



SRI VENKATESWARA UNIVERSITY, TIRUPATHI

4 -Year UG Honours in B.Sc. BOTANY: Major in Consonance with Curriculum Frame work w.e.f AY 2025-26 I Semester

COURSE STRUCTURE

SEMESTER-I

Year	Semester	Course	Title	No. Hrs./ Week	No. of Credits
I	I	1	Diversity of Microbes	3	3
			Diversity of Microbes -Practical	2	1
		2	Diversity of Thallophytes	3	3
			Diversity of Thallophytes -Practical	2	1

Signatures of the Board of Studies members

Sl No.	Designation	Name	Signature
1	BOS Chairman	Dr Mohano Behera, Department of Botany, Govt. Degree College, Pakala	
2	Member	Dr L. Md. Bakshu, Department of Botany, Dr YSR Govt. Degree College ,Veduru Kuppam	
3	Member	Dr M. Hemalatha, Department of Botany, SVCR Govt. Degree College, Palamaner	
4	Member	Dr A. Sasikala, Department of Botany, SVCR Govt. Degree College, Palamaner	
5	Member	Smt. S. Padmavathi, Department of Botany, Govt. Degree College, Puttur	
6	Member	Dr P. Sujana, Department of Botany, Govt. Degree College, Puttur	

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COURSE 1: DIVERSITY OF MICROBES

Theory

Credits: 3

3 hrs/week

I. Learning Objectives: By the end of this course the learner has to:

1. Gain awareness on hypotheses about the origin of life on Earth, and structure and multiplication of viruses.
2. Identify and describe the unique characteristics and significance of special types of bacteria.
3. Describe the structure, classification, and reproductive methods of eubacteria.
4. Tell the types of soil microorganisms and explain their interactions with each other, plants, and soil components.
5. Identify and differentiate between beneficial and harmful activities microbes in different fields.

II. Course Outcomes: On completion of this course students will be able to:

1. Illustrate the origin of life on Earth and diversity, multiplication and economic value of viruses.
2. Deliberate the general characteristics, and economic importance of special groups of bacteria.
3. Explain the structure, nutrition, reproduction and significance of eubacteria.
4. Evaluate the interactions of soil microbes among themselves and with plants.
5. Compile the value and applications of microbes in various fields.

III. Syllabus of Theory:

Unit-1: Origin of life and Viruses

10 Hrs.

1. Origin of life, concept of primary Abiogenesis; Miller and Urey experiment.; discovery of microorganisms, Pasteur experiments, germ theory of diseases; three domain – six kingdom classification of Carl Woese.
2. Shape and symmetry of viruses; structure of TMV and Gemini virus.
3. Lytic and lysogenic cycles of T-even phages; a brief account of prions, viroids and virusoids.
4. Transmission of plant viruses and their control; significance of viruses in production of vaccines and bio-pesticides.


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Unit-2: Special groups of Bacteria

7 Hrs.

1. General characteristics, and economic importance of following special groups of bacteria:
a) Archaeobacteria b) Actinomycetes c) Phytoplasma d) Cyanobacteria
2. Culture and cultivation of *Spirulina*

Unit-3: Eubacteria

8 Hrs.

1. Occurrence, distribution and cell structure of eubacteria; classification of Eubacteria based on nutrition
2. Reproduction- asexual (binary fission and endospores) and bacterial recombination (conjugation, transformation, and transduction).
3. Economic importance of Eu-bacteria with reference to their role in Agriculture and industry (fermentation and medicine)

Unit-4: Soil microbes – interactions

10Hrs.

1. Distribution of microorganisms in soil; factors influencing the soil microflora; role of microorganisms in soil fertility.
2. Microbial interactions: symbiosis, neutralism, commensalism, competition, antagonism, synergism, parasitism and predation.
3. Microorganisms of rhizosphere, phyllosphere and spermosphere; microbial interactions and their effect on plant growth.

Unit-5: Beneficial and harmful microbes

10 Hrs.

1. A brief account of symptoms of viral diseases in plants; Tungro disease in paddy.
2. A summary of symptoms of bacterial diseases in plants; Citrus canker.
3. Microorganisms as food; probiotics and prebiotics; products from microorganisms, Metabolites, enzymes, and antibiotics.
4. Bacterial and Cyanobacterial biofertilizers – their applications; Bacterial biopesticides and their applications.

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IV. Text Books:

1. Bhattacharjee, R.N., (2017) Introduction to Microbiology and Microbial Diversity, Kalyani Publishers, New Delhi.
2. Dubey, R.C. & D. K. Maheswari (2013) A Text Book of Microbiology, S.Chand & Company Ltd., New Delhi
3. Toshniwal, R.L. (2007) Agricultural Microbiology, Agrobios (India), Jodhpur

V. Reference Books:

1. Pelczar Jr., M.J., E.C.N. Chan & N. R. Krieg (2001) Microbiology, Tata McGraw- Hill Co, New Delhi
2. Prescott, L. Harley, J. and Klein, D. (2005) Microbiology, Tata McGraw –Hill Co. New Delhi.
3. Gyaneshwar, A.D., G.J. Parekh, and V.S. Reddy (2004) Agricultural Microbiology: Plant-Soil Interactions, Research Signpost, Kerala, India
4. Zaki A. Shuler and Zainul Abid (2014) Agricultural Microbiology: Principles and Applications, CRC Press, Boca Raton, Florida, USA

VI. Suggested activities and evaluation methods:

Unit-1: Activity: Collecting scientific literature on historical developments in microbiology.

Evaluation method: Evaluating the report based on a rubric.

Unit-2: Activity: Group discussion on various groups of special bacteria.

Evaluation method: Assessment of active participation, soft skills, communication skills, collaborative skills, time management etc., of a group or a student based on a rubric.

Unit-3: Activity: Presentation or poster summarizing the classification of Eu-bacteria based on nutrition.

Evaluation method: Assessment based on accuracy and understanding.

Unit-4: Activity: Microscopic observation of bacterial samples from soil/ phylloplane in their native place/ college campus.

Evaluation method: Evaluating the report on characteristics and classification of eubacteria.

Unit-5: Activity: Visit to Agriculture/Horticulture universities to learn about biofertilizers and biopesticides.

Evaluation method: Evaluating the report submitted by the student based a rubric.



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COURSE 1: DIVERSITY OF MICROBES

Practical

Credits: 1

2 hrs/week

I. Course Outcomes: On successful completion of this practical course, student shall be able to:

1. Take all necessary precautions in the microbiology laboratory.
2. Handle the instruments and prepare media for laboratory work.
3. Identify various microbes through microscopic observations.

II. Laboratory/Field exercises:

1. Study the principle and applications of important instruments (autoclave, hot air oven, incubator, Inoculation loop, Inoculation needle, membrane filter, laminar air flow system, colony counter, biological safety cabinets, BOD incubator, pH meter) used in the microbiology laboratory.
2. Study of Viruses (TMV and Gemini) using electron micrographs/ models.
3. Microscopic study of Cyanobacteria using temporary/permanent slides.
4. Study of Archaeobacteria, Actinomycetes and Phytoplasma using permanent slides/ electron micrographs/diagrams.
5. Microscopic study of Eubacteria using temporary/permanent slides.
6. Gram staining technique of Bacteria.
7. Demonstration of culture and cultivation of *Spirulina*
8. Tungro in Paddy and Citrus canker

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Frame work w.e.f AY 2025-26**

I Semester

Course 1: Diversity of Microbes

Suggested Model Paper for Practical Examination

Max Time: 3 Hrs

Max. Marks: 50

- | | |
|---|--------------|
| 1. Demonstration of Grams's staining techniques for Bacteria. "A" | 10 M |
| 2. Demonstration of culture and cultivation of <i>Spirulina</i> . "B" | 10 M |
| 3. Identify the following with specific reasons (Spotters) | 4 X 5 = 20 M |
| C. Principle and Applications of an Instrument | |
| D. Comment on the Virus | |
| E. Special groups of Bacteria | |
| F. Viral disease | |
| 4. Record | 7 M |
| 5. Viva-voce | 3 M |

- Key;**
- A : Gram staining technique of Bacteria.
 - B: Demonstration of culture and cultivation of *Spirulina*.
 - C: Autoclave, Hot air oven, Incubator, Laminar air flow.
 - D. Study of Viruses (TMV and Gemini)
 - E. Archaeobacteria, Actinomycetes and Phytoplasma
 - F. Tungro in Paddy and Citrus canker



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Model question paper- Semester: I
Subject: .BOTANY Major
Single major program wef: 2025- 26

COURSE 1: DIVERSITY OF MICROBES

Max. time: 3 hrs

Max. marks: 75

Section: A

Answer any 5 of the following 10 questions. Each question carries 3 marks
(2 questions should be given from each unit) 5 QX 3 M = 15 M

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
8. ✓
- 9.
- 10.

Section: B

Answer 5 of the following 10 questions following internal choice. Each question carries 12 marks (2 questions should be given from each unit) 5 QX 12 M = 60 M

Two questions (a,b) will be given from each unit in the syllabus, providing internal choice (a or b) within each unit. Students must answer a total of five questions, selecting one question from each unit.

11. Questions 11 & 12 from unit 1. One should be answered.
- 12.
13. Question 13 & 14 from unit 2. One should be answered
- 14.
15. Question 15 & 16 from unit 3. One should be answered
- 16.
17. Question 17 & 18 from unit 4. One should be answered
- 18.
19. Question 19 & 20 from unit 5. One should be answered
- 20.

Note: Questions should be framed to test the students' understanding, analytical, and creative skills. All questions must be set strictly within the prescribed syllabus framework.


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