PACIFIC MEDICAL UNIVERSITY, UDAIPUR

Ph.D. Entrance Syllabus – Medical Microbiology

1. General Microbiology

- History of microbiology
- Prokaryotic vs eukaryotic cells
- Bacterial structure (cell wall, capsule, flagella, spores)
- Bacterial growth and nutrition
- Sterilization and disinfection
- Culture media (simple, enriched, selective, transport media)
- Bacterial genetics (mutation, plasmids, transposons)

2. Immunology

- Innate and adaptive immunity
- Cells of immune system
- Antigens and antibodies (structure, classes, functions)
- Antigen–antibody reactions (precipitation, agglutination, ELISA)
- Complement system
- Hypersensitivity reactions (Types I–IV)
- Autoimmunity
- Immunodeficiency disorders
- Vaccines (types, principles, immunization schedules)

3. Bacteriology

General Bacteriology

- Classification of bacteria
- Gram-positive and Gram-negative bacteria
- Aerobic and anaerobic bacteria
- Pathogenic mechanisms

Systematic Bacteriology

- Gram-positive cocci – *Staphylococcus, Streptococcus*
- Gram-negative cocci – *Neisseria*
- Gram-positive bacilli – *Corynebacterium, Clostridium, Bacillus*
- Gram-negative bacilli – *Enterobacteriaceae, Pseudomonas*
- Mycobacteria – *M. tuberculosis, atypical mycobacteria*
- Spirochetes – *Treponema, Leptospira*
- Anaerobes – *Clostridium, Bacteroides*

4. Virology

- General properties of viruses
- DNA and RNA viruses
- Viral replication
- Host–virus interaction
- Viral oncogenesis
- Laboratory diagnosis of viral infections

Important Viruses

- HIV
- Hepatitis viruses (A–E)
- Herpes viruses
- Influenza virus
- Rabies virus
- Poliovirus
- Emerging and re-emerging viral infections

5. Mycology

- Classification of fungi
- Structure and morphology of fungi
- Laboratory diagnosis of fungal infections
- Superficial, subcutaneous, systemic mycoses
- Opportunistic fungal infections (*Candida, Aspergillus, Cryptococcus*)

6. Parasitology

Protozoa

- *Entamoeba histolytica*
- *Giardia lamblia*
- *Plasmodium* species
- *Leishmania*
- *Toxoplasma*

Helminths

- Nematodes (*Ascaris, Hookworm*)
- Cestodes (*Taenia*)
- Trematodes (*Schistosoma*)

Arthropods

- Mosquitoes, ticks, mites
- Role in disease transmission

7. Medical Mycoplasma, Chlamydia & Rickettsia

- *Chlamydia trachomatis*
- Rickettsial diseases
- *Mycoplasma pneumoniae*

8. Clinical Microbiology

- Sample collection and transport
- Laboratory diagnosis of infections
- Blood, urine, sputum, CSF cultures
- Hospital-acquired infections
- Infection control practices
- Biosafety and biomedical waste management

9. Antimicrobial Agents & Resistance

- Classification of antibiotics
- Mechanism of action
- Antimicrobial resistance
- Drug resistance mechanisms
- Antibiotic susceptibility testing
- Antimicrobial stewardship

10. Epidemiology & Preventive Microbiology

- Epidemiological triad
- Modes of transmission
- Surveillance of infectious diseases
- National health programs related to infectious diseases
- Outbreak investigation

11. Molecular Microbiology

- PCR and real-time PCR
- DNA probes
- Blotting techniques
- Molecular typing methods
- Genomics and proteomics (basic concepts)