MICROBIOLOGY

Learning Objectives:

After completion of training, the MBBS student should be able to understand the infectious diseases in terms of their etiology, pathogenesis, and laboratory diagnosis in order to efficiently treat, prevent and control the disease. To achieve this, the student should be able to:

1. Describe mechanism of host-parasite relationship.
2. Enumerate normal microbial flora and its importance in health and disease.
3. Describe etiology and pathogenesis of common infectious diseases.
4. Describe etiology and pathogenesis of opportunistic infections.
5. Choose appropriate laboratory investigation to support clinical diagnosis with respect to proper sample collection, timing and transport of the specimens.
6. Describe suitable antimicrobial agents for treatment.
7. Understand the mechanism of immunity to infection.
8. Explain scope of immunotherapy and vaccines for prevention of infectious disease
9. Perform simple tests to arrive at rapid diagnosis.
10. Apply appropriate method of sterilization, disinfection and biomedical waste disposal in hospital and community practice.
11. Explain the importance of National Health Programmes for prevention of communicable diseases

COURSE CONTENTS

Course Contents	Must Know	Desirable to know
General Microbiology:		
• General concepts of infectious diseases prevalent in India (morbidity, mortality data)	☑	
• Significant milestones in history of infectious diseases	☑	
• Definitions pertaining to infectious diseases.(eg: host, parasite, endogenous, exogenous, transmission, routes, source, reservoir etc)	☑	
• Classification of microbes from clinical view point	☑	
• Normal microbial flora of humans and its importance in health and disease.	☑	
• Bacterial cell: anatomy, physiology and genetics.		
• Sterilization, disinfections and standard precautions in patient care and disease prevention.	☑ ☑	
• Antimicrobials: mode of action, testing, interpretation of results and rational use, mechanism of resistance.	☑	

Immunology:	☑	
• Immune apparatus, lymphoid organs, Immunobiology	☑	
• Antigen and antibody.	☑	
• Ag+Ab –reactions, serology	☑	
• Cell and humoral immunity in health and disease	☑	
• Hypersensitivity	☑	
• Tumor immunity/transplantation an auto- immunity		
Systematic Bacteriology:		
• Gram Positive/Negative Cocci /Bacilli associated with human infections.	☑	
Vibrio, Campylobacter, Helicobacter	☑	
Mycobacteria,	☑	
Anaerobic bacteria	☑	
Spirochaetes	☑	
Chlamydia, Rickettsia, Mycoplasma	☑	
Miscellaneous bacteria of clinical importance.		
Legionella,Listeria etc.		☑
Virology:		
• General properties, structure, replication, classifications.	☑	
• Antiviral agents.		
• General concepts in laboratory diagnosis of viral infections.	☑	
• Herpes,Adeno,Arbo,Picorna,Orthomyxo,Paramyxo,Rabies,HIV,Hepatitis,	☑	
• Miscellaneous virus of medical importance: (Rota, Corona, etc)	☑	
• Viral vaccines.	☑	
• Pox, slow and oncogenic.		☑
Parasitology:		
• General concepts and definition of key terms, infections of national prevalence.	☑	
• Protozoal infections prevalent in India:	☑	
Intestinal,	☑	
Blood	☑	
Genital	☑	
• Helminthes (Intestinal and tissue) prevalent in India.	☑	
Cestodes,	☑	
Nematodes:	☑	
Trematodes.	☑	
Mycology:		
• General properties and classification of fungal diseases, approach to laboratory diagnosis (sample collection, identification), antifungal agents.	☑	

APPLIED Microbiology		
• CNS Infections: Acute and chronic meningitis, encephalitis and brain abscess.	☑	
• PUO/FUO: Infective and non infective causes and approach to diagnosis	☑	
• Diarrhoeal diseases(including food poisoning)	☑	
• Respiratory Tract Infection (Upper & Lower)	☑	
• UTI	☑	
• Wound infection	☑	
• Skin and soft tissue infections	☑	
• Eye and ear infections	☑	
• Sexually transmitted Infections	☑	
• Female genital tact infections	☑	
• Infections in immuno-compromised individuals	☑	
• Bone and Joint infections	☑	
• Hospital Associated Infections and its prevention.	☑	
• Zoonotic diseases.	☑	
• National Programmes of Communicable Diseases.	☑	
• Investigation of outbreaks and notification	☑	

Skills:

A medical student, in Microbiology**, MUST** be able to perform and interpret following skills **INDEPENDENTLY.**

1. Collection of relevant clinical samples. Blood-culture /serological tests
Urine for culture
Swabs for microscopy and culture of pus & other Body fluids
2. Storage and transport of the clinical specimens
3. Preparation of smears of clinical material
4 Microscopic Examination - Gram stain.
Ziehl - Neelsen Stain
Stool for ova and cyst
Blood smear for parasites (MP, Mf).
Albert stain for diphtheria
Modified Z-N of stool for protozoa in immuno-compromised .
Modified Z-N for M. leprae.
India ink of CSF for cryptococcus
KOH for fungal elements
5. Standard (universal precautions): Hand wash, asepsis, and antisepsis.
6. Biomedical waste disposal: Needle, sharps disposal, Infectious material
7. Interpretation of Microbiology reports: Antibiotic sensitivity: Rational use of antibiotics, Serology: VDRL, HIV, Hepatitis, ASO, RF, Widal Test.
Microscopy and Culture reports.

METHOD OF ASSESSMENT:

- Modified essay question
- Microscopic examination
- Short answer questions
- MCQs
- Problem solving exercises
- OSPE,
- Records Review.
- Checklist,
- Oral Viva Voce

TEACHING LEARNING METHODS:

- Structured interactive sessions
- Small group discussion
- Role play
- Focused group discussion (FGD)
- Practical including demonstrations
- Problem based exercises
- Video clips
- Written case scenario
- Self learning tools
- Interactive learning
- e-modules

TIME OF EVALUATION:

Examination of Microbiology should be at the end of 5th semester and formative assessment in middle of 3rd, 4th and 5th semester and summative assessment at the end of 3rd and 4th semester.

LEARNING RESOURCE MATERIALS

- Text books
- Reference books
- Practical note books
- Internet resources
- Video films etc.

Suggested E-Modules :

1. General concepts in infectious diseases
2. Bacterial cell: Anatomy and Physiology
3. Microbial cell and host cell interaction.
4. Molecular technique in diagnosis of infectious Diseases.
5. Kala-azar
6. Malaria
7. HIV/AIDS
8. Helminthic infections
9. Rabies
10. Influenza
11. Meningitis

Suggested Horizontal Integration: By the Department of Microbiology:

Content		Departments	Lead department	T/L Methods	Assessmet Method	
CNS infections		Physio,,Path Micro, Pharm	Micro	Student Seminars	PBQ.Structured, SAQ	
PUO		Physio,Med Micro,	Micro	-do-		
Diarrhoea		Physio, Micro, Pharm	Micro	-do-		
TB &control programmes		Path, Micro, Pharm, Com.Med	Micro	-do-		
Wound infections		Micro, Pharm	Micro	-do-		
Eye &Ear Infect		Micro, Pharm	Micro	-do-		
Female genital tract infect		Anat,Micro, Pharm	Micro	-do-		
Zoonotic Diseases		Micro, Com Med	Micro	-do-		
Congenital Infections		Anat,Micro	Micro	-do-		

UNIVERSITY ASSESSMENT IN MICROBIOLOGY:

The student will be assessed on the must know category in knowledge and skill.

Total marks: 400

Theory- 200 marks

Final : Problem based question (PBQ)
Short answer questions (SAQ)

Paper I-80 marks
(Section A (PBQ20+SAQ5X4) and B(PBQ20+SAQ 5X4)
Subject content: (inclusive of related applied aspects)

Gen. Microbiology	20
Immunology	20
Parasitology	40

Paper II-80 marks
(Section A(PBQ20+SAQ 5X4) and B(PBQ20+SAQ 5X4)
Subject content: (inclusive of related applied aspects)

Systematic Bacteriology	40
Virology	30
Mycology	10

Internal Assessment **-40** marks

Total **200 marks**

Practicals: 200 marks

Procedures: 80 marks (Making smears, and staining)
(Grams stain -15
(Z-N Stain -20
(Stool Examine -25
Paper case based problem serving exercise- 60
(Interpretation, Analysis) **120**
Viva 40 marks
Internal assessment: 40 marks
80 marks
Total: 200 marks

Suggested Books in Microbiology:

Textbook of Microbiology by Anantnarain & Panikar
Textbook of Microbiology by D R Arora
Textbook of Microbiology by C P Baveja
Textbook of Parasitology by D R Arora
Textbook of Parasitology by R Bhatia & R L Ichpujani
Textbook of Microbiology by Jawetz