# UNIVERSITY OF DELHI

CNC-II/093/1(19)/2021-22/ 337
Dated: 23.11.2022

## NOTIFICATION

Sub: Amendment to Ordinances

The following Amendments to Ordinances of the University which have been approved by the Executive Council at its meeting held on 25.03.2022 are notified for information and necessary action, if any, to all the concerned:

**1. Amendment to Ordinance V (2) & VII. [EC. Res. 78-7 dated 25.03.2022] regarding course curriculum prepared on competency based UG curriculum for MBBS course - 2nd Professional (New Scheme).**

**Curriculum document for**
**MBBS CBME Phase II Batch for Microbiology**

***(Maulana Azad Medical College, University College of Medical Sciences & Lady Hardinge Medical College New Delhi)***

### 1. VISION

To provide state of the art, reliable diagnostic services and quality medical education that integrates recent advances and research to foster the development of a highly knowledgeable, skilled and competent undergraduate and postgraduate student in the subject of clinical microbiology.

### MISSION

- To develop state of art facility, in terms of quality infrastructure and trained manpower so as to enable the students of medical microbiology to appreciate the aetiology, pathogenesis and laboratory diagnosis of infectious diseases.
- To deliver timely and quality diagnostic services to patients.
- To create an environment for need based quality research among faculty and students.

## 2. OVERALL LEARNING OBJECTIVES FOR UNDERGRADUATE MEDICAL EDUCATION

The objectives are developed to foster the development of an 'Indian Medical Graduate' possessing requisite knowledge, skills and values with regard to infectious diseases as outlined in Competency Based Medical Education curriculum of National Medical Commission.

**The undergraduate learner should be able to demonstrate:**

1. An understanding of role of microbial agents in health and disease.
2. An 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.

**3. COMPETENCIES**: Table 1 and Annexure I

**4. COURSE** (Topics, theory practical, laboratory clinical): As per CBME curriculum laid down by NMC for Indian medical Graduate: Table 1

**5. TEACHING LEARNING METHODS**: Table 1

**The curriculum is based on NMC Document UG curriculum Part-I (available at https://www.nmc.org.in/wp-content/uploads/2020/01/UG-Curriculum-Vol-I.pdf). The Teaching learning methods, assessment tools, horizontal and vertical integration will be based on the document form NMC.**

**Subtopics to be taught in Microbiology for fulfillment of competencies**

| Topics | Topics |
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| **Gen Microbiology** | **Immunology** |
| Introduction, history, biosafety, universal precautions | Introduction |
| Bacteria in health and disease | Structure & Functions of Immune System |
| Bacterial Morphology & Physiology | Antigen & antibody |
| Bacterial Genetics | Antigen-Antibody Reaction |
| Isolation & Identification of Bacteria including Culture Media & Culture Methods | Complement System |
| Antimicrobial Resistance | Humoral and cellular Immune Response |

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| Bacterial Pathogenicity | Hypersensitivity |
| Sterilization & Disinfection | Autoimmunity |
| Gen properties Virus and lab diagnosis | Transplantation & Immunodeficiency |
| Gen properties of fungi | Tumour Immunology, Immunohematology, Immunoprophylaxis |
| Gen properties of parasites | **GIT & Hepatobiliary** |
| **CVS & Blood** | Diarrhoea & dysentery, Cholera, |
| Rheumatic fever & Infective endocarditis | Enteric fever |
| Infections causing anaemia | Food poisoning |
| Kala Azar & Toxoplasma | Intestinal Protozoal, nematodes & Trematodes infections |
| Malaria & Filariasis | Helicobacter/APD |
| Brucella, Borrelia, Listeria, S minor | Viral GI infections including hepatitis |
| Viral Haemorrhagic fevers | **Respiratory Infections** |
| HIV | Bacterial URTI |
| **Musculoskeletal system skin and soft tissues infections** | Viral pneumonia |
| Anaerobic infections | Bacterial LRTI |
| Bone & Joint Infections | **Genitourinary & STD infections** |
| Skin & soft tissue infections | UTI, E Coli, Proteus, Klebsiella |
| **CNS infections** | STD: Syphilis & gonorrhoea |
| Bacterial meningitis | Gonorrhoea |
| Viral Meningitis | |
| Encephalitis | |
| **Zoonotic diseases and miscellaneous** | |
| Zoonotic infections | Emerging and re-emerging infections |
| Oncogenic virus | Opportunistic infections |
| Infection control, PPE, BMW & HAI | Environmental microbiology |

**Table 1: Specific learning objective and topic as per CBME**

| **Session** | **SLOs** |
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| **General Microbiology & Immunology** | |
| **MI1.1Describe the different causative agents of Infectious diseases, the methods used in their detection, and discuss the role of microbes in health and disease** | |
| **MI1.1a**<br>Introduction – Microbiology & History, Biosafety & standard precautions | 1. Describe the scope of clinical Microbiology<br>2. Describe the different branches of Microbiology with suitable examples<br>3. Describe Whittaker classification<br>4. Enumerate important milestones of Medical Microbiology<br>5. Describe contribution of Louis Pasteur & Robert Koch in |

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| | details<br>6. Describe the development of Chemotherapy and contributions of Ehrlich and Fleming<br>7. Describe standard precautions, Biosafety<br>8. Describe various components, & their use of standard precautions. |
| **MI 1.1b**<br>Introduction of Bacteria in health and disease | 1. Describe Normal flora and its benefits<br>2. Differentiate between pathogen, commensals, and saprophyte.<br>3. Describe opportunistic pathogen<br>4. Describe the pathogen<br>5. Define: Health, Disease, infectious agents, commensalism, parasite, pathogen and opportunistic pathogen.<br>6. Explain the pathogenesis of bacterial infection.<br>7. Discuss the various microbial factors contributing to disease.<br>8. Enumerate the Global burden of common infectious diseases<br>9. Describe common infectious diseases in India |
| **MI 1.1c**<br>Bacterial Morphology | 1. Describe salient feature of eukaryotic and prokaryotic cell<br>2. Describe morphology cell structure, different shapes and arrangement of bacterial cells<br>3. Describe the structure and function of Cell organelles |
| **MI 1.1d**<br>Physiology & Metabolism | 1. Describe Physiology and metabolism of bacteria.<br>2. Describe the growth curve of bacteria<br>3. Describe anaerobiosis |
| **MI 1.1e**<br>General principle of identification of Bacteria | 1. Microscopy and culture of bacteria<br>2. Enumerate common culture media and biochemical reactions and its use<br>3. Describe the use of automation in identification of bacteria<br>4. Enumerate molecular techniques for identification |
| **MI1.1f**<br>Bacterial genetics | 1. Discuss Replication, mechanism of gene transfer, mutation and gene rearrangement in bacteria.<br>2. Describe Principals of genetic engineering. |
| **MI1.1g**<br>General Properties and Classification of Viruses (Including Bacteriophages) | 1. Describe the general features of virus<br>2. Describe the structure and symmetry of viruses<br>3. Describe viral replication<br>4. Classify viruses<br>5. Describe bacteriophages, its replication cycles and use |
| **MI1.1h**<br>Laboratory Diagnosis of Viral infection | 1. Enumerate the technique used in viral lab diagnosis<br>2. Describe the use of Microscopy and inclusion bodies<br>3. Describe tissue culture and detection of viral growth in it<br>4. Describe serological methods for Lab Diagnosis<br>5. Describe the molecular methods for laboratory diagnosis of viral diseases |

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| **MI1.1i**<br>General Properties and Classification of Fungi | 1. Describe the general features of Fungi<br>2. Classify fungi on morphological and taxonomical bases<br>3. Enumerate different mycoses with suitable example<br>4. Describe lab diagnosis of fungal infections |
| **MI1.1j**<br>General Properties and Classification of Parasites | 1. Classify parasites giving suitable examples<br>2. Enumerate common parasitic pathogen<br>3. Classify protozoa and helminths giving suitable examples<br>4. Describe various modes of transmission of different parasites.<br>. Enumerate different methods used for laboratory diagnosis of parasitic diseases |
| **MI 1.3 Describe the epidemiological basis of common infectious diseases** | |
| **MI 1.3**<br>Describe the epidemiological basis of common infectious diseases | 1. Describe host parasite relationship<br>2. Discuss the various sources and reservoirs of infections.<br>3. Describe different routes of transmission with suitable examples<br>4. Enumerate common strategies to prevent infectious disease.<br>5. Describe the various epidemiological patterns of infectious disease. |
| **MI 1.4 Classify and describe the different methods of sterilization and disinfection. Discuss the application of the different methods in the laboratory, in clinical and surgical practice** | |
| **MI 1.4**<br>Sterilization & Disinfection | 1. Define: Sterilization, disinfection, asepsis, antiseptics, and decontamination.<br>2. List different methods of sterilisation and disinfection<br>3. Describe various methods of sterilization (principle, method, use).<br>4. Classify disinfectants and describe various methods of disinfection.<br>5. Explain various monitoring methods applied for individual methods of sterilisation procedures and disinfectants .<br>6. Enumerate new methods of sterilization |
| **MI 1.5 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**<br>Sterilization & Disinfection | 1. Differentiate between sterilization and disinfection.<br>2. Describe Spaulding Classification of medical devices.<br>3. Describe the practical use of disinfectants according to clinical condition.<br>4. Recommend various methods of sterilization / disinfection for medical devices.<br>5. Describe the process and functioning of CSSD. |
| **MI1.6 Describe the mechanisms of drug resistance, and the methods of antimicrobial susceptibility testing and monitoring of antimicrobial therapy** | |

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| **MI 1.6**<br>Antimicrobial agents, mechanisms of antimicrobial resistance and antimicrobial susceptibility testing | 1. Classify antimicrobial agents and their mechanism of resistance.<br>2. Define and classify antimicrobial resistance.<br>3. List and describe mechanism of action of antimicrobial agents.<br>4. Describe acquired and intrinsic resistance.<br>5. Describe various methods of antimicrobial susceptibility testing.<br>6. Describe disc diffusion methods, E test and MIC methods in detail.<br>7. Define: Bacteriostatic, bactericidal, pharmacodynamics, pharmacokinetics, MIC, MBC, agar dilution.<br>8. Describe relevance of AST.<br>9. Describe antibiotic stewardship program, its utility and principles. |
| **MI1.7 Describe the immunological mechanisms in health** | |
| **MI1.7a**<br>Introduction to immunity | 1. Define and classify immunity<br>2. Define and contrast innate and acquired immunity<br>3. Describe mechanisms of innate immunity<br>4. Define and describe the salient features of active, passive and acquired immunity<br>5. Define local immunity, herd immunity and adoptive immunity |
| **MI 1.7b**<br>Structure and function of immune system | 1. Describe the structure and function of Central and peripheral lymphoid organs.<br>2. Describe the development of T and B lymphocytes<br>3. Describe the types of T and B lymphocytes<br>4. Compare and Contrast T cells and B cells<br>5. Describe morphology and function of macrophage<br>6. Describe the structure and functions of human MHC gene complex<br>7. Outline the other cells of Immune System<br>8. Describe class, properties and functions of important cytokines |
| **MI 1.7c**<br>Antigens | 1. Define antigen and antigenicity<br>2. Define and classify epitope & haptens<br>3. Describe alloantigens, isoantigen, heteroantigen, autoantigen and heterophile antigen.<br>4. Define immunogenicity and describe the factors affecting it.<br>5. Describe various determinants of antigenicity<br>6. Define adjuvant with examples<br>7. Describe mechanisms of adjuvant<br>8. Describe T cell dependent/independent antigens and superantigens |
| **MI1.7d**<br>Antibody | 1. Define antibody<br>2. Describe the structure and function of antibody |

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| | 3. Classify immunoglobulins<br>4. Describe the structure and functions of IgG, IgM, IgA, IgE and IgD<br>5. Describe antigenic determinants of immunoglobulins<br>6. Describe abnormal Immunoglobulins<br>7. Define the monoclonal antibody<br>8. Describe the hybridoma technique for production of monoclonal antibody<br>9. Enumerate various applications of monoclonal antibody |
| **MI 1.7e** Antigen Antibody reactions | 1. Describe general properties of antigen antibody reactions.<br>2. Describe lattice hypothesis<br>3. Classify antigen antibody reactions.<br>4. Describe the principle, method, types and uses of precipitation, agglutination and neutralization reaction.<br>5. Describe the principle, method, types and uses of complement fixation test, ELISA, immunofluorescence assay, CLIA. Radioimmuno assay, western blot and rapid tests. |
| **MI 1.7f** Complement | 1. Define complement and enumerate complement activation pathways.<br>2. Describe the classical and alternate pathway of complement<br>3. Compare and contrast Classical and Alternative complement pathways<br>4. Describe the biological effects of complement<br>5. Enumerate common complement deficiency and associated diseases |
| **MI 1.8 Describe the mechanisms of immunity and response of the host immune system to infections** | |
| Immune response | 1. Define cell mediated and humoral immune response<br>2. Describe the process of antigen presentation<br>3. Describe the cell mediated immune response<br>4. Describe humoral immune response<br>5. Describe the activation and differentiation of B cells<br>6. Describe, compare and contrast the events of primary and secondary immune response |
| **MI1.9 Discuss the immunological basis of vaccines and describe the Universal Immunisation schedule** | |
| **MI 1.9**<br>Immunoprophylaxis | 1. Define immunoprophylaxis<br>2. Describe the types and explain the scientific basis of vaccines [live attenuated, killed, toxoid, subunit<br>3. Enumerate commonly used vaccines<br>4. Describe Universal immunisation program and National Immunisation Schedule<br>5. Describe the 'Cold Chain System" and the steps involved in vaccine development |

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| | 6. Describe the newer approaches for vaccine development |

**MI1.10 Describe the immunological mechanisms in immunological disorder (hypersensitivity, autoimmune disorders and immunodeficiency states) and discuss the laboratory methods used in detection.**

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| **MI 1.10a**<br>Hypersensitivity | 1. Define hypersensitivity.<br>2. Classify hypersensitivity and describe their features.<br>3. Describe the mechanism and clinical presentation of Type I,II,III & IV hypersensitivity |
| **MI 1.10b**<br>Autoimmune | 1. Define Autoimmunity<br>2. Describe mechanisms of immune (central and peripheral) tolerance<br>3. Describe mechanisms of autoimmunity<br>4. Describe the pathogenesis of common autoimmune diseases<br>5. Describe laboratory tests of autoimmune diseases<br>6. Describe the role of Immunofluorescent test in diagnosis of autoimmune diseases.<br>7. Describe newer approaches for treatment of autoimmune diseases |
| **MI1.10c**<br>Immunodeficiency | 1. Define and enumerate Immunodeficiency<br>2. Classify immunodeficiency diseases<br>3. Describe common immunodeficiency diseases |

**MI 1.11 Describe the immunological mechanisms of transplantation and tumor immunity**

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| Transplant & tumour immunity | 1. Describe the role of Histocompatibility antigens in transplant immunology<br>2. Describe the types of graft rejection<br>3. Describe mechanism and factors affecting graft rejection<br>4. Describe graft versus host reaction<br>5. Describe approaches for prevention of graft rejection<br>6. Describe Tumor antigens (TSTA and TATA)<br>7. Describe mechanism of immune response against tumour cells<br>8. Describe immune surveillance theory<br>9. Explain the role of vaccine, monoclonal antibodies and cytokines in cancer immunotherapy. |

| **CVS and Blood** |
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| MI2.1 Describe the etiologic agents in rheumatic fever and their diagnosis |

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| **MI2.1**<br>Rheumatic fever | 1. Define Rheumatic fever and name it's causative agent<br>2. Classify Streptococcus species<br>3. Describe the morphology, pathogenesis, toxins, virulence factors, antigenic structures, clinical features, epidemiology of streptococcus pyogenes<br>4. Describe the infections caused by S pyogenes and list the suppurative and non-suppurative sequelae of Streptococcus pyogenes<br>5. Describe the pathogenesis, clinical features and complications of Rheumatic fever<br>6. Describe the laboratory diagnosis of rheumatic fever and of other infection caused by beta haemolytic Streptococci. |
| **MI2.2Describe the classification etio-pathogenesis, clinical features and discuss the diagnostic modalities of Infective endocarditis** | |
| **MI 2.2**<br>Infective endocarditis (S. viridans, CONS, HACEK Enterococcus) | 1. Classify IE and enumerate the causative organisms<br>2. Describe the morphology, pathogenesis, virulence factors, antigenic structures, clinical features, epidemiology of S. viridans, CONS, HACEK organisms, Enterococcus<br>3. Describe the pathogenesis and clinical features of infective endocarditis.<br>4. Describe the Laboratory diagnosis of IE.<br>5. Briefly discuss the antimicrobial treatment of IE |
| **MI2.4 List the common microbial agents causing anemia. Describe the morphology, mode of infection and discuss the pathogenesis, clinical course, diagnosis and prevention and treatment of the common microbial agents causing Anemia** | |
| **MI 2.4**<br>Infections causinganemia: [Trematodes (Schistosoma), Nematodes (Ancylostoma, N. americanus, Trichuris trichuria) , Cestodes (D latum)]. | 1. Enumerate the microbial agents causing Anaemia<br>2. Describe morphology, modes of transmission, pathogenicity, life cycle of parasites causing anaemia ([Trematodes (Schistosoma), Nematodes (Ancylostoma, N. americanus, Trichuris trichuria) , Cestodes (D latum)]<br>3.Discuss clinical course of Anaemia caused by each microbial agent<br>4.Describe laboratory diagnosis of each microbial agent causing Anaemia.<br>5. Describe treatment, prevention and control of each microbial agent |
| **MI2.5 Describe the etio-pathogenesis and discuss the clinical evolution and the laboratory diagnosis of kalaazar, malaria, filariasis and other common parasites prevalent in India** | |

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| **MI2.5a**<br>Kala Azar (Leishmania)& sleeping sickness (Trypanosoma) | 1. Classify the common Leishmania species causing human disease and the clinical syndromes caused by them<br>2. Describe the morphology, modes of transmission, pathogenicity, life cycle of Leishmania donovanii and Trypanosoma<br>3. Discuss the clinical presentation, complications and laboratory diagnosis of kala azar and trypanosomiasis.<br>4. Describe PKDL<br>5. Describe treatment, prevention and control of kala azar and trypanosomiasis.<br>6. Classify the Trypanosomes infecting man and the diseases caused by them |
| **MI2.5b**<br>Toxoplasmosis | 1. Describe the morphology, modes of transmission, pathogenicity, life cycle of Toxoplasma gondii.<br>2. Describe the clinical presentation, complications and laboratory diagnosis of Toxoplasmosis.<br>3. Discuss the treatment, prevention and control of Toxoplasmosis. |
| **MI 2.5c**<br>Malaria and Babesia. | 1. Enumerate the causative Plasmodium species of human malaria<br>2. Describe the morphology, modes of transmission, pathogenicity, life cycle of Plasmodium species.<br>3. Describe the clinical presentation, complications immunity and laboratory diagnosis of malaria.<br>4. Discuss the treatment, prevention and control of malaria.<br>5. Describe the morphology, modes of transmission, pathogenicity, life cycle of Babesia.<br>6. Describe the clinical presentation and laboratory diagnosis of Babesiosis |
| **MI 2.5d**<br>Filariasis | 1. Enumerate the filarial nematodes causing lymphatic filariasis<br>2. Describe the morphology, modes of transmission, pathogenicity, life cycle of loaloa, oncocercavololus, Wuchereriabancrofti and Brugiamalayi.<br>3. Describe the clinical presentation, complications immunity and laboratory diagnosis of filariasis.<br>4. Discuss the treatment, prevention and control of filariasis.<br>5. Differentiate between the microfilaria of loaloa, oncocercavololus, Wuchereriabancrofti and Brugiamalayi. |
| **MI2.5e**<br>Miscellaneous Infections of blood:Brucella. | 1. Describe the epidemiology of Brucella<br>2. Describe the classification, morphology, and virulence factors of Brucella<br>3. Describe the epidemiology pathogenesis, mode of transmission, clinical features and laboratory diagnosis of Brucellosis<br>4. Describe the complications, treatment, prevention and control of Brucellosis. |

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| **MI2.5e**<br>Miscellaneous Infections of blood: Borrelia, Listeria, Spirillum minor, Parvovirus & EBV. | 1. Describe the epidemiology, morphology, virulence factors and pathogenicity of Borrelia, Listeria, Parvovirus and Epstein Barr Virus and spirillum minor.<br>2. Describe the pathogenesis, clinical features and diagnostic modalities of infections caused by these agents.<br>3. Describe the complications, treatment, prevention and control of listeriosis, rat bite fever, relapsing fever and Lyme disease. |
| **MI2.5f**<br>Viral haemmorhagic fevers: Arboviruses, Filovirus, robovirus | 1. Enumerate and classify the viruses causing haemorrahagic fevers.<br>2. Decribe the morphology, mode of transmission pathogenesis and virulence factors of viral agents causing VHF.<br>3. Describe the clinical features, complications and laboratory diagnosis of VHF.<br>4. Describe treatment prevention and control of VHF. |
| **MI2.7 Describe the epidemiology, the etio- pathogenesis, evolution complications, opportunistic infections, diagnosis, prevention and the principles of management of HIV** | |
| **MI 2.7**<br>HIV | 1. Describe morphology, antigenic structure, pathogenesis, serotypes, replication of HIV.<br>2. Describe clinical features including WHO clinical staging of HIV/AIDS for adults<br>3. Describe global and Indian epidemiology of AIDS.<br>4. Enumerate opportunistic infections occurs in HIV infected people<br>5. Describe laboratory diagnosis of HIV/AIDS<br>6. Describe NACO strategy for HIV diagnosis<br>7. Describe treatment strategies in brief.<br>8. Describe PEP as per NACP guidelines.<br>9. List HIV vaccine strategies |

| **GIT Infections** |
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| MI3.1 Enumerate the microbial agents causing diarrhea and dysentery. Describe the epidemiology, morphology, pathogenesis, clinical features and diagnostic modalities of these agents |

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| **MI3.1a**<br>Gastro intestinal tract infections: general, Diarrhoea, Dysentery, Introduction to Enterobacteriaceae, E coli, Shigella, Campylobacter, other Enterobacteriaceae members. | 1. Define diarrhoea and dysentery.<br>2. Describe the epidemiology of diarrhoea and dysentery<br>3. Enumerate the microbial agents causing diarrhoea and dysentery<br>4. Describe the pathogenesis, clinical features and complications of diarrhea & dysentery.<br>5. Differentiate the clinical features of diarrhoea and dysentery.<br>6. Describe laboratory diagnosis of diarrhoea and dysentery.<br>7. Describe the epidemiology, morphology, cultural characteristics, virulence markers, identification strategies of diarrheagenic E. coli, Shigella & other Enterobacteriaceae causing diarrhoea and dysentery. |
| **MI3.1b**<br>Cholera: Vibrio, Plesiomonas and Aeromonas | 1. Define cholera.<br>2. Describe the epidemiology of cholera<br>3. Describe the pathogenesis, clinical features and complications of cholera.<br>4. Describe various methods of clinical and laboratory diagnosis of cholera.<br>5. Describe the epidemiology, morphology, cultural characteristics, virulence markers, identification strategies of Vibrio cholera, Aeromonas, Plesiomonas<br>6. Describe the treatment, prevention and control of cholera. |
| **MI3.1c**<br>Parasitic Gastro intestinal tract infections: Entamoeba and Giardia | 1. Describe the epidemiology, morphology, life cycle, pathogenesis, clinical features and diagnosis of Entamoeba histolytica, Balantidium coli and Giardia<br>2. Describe the epidemiology, morphology, life cycle, pathogenesis, clinical features and diagnosis of coccidian parasites.<br>3. Describe the treatment, prevention and control of infections caused by Entamoeba histolytica, Balantidium coli, Giardia and coccidian parasites |
| **MI3.1d**<br>Viral GI infections | 1. Describe the epidemiology, morphology, pathogenesis, clinical features and diagnostic modalities of viral gastroenteritis.<br>2. Describe the epidemiology, morphology, pathogenesis, immunity, clinical features, |

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| | diagnosis, prevention and control of gastroenteritis caused by rotavirus, adenovirus, Norwalk agent and norovirus |
| **MI 3.1e**<br>Parasitic GI Infections-I & II:<br>Intestinal nematodes (Ascaris, Enterobius Trichinella Strongyloidiasis) Trematodes (Liver fluke etc. ) | 1. Describe the epidemiology, morphology, life cycle and pathogenesis, of cestodes (Taenia saginata, T. solium, H. nana, Echinococcusgranuloses)<br>2. Describe the epidemiology, morphology, life cycle, pathogenesis, clinical features and diagnosis of trematodes (Fasciola hepatica & F. buski)<br>3. Describe the epidemiology, morphology, life cycle, pathogenesis, clinical features and diagnosis of intestinal nematodes.<br>4. Describe the laboratory diagnosis, treatment, control and prevention of diseases caused by these organisms. |
| **MI 3.3 Describe the enteric fever pathogens and discuss the evolution of the clinical course and the laboratory diagnosis of the diseases caused by them** | |
| **MI 3.3**<br>GI Infections: Enteric fever | 1. List the various pathogens causing enteric fever.<br>2. Describe the pathogenesis of Typhoid & paratyphoid fever.<br>3. Describe the morphology, virulence factors, cultural characteristics and identification strategies for Salmonella Typhi, S. Paratyphi A and B.<br>4. Describe the laboratory diagnosis of typhoid and paratyphoid fever.<br>5. Describe clinical course, epidemiology, treatment and complications of enteric fever.<br>6. Describe multidrug resistant Salmonella<br>7. Discuss treatment, prevention and control of enteric fever. |
| **MI3.5 Enumerate the causative agents of food poisoning and discuss the pathogenesis, clinical course and laboratory diagnosis** | |
| **MI 3.5**<br>Food Poisoning {Staphylococcus aureus<br>Bacillus cereus<br>Clostridium perfringens<br>Bacillus cereus<br>Vibrio cholerae<br>Vibrio parahaemolyticus<br>Enterotoxigenic Escherichia coli | 1. Define and classify various types of Food Poisoning.<br>2. Enumerate and classify the causative agents of food poisoning and commonly incriminated food items<br>3. Describe the pathogenesis, clinical course with relation to the etiological agent.<br>4. Describe the laboratory diagnostic of food |

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| Enterohemorrhagic Escherichia coli<br>Non typhoidal Salmonella<br>Shigella spp.} | poisoning. |
| **MI3.6 Describe the etio-pathogenesis of Acid peptic disease (APD) and the clinical course. Discuss the diagnosis and management of the causative agent of APD** | |
| **MI 3.6**<br>APD:Helicobacter pylori | 1. Describe Acid peptic disease.<br>2. Describe clinical course of APD.<br>3. Describe the pathogenesis of APD due to H. pylori<br>4. Describe the morphology, cultural characteristics, and identification strategies of Helicobacter pylori.<br>5. Describe diagnosis, treatment, control and prevention of acid peptic disease. |
| **MI3.7 Describe the epidemiology, the etio-pathogenesis and discuss the viral markers in the evolution of Viral hepatitis. Discuss the modalities in the diagnosis and prevention of viral hepatitis** | |
| **MI 3.8a**<br>Viral Hepatitis | 1. Define and describe viral hepatitis<br>2. Enumerate and describe the viruses causing hepatitis<br>3. Describe the epidemiology, pathogenesis and clinical features of hepatitis A, B, C, D, E and G viruses.<br>4. Discuss the viral markers in the evolution of acute and chronic Viral hepatitis.<br>5. Describe the modalities in the diagnosis, treatment and prophylaxis of hepatitis A, B, C, D, E and G viruses. |
| **MI3.8 Choose the appropriate laboratory test in the diagnosis of viral hepatitis with emphasis on viral markers** | |
| **MI 3.8b**<br>Viral Hepatitis | 1. Enumerate and describe the viral markers daignostic of viral hepatitis<br>2. Describe the evolution, rise and fall of various markers.<br>3. Discuss the viral markers in the evolution of Viral hepatitis (A, B, C, D, E and G).<br>4. Describe the utility of each marker with respect to clinical stage of hepatitis. |

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| **Skin and soft tissue infections** |
| **MI 4.1 Enumerate the microbial agents causing anaerobic infections. Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of anaerobic infections** |

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| **MI 4.1a** Anaerobes and anaerobic infections including anaerobic culture methods | 1. Define anaerobes<br>2. Describe features of anaerobic infections<br>3. Enumerate and classify pathogenic anaerobic bacteria<br>4. Describe the pathogenesis, clinical course, laboratory diagnosis and complications of common anaerobic infection.<br>5. Describe different methods of anaerobiosis |
| **MI4.1b**<br>Tetanus and gas gangrene | 1. Define gas gangrene<br>2. Enumerate the causative agents of gas gangrene<br>3. Describe the morphology, virulence factors, cultural characteristics of Clostridium perfringens.<br>4. Describe the pathogenesis, clinical course and laboratory diagnosis of gas gangrene.<br>5. Describe the treatment, prevention and control of gas gangrene.<br>6. Define tetanus and name the causative agent<br>7. Describe the Morphology, virulence factors, cultural characteristics of Clostridium tetani<br>8. Describe the pathogenesis, clinical course and laboratory diagnosis of tetanus<br>9. Describe the treatment, prevention and control of tetanus |
| **MI4.1c**<br>Botulinum and Miscellaneous anaerobes} | 1. Define botulism and its types<br>2. Describe the morphology, virulence markers, cultural characteristics of Clostridium botulinum.<br>3. Describe the epidemiology, pathogenesis, clinical manifestations, complications & laboratory diagnosis of botulism<br>4. Describe role of anaerobic organisms as normal gut flora<br>5. Describe antibiotic associated colitis and its aetiology<br>6. Describe the pathogenesis, clinical features and management of antibiotic associated colitis<br>7. Enumerate non sporing anaerobes<br>8. Enumerate the diseases caused by common non sporing anaerobes<br>9. Describe the pathogenesis and clinical features of various infections caused by non sporing anaerobes.<br>10. Discuss laboratory diagnosis for infections caused by nonsporing anaerobes |
| **MI4.2 Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of bone & joint infections** | |
| **MI4.2**<br>Joint and bone infections: Osteomylitis & arthritis (Staph aureus, CONS) Parvovirus | 1. Enumerate common bacterial and viral agents causing osteomyelitis, septic arthritis, diabetic foot infections<br>2. Describe the pathogenesis, clinical features and laboratory diagnosis of osteomyelitis and arthritis. |

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| | 3. Differentiate between gonococcal and non gonococcal arthritis<br>4. Define osteomyelitis<br>5. Enumerate causative agents of osteomyelitis<br>6. Describe the pathogenesis, clinical features, laboratory diagnosis and management of Osteomyelitis. |
| **MI4.3 Describe the etio-pathogenesis of infections of skin and soft tissue and discuss the clinical course and the laboratory diagnosis** | |
| **MI 4.3 a**<br>Skin and soft tissue infections: Classification,etiology and general considerations , Parasitic Skin manifestations (Ectoparasites, Larva migrans, PKDL) | 1. Enumerate the organisms of normal skin flora<br>2. Discuss the role of normal flora of skin<br>3. Define and classify SSTIs<br>4. Describe the varied clinical presentations with eiological agents of SSTIs<br>5. Describe the etiopathogenesis, clinical presentation and management of superficial and deep skin infections<br>6. Describe lab diagnosis of various types of SSTI<br>7. Enumerate the parasites involved in skin and soft tissue infections.<br>8. Describe etiology, types, clinical presentation and management of larva migrans.<br>9. Describe etiology, clinical presentation and management of PKDL |
| **MI 4.3b**:<br>Leprosy and NTM | **1.** Define and classify leprosy<br>**2.** Describe morphology and cultural characters of M.leprae<br>**3.** Describe the pathogenesis and clinical presentations in leprosy<br>**4.** Describe the role of immunity in leprosy<br>**5.** Describe lepra reactions<br>**6.** Describe lab diagnosis, treatment and control of leprosy<br>**7.** Describe and classify Non tuberculus Mycobacteria (NTM).<br>**8.** Describe the etiopathogenesis, clinical presentation and management of infections caused by NTM |
| **MI 4.3 c:**<br>Viral exanthemas | 1. Enumerate the causes of viral exanthematous infections<br>2. Describe the etiopathogenesis of viral exanthematous infections<br>3. Describe the morphology, virulence factors, epidemiology and immunity of Measles virus, Chicken pox virus, small pox virus and Rubella virus.<br>4. Describe the clinical features, complication and diagnosis of measles, small pox, chicken pox and Rubella. |

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| | 5. Describe the treatment, prevention and control for viral exanthematous infections. |
| **MI 4.3d**<br>Superficial fungal infections | 1. Enumerate various surface infections of the skin and its appendages caused by fungal agents, along with their etiology<br>2. Describe the microscopic and cultural characteristics of fungal agents (Candida, Pityriasis versiclor, Tinea nigra, Piedra, onychomycosis, dermatophytes etc.) causing infections of skin<br>3. Enumerate various clinical types of dermatophytosis with their causative agents<br>4. Describe the morphological and cultural characters of dermatophytes.<br>5. Describe the laboratory diagnosis of superficial fungal infections<br>6. Describe the management of superficial fungal infections |
| **MI 4.3e**<br>Subcutaneous mycosis, mycetoma | 1. Define mycetoma<br>2. Enumerate the microbial agents (Bacteria & Fungi) causing mycetoma and subcutaneous mycosis<br>3. Describe the pathogenesis, clinical presentation laboratory diagnosis and treatment of subcutaneous mycosis and mycetoma. |

| **CNS Infections** | |
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| **MI5.1 Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of meningitis** | |
| **MI 5.1a**<br>Infections of CNS: Introduction & Pyogenic meningitis | **1.** Enumerate various infective syndromes of CNS<br>**2.** Define and classify Meningitis .<br>**3.** Differentiate between Acute & Chronic meningitis<br>**4.** Enumerate the bacterial, viral and parasitic causes of acute/pyogenic meningitis according to age.<br>**5.** Describe the morphology, antigenic structure and virulence factors of various etiological agents of pyogenic meningitis. (Neisseria meningitidis, Streptococcus pneumoniae, Haemophilus influenzae). |

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| **MI5.1 b** Aseptic meningitis | 1. Enumerate the bacterial, viral, fungal and parasitic etiological agents of aseptic meningitis.<br>2. Describe the morphology, antigenic structure and virulence factors of various etiological agents of aseptic meningitis. (Leptospira, Free living amoebae, Enterovirusess (poliovirus, echovirus, Coxsackie), Cryptococcus neoformans).<br>3. Describe the pathogenesis, clinical presentation, diagnosis, treatment, control and prevention of aseptic meningitis (Leptospira, Free living amoebae,Enterovirusess (poliovirus, echovirus, Coxsackie), Cryptococcus neoformans)<br>4. Differentiate the clinical findings of pyogenic meningitis and aseptic meningitis. |
| **MI 5.2 Describe the etiopathogenesis, clinical course and discuss the laboratory diagnosis of encephalitis** | |
| **MI 5.2a** Encephalitis | 1. Enumerate common etiological agents causing encephalitis with special reference to India.<br>2. Describe the morphology, virulence factors, antigenic structure and pathogenesis of causative agents of encepahlitis. (Rabies, Tick borne encephalitis viruses, HSV-2 & Nipah)<br>3. Describe the epidemiology, clinical features, diagnosis, treatment, control and prevention of Rabies.<br>4. Describe the epidemiology, clinical features, diagnosis, treatment, control and prevention of tick borne encephalitis.<br>5. Describe the epidemiology, clinical features, diagnosis, treatment, control and prevention of parasitic encephalitis |
| **MI 5.2b** Miscellaneous infections of CNS | 1. Define prions and slow virus infections<br>2. Describe the morphology, virulence factors, antigenic structure and pathogenesis of slow viruses and prions<br>3. Describe the epidemiology, clinical features, diagnosis, treatment, control and prevention of prion disease. |

| **Respiratory Tract Infections** | |
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| **MI6.1 Describe the etio-pathogenesis, laboratory diagnosis and prevention of Infections of upper and lower respiratory tract** | |
| **MI 6.1a** Respiratory tract infections: Introduction | 1. Describe the normal defence mechanism of respiratory tract<br>2. Enumerate various clinical types of respiratory infections with examples.<br>3. Describe the mode of transmission of upper and lower respiratory tract infections<br>4. Enumerate the causative agent of various type of respiratory infections.<br>5. Outline the laboratory diagnosis of patient with respiratory infection. |

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| **MI 6.1b** Viral URTI including common cold & croup | 1. Enumerate the causative viral agents of common cold, pharyngitis, croup, sinusitis, otitis media.<br>2. Describe classification, morphology, antigenic structure, virulence factor of causative agent (Adeno, Rhino, Mumps, Echo, Par echo, Coxsackie A, RSV, Corona, Influenza & Parainfluenza viruses).<br>3. Discuss the pathogenesis, epidemiology and immunity of causative agent .<br>4. Discuss the laboratory diagnosis, treatment and control of common cold, croup, mumps and pharyngitis. |
| **MI 6.1c** Tuberculosis | 1. Define and classify tuberculosis<br>2. Classify mycobacteria causing tuberculosis<br>3. Describe morphology, pathogenesis, virulence factors and cultural characteristics of Mycobacterium tuberculosis.<br>4. Describe the epidemiology, clinical manifestations, complications and laboratory diagnosis of pulmonary tuberculosis.<br>5. Discuss the treatment, control and prevention of tuberculosis.<br>6. Describe the strategies and case management as per RNTCP |
| **MI6.1d** Bacterial URTI-I<br>**MI6.1e** Bacterial URTI-II | 1. Enumerate the causative bacterial agents of pharyngitis, diphtheria, whooping cough (croup), sinusitis, otitis media.<br>2. Describe the clinical features, pathogenesis and immunity of diphtheria and whooping cough.<br>3. Describe the morphology, virulence factors and cultural characteristics of bacterial agents causing pharyngitis.<br>4. Describe clinical features, pathogenesis, complications and laboratory diagnosis of pharyngitis, diphtheria and whooping cough.<br>5. Describe the treatment, prevention and control measures for diphtheria, whooping cough and pharyngitis. |
| **MI 6.1f** Bacterial pneumonia other than Mycobacteria -I<br>**MI 6.1g** Bacterial pneumonia other than Mycobacteria -II | 1. Define the clinical types of Pneumonia [CAP, HAP/VAP & AP]<br>2. Enumerate the causative bacterial agents of pneumonia (other than Mycobacteria)<br>3. Describe the morphology, antigenic structure, virulence markers, cultural characteristics of various bacterial agent (S. pneumoniae, Staph. aureus, H. influenzae, Mycoplasma, Chlamydia, Klebsiella, Pseudomonas, Acinetobacter, Legionella ).<br>4. Describe the clinical features, pathogenesis, clinical features, complications and lab diagnosis of bacterial pneumonia.<br>5. Describe the treatment, prevention and control measures for pneumonia.<br>6. Describe the clinical features, pathogenesis, clinical course of Atypical pneumonia & legionella pneumonia.<br>7. Discuss the laboratory diagnosis, treatment, prevention and control of atypical pneumonia. |

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| **MI 6.1h** Fungal pneumonia | 1. Enumerate the various fungal agents of pneumonia<br>2. Describe the morphology, epidemiology, virulence and cultural characteristics of agent (Candida, Cryptococcus, Dimorphic fungi {Histoplasma, coccidoidies, paarcoccidoides C.immitis, P.brazilliansis} Aspergilus, P.Jeroveci, Penicillium, {Oral thrush, ABPA })<br>3. Discuss the predisposing factors and pathogenesis of fungal pneumonia.<br>4. Describe the clinical features, complications, laboratory diagnosis, treatment, control and preventive methods of fungal pneumonia. |
| **MI 6.1i** Viral LRTI-I | 1. Enumerate the causative viral agents of pneumonia, ARDS, ILI, SARI.<br>2. Describe epidemiology, classification, morphology, virulence factors, antigenic structure, immunity of the agent (paramyxovirus, orthomyxovirus, Corona, MERS COV, SARS, SARS-CoV2).<br>3. Describe the pathogenesis and immunity of viral pneumonia.<br>4. Define and Classify influenza viruses.<br>5. Discuss its pathogenesis [antigenic structure and variations]<br>6. Describe epidemiology including antigenic shift and drift of influenza virus.<br>7. Describe the clinical features, complications, laboratory diagnosis, treatment, control and preventive methods of viral pneumonia. |
| **MI 6.1j** Miscellaneous disorders of lung (Bronchitis, Bronchiectasis, Lung abscess, empyema, pleural effusion | 1. Enumerate the causative agents of Bronchitis, Bronchiectasis, Lung abscess, empyema, pleural effusion<br>2. Enumerate the parasitic agents causing lung infection<br>3. Describe the pathogenesis & clinical manifestations of Bronchitis, Bronchiectasis, Lung abscess, empyema, pleural effusion<br>4. Discuss the treatment, prevention & control of Bronchitis, Bronchiectasis, Lung abscess, empyema, pleural effusion<br>5. Describe the pulmonary manifestations of various parasites causing lung disorder (E.histolytica, E.granulosus)<br>6. Describe the epidemiology, morphology, life cycle, of P.westermani<br>7. Describe the pathogenesis, clinical features, complications, treatment and control of paragonimiasis<br>8. Discuss the laboratory diagnosis of varied lung infections. |

| **Genitourinary system and urinary tract infections** |
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| **MI 7.1 Describe the etio-pathogenesis and discuss the laboratory diagnosis of infections of genitourinary system** |

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| **MI 7.1**<br>Genitourinary system infections | 1. Enumerate the microorganisms found as part of normal flora of Genitourinary system.<br>2. Discuss the role of normal flora in health of genitourinary tract.<br>3. Define and Classify Genitourinary Tract infections, Reproductive Tract infections and Sexually Transmitted Infections<br>4. Describe the etio-pathogenesis of Genitourinary Tract infections, Reproductive Tract infections and Sexually Transmitted Infections<br>5. List the clinical syndromes associated with the RTIs<br>6. Name the etiological agents of the various clinical syndromes<br>7. Classify Urinary Tract Infections<br>8. Describe etiopathogenesis of Urinary Tract infections<br>9. Describe the laboratory diagnosis of Genitourinary infections |
| **MI 7.2 Describe the etio-pathogenesis and discuss the laboratory diagnosis of sexually transmitted infections. Recommend preventive measures** | |
| **MI 7.2 a**<br>**Painless** Genital ulcers: Syphilis | 1. Name the causative agent of Syphilis<br>2. Classify Treponemes<br>3. Describe the pathogenesis and clinical manifestations of various stages of Syphilis<br>4. Describe the morphology, virulence factors and cultural characteristics of Treponema pallidum<br>5. Describe the laboratory diagnosis of syphilis including congenital syphilis<br>6. Describe treatment, control and prevention of syphilis |
| **MI 7.2b**<br>STD-II Genital ulcers and warts | 1. Enumerate the causative agents of genital warts, painful genital ulcer.<br>2. Classify Herpesviruses<br>3. Describe the pathogenesis, clinical features and laboratory diagnosis of genital herpes, chancroid, Donovanosis.<br>4. Describe the epidemiology, morphology & cultural characteristics of Haemophilus ducreyi, HSV, Klebsiella granulomatis<br>5. Discuss Anogenital Warts and Human Papilloma Virus associated lesions. |

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| **MI 7.2c** Vaginal/Urethral Discharge -I Urethritis gonococcal and NGU (Gonorrhoea, Chlamydia, Trichomonas, Bacterial vaginosis, ureaplasma, Candida | 1. Enumerate the organisms causing vaginal/urethral discharge<br>2. Describe the morphology, cultural characteristics, methods for identification and antimicrobial susceptibility testing of Neisseria gonorrhoeae<br>3. Describe the pathogenesis, clinical features, laboratory diagnosis and treatment of gonorrhea<br>4. Define Non-gonococcal urethritis and cervicitis<br>5. List the causative agents of NGU, LGV<br>6. Classify family Chlamydiaceae<br>7. Describe the morphology, cultivation, typing and life cycle of Chlamydia trachomatis<br>8. Discuss the pathogenesis, complications and clinical features of genital Chlamydia trachomatis infections<br>9. Discuss the laboratory diagnosis of genital C. trachomatis infections |
| **MI 7.2d** Vaginal/ Urethra Discharge -II (Gonorrhoea, Chlamydia, Trichomonas, Bacterial vaginosis, Candida | 1. Describe the morphology, cultural characteristics, methods for identification of Mycoplasma and ureaplasma.<br>2. Describe the morphology, pathogenesis, life cycle and laboratory diagnosis of Trichomonas vaginalis.<br>3. Discuss the laboratory diagnosis of NGU and non-gonococcal endocervicitis<br>4. Enumerate the organisms associated with Bacterial Vaginosis<br>5. Describe the morphology, pathogenesis, life cycle and laboratory diagnosis of organisms involved in bacterial vaginosis. |
| **MI 7.2e** Miscellaneous STI | 1. Enumerate the non-sexually transmitted microbial causes of infections of genitourinary system<br>2. Describe the pathogenesis of these infections (PID, Genital warts (HPV), Molluscum contagiosum, pubic lice, scabies)<br>3. Describe the clinical features of these infections<br>4. Discuss the laboratory diagnosis of these infections |
| **MI7.2f** Lab diagnosis and syndromic management of STI | 1. Describe Syndromic management of STDs and Reproductive Tract Infections<br>2. Describe treatment, prevention and control of STDs |
| **MI 7.3** Describe the etio-pathogenesis, clinical features, the appropriate method for specimen collection, and discuss the laboratory diagnosis of Urinary tract infections | |

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| **MI 7.3**<br>UTI | 1. Enumerate the etiological agents causing Urinary Tract Infections<br>2. Describe the predisposing factors, pathogenesis and clinical features of UTI<br>3. Describe the laboratory diagnosis of UTI. ,<br>4. Define significant bacteriuria and interpret patients test reports<br>5. Describe the methods used to differentiate between upper and lower UTI<br>6. Describe the morphology, cultural characteristics, methods for identification and antimicrobial susceptibility testing of Proteus, Morganella and Providencia |

| Zoonotic and Miscellaneous Infections | |
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| MI8.1 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 | |
| **MI8.1a** Zoonotic disease: Introduction, epidemiology and prevention.<br>**MI 8.1b** Entomology and vectors in disease<br>**MI 8.1c** Rickettsia, Bartonella, Coxiella<br>**MI 8.1d** Miscellaneous Zoonosis: Yersinia, Bacillus anthracis, Pasteurella, Franscicella | 1. Define: Zoonoses<br>2. Enumerate the microbial agents and their vectors causing Zoonotic diseases.<br>3. Describe the morphology, mode of transmission, pathogenesis, clinical course, laboratory diagnosis and prevention of Zoonotic diseases:<br>4. Describe the morphology, cultural characteristics, methods for identification of Bacillus anthracis, Brucella species, Yersinia pestis, Leptospira, Ricketssia species, Rhabdovirus.<br>5. Describe the pathogenesis, clinical features, laboratory diagnosis and treatment of Anthrax, Brucellosis, Plague, Leptospirosis, Rickettsia, Rabies, |
| **MI8.2** Describe the etio-pathogenesis of opportunistic infections (OI) and discuss the factors contributing to the occurrence of OI, and the laboratory diagnosis | |
| **MI 8.2a** Opportunistic infections: General Bacterial, Parasitic and Virus | 1. Define Opportunistic infections<br>2. Classify and enumerate opportunistic infections.<br>3. Describe the etiopathogenesis of Opportunistic infections and discuss the factors contributing to opportunistic infections.<br>4. Describe diagnosis of opportunistic infections |
| **MI 8.2b** Opportunistic infections: Mycosis | 1. Enumerate fungi causing OI<br>2. Describe laboratory diagnosis of opportunistic infections |
| **MI8.3** Describe the role of oncogenic viruses in the evolution of virus associated malignancy | |

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| Oncogenic virus | 1. Describe oncogenesis<br>2. Describe the properties of cells transformed by viruses.<br>3. Enumerate oncogenic DNA and RNA viruses<br>3. Define and describe Oncogenes/ Proto-oncogenes<br>4. Describe the mechanism of viral oncogenesis. |
| **MI8.4** Describe the etiologic agents of emerging Infectious diseases. Discuss the clinical course and diagnosis | |
| Emerging and reemerging Infections | 1. Define: Emerging infectious agents.<br>2. Enumerate emerging infectious agents in world and in India.<br>3. Describe the factors that contribute to emerging and reemerging infections.<br>4. Discuss epidemiology of emerging infections with special reference to Indian context.<br>5. Discuss their clinical course and diagnosis. |
| **MI8.5** Define Healthcare Associated Infections (HAI) and enumerate the types. Discuss the factors that contribute to the development of HAI and the methods for prevention | |
| HAI | 1. Define Healthcare Associated Infections (HAI)<br>2. Enumerate and describe common types of HAI<br>3. Enumerate microbial agents responsible for various types of HAI<br>4. Discuss the factors that contribute to the development of HAI, including sources, mode of transmission and epidemiology of infectious agents<br>5. Discuss the methods of prevention of HAI |
| MI 8.6 Describe the basics of Infection control | |
| **MI 8.6**<br>Infection control | 1. Define and describe the concept of Hospital/ Healthcare Infection Control<br>2. Enumerate and describe the concepts and methods of Infection control.<br>3. Define Standard precautions, transmission based precautions, and contact precautions.<br>4. Describe the components of Standard precautions, transmission based precautions, and contact precautions.<br>5. Describe Respiratory etiquettes, sharps safety, safe injection practices, sterilization, disinfection, good housekeeping, PPE donning/doffing, hand hygiene, post-exposure prophylaxis, etc.)<br>6. Describe the constitution and functions of Hospital Infection Control Committee.<br>7. Define and classify Biomedical waste.<br>8. Discuss management of Biomedical Waste as per latest Biomedical Waste Management Rules. |

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| **MI 8.8** Describe the methods used and significance of assessing the microbial contamination of food, water and air | |
| **MI 8.8**<br>Milk, food and air Microbiology | 1. Enumerate the bacteria that can be found in food, water and air.<br>2. Describe the methods used and significance of assessing the microbial contamination of water air, food, and milk. |
| MI 8.13 Choose the appropriate laboratory test in the diagnosis of the infectious disease | |
| **MI 8.13a**<br>PUO | 1. Define PUO<br>2. Enumerate the causative agents of PUO<br>3. Enumerate the samples and describe sample collection techniques and transport<br>4. Describe blood collection technique<br>5. Describe the sample processing, identification and confirmation |
| **MI 8.13b**<br>Congenital infections | 1. Enumerate various congenital infections.<br>2. Enumerate various test to screen for congenital infections<br>3. Describe the pathogenesis, complications and screening for congenital infections. |
| **MI 8.13c**<br>URTI | 1. Enumerate various clinical types of upper respiratory infections with examples.<br>2. Describe the mode of transmission of upper and lower respiratory tract infections<br>3. Enumerate the causative agent of various type of respiratory infections.<br>4. Enumerate the samples and describe sample collection techniques and transport<br>5. Describe the sample processing, identification and confirmation |
| **MI 8.13d**<br>LRTI | 1. Enumerate various clinical types of lower respiratory infections with examples.<br>2. Describe the mode of transmission of upper and lower respiratory tract infections<br>3. Enumerate the causative agent of various type of respiratory infections.<br>4. Enumerate the samples and describe sample collection techniques and transport<br>5. Describe the sample processing, identification and confirmation |
| **MI 8.13e**<br>Wound infection | 1. Enumerate various clinical types of wound infections.<br>2. Enumerate the causative agent of various type of wound infections.<br>3. Enumerate the samples and describe sample collection techniques and transport<br>4. Describe the sample processing, identification and |

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| | confirmation |
| **MI 8.13f**<br>Meningitis | 1. Enumerate various clinical types of meningitis.<br>2. Enumerate the causative agent of various type of meningitis.<br>3. Enumerate the samples and describe sample collection techniques and transport<br>4. Describe the sample processing, identification and confirmation |
| **MI 8.13g**<br>Eye/ENT infections | 1. Enumerate various clinical types of eye and ENT infections.<br>2. Enumerate the causative agent of various type of Eye and ENT infections.<br>3. Enumerate the samples and describe sample collection techniques and transport<br>4. Describe the sample processing, identification and confirmation |
| **MI8.15 Choose and Interpret the results of the laboratory tests used in diagnosis of the infectious disease** | |
| **MI 8.15**<br>Lab diagnosis of PUO, URTI, LRTI, Meningitis, wound infections, Eye, ENT infections | 1. Enumerate various clinical types of infections with examples.<br>2. Describe the mode of transmission of infections<br>3. Enumerate the causative agent of various type of infections.<br>4. Enumerate the samples and describe sample collection techniques and transport<br>5. Describe the sample processing, identification and confirmation |
| **MI 8.16 Describe the National Health Programs in the prevention of common infectious disease** | |
| **MI 8.16** | 1. Enumerate various National programs for prevention of infectious diseases.<br>2. Enumerate the components and strategies of control program.<br>3. Describe the implementation of National Program at various levels.<br>4. Describe the evaluation of National Program. |

**6. Assessment**

Student will maintain a log book as given in Annexure II. Practical record book will also be maintained by students to record practical findings for day to day work and assessments. Both theory and practical to be assessed.

**(a) Formative**

- **First Term**

  Assessments (2): General Microbiology, Immunology & CVS

  End term Exam- January last week to February 1st week.

- **Second Term**

  Assessment (3): Respiratory, GIT 7 Hepatobiliary

  End Term Exam: April last week to May 1st week.

- **Third Term**

  Assessment (2): SDL & Zoonotic, CVS, GUT, Miscellaneous

  Sent Up Examination: August last week to September 1st week.

**Section 3: Schedule of Internal assessment (IA) in Microbiology**

| IA | 1st IA (Jan-Feb) | 2nd IA (April-May) | Sent up examination | Final Examination |
|---|---|---|---|---|
| Theory | 50 | 50 | Paper 1-100<br>Paper 2-100 | Paper 1-100<br>Paper 2-100 |
| Practical (including 10 marks log book & practical file) | 50 | 50 | 100 | 100 |
| Total | 100 | 100 | 300 | 300 |

**b) Internal Assessment**

Maintained in card format for all teachers. Feedback given after end of each assessment. Internal assessment is divided in two components. Day to day assessments based on performance in tutorials, seminars, Practical class and skill session will be given weightage of 20%, while term exam assessments, end competency assessments will be included in term assessments given weightage of 80 %. IA sheet will be maintained for each student mentioning the suggested and taken remedial measures.

| **Theory** | **T1** | **T2** | **T3** | **Total %** |
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| Interest in subject (5) | | | | |
| Active participation (5) | | | | |
| Scientific attitude (5) | | | | |
| Any other academic input (SDL, Quiz, Poster, Paper presentation, social service) (5) | | | | |
| **Exams assessment** (80) | | | | |
| **Total Theory** | | | | |
| **Practical** | | | | |
| Interest in subject (5) | | | | |
| Attitude (5) | | | | |
| Bench Work culture (5) | | | | |
| Behaviour (5) | | | | |
| **Term exams Assessment (60)** | | | | |
| **Log Book (10)** | | | | |
| **Practical record Book (10)** | | | | |
| **Total Practical (100)** | | | | |
| **Total IA (Theory + Practical)** | | | | |
| **Remarks/ Remedial measures suggested** | | | | |
| **Signature Student** | | | | |
| **Signature Teacher In charge** | | | | |
| **Signature Batch In charge** | | | | |
| **Signature HOD** | | | | |

## IA Sheet for monitoring of student's performance

**Roll No.** **Name:** **Contact no:**

| | | Attendance (%) | | Marks (%) | | Signature | Total Marks 100 (%) |
|---|---|---|---|---|---|---|---|
| **S. no.** | **Date** | **Theory** | **Practical** | **Theory** | **Practical** | | |
| **1st Term** | | | | | | | |
| **1.** | | | | | | | |

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|---|---|---|---|---|---|---|---|
| **2.** | | | | | | | |
| **End term** | | | | | | | |
| **2nd Term** | | | | | | | |
| **3.** | | | | | | | |
| **4.** | | | | | | | |
| **5** | | | | | | | |
| **End term** | | | | | | | |
| **Total** | | | | | | | |
| **3rd term** | | | | | | | |
| **6. SDL** | | | | | | | |
| **Sent up Exam** | | | | | | | |
| **Log Book** | | | | | | | |
| **Remarks/ Remedial measures suggested** | | | | | | | |

**Table 2: Theory distribution layout**

| Paper Layout | | | |
|---|---|---|---|
| **Types of questions** | **Marks per question** | **No. of questions in each paper** | **Total** |
| MCQ | 1 | 20 | 20 |
| Short answer | 3 | 10 | 30 |
| Short Note | 5 | 6 | 30 |
| Long Question | 10 | 2 | 20 |
| Total | | | 100 |

**Table 3: Theory paper distribution**

| PAPER I | Gen Microbiology | Immunology | CVS & Blood | GIT & Hepatobiliary | Total no. of questions |
|---|---|---|---|---|---|
| Total Marks (100) | 25 | 30 | 22 | 23 | 38 |

| PAPER II | Musculoskeletal system skin and soft tissues infections | Central Nervous System infections | Respiratory Infections | Genitourinary & Sexually transmitted infections | Zoonotic diseases and miscellaneous | Total no. of questions |
|---|---|---|---|---|---|---|
| Total Marks (100) | 20 | 20 | 20 | 20 | 20 | 38 |

**Table 4: Term wise assessment pattern for Practical**

| | Spots | Gram stain & hanging drop with clinical problem | PS for mp/ mf with clinical problem | Log book/ Practical file | Viva related to practical exercises | Total |
|---|---|---|---|---|---|---|
| 1st Term | 10 | 10 | 10 | 10 | 10 | 50 |
| 2nd Term | Spots | ZN stain | Stool examination for ova/cyst | Log book/Practical file | Viva related to practical exercises | Total |
| | 10 | 10 | 10 | 10 | 10 | 50 |

**Table 5: Complete distribution of Practical examination for final summative exam**

| Pattern | Exercise | Marks |
|---|---|---|
| **Microscopic skills*** | Gram staining, hanging drop & clinical problem | 10 (3+2+2+3) {Identify+Focus+Report+Record observation} |
| | ZN staining with clinical problem | 10 (3+2+2+3) {Identify+Focus+Report+Record observation} |
| | Stool Examination with clinical vignette | 10 (2 findings) (3+2X2) {Identify+Record observations} |
| **Clinical problem** | Clinical Problem solving for sample, container and precautions | 10 |
| **Spots or OSPE with Clinical Problem** | Clinical vignette with Peripheral blood smear for MP/MF | 5(3+2) |
| **Skill based exercise** | Exercise with infection control, PPE & hand hygiene | 05 |
| **AETCOM Excercise** | Clinical Problem with AETCOM competency | 05 |
| **Spot/OSPE** | Culture Medium, biochemical /AST | 3(2+1) {Identify +Question} |
| **Spot/OSPE** | Instrument, sterilization, disinfection, Biomedical waste | 3(2+1) {Identify +Question} |
| **Spot/OSPE** | Fungal | 3(2+1) {Identify +Question} |
| **Spot/OSPE** | Serology/Immunology | 3(2+1) {Identify +Question} |
| **Spot/OSPE** | Virus, Parasite | 3(2+1) {Identify +Question} |
| Viva based on practical exercises | | 30 |

| | | |
|---|---|---|
| Total | | **100** |

**Note: The students will submit practical file and log book during the Examination.**
*Numerical scoring: The steps of the staining procedure and interpretation are scored as follows

| Steps Done | Marks allotted |
|---|---|
| Performing the stain following all the steps (1 mark each)<br>-Primary stain<br>-Decolourisation<br>-Secondary stain | 3 |
| Focusing the stained slide with appropriate adjustments of the Microscope | 2 |
| Identifying the structures under the Microscope/Observation and inference | 3 |
| Diagram and writing the report | 2 |
| Total | 10 |

**7) ASSESSMENT OF INDIVIDUAL COMPETENCIES: (To be done similarly for each competency)**

1) Competency identified: MI 1.2 (a)
2) Name of the activity: Perform and identify the different causative agents of Infectious diseases by Gram Stain
3) Components of the activity:
    a) Practical session to demonstrate the procedure for stain.
    b) Performing the procedure by the student and focussing the slide.
    c) Recording the observation and the inference with a neat labelled diagram
    d) Feedback given on the session.
4) Criteria for successful completion: The student has to perform the activity 5 times and score more than 5/10 in each attempt

| **Attempt Number** | **Date of performing the activity** | **Marks scored out of 10** | **Rating Below Expectations(B); Meets Expectations(M); Exceeds Expectations(E)** | **Signature of faculty** | **Signature of student** |
|---|---|---|---|---|---|
| **1** | | | | | |
| **2** | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **3** | | | | | |
| **4** | | | | | |
| **5** | | | | | |

Documentation of activity (diagram and observation and inference) – to be written in the Record book.

Recommended action when unsuccessful : Repeat after discussion

***Note:***
*Keeping the basic structure of internal assessment intact, minor adjustments in unit I and II can be done based on the course covered.*
*For detailed assessment instructions refer to Assessment Blueprint document for CBME batch 2021*

*Internal assessment will be calculated for theory (40) marks and practical (20) marks Student will require to get 50 % combined in theory & practical (not less than 40 % in each) for eligibility to appear for university exam.*