

GENERIC ELECTIVES (GE-7: MICROBES IN INFECTIOUS DISEASES)

Credit distribution, Eligibility and Pre-requisites of the Course

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course	Department offering the course
		Lecture	Tutorial	Practical/ Practice			
MICROB-GE7: MICROBES IN INFECTIOUS DISEASES	4	2	0	2	None	NIL	Microbiology

Learning Objectives

The Learning Objectives of this course are as follows:

- The major objective of this course is to give students of other disciplines an overview of the fundamentals of principles of immunology, infection and disease.
- The students will become aware of the whole spectrum of infectious diseases caused by different classes of microbes.
- They will become familiar with methods of disease diagnosis, the identification of the causative microbe and the latest immunological techniques.

Learning outcomes

The Learning Outcomes of this course are as follows:

- The student will be able to describe the basic concepts associated with infectious diseases and the principles and types of infection.
- The student will be able to describe different immune organs, immune cells, and their functions, and discuss the role of antigens and antibodies in fighting infection.
- The student will be able to describe different types of microbial diseases, their symptoms, and mode of transmission.
- The student will be able to demonstrate the complete blood count (TLC and DLC), and able to identify the human blood groups and different immune cells.
- The student will be able to describe about the different selective and differential media for culturing bacteria, and the principle and working of PCR-based tests for disease diagnosis.
- The student will be able to identify pathogenic bacteria by performing biochemical tests.

SYLLABUS OF MICROB-GE7

UNIT – I (3 Weeks)

Introduction to basic concepts of infection and disease: Infection, colonization, pathogenicity, virulence and its determinants (adhesion, enzymes, toxins - exotoxins and endotoxins), transmission (direct and indirect) of infectious diseases. Types of infections (acute, latent, chronic), opportunistic and nosocomial infections. Reservoir and source of infection.

UNIT – II (6 Weeks)

Basic principles of immunology: Basic concepts of innate and adaptive immunity. Cells and organs of the immune system. Characteristics of antigen (foreignness, molecular size and heterogeneity), haptens, adjuvant. Structure, types and functions of antibodies. Cell mediated immunity. Primary and secondary immune response. Principles of immunization and types of vaccines

UNIT – III (6 Weeks)

Infectious diseases and their transmission: Symptoms and mode of transmission of diseases. Bacterial : tuberculosis, tetanus, anthrax. Viral: chicken pox, measles, mumps, polio, COVID-19, AIDS, dengue. Fungal: athlete's foot, histoplasmosis, candidiasis. Protozoan: malaria, amoebiasis

Practical component –

UNIT – 1 (5 Weeks)

Immunological techniques: Use of the haemocytometer. Analyzing total leucocyte count and differential leukocyte count in blood sample: determining percent count neutrophils, lymphocytes, eosinophils, basophils and monocytes in a blood smear. Identification of human blood groups and different immune cells

UNIT – 2 (5 Weeks)

Culturing of microorganisms and diagnosis: Use of various selective and differential media for culturing and identification of bacteria: mannitol salt agar, deoxycholate citrate agar / Salmonella Shigella (SS) agar, MacConkey / EMB Agar. Use of PCR based techniques to identify the infectious agent. Student group project: Different methods used to diagnose the following diseases: COVID19, tuberculosis

UNIT – 3 (5 Weeks)

Biochemical tests for identifying bacteria: Bacterial identification based on morphological features: Gram staining, capsule, endospore and motility characteristics. Bacterial identification based on biochemical characteristics: IMViC (Indole test, Methyl Red test, Voges-Proskauer test, Citrate test), Triple Sugar Iron (TSI) test, and catalase test. Kit based identification of a microbial pathogen.

Essential/recommended readings

1. Textbook of Microbiology by R. Ananthanarayan and C.K.J. Paniker. 11th edition. Universities Press, India. 2020.

2. Prescott's Microbiology by J. M. Willey, K. Sandman, K. and D. Wood. 11th edition. McGraw Hill Higher Education, USA. 2019
3. Basic Immunology: Functions and Disorders of the Immune System by A. K. Abbas, A. H. Lichtman, S. Pillai. 6th edition. Elsevier, India. 2019.
4. Kuby Immunology by J. Punt, S. Stranford, P. Jones, and J. Owen. 8th edition. W.H. Freeman and Company, USA. 2018.
5. Jawetz, Melnick and Adelberg's Medical Microbiology by K.C. Carroll, S. A. Morse, T.A. Mietzner, and S. Miller. 28th edition. McGraw Hill Education, USA. 2016. Immunology by C. Richard and S. Geoffrey. 6th edition. Wiley- Blackwell Scientific Publication, UK. 2009.

Suggestive readings (if any)

Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.