

**DISTRIBUTION OF MARKS TO VARIOUS DISCIPLINES**  
**I<sup>st</sup> Year**

Paper No	Theory Paper	Paper Code	Duration	Theory (Max. Marks)		Total	Practical (Max. Marks)		Total
				Sessional	Annual		Sessional	Annual	
I	Human Anatomy & Physiology		3 hrs	30	70	100	30	70	100
II	Basic Pathology		3 hrs	30	70	100			
III	Clinical Biochemistry		3 hrs	30	70	100	30	70	100
IV	Preventive Medicine & Health Care		3 hrs	30	70	100			
V	Fundamentals of Medical Microbiology		3 hrs	30	70	100	30	70	100
VI	Instrumentation Techniques in Medical Microbiology		3 hrs	30	70	100			
<b>TOTAL MARKS</b>				<b>180</b>	<b>420</b>	<b>600</b>	<b>90</b>	<b>210</b>	<b>300</b>

**II<sup>nd</sup> Year**

Paper No	Theory Paper	Paper Code	Duration	Theory (Max. Marks)		Total	Practical (Max. Marks)		Total
				Sessional	Annual		Sessional	Annual	
I	Bacterial Pathogens & Associated Diseases		3 hrs	30	70	100	30	70	100
II	Systematic Bacteriology		3 hrs	30	70	100			
III	Misc. Microbes Fungal, Pathogens & Asso. Disease		3 hrs	30	70	100	30	70	100
IV	Lab Diagnosis of Microbial Diseases		3 hrs	30	70	100			
V	Human Parasitology		3 hrs	30	70	100	30	70	100
VI	Applied Medical Microbiology		3 hrs	30	70	100			
<b>TOTAL MARKS</b>				<b>180</b>	<b>420</b>	<b>600</b>	<b>90</b>	<b>210</b>	<b>300</b>

**III<sup>rd</sup> Year**

Paper No	Theory Paper	Paper Code	Duration	Theory (Max. Marks)		Total	Practical (Max. Marks)		Total
				Sessional	Annual		Sessional	Annual	
I	Pathogenic Viruses and Associated Diseases		3 hrs	30	70	100	30	70	100
II	Applied Immunology		3 hrs	30	70	100			

	& Serodiagnosis								
III	Advanced Diagnostic Technology		3 hrs	30	70	100	30	70	100
IV	Automation & Computerization in Medical Microbiology		3 hrs	30	70	100			
V	Molecular Biology & Clinical Lab Technology		3 hrs	30	70	100	30	70	100
<b>TOTAL MARKS</b>				<b>150</b>	<b>350</b>	<b>500</b>	<b>90</b>	<b>210</b>	<b>300</b>

**CURRICULUM (SUBJECT WISE)  
SYLLABUS FOR MEDICAL MICROBIOLOGY**

**B.Sc Medical Microbiology I<sup>st</sup> year**

# **PAPER I: HUMAN ANATOMY & PHYSIOLOGY**

## **Unit I**

1. Introduction to Medical Sciences.
2. Organization of human body and integrated physiology.
3. Cell organizations, fundamental tissues of body and organ systems.
4. Primary defense mechanisms of human body against pathogenic microbes.
5. Gross Anatomy and histology of organs of respiratory system, organs of respiration mechanism of respiration and factors controlling it.
6. Gross anatomy and histology of organs of alimentary system, organs of digestive systems, and various glands associated with the digestive system, mechanism and physiology of digestion and absorption.

## **Unit II:**

1. Cells and organs of immune system Morphology & their distribution.
2. Gross Anatomy and Physiology of reticulo – endothelial system.
3. Secondary immune response of human body to external stimuli.
4. Physiology of various body fluids: CSF, peritoneal, pericardial, Pleural and synovial fluids.
5. Gross Anatomy, histology & Physiology of excretory system.
6. Gross Anatomy and histology of organs of Cardio-Vascular system, organs of the systems, mechanism and physiology of blood flow through the cardiovascular system.

## **Unit III**

1. Gross Anatomy and histology of musculo-skeletal system, classification & functions of bones and muscles. Physiology of muscular contraction and factor controlling them. Various types of joints and their physiology.
2. Gross Anatomy and histology of organs of nervous system, division of nervous system and mechanism of nerve impulse transmission & reflex arc, sensory and motor system, special sense organs.
3. Gross Anatomy and histology of organs of reproduction system, mechanism of reproduction and factors controlling it.
4. Gross Anatomy and histology of organs of endocrine system, different glands of the system and their distribution. Mechanism of hormone production, factors controlling it and their mechanism of action.

**B.Sc Medical Microbiology I<sup>st</sup> year**  
**PAPER II: BASIC PATHOLOGY**

**Unit I:**

1. Introduction to hematology. Laboratory organization & Safety measures.
2. Formation, Composition and functions of blood.
3. Anticoagulants, mode of action of anticoagulants and their merits & demerits.
4. Collection, preservation, transport and handling and disposal of blood samples.
5. Basic hematology and estimation of haematocrit values, physiological variations, normal and absolute values and quality assurance in hermatology.

**Unit II**

1. Romanowsky dyes, preparation and staining procedures of blood smears, Morphology of blood cells and their identifications.
2. Haemo-globinometry: Various methods errors involved and standardization of instruments.
3. Haemi-cytometry: Procedure of cell count, visual as well an electronic, red cells, leucocyte and platelet count. Errors involved and mean to minimize such errors.
4. Determinations of innate immunity and its mechanism, phagocytosis, the compliment system, gross structure and development of cells concerned with antibody production, cellular processes involved in antibody formation.

**Unit III**

1. Pathology of Inflammation in response to microbial invasion. Pathology of localized and systemic infections. Various routes of transport of Microbes to human body and methods of defense. Invastive techniques for diagnosis of acute and chronic microbial infections.
2. Pathology of specific chronic infective disorders: Tuberculosis, Leprosy, Syphills, SABE (Subacule bacterial endocarfitis) and Rheumatological disorders.
3. Study of microbes responsible for pathogenesis of tumors and their oncogenesis.
4. Immuno-histopathology & Immuno-histochemistry (Basic Principles, Procedures and applications).
5. Introduction to blood banking technology.

**B.Sc Medical Microbiology I<sup>st</sup> year**  
**PAPER III: CLINICAL BIOCHEMISTRY**

**Unit I:**

1. Introduction to Clinical Biochemistry and role of medical microbiologist, ethics, responsibility, safety measures and hazards in Clinical Biochemistry Lab and first aid in Laboratory accidents.
2. Basic awareness of laboratory in respect to equipments & glassware's. Unit of measurements and calibration of volumetric apparatus. Colorimetry, Spectrophotometry, flame-photometry, analytical balance etc. (principles, instrumentations & applications).
3. Preparation and storage of reagents, standard solutions, buffer solutions and pH determination, Biophysical techniques-osmosis, dialysis, surface, tension, sedimentation and viscosity - principles & applications.
4. Sterilization and disinfection: Study of various methods of sterilization-dry and moist heat, radiation, filtration, autoclaving and chemical disinfection.
5. Henderson- Hassalbach equation and its clinical applications. Acid base disturbances and their clinical significance. Acid- base-buffer and pH-simple calculations. Concept of clinical sensitivity and specificity and factors affecting the clinical results.

**Unit II:**

1. Collection of blood specimens avoiding haemolysis, de-proteinization & separation of serum/plasma.
2. Biochemical composition of body fluids and their physiological variations.
3. Physical and biochemical examination of urine samples: Qualitative tests of inorganic urinary ingredients: Chlorides, Phosphate, sulphur compounds, sodium, potassium, calcium and magnesium and their clinical significance.
4. Qualitative tests for glycosuria, pentosuria, galactosuria, proteinuria, microalbuminuria and Bence Jones Proteinuria and their clinical significance. Qualitative tests of urine for urea and creatinine. Quantitative estimation of 24 hours urine for albumin and 17 – ketosteroids and their clinical significance.
5. Physiological variation of biometabolites in various body fluids and their clinical significance. Pathological changes in composition of body fluids and their clinical correlation. Qualitative test of urine for ketone bodies, bilesalts, bile-pigments and urobilinogen and their clinical significance.

**Unit III:**

1. Carbohydrates: Structure, Classification and their function in biological system.
2. Lipids: General structure of Fatty Acids and classification of Lipids.
3. Proteins: Classifications, structural organization and function of protein.
4. Enzymes: Definition, classification of Enzymes. Concept of active sites and general mode of action of Enzymes.
5. Nucleic Acids: Structure function and types of DNA and RNA Nucleotides, Nucleosides, Nitrogen bases and role of Nucleic Acids.

**B.Sc Medical Microbiology I<sup>st</sup> year**  
**PAPER IV: PREVENTIVE MEDICINE**  
**AND HEALTH CARE**

**Unit I:**

1. Water, air and noise pollution: Removal of water hardness, purification of water and standards of water quality. Air and noise pollution and their prevention. Housing and air conditioning.
2. Hygiene and Sanitation: Sanitation barriers, excreta disposal and disposal of hospital waste, Incineration and disinfection.
3. Infections and control: Microbial pathogenicity, source and spread of infections in community, Pathogenesis toxogenicity, invasiveness, variations and Virulence. Host factors controlling infections. Source of infections to men, mode of spread and their control by physical & chemical agents.

**Unit II:**

1. Epidemiology: Epidemiology, surveillance and control of community infections. Role of laboratory in community and hospital infections. Emergence of drug resistance. Methods of prevention & control- isolation of patients, quarantine & incubation periods of various infectious diseases. Management of patients in infectious disease hospital (IDH).
2. Prophylactic Immunization: Rationale of immunization, immune response and duration of immunity controlled studies of prophylactic Vaccines and hazards of immunization. Various national immunization programs and vaccine schedules.
3. Reproductive, Family planning & Child Health Care Programs.

**Unit III:**

1. Bacteriology of water, milk, food and air: Bacteriological examination of water- collection of specimens, presumptive coliform count, cloacal room test, colony count and interpretation of results, Bacterial examination of sewage and sewage effluents. Bacteriological examination and control of swimming bath, membrane filter technique and isolation of pathogens.
2. Bacteriological examination milk, bacterial standards and various tests for pasteurized milk. Bacterial examination of ice-cream, shellfish and canned foods, milk bottles, crockery and cutlery. Examination of food stuff in cases of out break of food poisoning, Bacteriological examination of air and environments dust.
3. Health care by balance diet and yoga: Normal constituents of diet, various diet programs, balance diet and factors responsible for etiology of various nutritional disorders. Carcinogens in food. Role of regular exercise & yoga in prevention & management of various diseases.
4. Health Planning & Management: Health planning, Planning Cycle, Malaria eradication & various other National Health policy & programs.

**B.Sc Medical Microbiology I<sup>st</sup> year**  
**PAPER V: FUNDAMENTALS OF MEDICAL**  
**MICROBIOLOGY**

**Unit I:**

1. Microbiology & Medicine: Introduction to Medical Microbiology. Discovery of micro-organisms. Contribution of Robert Koch, Antony Van Leeuwenhock, Louis Pasteur, Border, Paul Ehrlich, Alexander Fleming, Metchnikoff, Needham, Tyndall, Jenson, Joseph Lister, Karl Landsteiner etc. Scope & relevance and safety measures of Medical Microbiology. Role of medical microbiology in identification and management of various infectious diseases.
2. Morphology & Nature of Bacteria: Anatomy of bacterial cell, intracellular components and their functions bacterial reproduction, morphological study of bacteria and its appendages-flagella, fimbriae, pili, capsule, spore and cysts.
3. Classification and identification of bacteria: Biological groups, morphological and biological classification, DNA composition as a basis of classification system of identification- morphology, staining reactions, cultural characters, biochemical reactions & antigenic characters etc.
4. Sterilization and disinfection: Various physical methods of sterilization- heat, UV radiations, ionizing radiations, character affecting sterilizations, autoclave control and its compounds. Alcohol, halogen heavy metals and quaternary ammonium compounds, aldehyde, gaseous compound. Use and abuse of disinfectants.

**Unit II**

1. Cultural Media: Liquid and solid media, containers for media, distribution of media in tubes, bottles and petri dishes. Common ingredients of cultural media. Synthetic media, peptone water, nutrient agar and broth, chocolate and blood agar, meat extract broth, milk agar etc. Special media for neisseria, corynebacterium, mycobacterium & enterobacteriaceae group etc.
2. Cultivation of bacteria: Instruments used, inoculation hood, laminar flow, culture procedure, incubation (Aerobic and Anaerobic). Isolation of pure culture and its preservation. Suspending media for freeze drying of bacteria. Blood culture.
3. Pure Culture: Maintenance & Preservation of pure cultures. Collection, transport processing & storage of clinical samples for Microbiological Analysis.
4. Growth and Nutrition of Bacteria: Typical growth curve, various phases of growth, physiology of bacteria-catabolism and anabolism, Nutrition of microbes and physical condition required for growth. Effect of Carbon, Nitrogen, Growth factors. Vitamins, temperature, pH Osmotic pressure. Oxygen and Carbon Dioxide on microbial growth.

**Unit III**

1. Introduction & scope of Immunology: Immunological principles, antigens, antibodies and antigen antibody reaction: Antigen and antigenic specificity antigenic determinate, general properties of antigens, immunoglobulin's, their structure and functions, Types of immunity and its determinants. Tissue involved in immune response. Structure and function of immune response.
2. Introduction to Virology, Mycology & Parasitology: Characteristic, morphology, classification, nomenclature pathogenesis.
3. Antimicrobial agents and antibiotic: Disinfectants, antiseptics, chemotherapeutic agents, chemotherapeutic index, development of chemotherapy, antibiotics and effect of antibiotics on protein, nucleic acid and cytoplasmic membrane. Future development of chemotherapy.

**B.Sc Medical Microbiology I<sup>st</sup> year**  
**PAPER VI: INSTRUMENTATION TECHNIQUES IN**  
**MEDICAL MICROBIOLOGY**

**Unit I**

1. Microscopy: Study of Compound microscope-magnification, numerical aperture, resolution and compounds of microscope. Dark ground illumination care of microscope and common difficulties. Micrometry Study of Phase contrast, interference, fluorescent an electron microscope. Preparation of smear for electron microscope.
2. Study of pH in Microbiology: Methods for measurements pH meter, Preparation dilution and chemistry of suspension fluids. Oxidation – reduction (redox) potential.
3. Preparation of Stains: Making of films, staining methods, mounting media, Grams stain- preparation of stain and staining methods. Special stains for AFB, diphtheria spores, capsule, intracytoplasmic lipids, polysaccharides nuclear material, Fields Stain for amoebae, fungi and rickettsiae.

**Unit II**

Study of instruments used in Medical Microbiology.

1. General instruments: Distillation plant, Centrifuge Machine, Analytical Balance, Hotplate, Magnetic Stirrer, water Bath, Automatic Dispensers and diluters. Deionizer etc.
2. Microbiological Instruments: Autoclave, Incubator, Hot air oven, Laminar Air Flow, Colony Counter. Muffle furnace. Refrigerator, inoculators, Mac-intos field- jar etc.
3. Instruments used in immunology: Electrophoresis, immunodiffusion, starplate, chromatography, ELISA reader, automatic washer and RIA equipment etc.
4. Care and management of experimental animals: General directions for the care of animals, material inoculated necroscopy, common diseases and experimental procedures. Various experimental animals-rabbits, guinea pigs, mice, rats, hamsters, fowls and monkeys- their data, cages, feeling and handling.
5. Safety measures in Microbiology Laboratory: Occurrence of lab infections, route of infection in laboratory, safety measures precautions in use of Pathogens in teaching lab organization, management, recording of results and quality control in Medical Microbiology.
6. Culture and Drug sensitivity tests: Culture, isolation and identification of Pathogens from urine, pus and sputum and recording of their results.



**B.Sc Medical Microbiology II<sup>nd</sup> year**  
**PAPER I: BACTERIAL PATHOGENS**  
**& ASSOCIATED DISEASES**

**Unit I**

Normal microflora of human body: Skin, Respiration system Gastrointestinal, and Genitourinary tracts.  
Source of infections, mode of spread and portals of entry.

Description, pathogenicity, mode of infection, incubation period and toxigenicity of:-

1. Staphylococcus
2. Streptococcus
3. Pneumococcus
4. Neisseria
5. Bordetella
6. Haemophilus

**Unit II**

Host Parasite interaction in bacterial infections. Pathogenic of bacteria (colonization of surface, invasion of tissue, production of exo and endo toxins). Antibacterial defence of the host.

Description Pathogenicity, mode of infection, incubation period and toxigenicity of:-

1. Corynebacteria, Erysipelothrix, Listeria,
2. Mycobacteria
3. Atypical Mycobacteria
4. Anthrax bacillus
5. Brucella
6. Yersenia, Pasteurella & Francisella.

**Unit III**

Physiology & Biochemistry of bacteria: Protein, Carbohydrate, lipid, and nucleic acid as antigens.

Description, Pathogenicity, mode of infection, incubation period and toxigenicity of:

1. Salmonella
2. Shigella
3. Proteus
4. Pseudomonas, Loefflerella
5. Vibrio
6. Escherichia coli
7. Clostridia

**B.Sc Medical Microbiology II<sup>nd</sup> year**  
**PAPER II: SYSTEMATIC BACTERIOLOGY**

**Unit I**

The role of laboratory in the diagnosis and control of infections: Management and quality control of medical microbiology laboratory.

- a) Specimen Collection from patients, clinics, and hospitals
- b) Specimen collection for epidemiological investigations.
- c) Training of medical microbiologist to handle epidemics, Morphology, staining, Cultural Character of Bacteria, Selective cultural media, identification by special tests, biochemical reactions and sero-typing of:
  - a) Grams positive cocci: - Cluster forming, chain forming and diplococci.
  - b) Neisseria, Bordetella and Haemophilus.

**Unit II**

Isolation of pure culture and its preservation.

Morphology, Staining, Cultural Character, selective cultural media, identification by special tests, biochemical reactions and serotyping of:-

1. Corynebacterium.
2. Mycobacterium.
3. Atypical Mycobacterium.
4. Anthrax bacillus.
5. Brucella.
6. Yersenia and Pasteurella.

**Unit III**

Microbial drugs sensitivity tests and its clinical interpretation

Morphology, Staining, Cultural character, Selective cultural medias, identification by special tests, biochemical reactions and serotyping of:-

- |                |                     |
|----------------|---------------------|
| 1. Salmonella  | 5. Vibrio           |
| 2. Shigella    | 6. Escherichia coli |
| 3. Proteus     | 7. Clostridia       |
| 4. Pseudomonas |                     |

**B.Sc Medical Microbiology II<sup>nd</sup> year**  
**PAPER III: MISCELLANEOUS MICROBES, FUNGAL**  
**PATHOGENS AND ASSOCIATED DISEASES**

**Unit I**

Principle and mode of action of antibiotics, antifungal and antiviral agents.

Description, Pathogenicity, mode of infection, incubation period and toxigenicity of:-

1. Bacteroides, Streptobacilli, Donovanias.
2. Lactobacillus.
3. Actinomyces, norcardia.
4. Leptospira.
5. Treponema, Borrelia.
6. Mycoplasma.

**Unit II**

Clinical presentation and pathology of miscellaneous microbial infections.

Description, pathogenicity mode of infection, incubation period and toxigenicity of:-

1. Chlamydia.
2. Rickettsiae.
3. Yeast, Yeast like organism and Candidiasis.
4. Dermatophytes and Superficial fungal infections.
5. Systematic fungi-Aspergillosis

**Unit III**

Pathogenic & Nonpathogenic fungi: - Clinical features and pathology.

Description, classification, Pathogenicity, mode of infection, incubation period and toxigenicity of:-

1. Pathogenic fungi: cryptococci, Blastomyces, Coccidioides, Paracoccidioides etc.
2. Superficial and deep fungal infections of Eye, Ear and skin.
3. Entomology: Insects: Mosquitoes, housefly, sand fly, fleas, lice, ticks and mites, Cyclops, bed bugs and cockroaches, rodents: Rats and mice.

**B.Sc Medical Microbiology II<sup>nd</sup> year**  
**PAPER IV: LAB DIAGNOSIS OF MICROBIAL DISEASES**

**Unit I**

Itiopathogenesis, Pathology, Clinical features and Lab diagnosis of: Osteomyelitis, sore throat, scarlet fever, rheumatic fever, acute glomerulonephritis, Pneumonia, whooping cough, respiratory infections, meningitis, gonorrhoea, rat bite fever actinomycosis dental caries and leptospirosis.

**Unit II**

Itiopathogenesis, Pathology, Clinical features and Lab diagnosis of: Diphtheria, tuberculosis, skin, ulcers and leprosy, malignant pustules and isortiers diseases, brucellosis, plague, genital infections, typhus, oral thrush, ringworms and mycetoma.

**Unit III**

Itiopathogenesis, Pathology, Clinical features and Lab diagnosis of: Typhoid and paratyphoid fever, bacterial food poisoning, bacillary dysentery, gastroenteritis, choleraangrene, tetanua, botulism, wound infections, Aspergillosis, Blastomycosis etc.

**B.Sc Medical Microbiology II<sup>nd</sup> year**  
**PAPER V: HUMAN PARASITOLOGY**

**Unit I**

Protozoology- Introduction and Classification.

Phylum – Protozoa

- a) Class Rhizopoda-Amoeba.
- b) Class Mastigophora-Intestinal, oral and vaginal flagellates trypanosome and leishmania.
- c) Class Sporozoa – black water
- d) Class Ciliata.

**Unit II**

Protozoa of uncertain classification- Sarcocysts, Pneumocystis and toxoplasma.

Phylum-platyhelminthes

- a) Class-Cestoidea
- b) Class-Trematoda

**Unit III**

Phylum nemathelminths- Class- Nematoda.

Lab Diagnostic procedures and special methods of demonstration of human parasites in blood, stool, tissue and other body fluids.

**B.Sc Medical Microbiology II<sup>nd</sup> year**  
**PAPER VI: APPLIED MEDICAL MICROBIOLOGY**

**Unit I**

1. Preparation of container and swabs for collections of specimens for microbial examinations.
2. Portal regulation and transport of specimen.
3. Flowchart of Lab diagnostic procedures.
4. Documentation of specimen in Laboratory.
5. Preservation of Micro-Organisms: Periodic subculture methods, cold Storage, freezing, deep freezing, lyophilize on methods. Total and viable counts of bacteria.

**Unit II**

1. Infection syndromes and diagnostic procedures.
2. Strategy of anti-microbial therapy.
3. Epidemiology markers of microorganisms: Serotyping and Bacteriophage.
4. Prophylactic mass immunization.
5. Nosocomial infection and sterility testing of I.V. fluids and processing of various samples for various hospital infections.

**Unit III**

1. Diagnosis, treatment and control of common infections and infestations.
2. Cell, tissue and organ culture.
3. Specific serological methods of diagnosis.
4. Test of sensitivity to antimicrobial agents and their preparation.
5. Specific culture and drug sensitivity methods.

**B.Sc Medical Microbiology III<sup>rd</sup> year**  
**PAPER I: PATHOGENIC VIRUSES AND**  
**ASSOCIATED DISEASES**

**Unit I**

1. Pox-Viruses: Smallpox, Vaccinia, Molluscum contagiosum.
2. Herpes Virus: H Simplex, Chickenpox-Zoster, CMV, IMN and burkitt's Lymphomas.
3. Adenoviruses: Pharyngeal infections, Respiratory infections and conjunctival infections.

**Unit II**

1. Orthomixoviruses (Influenza Type A, B, C etc): Influenza.
2. Paramyxovirus: Respiratory Infections, mumps and measles.
3. Miscellaneous Viruses: Rubella, Corona, Arboviruses: Rubella, common cold is lymphocytic choriomeningitis.
4. Picorna Viruses: Enteroviruses, Poliomyelitis Aseptic and Epidemic Myalgia.
5. Rhinoviruses-Common Cold.

**Unit III**

1. Hepatitis Viruses: Infectious and serum Hepatitis
2. Arboviruses: Encephalitis, Yellow fever, Dengue fever
3. Rhabdoviruses: Rabies
4. Slow and oncogenic Virus: Scrapie, Kuru and animal virus tumors
5. Cell culture and observation of effect of viruses on cell. Technique, Procedure and interpretation of results.

**B.Sc Medical Microbiology III<sup>rd</sup> year**  
**PAPER II: APPLIED IMMUNOLOGY & SERO-DIAGNOSIS**

**Unit I**

1. Basic Concept: Antigen, antibody complements and immune complexes. Immune reactions and laboratory tests for detection of antigen and antibodies.
2. Electrophoresis & Chromatography: Principles, technique and application. Gas – Liquid chromatography (GLC), Ion Exchange Chromatography, exclusion chromatography (TLC). Polyacrylamide Gel- Electrophoresis (PAGE), SDS-PAGE. Agarose Gel Electrophoresis and Immuno Electrophoresis.
3. Spectroscopic I & Centrifugation techniques: Visible & UV Spectroscopy, Electron spin resonance (ESR), Nuclear Magnetic resonance (NMR). Basic Principles of sedimentation and applications of analytical centrifuges.
4. Antibody production by microbial agents and its clinical significance.
5. Hepatitis markers: HbsAg, anti HBC Igm, HbeAg/anti Hbe Ag, HDV, anti HBs, HBVvDNA and Hv RNA: Technique and interpretation of results. Clinical significance of Hepatitis markers.

**Unit II**

1. Autoimmune disorders: Pathogenesis and clinical feature, Autoimmune disorders markers: C3, C4, ANCA, ANA, antismooth muscle antibodies, immune complexes, HLA B0-27, anti sperm antibody, clinical significance, Autoimmune disorders: Anti mitochondrial, anti SCI-70. Anti parietal cell antibody, lupin anticoagulants.
2. ELISA and allied techniques: Radio Immuno assay and polymerase chain reaction, principle technique and applications.

**Unit III**

1. Serological tests: Widal, ASO, CRP, Rose Walest, Brucella-Agglutination, Cold agglutination, VDRL, TPHA and STS.
2. HIV 1 & 2 screening and westernblot.
3. Tumor markers: Various tumor markers and their clinical significance Automation and advance technology in various surface markers: Principles and Applications.
4. Preparation of antibiotics and antimicrobial agents: Principles and significance, Preparation of Vaccine and experimental study of immunogenicity.



**B.Sc Medical Microbiology III<sup>rd</sup> year**  
**PAPER III: ADVANCED DIAGNOSTIC TECHNOLOGY**

**Unit I**

1. Bacteriophages: Classification, morphological groups and applications of Bacteriophages in Medical Microbiology
2. DNA, Replication, translation and transduction: Principles, technology and applications in diagnosis.
3. TORCH-Profile: Technique and interpretation of results.
4. Anti A-60Mycobacterium IgG and mycodot, Technique and interpretation of results.

**Unit II**

1. IgM to HB core antigen (HBCAg): Technique and interpretation of results.
2. IgG to Hepatitis C virus (HCV): Technique and interpretation of results.
3. IgG to Hepatitis A Virus (HAV): Technique and interpretation of results.
4. BHs Ag (ELFA): Technique and interpretation of results.
5. Cy: stercosis IgG (DLISIA): Technique and interpretation of result.

**Unit III**

1. HIV P-24 Antigen test: Technique and interpretation of results.
2. Anti ds DNA test: Technique and interpretation of results.
3. Chlamydia IgM: Technique and interpretation of results.
4. Dengue IgM: Technique and interpretation of results.
5. IgG, IgA, IgM: Technique and interpretation of results.
6. Steller test and total IgE: Technique and interpretation of results.

**B.Sc Medical Microbiology III<sup>rd</sup> year**  
**PAPER IV: AUTOMATION AND COMPUTERIZATION IN MEDICAL**  
**MICROBIOLOGY**

**Unit I**

1. Computer Fundamental: Introduction to Computer Hardware central processing Unit (CPU), input drives, storage and output devices. Binary decimal, octal and hexadecimal system, BCD, EBCDIC and ASCII coding systems. An overview of operating system DOS/Windows, Computer Simulation, Computer linked to Microbiological Equipments.
2. FORTRAN: Writing FORTRAN program-Data type Contents Variable names Arithmetic Statements input/output statements. If statements, do loops, Subscribed Variables, Subprograms common and equivalence statements.
3. Application of FORTRAN: Computer programs for simple problems such as Matrix addition Multiplication and Transposition, trace of Matrix Chi sq.test. Fitting a straight light line (using principal of least square fit), Calculation of mean, standard deviation of CO-efficient of Correlation. Rearranging a set of numbers in as ascending or descending order.

**Unit II**

1. Computer Application and their use in Medical Microbiology: Features of Computers. Advantages of using Computers Getting data into/ out of computers Role of Computers. What is data processing? Application areas of Computers involved in data processing common activities in processing. Type of date processing characteristic of information, Authorization and report validation.
2. Hardware Concepts: Architecture of computers classification of computer concept of damage. Types of storage Devices characteristic of disk tapes terminals printers' network application concept of PC systems care, floppy care, data care etc.
3. Classification Software: Classification of software, system software, application software, Operating Systems, computer Viruses, Precautions against Viruses Dealing with Viruses Computers in Medical Electronics, Basic Anatomy of Computers, Micro Processors and computers. Principles of Programming etc.

**Unit III**

1. Introduction to internet, Internet basics of Microbiologists. Electronic Mail, Electron Mail servers. Down Loading, file with anonymous FTP. The Worldwide wave and mosaic and genome database, Sequence database and obtaining BLAST documentation and help.
2. Medical Transcription: What is medical Transcription, Type of Medical documents, contents of medical case sheet, Goals of Medical Transcription training? Basic Guidelines for medical transcription. Pronunciation guidelines. Basic elements of a medical world. Basic rules for building and defining medical worlds. Anatomical combining forms and general medical terms.
3. Automation of Medical Microbiology Laboratory.

**B.Sc Medical Microbiology III<sup>rd</sup> year**  
**PAPER V: MOLECULAR BIOLOGY & CLINICAL LAB TECHNOLOGY**

**Unit I**

1. Determination of Blood Glucose by various methods. Glucose tolerance test, Glycosy pated hemoglobin: Interpretation of results & Clinical Co-relation.
2. Profile test: Serum Cholesterol, HDL, LDL, Triglycerides. Lipo proteins & lipids.
3. Determination of liver function tests: Serum bilirubin (Total, Direct & Indirect) SGOT (AST). SGPT (ALT), serum proteins, A/G ratio, Alkaline Phosphatase, Prothrombin Time (procedure. Interpretation & clinical correlation of results).
4. Function test: Blood urea, Serum Creatinine, Uric acid and various ice test.
5. Cardiac profile (CK – MB and LDH and Electrolyte (Sodium, Potassium chloride & Bicarbonates).

**Unit II**

1. Cebros spinal and other body fluids analysis. (Normal & Abnormal values & Clinical significance).
2. ABO & RH blood Group System: Technique of Grouping & Cross Matching, components their preparation & uses. Quality assurance and safety measures in Blood Banking. Organization. Operation and administration of Bank.
3. Static Mechanism: Theories of Blood Coagulation & Diagnostic procedures for coagulation disorders.
4. Antiglobulin (COOBM'S) test: Principle procedure and application. Direct indirect coomb's test.
5. Anemia & Leukemia: Definition, Classification, Pathogenesis and Diagnostic Procedures.

**Unit III**

1. Introduction to Histology, Histopathology & Histochemistry.
2. Fixation and Fixatives, types of Fixatives, Frozen section, Freeze Drying & Freeze Substitution.
3. Tissue Processing: Dehydration, clearing & impregnation in wax. Decalcification.
4. Microtomy & staining techniques dye-Chemistry & various types of stains.
5. Exfoliative cytology, FNAC and cervical cytology,. Techniques, applications and interpretation of results.