin contact impedance and technique to reduce it.

UNIT V: Body temperature
Observe its wave shape on CRO the output of blood pressure transducers body temperature transducers and pulse sensors.

UNIT VI: Sphygromanometer
Use of sphygromanometer for measurement of blood pressure.

UNIT VII: ECG system
Concept of ECG system and placement of electrodes.

UNIT VIII: Leakage currents
Measurement of leakage currents with the help of safety tester.

UNIT IX: PH measurement
PH measurement of given biological sample.

UNIT X: EMG system
Concept of EMG system and placement of electrode.

UNIT XI: Respiration rate
Measurement of respiration rate using thermistor.

UNIT XII: EEG system
Concept of EEG system and placement of electrode. Identification of different types of PH electrode.

SEMESTER III

MSCMLT31 --- Clinical Biochemistry

UNIT I: Carbohydrates
Carbohydrates intermediate metabolism, glycogenesis, glycogenolysis, gluconeogenesis & glycolysis. TCA.

UNIT II: HMP
HMP, and its regulations Disorders of carbohydrates metabolism related to each cycle (inborn error of metabolism).

UNIT III: Proteins
Different metabolic pathway of amino acid. The flow sheet of amino acids oxidation. Transamination, oxidative deamination and pathways leading to acetyl co-A.

UNIT IV: Amino acids
Decarboxylation of Amino acids, formation of nitrogenous excretion products. Urea cycle and ammonia excretion.

UNIT V: Lipid
Biosynthesis and oxidation of fatty acids (odd & even number) Ketone bodies formation and their oxidation. Regulation and inborn error of lipid metabolism.

UNIT VI: Biochemical aspects of Hormone
Hormone receptors and intracellular messengers, Adenylate cyclase, protein kinase and phosphodiesterase.

UNIT VII: Role of Insulin
Role of Insulin, glucagons, epinephrine and their mechanism. Various endocrine and regulatory systems mediated by cyclic AMP.

UNIT VIII: Vitamin
Hormone receptors and intracellular messengers, Adenylate cyclase, protein kinase and phosphodiesterase. Role of Insulin, glucagons.

UNIT IX: Epinephrine
Epinephrine and their mechanism. Various endocrine and regulatory systems mediated by cyclic AMP.

UNIT X: Vitamin and their deficiency
Fat and Water soluble and their deficiency.

UNIT XI: Mineral metabolism
Mineral metabolism: Minor and Major (Cu, Fe, Ca, Mg & P).

UNIT XII: Nucleic acids metabolism
Inborn error of Nucleic acids metabolism.

Reference Books:
3. Clinical biochemistry reviews: Volume 3 by D. M. Goldberg.

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MSCMLT32 — Clinical Haematology

UNIT I: Red Blood Cells
Normal morphology count, Isolation from whole blood & count, Effect on count & morphology of physiochemical parameters & the diseased state, Red cell anomalies & their relevance w.r.t normal & diseased state.

UNIT II: Blood Transfusion:
Pre-requisitement & the complication of mis-matched transfusion, Methods of blood matching.

UNIT III: White blood cells & platelets
Morphology count & methods of isolation, Effect on count & morphology of cell by the physiochemical parameters, diseased. State & the relevance of condition of the diseases.

UNIT IV: Anaemia's
Definition (in general) & courses, Types of anaemia & their classification, Physiochemical, characteristic features & etiology of a plastic anaemia, haemoloytic, megaloblastic.

UNIT V: Clinical
Introduction, features & diagnosis.

UNIT VI: Leukaemia
Definition (in general) & their etiology, Classification of leukaemia, FAB classification, Etiologies, physiochemical features of different Type of leukaeia, with reference to clinical states.

UNIT VII: Types of Diagonosis
Diagnosis of different types of leukaemias & their classification, Physiochemical, characteristic features & etiology of a plastic anaemia, haemolytic, megaloblastic, Clinical features & diagnosis.

UNIT VIII: Coagulation
Effect of promoters & inhibitors at diff steps in coagulation, their solution & mode of action, Diseases associated with coagulation disorders, their etiology & characteristics Features.

UNIT IX: Red Cell mass studies
Chemical method & radioactive methods, Red Cell function studies.

UNIT X: Steps in Blood Management
Reception, labeling and recording of laboratory investigations, Cleaning of glassware, pipettes, E.S.R tubes and counting chambers, preparation of capillary pipette, distilled water, reagents, buffers collection of blood, preparation of blood smear, staining of blood and bone marrow smears. Measurement of hemoglobin, counting of leucocytes, erythrocytes, platelets and reticulocytes. Recognition of blood cells in peripheral blood smear, Determination of haematocrite and E.S.R, preparation of haemolysate and determination of alkali resistant hemoglobin, paper electrophoresis of haemoglobin.

UNIT XI: Tests

UNIT XII: principal of clearing and preparing transfusion bottle and tubing set
principal of clearing and preparing transfusion bottle and tubing sets – preparation and composition of anticoagulant – preservative solutions, Transfusion reaction and their investigations.

Reference Books :-
1. Haematology at a Glance by Atul B. Mehta, Victor Hoffbrand
2. A beginner's guide to blood cells by Barbara J. Bain

MSCMLT33 — Diagnostic Microbiology

UNIT I: Classification of bacteria
On bacilli of differential staining Gram, s Stain. (its modification) ZN .Stain (its modification) On basis of their structure.

UNIT II: Pre -remit of sample collections-general & disease specific their processing & storage, Identification of bacteria on basis of cultural characteristics, morphological, & serological features.

UNIT III: Features
Staphylococcus & streptococcus including pneumonococcl, Family Enterobacterical, Haemophilus bordetlta, Corynebacterium, Nessieria .Treponema, Leptospira, mycoplasma, chlamydia & Triagents.

UNIT IV: Identification of pathogenic & nonpathogenic fungi
(Morphologically, biochemically, Yeast, Dermatophytes, Cryptococ cocci, Histoplasm a, Nocardia, Comm on lab fungal contaminants.

UNIT V: Characteristic diagnostic serological tests in diseases
Cholera, Typhoid, Tuberculosis, VDRL, TPHA, Satellitism. ELISA, PCR.

UNIT VI: Urology
General morphology & ultra structure of virus and growth cycles.

UNIT VII: Viral genome
Their types & symmetry. Cultivation of virus in embryonated eggs, primary culture & secondary culture.

UNIT VIII: Assay methods
Assay methods: Physical & chemical.

UNIT IX: Classification
On basic of structure, On basic of nuclear material.

UNIT X: Clinical diagnosis serological techniques

UNIT XI: Molecular Methods in Diagnostic Microbiology
Introduction, Amplification, Other Molecular Methods in Diagnostic Microbiology.

UNIT XII: Precipitation techniques
Immunodiffusion, immune electrophoretic method.

Reference Books:

MSCMLT34 --- Immunology

UNIT I: Immune response
ImmUNITY, Type (Innate & adaptive immune response).

UNIT II: Organs of Immune System
Organs of Immune System: Primary and Secondary lymphoid organ, Ontogeny and phylogeny of Lymphocytes: T and B Lymphocytes, Null.

UNIT III: Cell of Immune System
Mononuclear cell and granulocytes, Antigen presenting cell. Antigen.

UNIT IV: Heptanes
Heptanes: Factors effecting immunogenicity, m epitopes (Properties of it) antibodies: Structure, Types and function.

UNIT V: Complement System
Role of complement system in immune response, complements and Components and activation pathways.

UNIT VI: Monoclonal antibodies
Monoclonal antibodies: Production characterization and applications in diagnosis, therapy and basic research. Antigen-Antibody interaction, avidity & affinity measurement.

UNIT VII: Hypersensitivity
Definition, factor causing hypersensitivity, common hypersensitivity reaction, types, classification based on the time taken for reaction auto Immune disease.

UNIT VIII: Immunodiagnostic
Precipitation techniques, Agglutination, Fluorescence techniques, ELISA, RIA, Double diffusion and Immuno-electrophoresis.

UNIT IX: Immunodiagnostcs
Immunodiagnostics: VDRL test, Widal test, RA factor, Blood grouping, Rh typing, Comb’s test.

UNIT X: Fundamental function of the immune system:
Overview and fundamental function of the immune system: Pathogenicity - cells and organs of the immune system - innate and adaptive immune system - the course of an immune response.

UNIT XI: Vaccines
Vaccines – Active and passive, immunization, DNA vaccines, multivalent subUNIT, vaccines,
synthetic peptide vaccines, immunodeficiency diseases, interferon.

**UNIT XII: Automation in immunological techniques**
Introductionauto analyzers used in immunology, FACS and other techniques.

**Reference Books:**
1. Immunology: Janis Kuby, W. H. Freeman and Company, USA.
2. Immunology: Ivan Roitt, J. Brostoff and David Mole Mosby Times Mirror Int. Pub. Ltd.
3. Essential Immunology: Ivan Roitt Blackwell Science Ltd.
4. Immunology: Edwards S. Golub, Sinauer Associate, Sunderland

**MSCMLT35P --- Clinical Haematology Project**

**SEMESTER IV**

**MSCMLT41 --- Bacteriology**

**UNIT I: Introduction**

**UNIT II: Morphology and ultrastructure of bacterial cell wall of eubacteria and archaebacteria**
Cell membranes — structure, composition and properties.

**UNIT III: Bacterial Nutrition**
Bacterial Nutrition: Nutritional groups, common nutritional requirements, growth factors.

**UNIT IV: Growth of bacteria**
Growth of bacteria under extreme conditions: Psychrophiles, thermophiles, halophiles and Acidophiles.

**UNIT V: Bacterial reproduction**
Bacterial reproduction: Binary fission and endospore formation.

**UNIT VI: Mycoplasmas**
Mycoplasmas: General characteristics, structure and reproduction.

**UNIT VII: Cyanobacteria**
Cyanobacteria: General characteristics, structure, reproduction and economic importance
Bacterial growth curve, generation time.

**UNIT VIII: Growth Kinetics**
Introduction — Synchronous, Batch and continuous cultures Measurement of growth and factors affecting growth.

**UNIT IX: Microorganisms**
Chemical control of microorganisms: Heat, Filtration and radiation Sterilization of soaps, detergents and dyes.

**UNIT X: Chemical control of Microorganisms**
Microorganisms: Chemical control of microorganisms: halogens, phenol and phenolic compounds, heavy metals, alcohols, ethylene oxide, aldehydes and hydrogen peroxide.

**UNIT XI: Basis of microbial**
Introduction, classification. Classification and salient features of bacteria according to Bergey’s manual of determinative bacteriology.

**UNIT XII: General characteristics and life cycle**

**Reference Books:**
1. Fundamental principles of bacteriology by A.J. Salle.
2. Bacteriology: general, pathological and intestinal Arthur Isaac Kendall.

**MSCMLT42 --- Virology & Mycology**

**UNIT I: Ultra structure of Viruses**
General morphology and ultra structure of Viruses: Capsids- Helical Symmetry, icosahedral symmetry and complex symmetry.

**UNIT II: Envelope**
Envelope: Glycoprotein and matrix protein.

**UNIT III: Viral genome**
Viral genome: Introduction, their types and structure.

**UNIT IV: Cultivation of Viruses**
Cultivation of Viruses in embryonated eggs, experimental animals, cell culture: primary and secondary cell culture, suspension cell culture and monolayer cell cultures.

**UNIT V: Assays of viruses:**
Assays of viruses: physical and chemical methods of assays (protein nuclei acid, radioactivity traces, electrons microscopy, plaque method, pock counting method, end point method and infectivity of plant viruses).

**UNIT VI: Serological methods**
Serological methods: haemagglutination haemagglutination inhibition, complement fixation, immunofluorescence assays (IFA) ELISA, RIA.

**UNIT VII: Plant viruses**
Plant viruses: Recent advances in classification of plant viruses Life sciences and other details of TMV and mosaic virus, potato virus X General idea about cyanophages, actinophages and mycoviruses.

**UNIT VIII: Bacteriophages**
Bacteriophages: Classification, Morphology and ultrastructure One step growth curve (Latent period, eclipse period and burst size).

**UNIT IX: Life cycle**
Life cycle: Lytic and Lysogenic cycles of bacteriophages, Animal viruses; classification and nomenclature.

**UNIT X: Life cycles and other details of DNA viruses**
Life cycles and other details of DNA viruses: herpes, adeno and SV40.

**UNIT XI: Life cycle and other details of RNA viruses**
Life cycle and other details of RNA viruses: Retroviruses, oncogenic viruses and lentiviruses (HIV), picorna, ortho myxo and paramyx.

**UNIT XII: Mycology**
Introduction: Classification of Fungi, Growth and isolation, Mycoses (all types), Laboratory diagnosis of mycotic diseases, ImmUNITy in fungal diseases and value of immuno diagnosis, Role of mycotoxin, Antifungal agents, Epidemiology of fungal diseases.

**Reference Books:**

**MSCMLT43 --- Parasitology**
UNIT I: Introduction
General principle of host parasite interaction and definitions of terms in this connection.

UNIT II: Classification
Introduction, Classification of the parasitic protozoans.

UNIT III: Parasite host and Vectors
Introduction to parasite host and Vectors. Morphology, life cycle and lab diagnosis of Ecoli, Trichomonas and Leishmania.

UNIT IV: Parasitic helminthes
Introduction, Classification of parasitic helminthes.

UNIT V: Malarial parasite.
Morphology, life cycle and lab diagnosis of malarial parasite.

UNIT VI: Ascaries and Taenia
Morphology, life cycle and lab diagnosis of Ascaries and Taenia.

UNIT VII: Factors influencing parasitism
Factors influencing parasitism; Possible outcomes of parasitic infection, and implications for hosts and parasites.

UNIT VIII: Entamoeba and amebiasis
Introduction, Nonpathogenic amebae of primates and other animals; opportunistic free-living amebae.

UNIT IX: Microsporurn. Yeasts of medical importance
Introduction— Candida, cryptococcus. Mycotoxins, Antifungal agents, testing methods and quality control.

UNIT X: Histoplasma, Cocciodes

UNIT XI: Introduction to medical Parasitology
Introduction- Classification, Protozoa - Entamoeba - Plasmodium, Leishmania - Trypanosoma - Giardia Trichomonas -- Balantidium.

UNIT XII: Laboratory techniques in Parasitology

Reference Books :-
2. Dictionary of Parasitology Author: Peter J. Gosling Product Details pages: 408 pages

MSCMLT44P --- Bacteriology Practical

UNIT I: Introduction
Introduction, history and scope of microbiology, Contribution of Anatomy Von Leeuwenhockey, Louis Pasteur. Alexender Fleming in the development of Microbiology.

UNIT II: Morphology and ultrastructure of bacterial cell wall of eubacteria and archaeabacteria cell membranes – structure, composition and properties

UNIT III: Bacterial Nutrition
Bacterial Nutrition: Nutritional groups, common nutritional requirements, growth factors.

UNIT IV: Growth of bacteria
Growth of bacteria under extreme conditions: Psychrophiles, thermophiles, halophiles and
Acidophiles.

UNIT V: Bacterial reproduction
Bacterial reproduction: Binary fission and endospore formation

UNIT VI: Mycoplasmas
Mycoplasmas: General characteristics, structure and reproduction

UNIT VII: Cyanobacteria
Cyanobacteria: General characteristics, structure, reproduction and economic importance
Bacterial growth curve, generation time.

UNIT VIII: Growth Kinetics
Introduction – Synchronous, Batch and continuous cultures Measurement of growth and factors affecting growth.

UNIT IX: Microorganisms
Chemical control of microorganisms: Heat, Filtration and radiation Sterilization of soaps , detergents and dyes.

UNIT X: Chemical control of Microorganisms
Microorganisms: Chemical control of microorganisms: halogens, phenol and phenolic compounds, heavy metals, alcohols, ethylene oxide, aldehydes and hydrogen peroxide.

UNIT XI: Basis of microbial
Introduction, classification. Classification and salient features of bacteria according to Bergey’s manual of determinative bacteriology.

UNIT XII: General characteristics and life cycle

MSCMLT45P --- Project Report

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