
II. M.B.B.S. MICROBIOLOGY PRESCRIBED TEACHING HOURS - 250 Hrs.

GOAL :

The broad goal of the teaching of undergraduate students in Microbiology is to provide an understanding of the natural history of infectious diseases in order to deal with the etiology, pathogenesis, laboratory diagnosis, treatment, control and prevention of infections in the community, immune system in health and disease.

OBJECTIVES :

A) Knowledge

At the end of the course, the student will be able to :

- 1) State the normal flora of the human body and describe the host parasite relationship.
- 2) List the pathogenic microorganisms (bacteria, viruses, parasites, fungi and describe the Pathogenesis of the disease produced by them.
- 3) State or indicate the modes of transmission of pathogenic and opportunistic Organisms and their sources including insect vectors responsible for transmission of infection.
- 4) Acquire basic knowledge of normal immune system, abnormalities, identification of conditions of immunological importance.
- 5) Describe the mechanisms of immunity to infections.
- 6) Acquire knowledge on suitable antimicrobial agents for treatment of infections and scope of immune – therapy and different vaccines available for prevention of communicable diseases.
- 7) Apply methods of disinfection and sterilization to control and prevent hospital and community acquired infections.
- 8) Recommend laboratory investigations regarding bacteriological examination of food, water, milk and air.
- 9) To acquire knowledge of safe handling and disposal of infectious waste.
- 10) Acquire basic knowledge of laboratory diagnosis, treatment, control and prevention of infections.
- 11) Acquire basic knowledge of microbial physiology and genetics.
- 12) Investigation of outbreaks including collection of samples.

B) SKILLS:

At the end of course, the student will be able to

- 1) operate and use the light compound microscope.
- 2) to employ aseptic and sterile precautions while performing simple invasive procedures such as venepuncture etc.

- 3) collect and transport appropriate clinical materials with necessary precautions for the laboratory diagnosis of infectious diseases.
- 4) to perform common laboratory techniques (as given below) for the direct demonstration of microorganisms from clinical materials and interpret their findings. These should include :-
 - (a) Saline and iodine preparations and concentration methods for demonstration of trophozoites, Ova or cysts in stool samples.
 - (b) Prepare and stain peripheral blood for screening malarial parasites and microfilariae.
 - (c) Prepare a smear and perform Gram stain on body fluids, urine and pus specimens.
 - (d) Prepare a smear and perform Ziehl – Neelsen stain for demonstration of mycobacteria especially from sputum.
 - Interpret results of microbiological tests including antimicrobial testing for the diagnosis of common infectious diseases.
 - Report and interpretation of serological tests for diagnosis of infectious diseases

C) INTEGRATION:

The student will be integrated with the knowledge of Microorganisms and their pathogenicity, host response, laboratory diagnosis and epidemiology, control of diseases in the community by proper immunization procedures.

SYLLABUS

General Microbiology, Immunology and Systemic Bacteriology

1. GENERAL MICROBIOLOGY

History and mile stone in microbiology

Scope of Medical Microbiology

Microscopy

Staining of bacteria

Bacterial morphology and classification

Nutrition and growth of bacteria

Culture media and cultivation of bacteria.

Identification of bacteria (and bacterial classification).

Bacterial genetics

Sterilisation & Disinfection

Antimicrobials and Chemotherapy & Antimicrobial Sensitivity Testing.

Normal Microbial flora

Microbial pathogenicity and immunity

II. IMMUNOLOGY

Host response (immunity)

Structures and functions of Immune system

Cells of immune system

Immune response/immunity

Antigen

Antibody

The complement system

Antigen antibody reactions

Molecular techniques in diagnostic microbiology

Hypersensitivity

Auto immunity

Histo compatibility complex

Transplantation immunity

Tumour immunity

Immuno deficiency diseases

Immuno hematology

Immunoprophylaxis against infectious diseases

III. SYSTEMATIC BACTERIOLOGY

Staphylococcus

Streptococcus

Neisseriac

Corynebacteria

Bacillus

Clostridium

Nonsporing anaerobes

Mycobacteria

Actinomycetes and Nocardia

Coliform Bacteria – Escherichia coli & Klebsiella

Proteus

Salmonella

Shigella

Yersinia

Pasteurella & Francisella

Haemophilus

Bordetella

Brucella

Vibrio Cholerae

Helicobacter, Aeromonas, Pleisiomonas

Pseudomonas and other non-fermenters

Spirochaetes

Rickettsiae

Chlamydia

Mycoplasma

Miscellaneous bacteria

IV. PARASITOLOGY

Introduction

Classification

General Principles of diagnosing parasitic infections and treatment of parasitic infections.

Protozoology

Rhizopoda- Pathogenic and non – pathogenic amoebae

Mastigophora – Intestinal, blood and tissue Mastigophora

Sporozoa – Plasmodium, Toxoplasma, Isospora Ciliate –

Balantidium coli

Opportunistic Protozoan parasites.

- Helminthology – Platyhelminths – Cestodes and Trematodes
- Nematelminths –Nematodes
- Medically important insect vectors and ectoparasites

V. VIROLOGY

A. GENERAL VIROLOGY

Morphology of viruses

Replication of viruses

Cultivation of viruses

Classification of viruses

Assay of viruses

Identification of viruses and Lab diagnosis

Genetics of viruses

Pathogenesis and Host response to viral infections

Antiviral agents

Bacteriophage

B. SYSTEMIC VIROLOGY

DNA VIRUSES

- Pox viruses
- Adeno
- Herpes
- Papova
- Parvo

RNA VIRUSES

- Picorna
 - Orthomyxo
 - Paramyxo
- Rota Viruses
 - Rhabdo Viruses
 - Hepatitis Viruses
 - Arbo viruses
- Retro Viruses
 - Slow Viruses / Prion
 - Oncogenic Viruses
 - Miscellaneous viruses
- Recent Advances – SARS, BIRD FLU, Cornoavirus (COVID19)

VI. GENERAL MYCOLOGY

Economic importance and harmful effects of fungi – Mycotoxins

Classifications of fungi

Pathogenesis and Lab diagnosis of mycotic infections.

SYSTEMATIC MYCOLOGY

Superficial mycosis

Cutaneous mycoses

Sub cutaneous mycoses

Systemic mycoses

Opportunistic mycosis and common lab contaminants

Antifungal agents

VII. APPLIED CLINICAL MICROBIOLOGY

Collection, transport and storage, disposal of specimens

Organ specific infections

Central nervous system infections

Respiratory infections – Upper / Lower

Urinary tract infections

Gastro intestinal infections – acute / chronic including food poisoning

Infections of bones and joints, & Dental Infections

Genital tract infections and congenital infections

Infections of the Eye, ear and skin

Infection of CVS

Systemic infections / Syndromes – PUO, Septicemias

Zoonotic infections

Environmental sanitation tests (food, water, milk and air)

Hospital infections (Prevention and control)

Basic molecular biology in relation to diagnosis of infectious diseases.

- Investigations of outbreak - As Community health officer - PHC level.
- Operation theatre sterility
- Hospital waste management
- Emerging & Re-emerging infections.

PRACTICALS

Staining – Smear preparation Grams stain

Special Stains – Acid fast staining.

Demonstration of culture media / methods

Demonstration of sterilization techniques

Applied Exercises

Systematic – Identification of the pathogen from the given clinical material based on Staining property, cultural characters, biochemical and serological tests.

Immunology – Interpretation of the given Immunological test, Agglutination – Slide, tube and Passive agglutination (Latex etc.), precipitation – VDRL, Gel diffusion

Spotters

Mycology – Identification of the given fungus by cultural morphology and wet mount preparation / staining.

Haemagglutination and Haemagglutination inhibition

Parasitology – Stool examination for ova and cyst, Saline and iodine preparation, Direct and concentration techniques.

Blood smear for malarial parasite, Microfilaria and other parasite.

Identification and interpretation of the parasites (Adult and larval forms).

EVALUATION

Theory: 110 marks

Paper 1: 40 marks

Paper 2: 40 marks

Internal assessment: 15 marks

Viva: 15 marks

Practicals: 40 marks

Exercises: 25 marks

Internal assessment (including records): 15 marks

Total: 150 marks

UNIVERSITY EXAMINATION PATTERN

Two papers of 3 hours duration - 40 marks each.

Paper I – General Microbiology, Immunology & Systematic Bacteriology – 100marks

Paper II – Virology, Mycology, Parasitology & applied Microbiology – 100 marks

PRACTICALS

Spotters:

Gram stain:

ZN stain:

Stool examination:

Clinical exercise:

Marks qualifying for Pass :

50% in Theory : 55/110

50% in practicals : 20 /40

Total 50% aggregate : 75/150