

SEMESTER VI**ZY6B11U CORE COURSE 11****MICROBIOLOGY AND IMMUNOLOGY****54 hrs****Credits 3****Objectives of the course**

1. To inspire the students in learning the frontier areas of biological sciences
2. To make them aware of the pathogens , health related problems, their origin and treatment.
3. To equip the students with the knowledge of modern developments and recent trends in biological sciences

PART I MICROBIOLOGY**27hrs****Module1 Introduction and Scope of Microbiology****2 hr**

Outline classification of bacteria, fungi, viruses,

Core Readings

Panicker, S. Francis G., and Abraham G.K. 2008 , Microbiology and Immunology, Study Material Series published by Zoological Society of Kerala

Anthanarayan R & C.K. Jayaram Panicker. Textbook of Microbiology (2008) Orient Longman Private Ltd.

Kanika Sharema. Manual of Microbiology tools techniques 2nd Ed. Ane's student Editions 2009

Module 2 Methods in Microbiology**6 hrs**

Sterilization and disinfection. Different methods, physical and chemical. Sterilization by moist and dry heat, by filtration, by irradiation, preparation of culture media (aerobic and anaerobic cultivation) Selective media, enrichment media and differential media, Plating techniques and isolation of pure colonies, culture preservation techniques – refrigeration, deep freezing, freezing under liquid nitrogen and lyophilization.

Core Readings

Panicker, S. Francis G., and Abraham G.K. 2008 , Microbiology and Immunology, Study Material Series published by Zoological Society of Kerala Chapter 5 p. 107-137

Anthanarayan R & C.K. Jayaram Panicker. Textbook of Microbiology (2008) Orient Longman Private Ltd.

Kanika Sharema. Manual of Microbiology tools techniques 2nd Ed.
Ane's student Editions 2009

Module 3 Morphology and fine structure of bacteria, size, shape and 5 hrs
arrangements. Flagella, Pili, Capsule, cell wall and its composition,
Cytoplasmic membrane, protoplast, spheroplast, , nuclear material ,
cell inclusions, Bacterial spores

Core Readings

Panicker, S. Francis G., and Abraham G.K. 2008 , Microbiology and Immunology, Study Material Series published by Zoological Society of Kerala Chapter 1 p. 1-36

Anthanarayan R & C.K. Jayaram Panicker. Textbook of Microbiology (2008) Orient Longman Private Ltd.

Kanika Sharema. Manual of Microbiology tools techniques 2nd Ed.
Ane's student Editions 2009

Module 4 Bacterial Growth, Effect of various factors on bacterial growth. 2 hrs
cell division., Nutritional requirements.Enumeration of bacteria ;Total
count & viable count Bacterial growth curve

Core Readings

Panicker, S. Francis G., and Abraham G.K. 2008 , Microbiology and Immunology, Study Material Series published by Zoological Society of Kerala Chapter 3

Anthanarayan R & C.K. Jayaram Paniker. Textbook of Microbiology (2008) Orient Longman Private Ltd.

Kanika Sharema. Manual of Microbiology tools techniques 2nd Ed.
Ane's student Editions 2009

Module 5	<p>Basic Virology</p> <p>Viruses -Structure of Viruses Human, Animal, Plant and Bacterial Viruses. Replication of viruses, cultivation of animal and plant viruses. Viral assay</p> <p>Core Readings</p> <p>Panicker, S. Francis G., and Abraham G.K. 2008 , Microbiology and Immunology, Study Material Series published by Zoological Society of Kerala Chapter 2</p> <p>Anthanarayan R & C.K. Jayaram Paniker. Textbook of Microbiology (2008) Orient Longman Private Ltd.</p> <p>Kanika Sharema. Manual of Microbiology tools techniques 2nd Ed. Ane's student Editions 2009</p>	3 hrs
Module 6	<p>Infections</p> <p>Types, Primary and secondary infections. Cross infection , nosocomial infection</p> <p>Infection, endogenous and exogenous infections, different sources of infections, contagious diseases (Epidemic, endemic and pandemic) modes of transmission of diseases (by food, water, air, vectors, and carriers. Mention different types of carriers, healthy carriers, convalescent carriers, temporary and chronic carriers, contact carriers, paradoxical carriers , bacteraemia, Septicaemia</p> <p>Core Readings</p> <p>Anthanarayan R & C.K. Jayaram Panicker. Textbook of Microbiology (2008) Orient Longman Private Ltd</p> <p>Panicker, S. Francis G., and Abraham G.K. 2008 , Microbiology and Immunology, Study Material Series published by Zoological Society of Kerala Chapter 8.</p> <p>Park K., Park's Text Book of Preventive and Social Medicine – 2002, 17th Ed. Banarasidass Bhenot Publications</p>	2 hrs

Module 7	Diseases caused by different pathogens, epidemiology, symptomology, principles of laboratory diagnosis of Bacterial,viral and fungal diseases: A brief study of two examples from each category bacterial:Tuberculosis & Typhoid Viral : Infuenza & Polio Fungal: Dermatophytoses & Candidiasis Core Readings Panicker, S. Francis G., and Abraham G.K. 2008 , Microbiology and Immunology, Study Material Series published by Zoological Society of Kerala Chapter 7 Anthanarayan R & C.K. Jayaram Panicker. Textbook of Microbiology (2008) Orient Longman Private Ltd. Kanika Sharema. Manual of Microbiology tools techniques 2 nd Ed. Ane's student Editions 2009	7 hrs
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PART II IMMUNOLOGY 27 hrs

Module 8	Introduction to immunology Types of immunity, innate immunity, Mechanism of innate immunity (eg. Barriers, Phagocytosis, inflammation.) acquired - passive & active Vaccines types of vaccines , live, killed , toxoids,recombinant DNA Core Readings Panicker, S. Francis G., and Abraham G.K. 2008 , Microbiology and Immunology, Study Material Series published by Zoological Society of Kerala Chapter 1 Ivan Roitt, 2002 <i>Essentials of Immunology ELBS</i>	4 hrs
Module 9	Antigens Antibodies Complements Types of Antigens, haptens, antigenic determinants. Basic structure of immunoglobulins. Different classes of immunoglobulins and functions Complement system, biological effects of complements- a brief study Core Readings Panicker, S. Francis G., and Abraham G.K. 2008 , Microbiology and Immunology, Study Material Series published by Zoological	7hrs

Society of Kerala Chapter 4

Ivan Roitt, 2002 *Essentials of Immunology ELBS*

- Module 10 Antigen-antibody reactions, Precipitation test, Agglutination Test, 7 hrs
 Clinical applications of antigen antibody reaction : Eg: Widal , VDRL
 , HIV test (ELISA) Complement fixation test, Coombs test

Core Readings

Panicker, S. Francis G., and Abraham G.K. 2008 , Microbiology and
 Immunology, Study Material Series published by Zoological
 Society of Kerala

Ivan Roitt, 2002 *Essentials of Immunology ELBS*

- Module 11 Immune Response system 5 hrs
 Primary and secondary lymphoid organs. Cells of the immune system –
 Leucocytes, Lymphocytes T & B cells, Macrophages, Plasma cells,
 Memory cells, MHC Antibody synthesis, primary and secondary
 responses, Monoclonal antibodies – Hybridoma technology , uses,.

Core Readings

Panicker, S. Francis G., and Abraham G.K. 2008 , Microbiology and
 Immunology, Study Material Series published by Zoological
 Society of Kerala Chapter 10.

Ivan Roitt, 2002 *Essentials of Immunology ELBS*

- Module 12 Immunopathology- immune disorders 4hrs
 (Hypersensitivity, autoimmunity and immunodeficiency)
 Different types of hypersensitivity reactions -
 Abrief study on anaphylaxis, atopy, , serum sickness and delayed
 hypersensitivity
 Autoimmunity, mechanisms of autoimmunization
 A brief study on autoimmune diseases eg. Lymphadenoid
 goiter, thyrotoxicosis, rheumatoid arthritis and systemic lupus
 erythematosus
 Transplantation Immunity - Graft rejection , major
 histocompatibility, Human leukocyte antigen system - (HLA) immuno

-suppression Immunohaematology, Immunology of blood transfusion, Erythroblastosis foetalis.

Core Readings

Panicker, S. Francis G., and Abraham G.K. 2008 , Microbiology and Immunology, Study Material Series published by Zoological Society of Kerala

Ivan Roitt, 2002 *Essentials of Immunology ELBS*

Selected Further Readings

Anthanarayan R & C.K. Jayaram Panicker. Textbook of Microbiology (2008)
Orient Longman Private Ltd.

Coleman: 2002 Fundamentals of Immunology

Darla J. Wise & Gordon R. Carter: 2004:Immunology A Comprehensive Review
Iowa state University Press. A Blackwell science company,

Hans G. Sch Legal General Microbiology Seventh Ed. Cambridge Low Price
Ed.

Helen Hapel, Maused Harney Siraj Misbah and Next Snowden: 2006 Essentials of
Clinical Immunology Fifth Ed. Blackwell Publishing Company,

Heritage, J ., E.G.V. Evas & R.A.Killungten 2007: Introductory Microbiology
Cambridge University Press

Ivan Roitt: 2002 Essentials of Immunology ELBS.

K. Park, Park's Text Book of Preventive and Social Medicine – 2002, 17t Ed.
Banarasidass Bhenot Publications

Kanika Sharema. Manual of Microbiology tools techniques 2nd Ed. Ane's student
Editions 2009

Keith Wilson and John Walker, 2009, Principles and Techniques of Biochemistry
and Molecular Biology Sixth Ed. Cambridge University Press

Mangi, E.M.T El. C.F.A Bryca, A.L Demain, A.K. Allman Fermentation
Microbiology & Biotechnology Sec. Ed. Taylor Framics London New York
2006

Michael J. Pelczar ECS, Chan & Noel. R. Kreig, Microbiology, Tata McGraw Hill
5th ed. 1996.

Monica Cheesbrough: Laboratory Manual for Tropical Countries. Vol.II
Microbiology, ELBS – Cambridge Ed. 1986.

Panicker, S. Francis G., and Abraham G.K. 2008 , Microbiology and Immunology,
Study Material Series published by Zoological Society of Kerala.

Prakesh Arora M. Anes Illustrated Dictionary of Immunology, Ane Book India.
2002

Prescott. Microbiology 2nd edition

ZY6B11U [P] Practical 11**MICROBIOLOGY AND IMMUNOLOGY****36 hrs
Credit 1**

1. Instruments –Autoclave, Hot air oven, Bacteriological incubator – Working and use in Microbiology lab.
2. Cleaning and sterilization of glasswares
3. Preparation of solid and liquid media for microbial cultures. (Ingredients, pH and method of preparation)(Demonstration)
 - (a) Solid media (1) Nutrient agar (2) Mac Conkey's agar
 - (b) Liquid Media (1) Nutrient broth (2) Peptone water.
 - (c) Semi solid agar
 - (d) Firm agar
4. Culture methods (Demonstration)
 - (a) Streak plate technique and isolation of pure colonies.
 - (b) Lawn culture (c) Stab culture
 - (d) Pour plate culture
 - (e) Liquid culture
5. Serial dilution and Standard Plate Count (SPC) calculation of C fu /ml in well water sample (demonstration).
6. Examination of microbes in living condition
 - (a) Wet mount
 - (b) Hanging drop method for demonstrating motility of bacteria.
7. Gram staining – preparation, procedure, identification of Gram + ve and Gram –ve bacteria.
8. Antibiotic sensitivity test (demonstration).
9. Preparation of a fungal smear – Lactophenol cottonblue staining and mounting
10. Determination of ABO blood groups and Rh factor (Antigen –antibody Reaction)
11. Study through photographs/ illustration, the primary immune (Bone marrow and thymus) and secondary immune (spleen and lymph nodes) organs in Rat/Man.