



PRAVARA INSTITUTE OF MEDICAL SCIENCES

(DEEMED TO BE UNIVERSITY)

Loni, Tal. Rahata, Dist. Ahmednagar 413736

NAAC Re-accredited with 'A' Grade

SYLLABUS

UG Programme- MICROBIOLOGY

MBBS- IInd year

(Competency Based Undergraduate Curriculum will be implemented from MBBS batch 2024-25)

Course Code : Theory Paper I - MU 205

Theory Paper II - MU 206

1. GOALS

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

2. OBJECTIVES

Competencies: The undergraduate learner demonstrate:

1. Understanding of role of microbial agents in health and disease
2. Understanding of the immunological mechanisms in health and disease
3. Ability to correlate the natural history, mechanisms and clinical manifestations of infectious diseases as they relate to the properties of microbial agents
4. Knowledge of the principles and application of infection control measures
5. An understanding of the basis of choice of laboratory diagnostic tests and their interpretation, antimicrobial therapy, control and prevention of infectious diseases.

INTEGRATION

The teaching should be aligned and integrated horizontally and vertically in organ systems with emphasis on host-microbe-environment interactions and their alterations in disease and clinical correlations so as to provide an overall understanding of the etiological agents, their laboratory diagnosis and prevention.

MINIMUM TEACHINGHOURS

NMC No	Specific Learning Objective	Number of competencies	Lecture	Tutorial/ SGT/ Practical	SDL
MI 1	General Microbiology, Ethics & Communication	13	8	8	0
MI 2	Basic Immunology & Immunological disorders	08	10	6	1
MI 3	CVS and Blood	13	9	9	3
MI 4	Gastrointestinal and Hepatobiliary system	9	11	4	2
MI 5	Musculoskeletal system, Skin and Soft tissue infections	5	9	2	1
MI 6	Central Nervous System infections	3	6	3	1
MI 7	Respiratory tract infections	5	9	5	0
MI 8	Genitourinary and Sexually Transmitted Infections	4	5	3	1
MI 9	Zoonotic diseases and Miscellaneous	6	4	4	1
MI 10	Healthcare-associated infections (HAI)	5	4	4	0
MI 11	Antimicrobial resistance (AMR)	3	1	3	0

	&Antimicrobial Stewardship (AMSP)				
	TOTAL	74	76	51×3=153	10
	CBME Requirement	74	75	143	10

LEARNING OBJECTIVES

Learning objectives are derived as per the competency given in NMC, CBME manual.

The following instructions may be followed

Topics are numbered as per NMC like MI 1,MI 2, MI 3.....MI 11

Under each topic competency are numbered as per NMC,MI 1.1,MI 1.2 MI 11.3

Under each competency sub competencies are numbered as MI 1.1.1.MI 1.1.2.....

3. SYLLABUS

TOPIC: GENERAL MICROBIOLOGY, ETHICS & COMMUNICATION

(MI 1.1-1.11)

No of competencies-13

No of procedures requiring certification - 2

MI 1.1 Discuss notable historical events, scientific developments and contributions of key scientists in the evolution of medical microbiology. Discuss the role of microbes in health and disease

MI 1.1.1 INTRODUCTION & HISTORY

- Definition of microbiology, medical microbiology, clinical microbiology
- Contributions of key scientists in microbiology,

MI 1.1.2 Introduction to Infectious diseases

- Define: Health, Disease, infectious agents, commensalism, parasite, pathogen and opportunistic pathogen.
- Classify types of infections, Describe chain of infection
- Enumerate various types of medically important micro-organisms - bacteria, viruses, parasites, fungi
- Differentiate between pathogen, commensals, and saprophyte.

MI 1.2 Describe basic morphology, physiology/characteristics, classification and common infections /diseases caused by bacteria, viruses, fungi and parasites.

MI 1.2.1 Morphology, physiology & Classification

- Bacterial cell wall, cell membrane, cytoplasmic matrix, cell wall appendages
- Bacterial growth & nutrition, bacterial growth curve, factors affecting growth of bacteria

MI 1.2.2 common infections caused by bacteria, viruses, fungi and parasites

MI 1.3 Describe the basic principles of molecular biology and the concept and significance of studying molecular genetics. Discuss molecular techniques applied to disease diagnosis in clinical microbiology.

MI 1.3.1 Bacterial genetics

- Bacterial DNA, RNA
- Polypeptide synthesis- genetic code, translation, transcription

- Plasmid, mutation, horizontal gene transfer, genetic engineering, nucleic acid probe, blotting technique

MI1.3.2 Molecular techniques

- Polymerase chain reaction (PCR), Real time Polymerase chain reaction, ligase chain reaction
- Transcription mediated amplification
- Nucleic acid sequence based amplification
- Strand displacement amplification

MI 1.4 Describe the laboratory methods used to detect causative agents of infectious diseases

MI 1.4.1 Isolation & identification of bacteria

- Describe the classification & morphology of bacteria.
- Describe general pathogenesis and general lab diagnosis of bacterial infections
- Define & classify culture media, applications of **culture media**
- List out and describe different **culture methods**
- Interpretation of various biochemical reactions

MI 1.4.2 Introduction to virology

- Describe the classification & morphology of virus
- Describe general pathogenesis and general lab diagnosis of viral infections

MI 1.4.3 Introduction to mycology

- Describe the classification & morphology of fungi. Describe general pathogenesis and general lab diagnosis of fungal infections.

MI 1.4.4 Introduction to parasitology

- Describe the classification, morphology of parasites.
- Describe general pathogenesis and general lab diagnosis of parasitic infections

MI 1.5 Discuss the appropriate method of collecting and transporting samples to detect microbial agents, including instructions to be given to patients before sample collection.

MI 1.6 Discuss the appropriate method of collecting and transporting samples to detect microbial agents, including instructions to be given to patients before sample collection.

MI 1.7 Discuss the attitude & behaviors that portray respect & demonstrate respect for patient samples sent to the laboratory for performance of laboratory tests in the detection of microbial agents causing Infectious diseases

MI 1.8 Discuss and demonstrate effective communication skills with patients, relatives and clinicians during sample collection and pre/post-test counselling

MI 1.9 Discuss & demonstrate confidentiality pertaining to patient identity in laboratory results

MI 1.10 Perform Gram stain, ZN stain, and routine stool examination to identify the different causative agents of infectious diseases from the clinical specimen

MI 1.11 Describe the epidemiological basis of infectious diseases and their application.

- Define: Epidemiology, Describe the various epidemiological patterns of infectious disease.
- Discuss the various microbial factors contributing to disease.
- Discuss the various sources and reservoirs of infections.
- Describe the various modes of transmission of infections.

MI 1.12 Classify and describe the different methods of sterilization and disinfection. Discuss the mechanism of action, application and quality control of different methods in the laboratory and in clinical and surgical practices.

MI 1.12.1 Define: Sterilization, disinfection, asepsis, antiseptics, and decontamination.

- Classify & describe various methods of sterilization methods
- Discuss various methods of disinfection
- List out Testing of disinfectants. Discuss the application of the different methods in clinical and surgical practice.

MI 1.13 Choose the most appropriate method of sterilization and disinfection to be used in specific situations in the laboratory, in clinical and surgical practice

MI 1.5.1 Classify the medical devices using Spaulding's classification

- Classify disinfectants
- Define & applications of Fumigation, fogging
- Describe: Plasma sterilization
- Identify the most appropriate method of sterilization / disinfection in the given cases scenario.

TOPIC - Basic Immunology & Immunological disorders

No of competencies-8

No of procedures requiring certification-NIL

MI 2.1 Explain the role of immunological mechanisms in health and disease (innate and acquired immunity)

MI 2.1.1 Immunity

- Define & classify Immunity. Describe in detail all types of Immunity.
- Describe the role of vaccines in Immunity

MI 2.1.2 Immune system - Describe structure and functions of immune system

MI 2.2 Describe the structure and functions of immune system and its components (antigens, antibodies and complement systems).

MI 2.2.1 Antigen & Immunoglobulins

- Define & classify Antigen. Describe characteristics of Antigens
- Define & classify Immunoglobulins
- (Antibody).
- Describe in detail all types of Antibody.

MI 2.2.2 Complement system

- Describe components, general properties cascade and role of Complement system in health and disease

MI 2.2.3 Antigen antibody reactions

- Define & classify antigen antibody reactions
- Discuss the principles of Ag - Ab reactions
- Describe the applications of Ag-Ab reactions in the diagnosis of diseases.
- Describe the approach to interpretation of Ag-Ab reaction in the diagnosis of diseases.

MI 2.3 Describe the host immune responses in Microbial infections (humoral and cellular immune response).

MI 2.3.1 Define & classify Immune response

- Describe humoral immune response - Primary response, Secondary response, Td response, T independent response, immunomodulators, monoclonal antibodies

MI 2.3.2 Describe cell mediated immune response

- cytokines, importance of CMI
- Differentiate humoral and cell mediated immune response

- Discuss the theories of immune response of humoral immunity

MI 2.4 Explain the immune response in different types of infections (bacterial, mycobacterial, viral, fungal and parasitic infections)

MI 2.5 Discuss the principles and applications of laboratory tests used in diagnostic microbiology based on the host's immune response.

MI 2.6 Discuss the immunological basis of disease prevention through active and passive immune prophylaxis. Discuss the importance of herd immunity in prevention and control of infectious disease in community.

- Classify & describe types of immunization
- Define & classify types of Vaccines
- Discuss advantages and disadvantages among different types of vaccines
- Describe National Immunization Schedule (India)
- Importance of passive immunization

MI 2.7 Describe the immunological mechanisms in **immunological**

Disorder (hypersensitivity, autoimmune disorders and immunodeficiency states) and discuss the laboratory methods used in detection.

MI 2.7.1 Hypersensitivity

- Define & classify Hypersensitivity reactions including Gel and Coombs classification
- Describe the mechanism, clinical features, laboratory evaluation and prevention of type I hypersensitivity
- Describe the mechanism, clinical features, laboratory evaluation and prevention of type II hypersensitivity
- Describe the mechanism, clinical features, laboratory evaluation and prevention of type III hypersensitivity
- Describe the mechanism, clinical features, laboratory evaluation and prevention of type IV hypersensitivity
- Discuss tuberculin test, patch test.

MI 2.7.2 Autoimmunity

- Define & Describe mechanisms of Immunological tolerance
- Define & Describe various mechanisms of autoimmunity
- Describe various clinical manifestations of common autoimmune diseases
- Describe approach for laboratory diagnosis of autoimmune diseases

MI 2.7.3 Immunodeficiency

- Define & Classify immunodeficiency syndromes
- Describe various immunodeficiency syndromes.

- Discuss the laboratory methods used in detection of immunodeficiency diseases.
- MI 2.8** Describe the immunological mechanisms of transplantation and tumour immunity

MI2.8.1 Transplantation immunity

- Define & Classify transplantation,
- Define & Discuss the mechanism allograft rejection, prevention of rejection
- Histocompatibility antigens, MHC,
- Describe types of HLA typing
- Describe Graft – versus-host reaction, Tumor immunity
- Define Tumor antigen, immunological surveillance
- Describe immunosuppression.
- Describe immunotherapy in cancer

TOPIC - CVS & BLOOD

No ofcompetencies-13

No of procedures requiring certification-1

MI 3.1 Describe the etiopathogenesis, clinical features, complications/sequelae and laboratory diagnosis of rheumatic fever.

- Describe the immunological basis of rheumatic fever/nonsuppurative diseases caused by streptococci
- Classify streptococcus
- Describe the morphology, pathogenesis, antigenic structures, toxin & virulence factors, clinical features, epidemiology of streptococcus pyogenes
- Discuss the serological test for diagnosis of rheumatic fever.
- Discuss the role of antibiotics in treatment and prevention of rheumatic fever.

MI 3.2 Describe the classification etio-pathogenesis, clinical features and discuss the diagnostic modalities of Infective endocarditis

- Enumerate the organisms causing infective endocarditis
- Viridans Streptococcus, Coagulase negative Staph, HACEK group etc.
- Describe the pathogenesis, clinical features of infective endocarditis.
- Discuss the approach to identify the causative organism.
- Discuss the importance of multiple sample collection.
- Discuss automated blood culture systems.

MI 3.3 Discuss the diagnostic modalities of IE available with special emphasis on concept of sepsis and blood culture collection & processing.

MI 3.4 Diagnose a clinically suspected case of rheumatic fever/IE based on the findings of various microscopic, serological and culture investigations.

- Identify bacteria by observing colony morphology, biochemical reactions
- Interpret antimicrobial susceptibility test.
- Define: Minimum Inhibitory concentration, minimum bactericidal concentration.
- Discuss other test that can be used for diagnosis.

MI 3.4.1 Define sepsis, **septicemia**, bacteremia, fungemia, viremia, parasitemia

- Describe etiology, pathogenesis, clinical features, lab

diagnosis including prognostic markers and treatment of septicemia

MI 3.5 Define & describe types of Pyrexia of unknown origin (PUO). Discuss the etiopathogenesis and diagnostic modalities available to rule out infective causes of PUO.

MI 3.6 Classify & describe the enteric fever pathogens. Discuss the evolution of the clinical course, pathogenesis, complications, laboratory diagnosis and prevention of enteric fever.

MI 3.7 Choose the most appropriate laboratory test in a suspected case of enteric fever based on the duration of illness and in a suspected case of carrier.

MI 3.8 Read and interpret the results of various laboratory investigations in a suspected case of enteric fever with special emphasis on serological test results.

MI 3.9 Enumerate the common infective causes of anaemia and describe the mechanisms involved in causing anaemia by them.

- List the common microbial agents causing anaemia.
- Describe the morphology, of the common microbial agents causing anaemia.
- Discuss the mode of infection, pathogenesis & clinical course of the common microbial agents causing anaemia.
- Discuss the laboratory diagnosis of the common microbial agents causing anaemia.
- Discuss the treatment & prevention of the common microbial agents causing anaemia.
- Infectious agents causing Iron deficiency, megaloblastic, haemolytic anaemia and anaemia of chronic infections,

MI 3.10 Describe the morphology, life cycle, pathogenesis, laboratory diagnosis, prevention and control of the common parasites causing anaemia.

MI 3.11 Describe the morphology, life cycle, pathogenesis, clinical presentation, laboratory diagnosis and prevention of hemoparasites commonly prevalent in India (e.g. causing kala-azar, malaria, filariasis etc.)

Introduction

- Classify parasites and enumerate parasites prevalent in India

MI 3.11.1 Malaria

- Describe the morphology, life cycle, pathogenesis, clinical features of malarial parasite.
- Describe the treatment and prevention of malaria.

MI 3.11.2 Leishmania

- Describe the morphology, life cycle, pathogenesis, clinical features of leishmania.

- Describe the laboratory diagnosis for kala-azar
- Describe the treatment and prevention for kala-azar

MI 3.11.3 Trypanosoma

- Describe the morphology, life cycle, pathogenesis, clinical features of Trypanosoma.
- Describe the laboratory diagnosis for sleeping sickness.
- Describe the treatment and prevention for sleeping sickness

MI 3.11.4 Filarial worm

- Describe the morphology, life cycle, pathogenesis, clinical features of filarial worm.
- Describe the laboratory diagnosis for filarial worm.
- Describe the treatment and prevention for filarial worm.

MI 3.11.5 Schistosomes

- Describe the morphology, life cycle, pathogenesis, clinical features of Schistosomes.
- Describe the laboratory diagnosis for schistosomiasis.
- Describe the treatment and prevention of schistosomiasis.

MI 3.12 Differentiate agents of malignant malaria from agents of benign malaria reported in peripheral blood smear examination/ serology and explain its clinical significance.

MI 3.13 Describe the epidemiology, the etio- pathogenesis, evolution complications, opportunistic infections, diagnosis, prevention and the principles of management of HIV

MI 3.13.1 Describe morphology, epidemiology, pathogenesis of HIV

- Describe clinical features of AIDS

MI 3.13.2 Opportunistic infections in AIDS

MI 3.13.3 Describe the immunological abnormalities in HIV infection

- Describe various methods of laboratory diagnosis of HIV
- Discuss applications of serological tests.
- Discuss laboratory monitoring of HIV infection
- Discuss the different approaches to the treatment of AIDS

MI 3.13.4 Discuss NACO guidelines, strategies, pre-test counseling, post- test counseling. Discuss NACO guidelines for post-exposure prophylaxis

MI 3.13.5 Describe various modes of transmission of HIV

MI 3.13.6 Describe prophylactic measures in preventing HIV Transmission Standard precautions, spill management etc

TOPIC: GASTROINTESTINAL & HEPATOBILIARY SYSTEM

No of competencies- 9

No of procedures requiring certification -1

MI 4.1. Define and differentiate between diarrhea, dysentery and food poisoning. Enumerate the microbial agents causing them.

MI 4.2 Enumerate the microbial agents causing diarrhea and dysentery. Describe the epidemiology, morphology, pathogenesis, clinical features and diagnostic modalities of these agents.

MI 4.2.1 Introduction of gastrointestinal infections

- Brief structure and immunity of GIT
- Define diarrhoea, dysentery
- Enumerate the various etiological agents of diarrhoea bacterial, viral, parasitic etc.
- Classify the etiological agents in different age groups, immunocompromised, immunocompetent individuals.
- Discuss the mode of transmission, the pathogenesis, clinical manifestation and laboratory diagnosis of diarrhoea

MI 4.2.2 Epidemiology, pathogenesis, laboratory diagnosis of diarrheagenic E.coli,

MI 4.2.3 Epidemiology, pathogenesis, clinical features, complications, laboratory diagnosis, treatment & prophylaxis of Cholera

MI 4.2.4 **Antibiotic Associated Diarrhoea** – Clostridium difficile

MI 4.2.5 **Viral gastroenteritis** etiological agents, epidemiology, pathogenesis, clinical features and laboratory diagnosis - Rota, Astro, Noro

MI 4.3 Describe the epidemiology, morphology, pathogenesis, clinical features and diagnostic modalities of bacterial, viral, parasitic and fungal agents causing dysentery

MI 4.3.1 **Bacillary dysentery** Define dysentery etiological agents, pathogenesis, clinical features and laboratory diagnosis of bacillary dysentery - Shigella. Y. enterocolitica

MI 4.3.2 **Amoebic dysentery** Discuss the morphology, life cycle, mode of transmission, pathogenesis, clinical features, complications and laboratory diagnosis of Amoebic dysentery difference between amoebic and bacillary dysentery – E. histolytica
Mention briefly about non pathogenic intestinal amoebae

- MI 4.3.3** Etiological agents, pathogenesis, clinical manifestations and laboratory diagnosis of Diarrhoea in immunocompromised host- Giardiasis Cryptosporidium, Cyclospora, Isospora, Giardia
- MI 4.3.4** Soil transmitted helminthic infections- Ascaris, Enterobius, Trichuristrichiura
- MI 4.4** Identify the common etiologic agents of diarrhoea and dysentery by stool microscopic examination.
- MI 4.5** Enumerate the bacterial, viral, parasitic and fungal agents of food poisoning and discuss their pathogenesis, clinical course and laboratory diagnosis.
- Definition, source, pathogenesis, classification of food poisoning etiological agents based on type of food and pathogenesis, clinical manifestation laboratory diagnosis treatment and prophylaxis of food poisoning – Staphylococcus, Bacillus cereus, Clostridium perfringens, Clostridium botulinum, Salmonella typhimurium, halophilic vibrios etc
- MI 4.6** Describe the infective aetiology, pathogenesis and clinical course of Acid peptic disease (APD) and Discuss the laboratory diagnosis and management of the causative agent of APD.
- Etiopathogenesis, clinical features, complications laboratory diagnosis treatment and prophylaxis of Acid peptic disease -H. pylori
- MI 4.7** Describe the epidemiology, etiopathogenesis, clinical features and complications of viral hepatitis.
- MI 4.8** Discuss the modalities in laboratory diagnosis, with special emphasis on viral markers and preventive strategies for viral hepatitis caused by hepatitis viruses.
- MI 4.9** Suggest the most appropriate laboratory test based on history and clinical presentation in a suspected case of viral hepatitis and interpret the type and progress of viral hepatitis based on the laboratory report of viral markers in a case of infection by hepatitis virus.
- MI 4.9.1** Discuss the pathogenesis, clinical manifestations, complications and laboratory diagnosis, treatment and prophylaxis of enterically transmitted viral hepatitis A & E
- MI 4.9.2** Discuss the pathogenesis, clinical features, laboratory diagnosis treatment and prophylaxis of parenteral transmitted viral hepatitis -Hepatitis B
- MI 4.9.3** Discuss the pathogenesis, clinical features, laboratory diagnosis treatment and prophylaxis of parenteral transmitted viral hepatitis C & D
Note on national programme National Viral Hepatitis Control & Prevention Programme (NVHCP)

TOPIC: INFECTIONS OF SKIN & MUSCULOSKELETAL SYSTEM

(MI 5.1-5.5)

No of competencies-5

No of procedures requiring certification -NIL

- MI 5.1** Enumerate the microbial agents causing anaerobic infections. Describe the pathogenesis, clinical course and discuss the laboratory diagnosis of anaerobic infections
- MI 5.1.1** Introduction to anaerobic infections
- List the normal anaerobic flora of human body.
 - Enumerate and classify disease causing anaerobic bacteria with disease caused by them.
 - Define Anaerobiosis. Describe the types of samples and collection methods for anaerobic culture. Describe the transport of specimen and culture of clinical samples for anaerobic culture. List the antibiotics used to treat anaerobic infections
 - Classify Genus Clostridium. Describe the morphology of Genus Clostridium
 - Discuss the etiopathogenesis, clinical features, laboratory diagnosis, treatment and prophylaxis of **Gas gangrene**.
- MI 5.1.2** Discuss the pathogenesis, clinical features, laboratory diagnosis, treatment and prophylaxis of **Tetanus**.
- MI 5.1.3** Discuss the pathogenesis, clinical features, laboratory diagnosis and treatment of **botulism**.
- MI 5.1.4** Discuss the etiopathogenesis, clinical features, laboratory diagnosis and treatment of **pseudomembranous colitis**.
- MI 5.1.5** Classification, diseases, laboratory diagnosis & treatment of infections caused by **non sporing anaerobes**
- MI 5.1.6** Discuss the pathogenesis, clinical features, lab diagnosis, treatment and prophylaxis of **Actinomycosis & nocardiosis**
- MI 5.2** Explain the etiopathogenesis, clinical course & laboratory diagnosis of bone & joint infections caused by bacterial, fungal, viral and parasitic agents.
- Classify bone & joint infections
 - Enumerate the microorganisms causing infections of bone & joint (infectious arthritis, osteomyelitis and orthopedic implant associated infections)
 - Describe the etiopathogenesis& clinical course of bone & joint infections
 - Discuss the laboratory diagnosis of bone & joint infections
- MI 5.3** Describe the etiopathogenesis of infections of skin and soft tissue and discuss the clinical course and the laboratory diagnosis

- MI 5.3.1** Introduction to Skin & Soft Tissue Infections
- Describe the normal anatomy, innate immunity & commensals of skin
 - Define folliculitis, furuncle, carbuncle, macule, papule, nodule, pustule, vesicle, scales, ulcer and bulla.
 - List the various organisms causing skin and soft tissue infections - Bacteria, Viruses, Fungi, Parasites
 - Describe the pathogenesis, clinical course and laboratory diagnosis of **Staphylococcus aureus**
 - Enumerate the etiological agents and laboratory diagnosis of post-operative wound infections & burns wound infection
- MI 5.3.2** Describe the pathogenesis, clinical course and laboratory diagnosis of **Leprosy**
- Describe the pathogenesis, clinical course and laboratory diagnosis of **Atypical mycobacterial infections**
- MI 5.3.3** Enumerate **viruses causing skin and soft tissue lesions**. Discuss in detail Herpes viruses, pathogenesis, clinical features, laboratory diagnosis, treatment and prophylaxis
- MI 5.3.3a** Viral exanthematous infections - Measles, Rubella, (Coxsackie, Pox, HPV, Molluscum, Hand foot mouth Disease)
- MI 5.3.4** List fungi causing **superficial fungal diseases**. Describe their clinical features, laboratory diagnosis, treatment and prophylaxis - Tinea versicolor, piedra, tinea nigra, dermatophytosis, Mucocutaneous candidiasis
- MI 5.3.5** **subcutaneous mycosis** - list the fungi causing subcutaneous mycosis. Describe the clinical features, laboratory diagnosis and treatment of subcutaneous mycosis- Sporotrichosis, Chromoblastomycoses, Rhinosporidiosis, entomophthoromycoses, mycetoma
- MI 5.3.6** Enumerate the tissue nematode parasites causing skin and soft tissue lesions with their clinical course and laboratory diagnosis- Filariasis, Onchocerca, Loa loa, Mansonella, Dracunculus, Trichinella and Larvamigrans
- MI 5.3.7** Describe the pathogenesis, clinical course and laboratory diagnosis of Diabetic foot & cellulitis- Streptococcus & others
- MI 5.3.8** Describe the pathogenesis, clinical course and laboratory diagnosis of cutaneous Anthrax

MI 5.4 Differentiate between infective and non-infective lesions in the skin.
Enlist microbes causing systemic disease with involvement of skin

- List infective lesions of skin
- List diseases caused by various microbes
- List non-infective lesions of skin
- List diseases of non-infective lesions
- How to differentiate between infective and non-infective lesions

MI 5.5 Describe the etiopathogenesis, clinical course, complications and laboratory diagnosis of mycobacterial infections involving skin & soft tissue with special emphasis on sample collection from/of skin

- Describe how to collect the skin lesion samples
- Describe etiopathogenesis of mycobacterial infections involving skin & soft tissue
- Describe clinical course, complications of mycobacterial infection involving skin & soft tissue
- Describe laboratory diagnosis of mycobacterial infections involving skin & soft tissue

TOPIC: CENTRAL NERVOUS SYSTEM INFECTIONS

(MI 6.1-6.3)

No of competencies: (3)

No of procedures that require certification: NIL

- MI 6.1** Enumerate the microbial agents causing meningitis. Explain the pathogenesis, clinical course and laboratory diagnosis of meningitis caused by bacterial, fungal, viral and parasitic agents.
- MI 6.1.1** Describe normal structure of CNS and normal protective mechanisms
- MI 6.1.2** Define meningitis
- MI 6.1.3** Classify meningitis based on age group and duration
- MI 6.1.4.** Enumerate the causative agents of meningitis and classify them based on age group affected, duration of disease and immune status
- MI 6.1.5.** Describe general pathogenesis and clinical features of meningitis
- MI 6.1.6.** Discuss the general approach to diagnosis of meningitis
- MI 6.1.7.** Describe pathogenesis, lab diagnosis, prevention and treatment of meningococcal meningitis
- MI 6.1.8.** Describe pathogenesis, lab diagnosis, prevention and treatment of pneumococcal meningitis
- MI 6.1.9.** Describe pathogenesis, lab diagnosis, prevention and treatment of meningitis caused by *Streptococcus agalactiae*
- MI 6.1.10.** Describe pathogenesis, lab diagnosis, prevention and treatment of meningitis caused by *Haemophilus influenzae*
- MI 6.1.11.** Describe pathogenesis, lab diagnosis, prevention and treatment of Listeria meningitis
- MI 6.1.12.** Describe pathogenesis, lab diagnosis, prevention and treatment of gram negative bacterial meningitis
- MI 6.1.13.** Describe pathogenesis, lab diagnosis, prevention and treatment of tubercular meningitis
- MI 6.1.14.** Describe pathogenesis, lab diagnosis, prevention and treatment of meningitis caused by spirochetes
- MI 6.1.15.** Describe pathogenesis, lab diagnosis, prevention and treatment of viral meningitis caused by *Herpes viruses*, *Enteroviruses*, *Mumps virus*, etc

MI 6.1.16. Describe pathogenesis, lab diagnosis, prevention and treatment of meningitis caused by fungi - *Cryptococcus neoformans*, *Candida Spp.*, *Coccidioides*, *Histoplasma*, etc

MI 6.2 Enumerate the microbial agents causing encephalitis Explain the pathogenesis, clinical course and laboratory diagnosis of encephalitis caused by bacterial, fungal, viral and parasitic agents.

MI 6.2.1. Define: Encephalitis

MI 6.2.2. Classify Encephalitis

MI 6.2.3. Enumerate the causative agents of Encephalitis

MI 6.2.4. Describe general pathogenesis of encephalitis

MI 6.2.5. Describe the clinical presentation of Encephalitis

MI 6.2.6. Discuss the approach to diagnosis of viral Encephalitis

MI 6.2.7. Describe morphology of polio virus. Describe pathogenesis, clinical features, lab diagnosis and prevention of poliomyelitis

MI 6.2.8. Describe morphology of rabies virus. Describe pathogenesis, clinical features, lab diagnosis and prevention of rabies

MI 6.2.9. Describe etiology, pathogenesis, clinical features, lab diagnosis and prevention of slow viral infections

MI 6.2.10. Discuss the etiopathogenesis, clinical features and approach to diagnosis of parasitic meningitis and Encephalitis

MI 6.2.11. Discuss the etiopathogenesis, clinical features and approach to diagnosis of brain abscess

MI 6.2.12. Discuss the etiopathogenesis, clinical features and approach to diagnosis of cystic brain lesion- neurocysticercosis, hydatid disease of brain

MI 6.3 Identify the microbial agents causing meningitis from a Gram stained given smear. Read & Interpret the microscopic findings and culture report of CSF to diagnose a case of bacterial, viral, fungal or parasitic infection in CNS

MI 6.3.1. Analyse clinical features, interpret laboratory test results & gram staining slide provided to diagnose the clinical condition and identify the causative microorganism.

MI 6.3.2 Describe normal ranges of common CSF parameters

MI 6.3.3. Interpret abnormal results of CSF analysis report provided.

MI 6.3.4 Demonstrate CSF collection in a mannequin

TOPIC: RESPIRATORY TRACT INFECTIONS**(MI 7.1-6.5)****No of Competency-5****No of procedures require Certification-2**

- MI 7.1** Describe the etio-pathogenesis, laboratory diagnosis and prevention of Infections of upper respiratory tract
- MI 7.1.1** Describe the structure respiratory system and role of immunity in respiratory system
- MI 7.1.2** Discuss the etiological agents, pathogenesis epidemiology clinical features, complications and laboratory diagnosis of rhinitis
- MI 7.1.3** Discuss the classification, etiological agents, pathogenesis, epidemiology clinical features, complications and laboratory diagnosis of otitis
- MI 7.1.4** Discuss the etiological agents, pathogenesis, epidemiology, clinical features, complications and laboratory diagnosis of sinusitis.
- MI 7.1.5** Discuss the etiological agents, pathogenesis, epidemiology, clinical features, complications and laboratory diagnosis of tonsillitis.
- MI 7.2** Explain the etiopathogenesis, laboratory diagnosis and prevention of Infections of the lower respiratory tract caused by bacterial, mycobacterial, viral, fungal and parasitic agents.
- MI 7.2.1** Discuss the etiological agents, pathogenesis, epidemiology, clinical features, complications and laboratory diagnosis of laryngitis, bronchitis, bronchiolitis.
- MI 7.2.2** Define & classify pneumonia. Enumerate the etiological agents of pneumonia general laboratory diagnosis and prophylaxis of pneumonia

- MI 7.2.3** Describe the epidemiology, mode of transmission, pathogenesis, clinical features complications, laboratory diagnosis, treatment and prophylaxis of pulmonary tuberculosis
- MI 7.2.4** Discuss the importance of MDR TB, RNTCP HIV TB co-infection
- MI 7.2.5** Define and classify the atypical mycobacteria discuss the pathogenesis, clinical features, complications and treatment of pulmonary atypical mycobacterial infection
- MI 7.2.6** Enumerate the etiological agents, pathogenesis, epidemiology clinical features, complications and laboratory diagnosis of viral respiratory infections – Adeno, RSV, EBV
- MI 7.2.7** Enumerate the etiological agents, pathogenesis, epidemiology clinical features, complications and laboratory diagnosis of viral pneumonia – Influenza virus, SARS-corona

MI 7.3 Enlist & identify the etiological agents of lower respiratory infection in specific situations like age, immune status, community-acquired pneumonia, hospital-acquired pneumonia etc

- MI 7.3.1** Discuss pathogenesis, epidemiology clinical features, complications and laboratory diagnosis of community acquired pneumonia-pneumococci
- MI 7.3.2** Enumerate the etiological agents, pathogenesis, epidemiology clinical features, complications and laboratory diagnosis of hospital acquired pneumonia- Klebsiella, Staphylococci, Legionella
- MI 7.3.3** Enumerate the etiological agents, pathogenesis, epidemiology clinical features, complications and laboratory diagnosis treatment and prophylaxis of ventilator associated pneumonia- Acinetobacter
- MI 7.3.4** Enumerate the etiological agents, pathogenesis, epidemiology clinical features, complications and

- laboratory diagnosis of atypical pneumonia- Mycoplasma, Chlamydia
- MI 7.3.5** Enumerate the etiological agents, pathogenesis, epidemiology clinical features, complications and laboratory diagnosis of pneumonia in immunocompromised host- Pneumocystis jirovecii, CMV
- MI 7.3.6** Discuss the general characters of dimorphic fungi. Discuss the mode of transmission, pathogenesis, clinical features, complications and laboratory diagnosis of pulmonary mycosis- Histoplasma, coccidioides, Blastomyces, Paracoccidioides
- MI 7.3.7** Discuss mode of transmission, pathogenesis, clinical features laboratory diagnosis of aspergillosis
- MI 7.3.8** Parasites affecting lung - Paragonimus westermanii (non core), Loeffler's syndrome, amoebic lung abscess
- MI 7.3.9** Discuss the immunoprophylaxis for respiratory tract infections
- MI 7.4** Identify the common etiologic agents of upper respiratory tract infections (Gram Stain)
- MI 7.4.1** Describe the method of sample collection and transportation
- MI 7.4.2** Explain the steps of gram's staining procedure
- MI 7.4.3** Do the gram's staining procedure
- MI 7.4.4** Observe the stained smear
- MI 7.4.5** Interpret and Report the staining results
- MI 7.5** Identify the common etiologic agents of lower respiratory tract infections (Gram Stain & Acid fast stain)
- MI 7.5.1** Enumerate the organisms causing LRTI
- MI 7.5.2** Describe the method of sample collection
- MI 7.5.3** Recap the Gram's staining procedure and repetition
- MI 7.5.4** Explain the Acid fast staining procedure
- MI 7.5.5** Perform the Acid fast staining procedure
- MI 7.5.6** Interpret and Report the staining results

TOPIC: - GENITOURINARY & SEXUALLY TRANSMITTED INFECTIONS**(MI 8.1-8.4)****No of competencies-4****No of procedures requiring certification -NIL**

- MI 8.1** Describe the etiopathogenesis and discuss the laboratory diagnosis of common bacterial, fungal and parasitic infections of genitourinary system
- MI 8.1.1** Describe the normal anatomy and innate defence mechanisms in the male and female genital tract
 - MI 8.1.2** Enumerate the various infections of genitourinary tract
 - MI 8.1.3** Describe the etiology and pathogenesis of Genitourinary tract infections in general
 - MI 8.1.4** Discuss the clinical features, sample collection and laboratory diagnosis of genitourinary infections in general
 - MI 8.1.5** Discuss the effect/ complications of genitourinary infections in pregnancy (Maternal & fetal)
- MI 8.2** Enlist common sexually transmitted infections (STI). Explain the pathogenesis, laboratory diagnosis and prevention of common bacterial and viral sexually transmitted infections.
- MI 8.2.1** Enumerate the bacterial, viral, fungal and parasitic agents causing Sexually Transmitted infections
 - MI 8.2.2** Describe the pathogenesis, clinical features, laboratory diagnosis and treatment of pathogens causing ulcerative lesions in the genital tract (Syphilis, Haemophilus ducreyi, LGV, Calymmatobacterium granulomatis, Herpes Virus)
 - MI 8.2.3** Describe the pathogenesis, clinical features, laboratory diagnosis and treatment of pathogens causing Urethral syndrome/ white discharge per vagina (Gonococci, Candida spp, Trichomonas vaginalis, Bacterial vaginosis)
 - MI 8.2.4** Describe the pathogenesis, clinical features, laboratory diagnosis and treatment of Mycoplasma spp
 - MI 8.2.5** Describe non gonococcal urethritis. Enumerate the agents causing the same
 - MI 8.2.6** Differentiate between bacterial vaginosis & bacterial vaginitis
 - MI 8.2.7** Discuss the various measure for prevention of Sexually Transmitted infections

- MI 8.2.8** Discuss the importance of confidentiality in reporting Sexually transmitted diseases
- MI 8.2.9** Discuss the role of counselling in management of Sexually transmitted diseases
- MI 8.2.10** Enumerate the pathogens causing congenital infections. Discuss the pathogenesis, lab diagnosis, prophylaxis, prevention and treatment of these infections.
- MI 8.3** Explain the concept and utility of Syndromic management of STI.
- List various STI
 - List microorganisms causing STI
 - Mention clinical lesions and laboratory diagnosis of STI
 - Mention management of STI
- MI 8.4** Describe the etiopathogenesis, clinical features, the appropriate method for specimen collection and discuss the laboratory diagnosis of **Urinary tract infections**
- MI 8.4.1** Describe the normal anatomy, physiology and Innate defense mechanisms of the urinary tract
- MI 8.4.2** Mention the types of Urinary tract infections (upper and lower)
- MI 8.4.3** Mention the causative agents of urinary tract infection
- MI 8.4.4** Enumerate the predisposing factors in Urinary Tract infections
- MI 8.4.5** Discuss the pathogenesis of urinary tract infection
- MI 8.4.6** Discuss the clinical features of Urinary tract infections (Difference between upper and lower urinary tract infections)
- MI 8.4.7** Describe the methods of collection of urine from infant, adult men/women, and catheterized patients
- MI 8.4.8** Discuss the concept of significant bacteriuria
- MI 8.4.9** Discuss about asymptomatic bacteriuria& conditions these are seen
- MI 8.4.10** Describe about sterile pyuria and enumerate the disease causing sterile pyuria
- MI 8.4.11** Define Catheter associated urinary tract infection. Enumerate the predisposing factors, prevention, diagnosis and treatment of CAUTI
- MI 8.4.12** Discuss the laboratory diagnosis and treatment of Urinary tract infections

TOPIC- ZOONOTIC DISEASES & MISCELLANEOUS

(MI 9.1-9.6)

No of competencies-6

No of procedures require certification-NIL

- MI 9.1** Enumerate the microbial agents and their vectors causing **Zoonotic diseases**. Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course laboratory diagnosis and prevention
- Introduction-Define zoonotic infections. Enumerate organisms causing zoonotic infections in man and the mode of transmission/vectors transmitting them
- MI 9.1.1 Anthrax**-Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course laboratory diagnosis and prevention of Anthrax
- MI 9.1.2 Plague**- Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course laboratory diagnosis and prevention plague
- MI 9.1.3 Brucellosis**-Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course laboratory diagnosis and prevention brucellosis
- MI 9.1.4 Leptospirosis**-Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course laboratory diagnosis and prevention leptospirosis
- MI 9.1.5 Rickettsia**- Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course laboratory diagnosis and prevention Rickettsial and miscellaneous zoonoses
- MI 9.1.6 Arboviral**-Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course laboratory diagnosis and prevention of Arboviral infections- Dengue,chikungunya,KFD
- MI 9.1.7 Toxoplasma &Balantidium**-Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course laboratory diagnosis and prevention of toxoplasmosis &balantidiasis
- MI 9.1.8 Taeniasis**-Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course laboratory diagnosis and prevention of taeniasis
- MI 9.1.9 Hydatid disease**-Describe the morphology, mode of transmission, pathogenesis and discuss the clinical course laboratory diagnosis and prevention of hydatid cyst disease

MI 9.1.10 Rabies-Describe morphology of Rabies virus. Describe pathogenesis, clinical features, lab diagnosis and prevention of rabies

MI 9.2 Describe the etio-pathogenesis of **Opportunistic Infections (OI)** and discuss the factors contributing to the occurrence of OI, and the laboratory diagnosis

- Define opportunistic infections
- Enumerate organisms causing opportunistic infections
- Discuss factors contributing to development of opportunistic infections

Viral agents

- Describe pathogenesis, clinical features, laboratory diagnosis and prevention of viral opportunistic infections - Herpes group, human papillomavirus,

Fungal Opportunistic Infections

- Describe pathogenesis, clinical features, laboratory diagnosis and prevention of candidiasis
- Describe pathogenesis, clinical features, laboratory diagnosis and prevention of Cryptococcosis
- Describe pathogenesis, clinical features, laboratory diagnosis and prevention of mucormycosis

Parasitic Opportunistic Infections

- Describe pathogenesis, clinical features, laboratory diagnosis and prevention of opportunistic parasitic infections - coccidian intestinal parasitic infections, strongyloidiasis

MI 9.3 Choose the most suitable microbiological investigation in a given clinical situation and interpret the results of the laboratory tests for the diagnosis of the infectious disease

MI 9.4 Describe the role of **oncogenic viruses** in the evolution of virus associated malignancy

- Define oncogenic viruses
- Enumerate oncogenic viruses
- Describe pathogenesis of viral oncogenesis
- Describe laboratory diagnosis of oncogenic viral infections
- Describe methods of prevention of oncogenic viral infections

MI 9.5 Describe the etiologic agents of **Emerging Infectious diseases**.

- Discuss the clinical course and diagnosis
- Define emerging infectious agents.
- Enumerate agents causing emerging infections
- Describe factors contributing to emerging infections.
- Discuss clinical course and laboratory diagnosis of emerging infections
- Describe the Indian scenario of emerging infectious agents

MI 9.6 Describe the National Health Programs in the prevention of common infectious diseases and discuss the National reference centres for disease diagnosis and control

- Enumerate all the National Health Programs regarding common infectious diseases in India
- Describe the goals of the various National Health Programs in the prevention of common infectious disease.
- Describe laboratory diagnostic tools used in the National Programs related to infectious diseases
- Describe general immunoprophylactic and chemoprophylactic measures used in the National Programs related to infectious diseases
- Discuss the National reference centers for disease diagnosis and control

TOPIC- HEALTH CARE ASSOCIATED INFECTIONS (HAI)

(MI 10.1-10.5)

No of competencies-5

No of procedures require certification-1

MI 10.1 Define **Healthcare Associated Infections (HAI)** and enumerate the types. Discuss the factors that contribute to the development of HAI and the methods for prevention

- Define Healthcare Associated Infections(HAI)
- Enumerate the types of HAI
- Discuss the factors that contribute to the development of and methods to prevent catheter associated urinary tract infection(CAUTI)
- Discuss the factors that contribute to the development of and methods to prevent central line associated blood stream infection(CLABSI)
- Discuss the factors that contribute to the development of and methods to prevent ventilator associated pneumonia(VAP)
- Discuss the factors that contribute to the development of and methods to prevent surgical site infection(SSI)
- Describe principles and application of antibiotic stewardship

MI 10.2, 10.3 Describe the standard & transmission based precautions for infection control and the role of the hospital infection control committee (HICC) in the prevention of HAI. Demonstrate hand washing, donning-doffing of PPE and segregation of Biomedical waste

- Define Standard precautions
- List the components of Standard precautions
- Describe the various transmission-based precautions.
- Describe the constitution and functions of HICC.
- Define Biomedical waste
- Classify biomedical waste and describe methods of segregation, decontamination and disposal of each type as per Biomedical waste management rule
- Describe appropriate management of needle stick injury in healthcare setting

- Manage bio-spill
- Describe vaccines that are useful in healthcare workers

MI 10.4 Describe the methods used and significance of assessing the microbial contamination of food, water and air (in hospital surveillance)

- Describe the methods used and significance of assessing the microbial contamination of food.
- Describe the methods used and significance of assessing the microbial contamination of water.
- Describe the methods used and significance of assessing the microbial contamination of air

MI 10.5 Describe the commonly detected drug-resistant microbes in HAI. Explain the mechanism of evolution, spread, and control of antimicrobial drug resistance in hospitalized patients.

TOPIC- Antimicrobial resistance (AMR) & Antimicrobial Stewardship (AMSP)

(MI 11.1-11.3)

No of competencies-3

No of procedures require certification-NIL

MI 11.1 Describe the genotypic & phenotypic mechanisms of antimicrobial drug resistance and the methods of antimicrobial susceptibility testing, along with interpretation of the antimicrobial susceptibility testing report

MI 11.1.1 Describe the bacterial genetic structures

- Describe bacterial variation – mutation & gene transfer
- Describe the methods of gene transfer in bacteria
- Describe gene transfer by artificial methods.
- List out mechanism of action of antimicrobial agents

MI 11.1.2 Define drug resistance, List out various mechanisms of antibacterial resistance. MRSA, VRE, ESBL, MBL etc.

- Define: Bacteriostatic, bactericidal, pharmacodynamics, pharmacokinetics, adverse reactions.
- List out and describe different methods of antimicrobial susceptibility testing
- Discuss MIC, broth dilution, agar dilution
- Describe principles of antibiotics selection and monitoring therapy

MI 11.2 Explain intrinsic & acquired drug resistance along with the antimicrobial spectrum of important human pathogens and its application in clinical therapy.

- What is drug resistance
- Mention types of drug resistance
- Explain intrinsic and extrinsic drug resistance
- What are the mechanisms for acquiring drug resistance
- Explain use of antimicrobial spectrum use in clinical therapy for human pathogens

MI 11.3 Explain the concept and application of the antimicrobial stewardship program including rational antimicrobial prescription and your role in its implementation.

- Define antimicrobial stewardship and explain in detail
- Define application and uses of AMSP
- What is rational antimicrobial prescription
- What is the role of AMSP in antimicrobial prescription in the hospital

5. UNIVERSITY EXAMINATION & PRELIMINARY EXAMINATION MARK DISTRIBUTION

Type of exam		Maximum marks	Minimum Marks
SUMMATIVE			
Theory (Two Papers)	Paper I	100	40
	Paper II	100	40
	Total	200	100
Practical		100	40
Total		300	150

Candidate must secure minimum 50% of marks in aggregate (Both in Theory and Practical) and NOT less than 40% in theory or Practical to declare PASS

6. PATTERN OF THEORY EXAMINATION IN FINAL EXAMINATION INCLUDING DISTRIBUTION OF MARKS, QUESTIONS, AND TIME

- i. Two theory papers : 100 marks each
- ii. Total duration : 3 hrs each (There will be 3 sections in each paper.)
- iii. Paper I : General Microbiology, hospital infection and control, immunology, infections of blood and cardiovascular system, Gastrointestinal tract and hepatobiliary system AETCOM modules 2.1
- iv. Paper II : Infections of skin, soft tissue & musculoskeletal system, Central nervous system, Respiratory system, Genitourinary & sexually transmitted infections, zoonotic and miscellaneous infections, AETCOM modules 2.8

7. QUESTION PAPER PATTERN

Paper I- General Microbiology, Hospital Infection & Control, immunology, infections of blood and cardiovascular system, gastrointestinal tract and hepatobiliary system, AETCOM 2.1

Section	Question No	Type	No of Questions	Marks
A	Question 1.	MCQ	10	20
B	Question 2	Long Answer Question	1	12
	Question 3	Short Notes	3 / 4	18
	Question 4	Short Answer Question	5 / 6	10
C	Question 5	Long Answer Question	1	12
	Question 6	Short notes	3 / 4	18
	Question 7	Short Answer Question	5 / 6	10
Total				100

Paper II- Infections of skin, soft tissue & musculoskeletal system, Central nervous system, Respiratory system, Genitourinary & sexually transmitted infections, zoonotic and miscellaneous infections, AETCOM modules 2.8

Section	Question No	Type	No of Questions	Marks
A	Question 1.	MCQ	10	20
B	Question 2	Long Answer Question	1	12
	Question 3	Short Notes	3 / 4	18
	Question 4	Short Answer Question	5 / 6	10
C	Question 5	Long Answer Question	1	12
	Question 6	Short notes	3 / 4	18
	Question 7	Short Answer Question	5 / 6	10
Total				100

There will be At least one Short Note on AETCOM in each paper

8. PRACTICAL EXAMINATION:

1	Staining	:	20 Marks
2	Stool examination/ PS- MP	:	20 marks
3	Hospital Infection Control- PPE	:	10 Marks
4	Spot/ OSPE	:	20 Marks
5	Viva I	:	15 marks
6	Viva II	:	15 Marks
	Total Marks	:	100 Marks

9. INTERNAL EXAMINATION I and II**1. Theory Examination Pattern**

Question No	Type	No of Questions	Marks
Question 1.	MCQ	10	10
Question 2	Long Answer Question	1	12
Question 3	Short Notes	3 / 4	18
Question 4	Short Answer Question	5 / 6	10
Total			50

2. Practical Examination:**For Ist and IInd term examinations**

1	Staining	:	15 Marks
2	Stool examination/ PS- MP/ PPE	:	10 marks
3	Spots/ OSPE	:	10 marks
4	Viva	:	15 marks
	Total Marks		50 Marks

Separate 10 Marks will be given to Journals on Internal assessment Practical Exams

10. PLAN FOR INTERNAL ASSESSMENT:

- There will be 3 internal assessment examinations in Microbiology. The structure of the internal assessment theory examinations will be similar to the structure of University Examinations.
- It is mandatory for the students to appear for all the internal assessment examinations.
- There will be only one additional examination for absent students (due to genuine reason) after approval by the Institutional Grievances

Committee. It shall be taken after preliminary examination and before submission of internal assessment marks to the University.

4. Internal assessment marks for theory will be out of 400 including log book and attendance and will be converted to 100. Internal assessment marks for practical will be out of 300 including Practical Journal, attendance and will be converted to 100. It will include day to day assessment, Journal completion, Reflection on ATECOM module 21 & 2.8, all activities like seminar, symposia, quizzes and other academic activities and Achievement of certifiable competencies.
5. Students must secure at least 50% marks of the total marks of internal assessment (combined in theory and practical,) and minimum marks in theory or practical should not be less than 40% to be eligible for appearing University examination.
6. 75% attendance in theory and 80% attendance in practical are mandatory to be eligible for University examinations.
7. Internal assessment marks will reflect as separate head of passing at the summative examination.
8. Internal assessment marks will not be added to marks of the University examinations and will be shown separately in mark list.

11. RECOMMENDED TEXT AND REFERENCE BOOKS

1. Microbiology – Topley & Wilson
2. Medical Microbiology – Greenwood
3. Essentials of Medical Microbiology – Apurba Sastry
4. Text book of Microbiology – Ananthanarayanan
5. Text book of Microbiology – Baveja
6. Parasitology – Chatterjee
7. Text book of parasitology – Chakraborty
8. Medical parasitology – Rajesh Karyakarte
9. Immunology – Roit
10. Mycology – Jagdishchandar



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