MICROBIOLOGY

Learning Objectives:

At the end of the course, the learner shall 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

	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 human microbial flora of 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.	✓	

	Must know	Desirable to know
• 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.	✓	

	Must know	Desirable to know
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

	Able to to perform independently	Able perform under guidance	Assist	Observe
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	✓			

		Able to to perform independently	Able perform under guidance	Assist	Observe
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 stain 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: Serology: VDRL, HIV, Hepatitis, ASO, RF, Widal Test.	✓			
8.	Antibiotic sensitivity: Rational use of antibiotics,		✓		

METHOD OF ASSESSMENT:

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

TEACHING LEARNING METHODS:

Structured interactive sessions, Small group discussion, Role play, Practical including demonstrations, Problem based exercises, Video clips, Written case scenario, Self learning tools, Interactive learning and 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 5th semester.

LEARNING RESOURCE MATERIALS

Text books, Reference books, Practical note books, Internet resources and 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:

1. PUO
2. Diarrhoea
3. Tuberculosis
4. Wound infections
5. Eye & Ear infection
6. CNS infection
7. Zoonotic Diseases
8. Congenital Infections
9. Female Genital Treat Infections

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