



SRI VENKATESWARA UNIVERSITY, TIRUPATHI

B.Sc. COURSE IN MICROBIOLOGY V SEMESTER (MINOR)

W.E.F. 2025-26

COURSE 5: IMMUNOLOGY & MEDICAL MICROBIOLOGY

COURSE 6: APPLIED MICROBIOLOGY

COURSE STRUCTURE

Year	Semester	Course	Title of Paper	No. of Hrs/Week	No.of Credits
III	V	5	Immunology and medical microbiology(T)	3	3
			Immunology and medical microbiology(P)	2	1
		6	Applied microbiology –(T)	3	3
			Applied microbiology –(P)	2	1

SRI VENKATESWARA UNIVERSITY, TIRUPATI
B.Sc. COURSE IN MICROBIOLOGY V SEMESTER (MINOR)
COURSE 5: IMMUNOLOGY & MEDICAL MICROBIOLOGY

Subject code:

I THEORY

TOTAL HOURS: 50

I. Course outcomes:

By the Completion of the course, the learner should be able to—

1. Describe the key concepts in Immunology and how the immune system can discriminate Self and non-self
2. Explain how the innate and adaptive immune systems work together to generate an effective immune response against a specific pathogen.
3. Explain how the immune system can respond to so many diverse antigens.
4. To understand the importance of pathogenic microorganisms in human disease concerning infections of the respiratory tract, gastrointestinal tract, urinary tract, etc
5. To understand and correlate disease symptoms with the causative agent, isolate and identify pathogens.

Unit - 1: Immune System

No. of Hours:9

1. Concept of Innate and Adaptive Immunity
2. Primary and secondary organs of the immune system - thymus, bursa fabricius, bone marrow, spleen, lymph nodes, and lymphoid tissues
3. Cells of the immune system- B and T lymphocytes, null cells, monocytes, macrophages, neutrophils, basophils, and eosinophils, Complement system (in brief)

Unit - 2: Immune response

No. of Hours 9

1. Characteristics of antigen (Foreignness, Molecular size, Heterogeneity, and solubility) haptens.
2. Antibodies - basic structure and types.

3. Immune Response - Primary and Secondary Immune Response, Humoral Immune Response (Plasma and Memory cells), Cell Mediated Immune Response
4. Antigen–Antibody reactions: Precipitation, Agglutination, Neutralisation, Complement fixation, Phagocytosis
5. Hypersensitivity- definition and types (in brief)

Unit 3: Microbes in Health and Disease.

No. of Hours:9

1. Normal flora of the human body.
2. Definitions - Infection, Invasion, Pathogen, Pathogenicity, Virulence, Toxigenicity, Opportunistic infections, Nosocomial infections.
3. General account on microbial diseases - causal organism, pathogenesis, epidemiology, diagnosis, prevention, and control of the following: Bacterial diseases - Tuberculosis, Typhoid, Botulism. Fungal diseases - Candidiasis. Viral Diseases - Hepatitis A and AIDS

Unit - 4: Principles of Diagnosis

No. of Hours:9

1. General principles of diagnostic microbiology- Collection, transport of clinical samples
2. General methods of laboratory diagnosis - cultural, biochemical, serological, and molecular methods.

Unit - 5: Prevention and Treatment

No. of Hours:9

1. Vaccines (Natural and recombinant) and hyperimmune serum
2. Antimicrobial agents- General modes of action of antibacterial (Penicillin, Streptomycin), antifungal (Amantadine, Acyclovir)agents
3. Interferons (Amphotericin and Griseofulvin), antiviral
4. Antibiotic resistance -Tests for antimicrobial susceptibility (Disc diffusion)

II Skill Outcomes: By the completion of the course, the learner should be able to—

1. Perform some of the Ag-Ab reactions.
2. Carry out the biochemical tests useful for the identification of bacteria.
3. Perform an antibiotic sensitivity test
4. Identify some common symptoms and relate them to etiology
5. Prepare some differential media routinely used for the identification of bacteria

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B.Sc. COURSE IN MICROBIOLOGY V SEMESTER (MINOR)

V SEMESTER COURSE 5: IMMUNOLOGY AND MEDICAL MICROBIOLOGY

CREDITS-1

1. Identification of human blood groups.
2. Separate serum from the blood sample (demonstration).
3. Immunodiffusion by the Ouchterlony method.
4. Identification of any of the bacteria (*E. coli*, *Pseudomonas*, *Staphylococcus*, *Bacillus*) using laboratory strains based on cultural, morphological, and biochemical characteristics: IMViC, urease production, and catalase tests
5. Study of composition and use of important differential media for identification of bacteria: EMB Agar, McConkey agar, Mannitol salt agar, Deoxycholate citrate agar, TCBS
6. Isolation of bacterial flora of skin by the swab method.
7. Antibacterial sensitivity by Kirby-Bauer method
8. Determination of the minimal inhibitory concentration of an antibiotic
9. Study symptoms of the diseases with the help of photographs: Anthrax, Polio, Herpes, chicken pox, HPV warts, Dermatophytes (ringworms)
10. Isolation of Normal flora of the human body (Hands, Feet, Nostrils, and Teeth Surface) by swab method.

III References

1. Ananthanarayan R. and Paniker C.K.J. (2009). Textbook of Microbiology. 8th edition, University Press Publication.
2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A., and Mietzner, T.A. (2013). Jawetz, Melnick, and Adelberg's Medical Microbiology. 26th edition. McGraw-Hill Publication.
3. Delves P, Martin S, Burton D, Roitt IM. (2006). Roitt's Essential Immunology, 11th edition, Wiley-Blackwell Scientific Publication, Oxford.
4. Goldsby RA, Kindt TJ, Osborne BA. (2007). Kuby's Immunology. 6th edition, W.H. Freeman and Company, New York.
5. Kuby's Immunology. 6th edition, W.H. Freeman and Company, New York.
6. Jawetz, Melnick, and Adelberg's Medical Microbiology. 26th edition. McGraw-Hill Microbiology. 4th edition. Elsevier Publication.
7. Willey JM, Sherwood LM, and Woolverton CJ. (2013) Prescott, Harley, and Klein's Microbiology. 9th edition. McGraw-Hill Higher Education Practical Microbiology-M.N.Reddy Practical microbiology-M.N.Reddy
8. Microbiology: a laboratory manual / James G. Cappuccino, Natalie.

9. Plant Pathology and Microbiology-K.R.Aneja 10. Mackie & McCartney Practical Medical Microbiology,

VI. Co-Curricular Activities:

1. Screening of Blood groups
2. Visit to Diagnostic /Laboratory
3. Competition on composition and sterile media preparation
4. Competition on Isolation and Identification of bacteria from a sample

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B.Sc COURSE IN MICROBIOLOGY V SEMESTER (MINOR)
COURSE 5: IMMUNOLOGY & MEDICAL MICROBIOLOGY

Subject code-

MAX MARKS-75

TIME-3HRS

SECTION – A

Answer any five of the following short questions. Each carries 5 marks 5 X 5 = 25M

1. From unit 1
2. From unit 1
3. From unit 2
4. From unit 2
5. From unit 3
6. From unit 3
7. From unit 4
8. From unit 4
9. From unit 5
10. From unit 5

SECTION – B

Answer any five of the following essay questions. Each carry 10 marks 5X10 =50 M

11. From unit 1 - a or b
12. From unit 2 - a or b
13. From unit 3 - a or b
14. From unit 4 - a or b
15. From unit 5 - a or b

SRI VENKATESWARA UNIVERSITY, TIRUPATI
B.Sc. COURSE IN MICROBIOLOGY V SEMESTER (MINOR)
(CBCS) REVISED SYLLABUS – 2025-26
COURSE 6: APPLIED MICROBIOLOGY

Subject code-

I THEORY

TOTAL HOURS: 50

Course Outcomes: By the completion of the course, the learner should be able to

1. Identify the areas of entrepreneurship and assess the scope for establishment.
2. Explain the production of fermentation products and economics.
3. Explain the production method of biofertilizers and mushrooms
4. Explain the process of baking and brewing
5. Prepare DPR and understand patenting

Unit–I: Entrepreneurial skill & Environmental Microbiology

No of Hours: 9

Entrepreneurial skills–Institutes involved, Government support to entrepreneurs, Solid waste management, Liquid waste management, Coliform test

Unit–II: Fermentation

No. of Hours: 9

Microbial cells as fermentation products-

1. Single-Cell Protein
2. Bacterial Insecticides.
3. Enzymes as fermentation products–
4. Bacterial and Fungal Amylases.
5. Basic design of the fermenter
6. Screening process of industrially important microbes

Unit–III: Bio-fertilisers and Mushrooms

No of Hours: 9

1. Mushroom cultivation–Cultivation of *Agaricus bisporus*, Preparation of compost, filling tray beds, spawning, maintaining optimal temperature, casing, watering, harvesting, storage.
2. Biofertilizers –Chemical fertilizers versus biofertilizers, organic farming. Commonly used biofertilizers.

Unit–IV: Foods & Beverages**No of Hours: 9**

1. Brewing– Production of Beer.
2. Bread making- Yeast activation.
2. Cheese production

Unit–V: DPR and Patents**No of Hours: 9**

1. Preparation of DPR (Detailed Project Report)
2. Patents and IPR.
3. HACCP concept

Skill Outcomes: By the completion of the course, the learner should be able to–

1. Prepare Microbial consortia for composting
2. Prepare a report on the working of the production unit of mushrooms/biofertiliser
3. Prepare a sample DPR

V SEMESTER COURSE 6:**APPLIED MICROBIOLOGY credits -1**

1. Preparation of Microbial consortia for composting
2. Field visit and report preparation of Mushroom cultivation unit/ Biofertilizer production centre/or any other
3. Preparation of the sample

DPR References:

1. Entrepreneurial Development in India -ByArora.
2. Sathyanarayana, U., Biotechnology. (2005) 1st Ed.BooksandAllied(P)Ltd.
3. Casida, LEJR,(2019). Industrial Microbiology.NewAge International Publishers
4. K.R.Aneja, Experiments in Microbiology, Plant Pathology, Tissue Culture and Mushroom Production Technology, 6th Ed.Schand Publication
5. NdukaOkafor.Modern Industrial Microbiology and Biotechnology. 2007.CRCPre s
6. MichaelJ.Waites, Neil L.Morgan, John S.Rockey, Gary Higton. Industrial Microbiology: Introduction 2013.WileyBlackwellPublishers.
7. A.H.Patel.Industrial Microbiology. 2016. 2nd Ed.Laxmi Publications, New Delhi.
8. DubeyRC.A Textbook of Biotechnology. (2014).S Chand Publishers.
9. RobertD.Hisrich, Michael P.Peters, "Entrepreneurship Development", Tata McGraw-Hill

II. Co-Curricular Activities:

1. Prepare fermented foods
2. Workshop on project report preparation of mushroom cultivation
3. Visit to an industry producing microbial products

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COURSE 6: APPLIED MICROBIOLOGY

Subject code-

MAX MARKS-75

TIME-3HRS

SECTION – A

Answer any five of the following short questions. Each carries 5 marks 5 X 5 = 25M

1. From unit 1
2. From unit 1
3. From unit 2
4. From unit 2
5. From unit 3
6. From unit 3
7. From unit 4
8. From unit 4
9. From unit 5
10. From unit 5

SECTION – B

Answer any five of the following essay questions. Each carry 10 marks 5X10 =50 M

11. From unit 1 - a or b
12. From unit 2 - a or b
13. From unit 3 - a or b
14. From unit 4 - a or b
15. From unit 5 - a or b

SRI VENKATESWARA UNIVERSITY, TIRUPATI

III B.Sc. Microbiology MINOR- SEMESTER –V

PAPER V & VI

PRACTICAL EXAMINATION

Time: 3 hrs

Max Marks: 50

SECTION-A

Major experiment. $1 \times 15 = 15$ M

a) Explain and demonstrate the given experiment

Scheme of evaluation: Demonstration(8M) + Description(7M)

SECTION-B

Minor experiment. $1 \times 10 = 10$ M

b) Explain and demonstrate the given experiment

Scheme of evaluation: Demonstration(5M) + Description(5M)

SECTION-C

Spotters-Identify and give important features of the given materials $5 \times 3 = 15$ M

c)

d)

e)

Scheme of evaluation: Identification(1M)+Diagram(2M)+Features(2M)=5 per spotter

RECORD – 5M

VIVA-VOCE – 5M