

DEPARTMENT OF MICROBIOLOGY
BoS
2026-2027
MINOR



Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN
(AUTONOMOUS)
(Re-Accredited by NAAC with 'A' Grade)
CHITTOOR

DEPARTMENT OF MICROBIOLOGY

BOARD OF STUDIES – MINUTES OF THE MEETING

ACADEMIC YEAR 2026 – 2027 (W.E.F. 2025 – 26)

B.Sc. (MINOR) MICROBIOLOGY
COURSE-1

SEMESTER – III

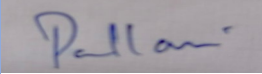
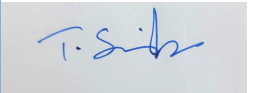
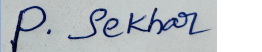
MINOR PAPER – I: BASIC MICROBIOLOGY

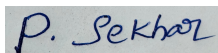
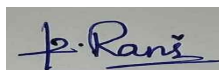
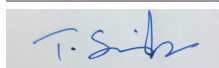
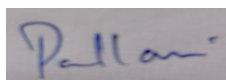
(Theory Code: 25MIC3MIT | Practical Code: 25MIC3MIP)

Conducted on: 23 /07/ 2026

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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR*(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY****Board of Studies Meeting 2025-2026****BOARD OF STUDIES – COMPOSITION**

S.No	Category	Name & Designation	Role / Contact	SIGNATURE
1	Chairman	Dr. P. Sivaraagini, M.Sc., M.Phil., Ph.D., DISM, DIPC – Lecturer in Microbiology	Chairperson 7569103565 sivaraagini@gmail.com	
2	Faculty Member	P. Prasanna – Lecturer in Microbiology, Smt. N.P.S. GDC(W)(A)	Member 7416357785 prasannakumari27598@gmail.com	
3	University Nominee (VC)	Dr. H. Pallavi – Lecturer in Microbiology, Govt. College (A), Anantapuramu	Member 9491233355 pallavi.pavan2003@gmail.com	
4	External Subject Expert	Dr. T. Sujatha – Lecturer in Microbiology, Govt. College (A), Rajahmundry	Member 9440392455 sujatha.taidala@gmail.com taidala.sujata@gmail.com	
5	External Subject Expert	Dr. A. Padmavathi – Lecturer in Microbiology, St. Theresa's College, Eluru	Member 9440581035 dr.padmavathi@stcelr.ac.in chsdtheresa@gmail.com	
6	Industry / Corporate	P.Sekhar VEG BY NATURE	Member 9963225486 sekhar.micro@gmail.com	
7	Meritorious Alumnus	A.M. Dilli Rani – Ph.D. Scholar, SPMVV, Tirupati	Member 7032316369 ranimuruges2105@gmail.com	

Signature of the Members:**Signature of the BOS Chairman**

PAPER SETTERS AND EVALUATORS

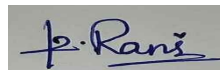
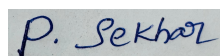
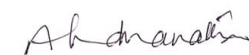
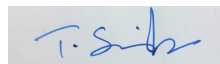
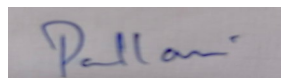
S.No	Name of the Lecturer	Designation	Name of the College	Account Number	IFSC Code	Phone Number
1	Dr. H. Pallavi	Lecturer in Microbiology	Govt. College (A), Anantapuramu	H PALLAVI Karnataka Bank, Anantapur 0252500100126101	KARB0000025	9491233355
2	Dr. T. Sujatha	Lecturer in Microbiology	SRR & CVR Govt college (A) Vijayawada	Ac no 36902202474 Eluru	SBIN0012722	9440392455
3	Dr. A. Padmavathi	Lecturer in Microbiology	St. Theresa's College, Eluru			9440581035
4	Sri G.Prasad	Lecturer in Microbiology	P.V.K.N GDC(A) Chittoor	Ac.no 30843097147 SBI Greampet branch	SBIN0007083	9441643317
5	Dr. G. Sreedevi	Lecturer in Microbiology	S.G.S .ARTS & Science College (A)			8919339866
6	Dr.J.Hima Bindhu	Lecturer in Microbiology	S. V. Arts college (A), TTD, Tirupati.	AC.NO. 1158 100 110 27 607	IFSC CODE : UBIN0800333	9885455977
7	Dr. P. Sandya Priya	Lecturer in Microbiology	S. V. Arts college (A), TTD, Tirupati.	Ac. No: 115810023000005	IFSC: UBIN0800333	9346760577

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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR*(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY****Board of Studies Meeting 2026-2027****AGENDA FOR THE MEETING**

The following agenda was placed before the Board for the introduction of B.Sc. (Minor) Microbiology Paper–I for Semester III, offered to students with Zoology and Chemistry as major subjects, in accordance with APSCHE and UGC Regulations 2025.

- Approval of the up-gradation, revision and redesigning of the Semester–III Minor Microbiology syllabus recommended by APSCHE for the academic year 2025–26 (Theory and Practical).
- Approval of the UG course structure of B.Sc. (Minor) Microbiology in combination with Chemistry and Zoology majors.
- Approval of Course Objectives, Course Outcomes (COs), Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) and the CO–PO–PSO mapping.
- Approval of the Blue Print (Bloom's Taxonomy) and the Model Question Paper for the Semester End Examination.
- Approval of the Internal (Mid) examination pattern – Mid-1 and Mid-2.
- Approval of the Practical syllabus, scheme of valuation and Practical Model Paper.
- Approval of the Question Bank with Answer Key.
- Panel of question-paper setters and examiners.
- Methodologies of teaching–learning and innovative pedagogy as per UGC guidelines.
- Continuous Internal Assessment (CIA) component and additional credits for co/extra-curricular activities.
- Skill-based learning / knowledge-based activities and skill modules.
- Proposals for field visits, seminars, workshops and MOUs for the academic year 2026–27.
- Any other proposal with the permission of the Chair.

Signature of the Members**Signature of the BOS Chairman**

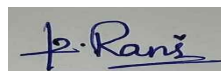
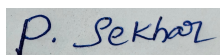
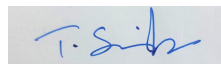
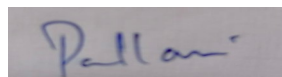
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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR*(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY****Board of Studies Meeting 2026-2027****MINUTES OF THE MEETING**

The 1st meeting of the Board of Studies in (Minor) Microbiology, for the combination with Chemistry and Zoology majors, was held at the Department of Microbiology, Smt. N.P.S. Govt. Degree College (W)(A), Chittoor. The following resolutions were made and unanimously approved.

RESOLVED & APPROVED

1. Approved the up-gradation, revision and redesigning of the Semester–III Minor Microbiology syllabus (Theory and Practical) recommended by APSCHE for 2025–26.
2. Approved the UG course structure of B.Sc. (Minor) Microbiology with Chemistry and Zoology majors.
3. Ratified the III-Semester Minor Paper–I titled **BASIC MICROBIOLOGY** (Code 25MIC301T).
4. Approved the Course Objectives, COs, POs, PSOs and the CO–PO–PSO articulation matrix.
5. Approved the Bloom's Taxonomy Blue Print and the Model Question Paper (SEE, 70 marks, 3 hours).
6. Approved the Internal assessment pattern: best of two mid examinations (20 marks each) plus assignment and seminar components, aggregating to CIA = 30 marks.
7. Approved the Practical syllabus (Code 25MIC-M301P, 1 credit), scheme of valuation and Practical Model Paper (50 marks).
8. Approved the Question Bank with Answer Key for all five units.
9. Accepted the panel of question-paper setters and examiners.
10. Approved innovative pedagogy, skill modules and co-curricular activities embedded in each unit.

Signature of the Members**Signature of the BOS Chairman**

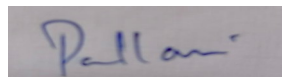
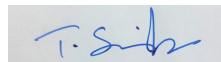
25MIC3M1T**Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR***(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY****Board of Studies Meeting 2025-2026****COURSE STRUCTURE – SEMESTER III**

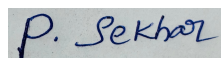
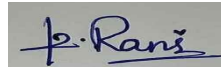
Under CBCS, W.E.F. 2025–26. Position of the Minor Microbiology paper within the III-Semester structure for Zoology / Chemistry major students.

S.No	Component	Title of Paper & Code	Credits	Hrs/Week	Total Hrs	CIA	SEE	Total
1	Minor – Theory	Basic Microbiology (25MIC-301T)	3	3	45	30	70	100
2	Minor – Practical	Basic Microbiology Practical (25MIC-301P)	2	2	30	–	50	50
TOTAL			5	5	75	30	120	150

Scheme of Assessment – Theory: CIA 30 = Mid Examination 20 (Average of two mids) + Assignment 05 + Seminar / Quiz / Attendance 10; SEE = 70; Total = 100.

Scheme of Assessment – Practical: Semester-End Practical Examination = 50 marks (no internal).

Signature of the Members





Signature of the BOS Chairman

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DEPARTMENT OF MICROBIOLOGY

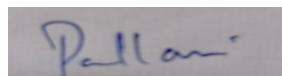
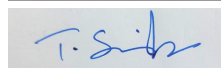
Board of Studies Meeting 2026-2027

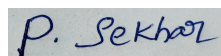
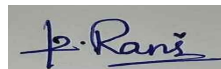
RATIONALE & SCOPE

Rationale: Microbiology is a foundational life-science discipline. For Zoology and Chemistry major students, a Minor in Microbiology builds essential understanding of microbial diversity, structure, growth and applications, strengthening lateral and vertical mobility toward biotechnology, molecular biology, clinical and food sciences.

Scope and Importance: Microorganisms underpin health, agriculture, food, industry and the environment. The course introduces the history of the science, the diversity of bacteria, archaea, fungi, algae, protozoa and viruses, and the principles of microbial nutrition and growth, giving students the conceptual base required for advanced and interdisciplinary study.

Eligibility: Students admitted to B.Sc. with Zoology / Chemistry as major subjects and Microbiology as the minor stream, having studied biology / chemistry at the 10+2 level.

Signature of the Members





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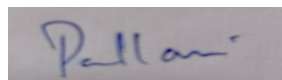
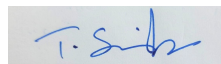
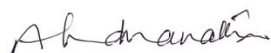
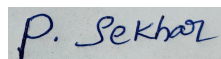
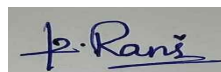
DEPARTMENT OF MICROBIOLOGY

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COURSE DETAILS

Programme & Semester	III Semester B.Sc. – Zoology / Chemistry Major with Minor Microbiology
Course Title	MINOR PAPER – I : BASIC MICROBIOLOGY
Course Code	25MIC-301T (Theory) 25MIC-301P (Practical)
Total Teaching Hours	Theory 45 hrs Practical 30 hrs
Pre-requisite	10+2 level Biology / Chemistry; general science background
L – T – P – C (Theory)	3 – 0 – 0 – 3
L – T – P – C (Practical)	0 – 0 – 2 – 2

Signature of the Members

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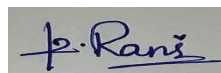
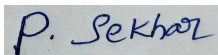
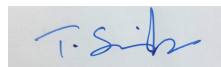
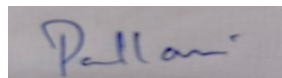
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Board of Studies Meeting 2025-2026

PROGRAMME OUTCOMES (POs)

PO	Domain	Statement
PO1	Fundamental Knowledge	Develop a strong foundation in microbiology and related life sciences – microbial diversity, structure, function and interactions.
PO2	Laboratory Skills	Acquire hands-on skills in aseptic technique, microbial culture, staining, microscopy and biochemical tests.
PO3	Research Aptitude	Design experiments, analyse data and apply the scientific method to investigate microbial processes.
PO4	Application of Microbiology	Apply microbiological knowledge in agriculture, industry, environment, medicine and biotechnology.
PO5	Problem-Solving	Use critical thinking to analyse microbiological issues and propose safe, ethical solutions.
PO6	Modern Tools	Employ laboratory instruments and modern techniques for microbial identification and characterisation.
PO7	Communication	Communicate microbiological concepts and findings in oral, written and digital forms.
PO8	Ethics & Responsibility	Practise biosafety, bioethics and environmental responsibility while handling microorganisms.
PO9	Teamwork & Leadership	Work effectively in multidisciplinary teams with cooperation and adaptability.
PO10	Lifelong Learning	Develop continuous learning and adaptability to new scientific discoveries and societal needs.

Signature of the Members



Signature of the BOS Chairman

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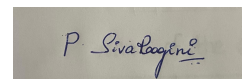
DEPARTMENT OF MICROBIOLOGY

Board of Studies Meeting 2025-2026

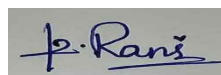
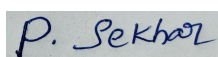
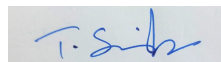
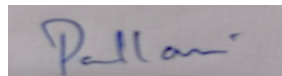
PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of the B.Sc. (Minor) Microbiology stream, students will be able to:

- **PSO1:** Identify and differentiate major microbial groups – bacteria, archaea, fungi, algae, protozoa and viruses – on the basis of structure and classification.
- **PSO2:** Explain microbial cell structure, nutrition, growth and the environmental factors that regulate microbial activity.
- **PSO3:** Demonstrate fundamental laboratory competence in microscopy, sterilisation, aseptic technique and observation of microorganisms, and apply this knowledge in allied life-science and chemistry fields.



Signature of the Members



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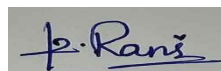
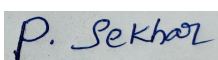
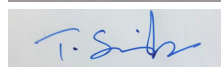
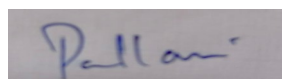
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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR*(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY****Board of Studies Meeting 2025-2026****COURSE OBJECTIVES & OUTCOMES****Course Objectives**

1. To introduce the history, scope and importance of microbiology.
2. To provide knowledge of microbial diversity – bacteria, archaea, fungi, algae, protozoa, helminths and viruses.
3. To explain microbial cell structures and their functional significance.
4. To describe microbial growth, nutrition and environmental influences.
5. To establish a foundation for advanced microbiology courses.

Course Outcomes (COs) with Bloom's Level

CO	On completion of the course the student will be able to	Bloom's Level
CO1	Recall the history and contributions of the pioneers of microbiology.	Remember
CO2	Differentiate between prokaryotic and eukaryotic microorganisms.	Understand
CO3	Explain the structural and physiological features of the major microbial groups.	Understand
CO4	Classify microorganisms using Bergey's Manual, morphology and host specificity.	Apply / Analyse
CO5	Interpret microbial growth patterns under varying nutritional and environmental conditions.	Analyse / Evaluate

Signature of the Members**Signature of the BOS Chairman**

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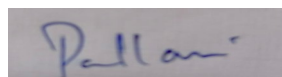
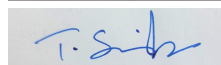
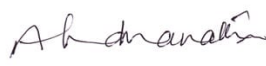
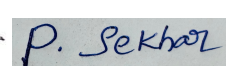
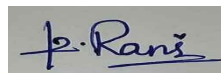
Board of Studies Meeting 2025-2026

CO – PO – PSO MAPPING MATRIX

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	2	2	2	1	2	1	1	3	3	2	2
CO2	3	2	2	2	2	1	2	1	1	3	3	2	2
CO3	3	2	3	3	3	2	2	2	2	3	3	3	2
CO4	2	3	3	2	3	3	2	2	2	2	3	3	3
CO5	2	3	3	3	3	3	2	2	2	2	3	3	3
Avg	2.6	2.4	2.6	2.4	2.6	2.0	2.0	1.6	1.6	2.6	3.0	2.6	2.4

Correlation scale: 1 = Slight (Low) | 2 = Moderate (Medium) | 3 = Substantial (High) | '-' = No correlation.

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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR*(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY****Board of Studies Meeting 2025-2026 (APSCHE-SYLLABUS)****THEORY SYLLABUS****MINOR PAPER – I : BASIC MICROBIOLOGY****Code: 25MIC-M301T Credits: 3 Hrs/Week: 3****Total Hours: 45****UNIT – I : Fundamentals of Microbiology****No. of hrs: 9**

- History and major contributions – Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Joseph Lister, Ignaz Semmelweis, Alexander Fleming, Ivanowsky, Beijerinck, Winogradsky.
- Scope, branches, applications and importance of microbiology in health, agriculture, food, industry and environment.
- Classification of microorganisms – Whittaker's Five Kingdoms; Carl Woese's Three Domains.
- Origin of microbial life on Earth – timeline of microbial evolution; Endosymbiosis theory (role of cyanobacteria); differences between prokaryotic and eukaryotic cells.

UNIT – II : Microbial Diversity – Prokaryotes**No. of hrs: 9**

- General features of Bacteria and Archaea.
- Bacterial cell structure: cell wall, glycocalyx/capsule, flagella, pili, fimbriae, nucleoid, plasmids, ribosomes, cytoplasmic membrane, mesosomes, inclusion bodies, endospore.
- Gram-positive and Gram-negative bacteria – structural differences and significance.
- Bergey's Manual of Systematic Bacteriology – basic outline of bacterial classification; economic importance of bacteria.

UNIT – III : Microbial Diversity – Eukaryotes**No. of hrs: 9**

- General features of fungi – morphology, reproduction, significance.
- General features of microalgae – classification, ecological roles, photosynthetic pigments.
- General features of protozoa – morphology, modes of nutrition, reproduction; overview of parasitic protozoa.
- Economic importance of algae and fungi.

UNIT – IV : Viruses and Other Acellular Agents**No. of hrs: 9**

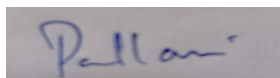
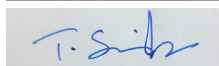
- General characteristics of viruses, bacteriophages, viroids and prions.
- Structure of typical viruses – bacterial, plant and animal viruses.
- Host specificity and classification of viruses – plant viruses, animal viruses, bacteriophages.
- Role of viruses as disease-causing agents and as useful tools in biotechnology (gene-therapy vectors, vaccine development).

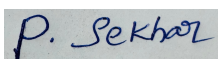
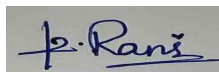
UNIT – V : Bacterial Growth and Nutrition**No. of hrs: 9**

- Nutritional requirements of bacteria: macronutrients, micronutrients, growth factors; nutritional types (autotrophs, heterotrophs, phototrophs, chemotrophs).
- Culture media: defined, complex, selective, differential, enrichment, transport.
- Bacterial growth curve: phases (lag, log, stationary, death) and significance.
- Factors affecting bacterial growth: temperature, pH, osmotic pressure, oxygen requirement (aerobes, anaerobes, facultatives, microaerophiles).

Reference Books

- Pelczar, Reid & Chan – Microbiology.
- Prescott, Harley & Klein – Microbiology.
- Madigan & Martinko – Brock Biology of Microorganisms.
- Tortora, Funke & Case – Microbiology: An Introduction.
- Cappuccino & Sherman – Microbiology: A Laboratory Manual.

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25MIC3M1T**COURSE 1: BASIC MICROBIOLOGY****BOS MEETING SUGESSTED CHANGES****Unit 1: Fundamentals of Microbiology** **No. of hrs: 9**

1.1 History and major contributions – Leeuwenhoek, Edward Jenner, Louis Pasteur, Robert Koch, Joseph Lister, Ignaz Semmelweis, Alexander Fleming, Ivanowsky, Beijerinck, Winogradsky.

1.2 Scope and applications of Microbiology

1.3 Classification of microorganisms – Whittaker's Five Kingdoms, Carl Woese's Three Domains.

1.4 Origin of microbial life on Earth – Timeline of microbial evolution, Endosymbiosis theory (role of cyanobacteria), differences between prokaryotic and eukaryotic cells.

Unit 2: Microbial Diversity – Prokaryotes **No. of hrs: 9**

2.1 General features of Bacteria and Archaea.

2.2 Bacterial cell structure: cell wall, glycocalyx/capsule, flagella, pili, fimbriae, nucleoid, plasmids, ribosomes, cytoplasmic membrane, inclusion bodies, endospore.

2.3 Gram-positive and Gram-negative bacteria – structural differences and significance.

2.4 **Bergey's Manual of Systematics of Archaea and Bacteria (BMSAB) - Basis for classification.**

Unit 3: Microbial Diversity – Eukaryotes **No. of hrs: 9**

3.1 General characters of Fungi

3.2 General characters of Microalgae

3.3 General characters of Protozoa

3.4 Economic importance of Algae and Fungi.

Unit 4: Viruses and Other Acellular Agents **No. of hrs: 9**

4.1 **Viral Structure, Genomic Composition, Replication, Classification, and Host specificity;** bacteriophages, viroids, and prions

4.2 Outline of Baltimore classification of viruses

4.3 Structure of TMV, Lambda and Influenza viruses

4.4 Role of viruses as disease-causing agents and as useful tools in biotechnology (gene therapy vectors, vaccine development)

Unit 5: Bacterial Growth and Nutrition

No. of hrs: 9

5.1 Nutritional types of bacteria: autotrophs, heterotrophs, phototrophs, chemotrophs, lithotrophs, organotrophs and obligate parasites

5.2 Culture media: [macronutrients, micronutrients, growth factors] defined and complex media, [Non culturable bacteria]

5.3 Bacterial growth in batch culture: Growth phases (lag, log, stationary, decline) and significance.

5.4 Factors affecting bacterial growth: temperature, pH, osmotic pressure, oxygen requirement.

Existing topic	Suggested Addition / Replacement	Rationale
1.1 Scope, branches, applications and importance of microbiology in health, agriculture, food, industry and environment.	1.1 Scope and applications of Microbiology	Narrows a broad, multi-part topic into a focused, teachable unit. "Applications" more precisely captures how microbiology is used across health, agriculture, food, industry, and environment than the vaguer "importance," making learning outcomes easier to assess.
2.5 Bergey's Manual of Systematic Bacteriology – basic outline of bacterial Classification. Economic importance of bacteria	2.5 Bergey's Manual of Systematics of Archaea and Bacteria (BMSAB) - Basis for classification.	Updates outdated terminology — the manual's current edition covers <i>Archaea and Bacteria</i> (BMSAB), not just "Systematic Bacteriology." Reflects current taxonomic nomenclature and keeps the syllabus aligned with the actual reference text students will use. Also removes "Economic importance of bacteria" as a separate, disconnected line item, consolidating focus purely on classification.
3.5 General features of fungi – morphology, reproduction, significance 3.6 General features of Microalgae – classification, ecological roles, Photosynthetic Pigments. 3.7 General features of protozoa – Morphology, modes of nutrition, reproduction, parasitic protozoa overview.	3.5 General characters of Fungi 3.6 General characters of Microalgae 3.7 General characters of Protozoa	Breaks a dense, run-on topic into three parallel, clearly numbered sub-units of equal structure and depth, making each group of organisms independently teachable and assessable rather than bundled together as one item.
4.5 General characteristics of viruses 4.6 Structure of typical viruses – bacterial, plant, animal viruses. 4.7 Host specificity and classification of viruses – plant viruses, animal viruses, bacteriophages.	4.5 Viral Structure, Genomic Composition, Replication, Classification, and Host specificity; bacteriophages, viroids, and prions 4.6 Outline of Baltimore classification of viruses 4.7 Structure of TMV, Lambda and Influenza viruses	Reorganizes viral content into a more logical teaching sequence: general principles first (4.5), then a specific classification framework (Baltimore system, 4.6), then concrete structural examples (4.7). Explicitly adds viroids and prions , which are non-viral infectious agents often omitted but expected in a comprehensive virology unit. Naming specific viruses (TMV, Lambda, Influenza) gives students concrete case studies instead of only abstract categories (bacterial/plant/animal).
5.5 Nutritional requirements of bacteria: macronutrients, micronutrients, growth factors; nutritional types (autotrophs, heterotrophs, phototrophs, chemotrophs). [Nutritional	5.5 Nutritional types of bacteria: autotrophs, heterotrophs, phototrophs, chemotrophs, lithotrophs, organotrophs and obligate parasites	Expands the original four nutritional types to a more complete and accurate classification scheme by adding lithotrophs, organotrophs, and obligate parasites — categories based on electron/energy donor source that are standard in microbiology curricula but missing from the original list. Also separates nutritional <i>types</i> from nutritional <i>requirements</i> (macro/micronutrients, growth factors), which arguably deserves its own line item, avoiding topic overload.
Bacterial growth curve	Bacterial growth in batch culture	More precise terminology — "batch culture" specifies the exact experimental condition (closed system, no nutrient replenishment) under which the classic growth curve (lag, log, stationary, death phases) is observed, distinguishing it from continuous culture systems (e.g., chemostat) that students may encounter later.
DEATH	decline	"Decline" is the more standard and accurate term for this growth phase in most microbiology textbooks (often called the "decline" or "death phase" interchangeably, but "decline phase" better reflects the gradual decrease in viable cell numbers rather than implying an abrupt end).

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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR*(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY****Board of Studies Meeting 2025-2026****BLUE PRINT – BLOOM'S TAXONOMY**

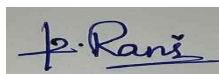
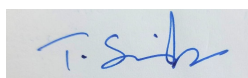
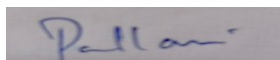
Unit-wise distribution of Semester-End questions across Bloom's cognitive levels. Entries indicate the number of questions targeted at each level (Section A = very short, 4 marks; Section B = essay, 10 marks).

Unit	Remember	Understand	Apply	Analyse	Evaluate	Create	VSAQ	Essay	Unit Marks
I	1	1	–	–	–	–	2	2	28
II	1	1	1	–	–	–	2	2	28
III	1	1	–	1	–	–	2	2	28
IV	1	1	–	1	–	–	2	2	28
V	–	1	1	1	1	–	2	2	28
Total	4	5	3	4	1	0	10	10	140*

* 140 = total marks of all questions SET (10 VSAQ×4 + 10 Essay×10 = 40 + 100). Marks to be ANSWERED = 70 (see paper pattern). Higher-order levels (Analyse / Evaluate) are emphasised in Units III–V.

CO – Bloom's Level Coverage

Bloom's Level	Mapped COs	Approx. Weightage
Remember	CO1	20%
Understand	CO2, CO3	30%
Apply	CO4	15%
Analyse	CO4, CO5	25%
Evaluate	CO5	10%
Create	–	0%

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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

(Re-Accredited by NAAC with 'A' Grade)

DEPARTMENT OF MICROBIOLOGY

Board of Studies Meeting 2025-2026

BLUE PRINT FOR QUESTION-PAPER SETTING

BASIC MICROBIOLOGY (SEE – 70 Marks)

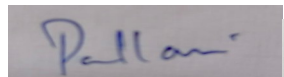
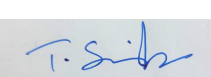
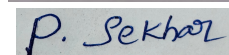
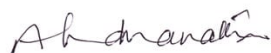
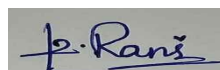
Unit	Section A VSAQ (4 M)	Section B Essay (10 M)	Marks Allotted per Unit
I	2	2	28
II	2	2	28
III	2	2	28
IV	2	2	28
V	2	2	28
Total Questions Set	10	10	140

Note: One VSAQ and one Essay (with internal choice) are set from each unit. In Section A the candidate answers any 5 of 10 ($5 \times 4 = 20$). In Section B the candidate answers all 5 essays, choosing (a) or (b) from each unit ($5 \times 10 = 50$). Total = 70.

Section	Description	Set	To Answer	Marks
A	Very Short Answer Questions	10	Any 5	$5 \times 4 = 20$
B	Essay Questions (internal choice, one per unit)	10 (5 pairs)	5	$5 \times 10 = 50$
	Grand Total			70

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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR
SEMESTER END EXAMINATION – MODEL QUESTION PAPER

III Semester B.Sc. (Minor Microbiology) – Paper I

BASIC MICROBIOLOGY

Subject Code: 25MIC-M301T

Time: 3 Hours

Max. Marks: 70

SECTION – A

Answer any FIVE of the following.

5 × 4 = 20 M

1. Koch's postulates.
2. Whittaker's Five-Kingdom classification.
3. Endosymbiotic theory.
4. Bacterial endospore.
5. Gram-positive vs. Gram-negative cell wall (any two differences).
6. Photosynthetic pigments of algae.
7. Bacteriophage.
8. Prions and viroids.
9. Selective and differential media.
10. Define generation time.

SECTION – B

Answer ALL questions. Each carries internal choice (a / b).

5 × 10 = 50 M

- 11. (a)** Describe the major contributions of Louis Pasteur and Robert Koch to microbiology.

(OR)

(b) Explain Whittaker's Five-Kingdom and Woese's Three-Domain systems of classification.

- 12. (a)** Describe the ultrastructure of a bacterial cell with a labelled diagram.

(OR)

(b) Compare the structure and significance of Gram-positive and Gram-negative bacteria.

- 13. (a)** Describe the general features, morphology and reproduction of fungi.

(OR)

(b) Explain the general features and economic importance of algae.

- 14. (a)** Describe the structure of a typical virus with reference to bacterial, plant and animal viruses.

(OR)

(b) Explain host specificity and the classification of viruses; add a note on prions and viroids.

- 15. (a)** Describe the bacterial growth curve and the significance of each phase.

(OR)

(b) Explain the factors affecting bacterial growth and the major nutritional types.

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(Re-Accredited by NAAC with 'A' Grade)

DEPARTMENT OF MICROBIOLOGY

Board of Studies Meeting 2025-2026

SEMESTER END EXAMINATION – PATTERN

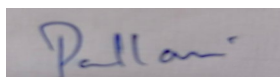
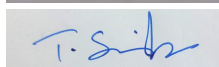
The Semester End Examination (SEE) for the theory paper is conducted for 70 marks over 3 hours, following the structure approved in the Blue Print.

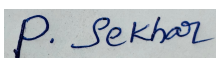
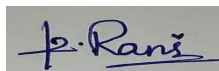
Section	Type	Questions	Marks	Bloom Focus
A	Very Short Answer (define / explain in brief)	Answer any 5 of 10	$5 \times 4 = 20$	Remember / Understand
B	Essay (internal choice, one per unit)	Answer all 5 (a or b)	$5 \times 10 = 50$	Understand / Apply / Analyse / Evaluate
	Total		70	

Instructions to candidates: Draw neat, labelled diagrams wherever necessary. All sections are compulsory. Figures to the right indicate marks.

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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR
FIRST MID (INTERNAL) EXAMINATION

III Semester B.Sc. (Minor Microbiology) Paper – I : BASIC MICROBIOLOGY
(Syllabus: Units I & II)

Time: 1 Hour

Max. Marks: 20

SECTION – A

Answer ALL questions (Very Short Answer).

5 × 2 = 10 M

1. Name any two contributions of Leeuwenhoek.
2. What are the three domains of life?
3. Define peptidoglycan.
4. What is a mesosome?
5. Name any two Gram-positive bacteria.

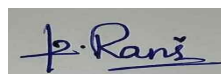
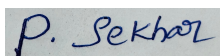
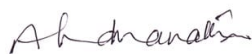
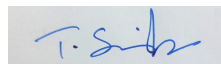
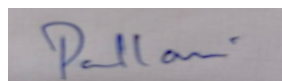
SECTION – B

Answer any TWO of the following (Short Answer).

2 × 5 = 10 M

6. Explain the contributions of Robert Koch.
7. Describe the bacterial cell wall structure.
8. Distinguish between prokaryotic and eukaryotic cells.

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(Syllabus: Units III, IV & V)

Max. Marks: 20

$$5 \times 2 = 10 \text{ M}$$

- $$2 \times 5 = 10 \text{ M}$$

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P. Rani

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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR*(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY****Board of Studies Meeting 2025-2026****PRACTICAL SYLLABUS****BASIC MICROBIOLOGY – PRACTICAL****Code: 25MIC301P****Credits: 1 Hrs/Week: 2****Total Hours: 30****Practical Course Outcomes**

- Demonstrate good laboratory practices, biosafety procedures and correct handling of the compound light microscope and its parts.
- Perform microscopic observation and identification of bacteria, algae, fungi and protozoa, and interpret electron micrographs of viruses.
- Operate essential microbiology laboratory equipment (autoclave, hot-air oven, laminar airflow chamber) following correct working principles and aseptic technique.

Laboratory / Field Exercises

S.No	Experiment
1	Microbiology laboratory: basic rules and requirements.
2	Laboratory equipment: working principles of autoclave, hot-air oven, laminar airflow chamber.
3	Demonstration of microflora in the environment by exposing nutrient agar plates to air.
4	Study of fungal morphology using lactophenol cotton blue.
5	Study of algal morphology using wet mount.
6	Enumeration of bacteriophages by plaque assay.
7	Effect of environmental temperature on bacterial growth.
8	Observation of electron micrographs of viruses (Lambda, T4, TMV, HIV, SARS CoV-2, Polio)

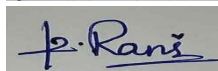
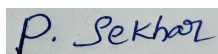
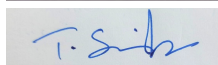
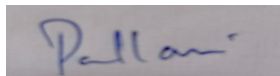
INCLUDING THIS PRACTICAL FROM COURSE -2 TO COURSE-1

1. Observation of electron micrographs of viruses (Lambda, T4, TMV, HIV, SARS CoV-2, Polio).- [this can go to course 1](#)

Reference Books for Laboratory

- Cappuccino & Sherman – Microbiology: A Laboratory Manual.
- Dubey & Maheswari – Practical Microbiology, S. Chand & Co.
- Aneja, K.R. – Experiments in Microbiology, Plant Pathology and Biotechnology.

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PRACTICAL MODEL PAPER

III Semester B.Sc. (Minor Microbiology) Paper – I

BASIC MICROBIOLOGY – PRACTICAL

Time: 3 Hours Code: 25MIC301P

Max. Marks: 50

Q	Question	Scheme of Valuation	Marks
A	Major Experiment: Perform any one allotted experiment (e.g., exposure plate / temperature effect on growth / plaque assay).	Procedure 8 + Result & inference 7	15
B	Minor Experiment: Perform any one allotted experiment (e.g., lactophenol cotton blue mount / algal wet mount).	Principle 5 + Procedure 5	10
C	Spotters: Identify and write notes on C, D, E (microscope parts / equipment / micrographs).	Identification 1 + Reasons 2 + Diagram 2 (each)	$5 \times 3 = 15$
D	Record	—	5
E	Viva voce	—	5
	Total		50

P. Sivabagane

Signature of the Members

Pallavi

T. Sibi

Ahmadanath

P. Sekhar

P. Rani

Signature of the BOS Chairman

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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

(Re-Accredited by NAAC with 'A' Grade)

DEPARTMENT OF MICROBIOLOGY

Board of Studies Meeting 2025-2026

QUESTION BANK WITH ANSWER KEY

BASIC MICROBIOLOGY (Minor Paper – I)

UNIT – I : Fundamentals of Microbiology

A. Very Short Answer Questions (with key)

1. Who is regarded as the Father of Microbiology?

Ans: Antonie van Leeuwenhoek, who first observed microorganisms ('animalcules') using his simple microscopes (1670s).

2. State Koch's postulates.

Ans: A set of four criteria to prove that a specific microbe causes a specific disease: (1) the organism is present in every diseased host; (2) it can be isolated and grown in pure culture; (3) it reproduces the disease when inoculated into a healthy host; (4) it is re-isolated from the new host.

3. What is the contribution of Edward Jenner?

Ans: He developed the first vaccine (against smallpox, 1796) using cowpox material, founding the science of immunisation.

4. Name the three domains of life (Woese).

Ans: Bacteria, Archaea and Eukarya, based on 16S/18S rRNA sequence comparison.

5. List Whittaker's five kingdoms.

Ans: Monera, Protista, Fungi, Plantae and Animalia.

6. What is the endosymbiotic theory?

Ans: The proposal that mitochondria and chloroplasts of eukaryotes arose from once free-living bacteria (an aerobic bacterium and a cyanobacterium) engulfed by an ancestral host cell.

7. Define microbiology.

Ans: The branch of biology dealing with microorganisms – bacteria, archaea, fungi, algae, protozoa and viruses – their structure, function and applications.

8. Name any two branches of microbiology.

Ans: Medical microbiology, agricultural microbiology, industrial microbiology, food microbiology, environmental microbiology (any two).

B. Essay Questions (with key points)

1. Describe the major contributions of the pioneers of microbiology.

Key points: Leeuwenhoek (first observation of microbes); Pasteur (disproved spontaneous generation, pasteurisation, germ theory, vaccines for anthrax and rabies); Koch (pure-culture techniques, Koch's postulates, identification of TB and cholera bacilli); Lister (antiseptic surgery); Jenner (smallpox vaccine); Fleming (penicillin); Ivanowsky/Beijerinck (discovery of viruses); Winogradsky (chemoautotrophy, nitrogen and sulphur cycles); Semmelweis (hand hygiene).

2. Explain Whittaker's Five-Kingdom and Woese's Three-Domain classifications.

Key points: Whittaker (1969) classified organisms into Monera, Protista, Fungi, Plantae, Animalia using cell type, organisation and nutrition. Woese (1977), using rRNA sequencing, reorganised life into three domains: Bacteria, Archaea (distinct membrane lipids, cell-wall chemistry, rRNA) and Eukarya. Compare basis, merits and limitations; note that Archaea differ from Bacteria despite both being prokaryotic.

UNIT – II : Microbial Diversity – Prokaryotes

A. Very Short Answer Questions (with key)

1. Define peptidoglycan.

Ans: A polymer of N-acetylglucosamine and N-acetylmuramic acid cross-linked by short peptides; it forms the rigid bacterial cell wall.

2. What is a capsule (glycocalyx)?

Ans: An organised outer layer of polysaccharide/polypeptide surrounding the cell wall; aids attachment and resistance to phagocytosis.

3. What is an endospore?

Ans: A dormant, highly resistant resting structure formed within certain Gram-positive bacteria (e.g., Bacillus, Clostridium) that survives heat, desiccation and chemicals.

4. Differentiate Gram-positive and Gram-negative cell walls (two points).

Ans: Gram-positive: thick peptidoglycan, teichoic acids, no outer membrane, stain purple. Gram-negative: thin peptidoglycan, outer membrane with LPS, periplasmic space, stain pink.

5. What is a mesosome?

Ans: An invagination of the plasma membrane in bacteria thought to assist in respiration, septum formation and DNA replication.

6. Define plasmid.

Ans: A small, circular, extrachromosomal DNA molecule that replicates independently and often carries antibiotic-resistance or other accessory genes.

7. What is the nucleoid?

Ans: The irregular region in a prokaryotic cell containing the single, circular, supercoiled chromosome (no nuclear membrane).

8. Name two features unique to Archaea.

Ans: Ether-linked membrane lipids and cell walls lacking peptidoglycan (e.g., pseudopeptidoglycan); many are extremophiles.

B. Essay Questions (with key points)

1. Describe the ultrastructure of a bacterial cell.

Key points: Cover external structures (glycocalyx/capsule, flagella, pili, fimbriae), the cell wall (peptidoglycan; Gram +/-), the cytoplasmic membrane and mesosomes, and internal components (nucleoid, plasmids, ribosomes 70S, inclusion bodies, endospore). Add a labelled diagram and the function of each part.

2. Compare Gram-positive and Gram-negative bacteria and explain the significance.

Key points: Tabulate differences in peptidoglycan thickness, outer membrane/LPS, teichoic acids, periplasm, staining and antibiotic sensitivity. Significance: basis of Gram staining, drug selection, endotoxin (LPS) in Gram-negatives, and taxonomic value in Bergey's Manual.

UNIT – III : Microbial Diversity – Eukaryotes

A. Very Short Answer Questions (with key)

1. Define hyphae and mycelium.

Ans: Hyphae are the tubular filaments of a fungus; a network of hyphae forms the mycelium (the vegetative body).

2. Name two photosynthetic pigments of algae.

Ans: Chlorophyll a and accessory pigments such as carotenoids, phycobilins (phycoerythrin, phycocyanin).

3. What is a thallus?

Ans: An undifferentiated plant/algal/fungal body lacking true roots, stems and leaves.

4. Name the modes of nutrition in protozoa.

Ans: Holozoic (ingestion), saprozoic (absorption), holophytic (photosynthetic) and parasitic.

5. State the economic importance of fungi (two points).

Ans: Production of antibiotics, organic acids, enzymes and fermented foods; some cause spoilage and disease; useful in baking, brewing and as decomposers.

6. Give two examples of parasitic protozoa.

Ans: Plasmodium (malaria), Entamoeba histolytica (amoebic dysentery), Trypanosoma, Giardia (any two).

B. Essay Questions (with key points)

1. Describe the general features, morphology and reproduction of fungi.

Key points: Eukaryotic, mostly multicellular, heterotrophic (saprophytic/parasitic), cell wall of chitin; body of hyphae (septate/aseptate) forming mycelium. Reproduction: vegetative (fragmentation, budding), asexual (spores – conidia, sporangiospores), sexual (zygospores, ascospores, basidiospores). Add significance in industry, medicine and ecology.

2. Explain the general features and economic importance of algae.

Key points: Photosynthetic eukaryotes (and cyanobacteria), aquatic/terrestrial, with chlorophyll and accessory pigments; classified by pigment and storage products. Economic importance: oxygen production, food (Spirulina, Chlorella), agar/alginate/carrageenan, biofertilisers, biofuel, and roles in aquatic food chains.

UNIT – IV : Viruses and Other Acellular Agents

A. Very Short Answer Questions (with key)

1. Define a virus.

Ans: An obligate intracellular acellular agent consisting of nucleic acid (DNA or RNA) enclosed in a protein coat (capsid), able to replicate only inside a host cell.

2. What is a bacteriophage?

Ans: A virus that infects bacteria; e.g., the T-even phages of *E. coli*.

3. Define a viroid.

Ans: A small, naked, circular single-stranded RNA molecule (no capsid) that causes diseases in plants.

4. Define a prion.

Ans: An infectious, abnormally folded protein particle (no nucleic acid) causing transmissible spongiform encephalopathies such as CJD.

5. What is a capsid?

Ans: The protein coat surrounding the viral nucleic acid, built of subunits called capsomeres.

6. What is host specificity?

Ans: The property by which a virus infects only a particular host species or cell type, determined by receptor-ligand recognition.

B. Essay Questions (with key points)

1. Describe the structure of a typical virus with examples.

Key points: Components: nucleic acid core (DNA/RNA, single/double stranded), capsid (helical, icosahedral or complex), and optional envelope with glycoprotein spikes. Examples: TMV (helical, plant), T4 bacteriophage (complex, head-tail), adenovirus (icosahedral, animal). Include a labelled diagram.

2. Explain host specificity and classification of viruses; add a note on prions and viroids.

Key points: Host specificity arises from receptor recognition; viruses are grouped as plant, animal and bacterial viruses and further by nucleic-acid type, symmetry, envelope and Baltimore class. Note that viruses serve as gene-therapy vectors and in vaccine development. Prions = infectious proteins; viroids = naked infectious RNA; both are sub-viral agents.

UNIT – V : Bacterial Growth and Nutrition

A. Very Short Answer Questions (with key)

1. Define macronutrients with examples.

Ans: Elements required in large amounts – C, H, O, N, P, S, K, Mg, Ca, Fe – used in cell constituents and energy metabolism.

2. What are growth factors?

Ans: Organic compounds (vitamins, amino acids, purines/pyrimidines) that a microbe cannot synthesise and must obtain pre-formed.

3. Define autotroph and heterotroph.

Ans: Autotroph: uses CO₂ as the carbon source. Heterotroph: uses organic compounds as the carbon source.

4. What is selective medium?

Ans: A medium that contains agents permitting growth of some organisms while inhibiting others (e.g., MacConkey for Gram-negatives).

5. What is differential medium?

Ans: A medium that distinguishes organisms by a visible reaction (e.g., blood agar showing haemolysis).

6. Define generation (doubling) time.

Ans: The time required for a bacterial population to double in number under given conditions.

7. Name the phases of the growth curve.

Ans: Lag phase, log (exponential) phase, stationary phase and death (decline) phase.

8. Define psychrophile, mesophile and thermophile.

Ans: Microbes with optimum growth at low ($<15\text{ }^{\circ}\text{C}$), moderate ($25\text{--}40\text{ }^{\circ}\text{C}$) and high ($45\text{--}80\text{ }^{\circ}\text{C}$) temperatures, respectively.

B. Essay Questions (with key points)

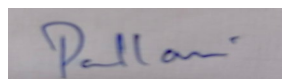
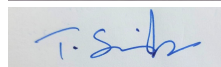
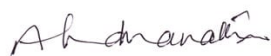
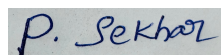
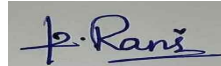
1. Describe the bacterial growth curve and the significance of each phase.

Key points: Plot of $\log(\text{number})$ vs time in a closed (batch) culture. Lag: adaptation, enzyme synthesis, no division. Log: maximum, constant growth rate; cells most uniform; used for studies/antibiotic testing. Stationary: nutrient depletion and waste accumulation balance growth and death; secondary metabolites/endospores form. Death: viable count declines exponentially. Include a labelled graph and generation-time concept.

2. Explain the factors affecting bacterial growth and the major nutritional types.

Key points: Physical/chemical factors: temperature (psychro/meso/thermophiles), pH (acido/neutro/alkaliphiles), osmotic pressure (halophiles), and oxygen (obligate aerobes, obligate anaerobes, facultative anaerobes, microaerophiles, aerotolerant). Nutritional types by carbon and energy source: photoautotrophs, photoheterotrophs, chemoautotrophs, chemoheterotrophs. Relate to culture-media design.

Signature of the Members

Signature of the BOS Chairman

25MIC3M1T

Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

(Re-Accredited by NAAC with 'A' Grade)

DEPARTMENT OF MICROBIOLOGY

Board of Studies Meeting 2025-2026

ASSIGNMENT QUESTIONS & CO-CURRICULAR ACTIVITIES

Assignment Questions

1. Write an account of the contributions of pioneers to the development of microbiology.
2. Describe the ultrastructure of a bacterial cell with a labelled diagram.
3. Compare Gram-positive and Gram-negative bacteria.
4. Explain the general features and economic importance of algae and fungi.
5. Describe the structure and classification of viruses; add a note on prions and viroids.
6. Explain the bacterial growth curve and the factors affecting microbial growth.

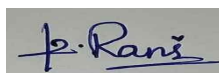
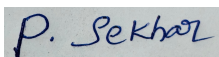
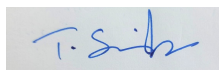
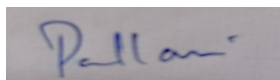
Co-Curricular / Skill-Based Activities (Skill Module – 10 hours)

For the teacher: training of students in the laboratory/field on basic techniques and skills.

For the student (any three): seminars on contributions of microbiologists; charts/models of microbial cell structure and the growth curve; poster on prokaryotic vs eukaryotic cells and virus structure; field visit to a local water/soil site; quiz/debate ('Are viruses living or non-living?'); e-portfolios.

Maximum marks for the above activities: 05.

Signature of the Members



Signature of the BOS Chairman



Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)

(Re-Accredited by NAAC with 'A' Grade)

CHITTOOR

DEPARTMENT OF MICROBIOLOGY

BOARD OF STUDIES – MINUTES OF THE MEETING

ACADEMIC YEAR 2026 – 2027 (W.E.F. 2026 – 27)

B.Sc. (MINOR) MICROBIOLOGY

SEMESTER – IV

MINOR PAPER – II: TECHNIQUES IN MICROBIOLOGY

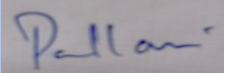
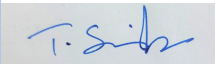
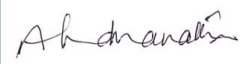
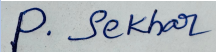
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Conducted on: 23/ 07 / 2026

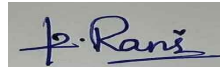
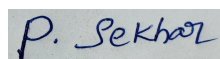
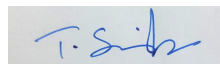
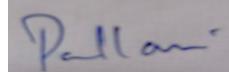
Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR*(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY**

Board of Studies Meeting 2026-2027

BOARD OF STUDIES – COMPOSITION

S.No	Category	Name & Designation	Role / Contact	SIGNATURE
1	Chairman	Dr. P. Sivaraagini, M.Sc., M.Phil., Ph.D., DISM, DIPC – Lecturer in Microbiology	Chairperson 7569103565 sivaraagini@gmail.com	
2	Faculty Member	P. Prasanna – Lecturer in Microbiology, Smt. N.P.S. GDC(W)(A)	Member 7416357785 prasannakumari27598@gmail.com	
3	University Nominee (VC)	Dr. H. Pallavi – Lecturer in Microbiology, Govt. College (A), Anantapuramu	Member 9491233355 pallavi.pavan2003@gmail.com	
4	External Subject Expert	Dr. T. Sujatha – Lecturer in Microbiology, Govt. College (A), Rajahmundry	Member 9440392455 sujatha.taidala@gmail.com taidala.sujata@gmail.com	
5	External Subject Expert	Dr. A. Padmavathi – Lecturer in Microbiology, St. Theresa's College, Eluru	Member 9440581035 dr.padmavathi@stcelr.ac.in chsdtheresa@gmail.com	
6	Industry / Corporate	P.Sekhar VEG BY NATURE	Member 9963225486 sekhar.micro@gmail.com	
7	Meritorious Alumnus	A.M. Dilli Rani – Ph.D. Scholar, SPMVV, Tirupati	Member 7032316369 ranimurugesh2105@gmail.com	

Signature of the Members

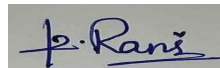
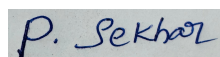
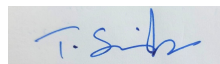
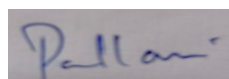
**Signature of the BOS Chairman**

Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR*(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY****Board of Studies Meeting 2026-2027****AGENDA FOR THE MEETING**

The following agenda was placed before the Board for the introduction of B.Sc. (Minor) Microbiology Paper–II for Semester IV, offered to students with Zoology and Chemistry as major subjects, in accordance with APSCHE and UGC Regulations 2025.

1. Approval of the up-gradation, revision and redesigning of the Semester–IV Minor Microbiology syllabus recommended by APSCHE for the academic year 2026–27 (Theory and Practical).
2. Approval of the UG course structure of B.Sc. (Minor) Microbiology in combination with Chemistry and Zoology majors for Semester IV.
3. Approval of Course Objectives, Course Outcomes (COs), Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) and the CO–PO–PSO mapping.
4. Approval of the Blue Print (Bloom's Taxonomy) and the Model Question Paper for the Semester End Examination.
5. Approval of the Internal (Mid) examination pattern – Mid-1 and Mid-2.
6. Approval of the Practical syllabus, scheme of valuation and Practical Model Paper.
7. Approval of the Question Bank with Answer Key.
8. Panel of question-paper setters and examiners.
9. Methodologies of teaching–learning and innovative pedagogy as per UGC guidelines.
10. Continuous Internal Assessment (CIA) component and additional credits for co/extra-curricular activities.
11. Skill-based learning / knowledge-based activities and skill modules.
12. Proposals for field visits, seminars, workshops and MOUs for the academic year 2026–27.
13. Any other proposal with the permission of the Chair.

Signature of the Members



Signature of the BOS Chairman

Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR*(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY**

Board of Studies Meeting 2026-2027

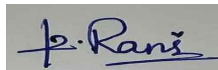
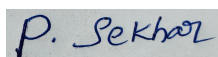
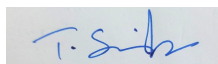
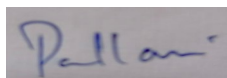
MINUTES OF THE MEETING

The 2nd meeting of the Board of Studies in (Minor) Microbiology, for the combination with Chemistry and Zoology majors, was held at the Department of Microbiology, Smt. N.P.S. Govt. Degree College (W)(A), Chittoor. The following resolutions were made and unanimously approved.

RESOLVED & APPROVED

1. Approved the up-gradation, revision and redesigning of the Semester–IV Minor Microbiology syllabus (Theory and Practical) recommended by APSCHE for 2026–27.
2. Approved the UG course structure of B.Sc. (Minor) Microbiology with Chemistry and Zoology majors for Semester IV.
3. Ratified the IV-Semester Minor Paper–II titled TECHNIQUES IN MICROBIOLOGY (Code 25MIC-402T).
4. Approved the Course Objectives, COs, POs, PSOs and the CO–PO–PSO articulation matrix.
5. Approved the Bloom's Taxonomy Blue Print and the Model Question Paper (SEE, 70 marks, 3 hours).
6. Approved the Internal assessment pattern: best of two mid examinations (20 marks each) plus assignment and seminar components, aggregating to CIA = 30 marks.
7. Approved the Practical syllabus (Code 25MIC-402P, 2 credits), scheme of valuation and Practical Model Paper (50 marks).
8. Approved the Question Bank with Answer Key for all five units.
9. Accepted the panel of question-paper setters and examiners.
10. Approved innovative pedagogy, skill modules and co-curricular activities embedded in each unit.

Signature of the Members



Signature of the BOS Chairman

Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR*(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY**

Board of Studies Meeting 2026-2027

COURSE STRUCTURE – SEMESTER IV

Under CBCS, W.E.F. 2026–27. Position of the Minor Microbiology paper within the IV-Semester structure for Zoology / Chemistry major students.

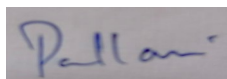
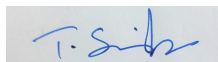
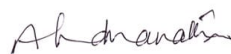
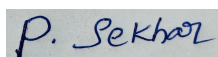
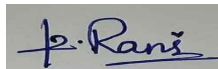
S.No	Component	Title of Paper & Code	Credits	Hrs/Week	Total Hrs	CIA	SEE	Total
1	Minor – Theory	Techniques in Microbiology (25MIC-402T)	3	3	45	30	70	100
2	Minor – Practical	Techniques in Microbiology Practical (25MIC-402P)	2	2	30	–	50	50
	TOTAL		5	5	75	30	120	150

Scheme of Assessment – Theory: CIA 30 = Mid Examination 20 (Average of two mids) + Assignment 05 + Seminar / Quiz / Attendance 10; SEE = 70; Total = 100.

Scheme of Assessment – Practical: Semester-End Practical Examination = 50 marks (no internal).

Signature of the Members

Signature of the BOS Chairman

Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

(Re-Accredited by NAAC with 'A' Grade)

DEPARTMENT OF MICROBIOLOGY

Board of Studies Meeting 2026-2027

RATIONALE & SCOPE

Rationale: Building on the foundational concepts introduced in Semester III, this course equips Zoology and Chemistry major students with the essential hands-on techniques used across microbiology laboratories – microscopy, staining, media preparation, isolation, enumeration, sterilization and biosafety – strengthening their readiness for advanced study and employment in biotechnology, clinical, food and industrial microbiology sectors.

Scope and Importance: Mastery of laboratory technique is central to microbiology as an experimental science. The course introduces students to the instruments and methods used to visualise, isolate, quantify and safely handle microorganisms, giving them the practical competence required for research, diagnostic and industrial laboratory settings, and for further interdisciplinary study.

Eligibility: Students admitted to B.Sc. with Zoology / Chemistry as major subjects and Microbiology as the minor stream, who have completed Semester III Minor Paper – I: Basic Microbiology.

Signature of the Members

Signature of the BOS Chairman

Pallani

T. Smith

Ahmadan

P. Sekhar

P. Rani

Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR*(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY**

Board of Studies Meeting 2026-2027

COURSE DETAILS

Programme & Semester	IV Semester B.Sc. – Zoology / Chemistry Major with Minor Microbiology
Course Title	MINOR PAPER – II : TECHNIQUES IN MICROBIOLOGY
Course Code	25MIC-402T (Theory) 25MIC-402P (Practical)
Total Teaching Hours	Theory 45 hrs Practical 30 hrs
Pre-requisite	Semester III Minor Paper – I: Basic Microbiology; general laboratory orientation
L – T – P – C (Theory)	3 – 0 – 0 – 3
L – T – P – C (Practical)	0 – 0 – 2 – 2

Signature of the Members

Signature of the BOS Chairman

Pallan

T. Sibi

Ahmadan

P. Sekhar

P. Rani

Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR*(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY**

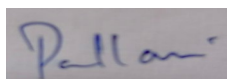
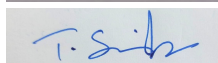
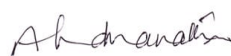
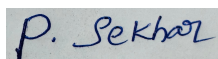
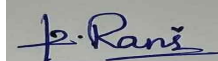
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PROGRAMME OUTCOMES (POs)

PO	Domain	Statement
PO1	Fundamental Knowledge	Develop a strong foundation in microbiology and related life sciences – microbial diversity, structure, function and interactions.
PO2	Laboratory Skills	Acquire hands-on skills in aseptic technique, microbial culture, staining, microscopy and biochemical tests.
PO3	Research Aptitude	Design experiments, analyse data and apply the scientific method to investigate microbial processes.
PO4	Application of Microbiology	Apply microbiological knowledge in agriculture, industry, environment, medicine and biotechnology.
PO5	Problem-Solving	Use critical thinking to analyse microbiological issues and propose safe, ethical solutions.
PO6	Modern Tools	Employ laboratory instruments and modern techniques for microbial identification and characterisation.
PO7	Communication	Communicate microbiological concepts and findings in oral, written and digital forms.
PO8	Ethics & Responsibility	Practise biosafety, bioethics and environmental responsibility while handling microorganisms.
PO9	Teamwork & Leadership	Work effectively in multidisciplinary teams with cooperation and adaptability.
PO10	Lifelong Learning	Develop continuous learning and adaptability to new scientific discoveries and societal needs.

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DEPARTMENT OF MICROBIOLOGY

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PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of the B.Sc. (Minor) Microbiology stream, students will be able to:

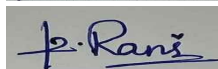
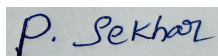
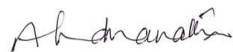
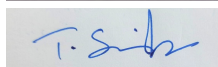
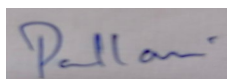
PSO1: Identify and differentiate major microbial groups – bacteria, archaea, fungi, algae, protozoa and viruses – on the basis of structure and classification.

PSO2: Explain microbial cell structure, nutrition, growth and the environmental factors that regulate microbial activity.

PSO3: Demonstrate proficiency in core laboratory techniques – microscopy, staining, media preparation, isolation, enumeration, sterilization and biosafety practice – and apply this competence in allied life-science and chemistry fields.

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COURSE OBJECTIVES & OUTCOMES**Course Objectives**

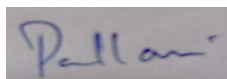
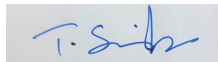
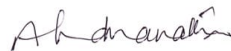
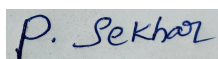
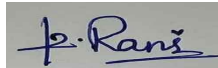
1. Learn principles and use of microscopes and basic staining methods.
2. Understand preparation of media and isolation of pure cultures.
3. Learn methods to estimate microbial numbers and assess growth.
4. Understand physical and chemical sterilization methods and their applications.
5. Learn biosafety levels, PPE usage, and safe handling of biohazardous materials.

Course Outcomes (COs) with Bloom's Level

CO	On completion of the course the student will be able to	Bloom's Level
CO1	Identify microbial morphology, arrangements, and structures using different stains and microscopes.	Understand / Apply
CO2	Demonstrate isolation of microbes and maintain pure cultures effectively.	Apply
CO3	Quantify microbial populations and monitor growth patterns.	Apply / Analyse
CO4	Sterilize media, glassware, instruments, and workspaces effectively.	Apply
CO5	Apply good laboratory practices to prevent contamination and ensure safety.	Apply / Evaluate

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CO – PO – PSO MAPPING MATRIX

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	2	2	1	3	2	2	1	2	3	2	3
CO2	2	3	2	2	2	3	2	2	2	2	3	2	3
CO3	2	3	3	2	3	3	2	2	2	2	3	3	3
CO4	1	3	2	2	2	3	1	3	1	2	2	2	3
CO5	1	2	2	3	3	2	2	3	2	2	2	2	3
Avg	1.6	2.6	2.2	2.2	2.2	2.8	1.8	2.4	1.6	2.0	2.6	2.2	3.0

Correlation scale: 1 = Slight (Low) | 2 = Moderate (Medium) | 3 = Substantial (High) | '-' = No correlation.

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Pallavi

T. Sibi

A. Anand

P. Sekhar

P. Rani

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THEORY SYLLABUS(APSCE)**MINOR PAPER – II : TECHNIQUES IN MICROBIOLOGY**

Code: 25MIC-402T Credits: 3 Hrs/Week: 3

Total Hours: 45

UNIT – I : Microscopy and Staining Techniques**No. of hrs: 9**

1. Principles and applications of light microscopy, phase-contrast, and fluorescence microscopy.
2. Electron microscopy: SEM and TEM, sample preparation, and applications.
3. Staining methods: Simple, differential, and special staining (Gram, Acid-fast, Capsule, Endospore).

UNIT – II : Culture and Isolation Techniques**No. of hrs: 9**

1. Media preparation: Types of media – selective, differential, and enrichment media.
2. Isolation techniques: Streak plate, spread plate, pour plate.
3. Pure culture maintenance: Sub-culturing and preservation methods.

UNIT – III : Quantitative and Qualitative Microbial Analysis**No. of hrs: 9**

1. Microbial enumeration: Serial dilution, standard plate count, most probable number (MPN).
2. Microscopic counts: Direct counts using counting chambers with vital staining.
3. Assessment of microbial growth: Turbidity measurement, spectrophotometry, and dry weight.

UNIT – IV : Sterilization Techniques**No. of hrs: 9**

1. Physical methods: Autoclaving, dry heat, filtration, and radiation techniques.
2. Chemical methods: Alcohols, phenolics, aldehydes, quaternary ammonium compounds.
3. Sterilization of media, glassware, instruments, and workspace.

UNIT – V : Biosafety and Handling Biohazardous Materials**No. of hrs: 9**

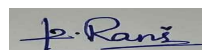
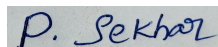
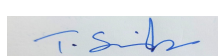
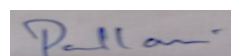
1. Laboratory biosafety levels (BSL-1 to BSL-3) and PPE.
2. Handling, transport, and disposal of biohazardous materials.
3. Good microbiological and laboratory practices.

Reference Books

1. Cappuccino, J.G. & Sherman, N. – Microbiology: A Laboratory Manual.
2. Aneja, K.R. – Experiments in Microbiology, Plant Pathology and Biotechnology.
3. Dubey, R.C. & Maheshwari, D.K. – Practical Microbiology, S. Chand & Co.
4. Collins, C.H., Lyne, P.M. & Grange, J.M. – Collins and Lyne's Microbiological Methods.
5. Gerhardt, P. et al. – Methods for General and Molecular Bacteriology, ASM Press.

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SEMESTER-IV (BOS PANNEL SUGESTED)

COURSE 2: TECHNIQUES IN MICROBIOLOGY

Theory

Credits: 3

3 hrs/week

I. Learning Objectives:

1. Learn principles and use of microscopes and basic staining methods.
2. Understand preparation of media and isolation of pure cultures.
3. Learn methods to estimate microbial numbers and assess growth.
4. Understand physical and chemical sterilization methods and their applications.
5. Learn biosafety levels, PPE usage, and safe handling of biohazardous materials.

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

1. Identify microbial morphology, arrangements, and structures using different stains and microscopes.
2. Demonstrate isolation of microbes and maintain pure cultures effectively.
3. Quantify microbial populations and monitor growth patterns.
4. Sterilize media, glassware, instruments, and workspaces effectively.
5. Apply good laboratory practices to prevent contamination and ensure safety.

III. Syllabus of Theory:**Unit 1: Microscopy and Staining Techniques**

No. of hrs: 9

1.1 Principles and applications of light microscopy, phase-contrast, and fluorescence microscopy

1.2 Electron microscopy: SEM and TEM, sample preparation, and applications

1.3 Staining methods: Simple, differential, (Gram, Acid-fast, Capsule, Endospore)

Unit 2: Culture and Isolation Techniques

No. of hrs: 9

2.1 **Growth Media:** Types of media- selective, differential, and enrichment media

2.2 Isolation techniques: Streak plate, spread plate, pour plate

2.3 Pure culture maintenance: Sub-culturing and preservation methods.

Unit 3: Quantitative and Qualitative Microbial Analysis

No. of hrs: 9

3.1 Observation of colony morphology (size, shape, margin, elevation, pigmentation, texture)

Microscopic examination of cell morphology, arrangement, and motility

3.2 Microbial enumeration: Serial dilution, standard plate count, most probable number (MPN)

3.3 Assessment of microbial growth: Turbidity measurement, spectrophotometry, and dry Weight

Unit 4: Sterilization and Disinfection Techniques

No. of hrs: 9

4.1 Physical methods: Autoclaving, dry heat, filtration, and radiation techniques

4.2 Chemical methods: Alcohols, phenolics, aldehydes, quaternary ammonium compounds

4.3 Sterilization/Disinfection of Media, glassware, instruments, and workspace

Unit 5: Biosafety and Handling Biohazardous Materials

No. of hrs: 9

5.1 Laboratory biosafety levels (BSL-1 to BSL-3) and PPE

5.2 Handling, transport, and disposal of biohazardous materials

5.3 Good microbiological and laboratory practices; Basic laboratory safety-Spill management and exposure response

Existing topic	Suggested Addition / Replacement	Rationale
special staining	DELETED	Likely removed due to overlap with staining techniques already covered elsewhere in the syllabus (e.g., simple/differential staining), or because it exceeds the scope of an introductory practical course. Keeps the practical syllabus focused on foundational techniques rather than specialized/advanced staining methods that may be better suited to an advanced or elective module.
Media: preparation	Growth Media	Broadens the topic beyond just the <i>act</i> of preparing media to include understanding media <i>types and composition</i> (e.g., selective, differential, enriched). "Growth Media" as a heading better reflects a complete learning unit — covering what growth media are, their categories, and their preparation — rather than only the procedural step.
	Serial dilution	Adds a fundamental quantitative microbiology technique that was missing from the syllabus. Serial dilution is a prerequisite skill for colony counting, enumeration, and most quantitative culture-based experiments, so it needs to be explicitly taught before those exercises.
	1.1. Observation of colony morphology (size, shape, margin, elevation, pigmentation, texture) Microscopic examination of cell morphology, arrangement, and motility	Adds essential foundational observational skills that connect macroscopic (colony-level) and microscopic (cell-level) identification techniques. These are core competencies students need before moving to more complex identification or biochemical tests, and were previously absent as a distinct practical exercise.
Microscopic counts: Direct counts using counting chambers with vital staining	DELETED	Likely removed as it may be too advanced/specialized for this course level, redundant with other enumeration techniques (e.g., serial dilution + plate counts) already being introduced, or reflects a shift in emphasis from direct microscopic counting toward culture-based/indirect counting methods more aligned with the course's practical scope.
Sterilization	Sterilization and Disinfection	Expands the topic to explicitly include disinfection, which is a distinct but related concept (disinfection reduces/eliminates pathogens on surfaces, while sterilization eliminates all microbial life). Teaching both together gives students a complete picture of microbial control methods and their appropriate applications, which is standard in microbiology lab curricula.
	5.1 Basic laboratory safety - Spill management and exposure response	Adds critical, practical biosafety training that was missing. Moves beyond generic "safety" awareness to specific, actionable protocols (spill management, exposure response) that students need for hands-on lab work — essential for regulatory/institutional biosafety compliance and student/staff protection in a microbiology lab setting.

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BLUE PRINT – BLOOM'S TAXONOMY

Unit-wise distribution of Semester-End questions across Bloom's cognitive levels. Entries indicate the number of questions targeted at each level (Section A = very short, 4 marks; Section B = essay, 10 marks).

Unit	Remember	Understand	Apply	Analyse	Evaluate	Create	VSAQ	Essay	Unit Marks
I	1	1	–	–	–	–	2	2	28
II	1	1	1	–	–	–	2	2	28
III	–	1	1	1	–	–	2	2	28
IV	–	1	1	–	–	–	2	2	28
V	–	1	1	–	1	–	2	2	28
Total	2	5	4	1	1	0	10	10	140*

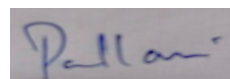
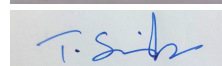
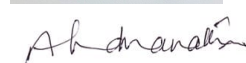
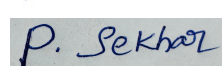
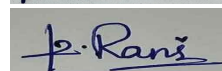
* 140 = total marks of all questions SET (10 VSAQ×4 + 10 Essay×10 = 40 + 100). Marks to be ANSWERED = 70 (see paper pattern). Higher-order levels (Analyse / Evaluate) are emphasised in Units III–V.

CO – Bloom's Level Coverage

Bloom's Level	Mapped COs	Approx. Weightage
Remember	CO1	10%
Understand	CO1, CO2	25%
Apply	CO2, CO3, CO4	35%
Analyse	CO3, CO5	20%
Evaluate	CO5	10%
Create	–	0%

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DEPARTMENT OF MICROBIOLOGY

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BLUE PRINT FOR QUESTION-PAPER SETTING

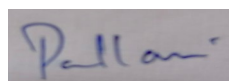
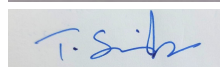
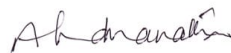
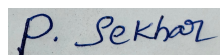
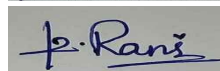
TECHNIQUES IN MICROBIOLOGY (SEE – 70 Marks)

Unit	Section A VSAQ (4 M)	Section B Essay (10 M)	Marks Allotted per Unit
I	2	2	28
II	2	2	28
III	2	2	28
IV	2	2	28
V	2	2	28
Total Questions Set	10	10	140

Note: One VSAQ and one Essay (with internal choice) are set from each unit. In Section A the candidate answers any 5 of 10 ($5 \times 4 = 20$). In Section B the candidate answers all 5 essays, choosing (a) or (b) from each unit ($5 \times 10 = 50$). Total = 70.

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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR
SEMESTER END EXAMINATION – MODEL QUESTION PAPER

IV Semester B.Sc. (Minor Microbiology) – Paper II

TECHNIQUES IN MICROBIOLOGY

Subject Code: 25MIC-402T

Time: 3 Hours

Max. Marks: 70

SECTION – A

Answer any FIVE of the following.

$5 \times 4 = 20$ M

1. Phase-contrast microscopy – principle.
2. Differentiate SEM and TEM.
3. Endospore staining.
4. Selective and enrichment media.
5. Streak plate method.
6. Most Probable Number (MPN).
7. Turbidometry as a growth-assessment method.
8. Dry heat sterilization.
9. Quaternary ammonium compounds as disinfectants.
10. Biosafety Level (BSL) – definition and levels.

SECTION – B

Answer ALL questions. Each carries internal choice (a / b).

$5 \times 10 = 50$ M

11. (a) Describe the principles and applications of light, phase-contrast and fluorescence microscopy.
(OR)
(b) Explain electron microscopy (SEM and TEM) with reference to sample preparation and applications.
12. (a) Describe the preparation and types of culture media – selective, differential and enrichment media.
(OR)
(b) Explain the streak plate, spread plate and pour plate techniques of isolating pure cultures.
13. (a) Describe the methods of microbial enumeration – serial dilution, standard plate count and MPN.
(OR)
(b) Explain the methods used to assess microbial growth – turbidity measurement, spectrophotometry and dry weight.
14. (a) Describe the physical methods of sterilization – autoclaving, dry heat, filtration and radiation.
(OR)
(b) Explain the chemical methods of sterilization and their applications in the microbiology laboratory.
15. (a) Describe the laboratory biosafety levels (BSL-1 to BSL-3) and the PPE required at each level.
(OR)
(b) Explain the handling, transport and disposal of biohazardous materials, and outline good microbiological laboratory practices.

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SEMESTER END EXAMINATION – PATTERN

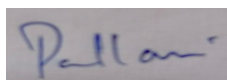
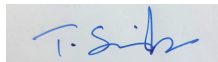
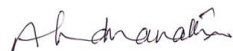
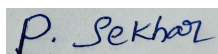
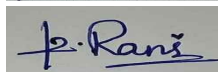
The Semester End Examination (SEE) for the theory paper is conducted for 70 marks over 3 hours, following the structure approved in the Blue Print.

Section	Description	To Answer	Marks
A	Very Short Answer Questions	Any 5 of 10	$5 \times 4 = 20$
B	Essay Questions (internal choice, one per unit)	5 of 5 pairs	$5 \times 10 = 50$
	Grand Total		70

Instructions to candidates: Draw neat, labelled diagrams wherever necessary. All sections are compulsory. Figures to the right indicate marks.

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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR
FIRST MID (INTERNAL) EXAMINATION

(Syllabus: Units I & II)

Max. Marks: 20

Answer ALL questions (Very Short Answer).

$$5 \times 2 = 10 \text{ M}$$

1. Define resolution in light microscopy.
2. What is fluorescence microscopy used for?
3. Name the reagents used in Gram staining.
4. Define selective medium.
5. Name the three streak-plate isolation patterns.

Answer any TWO of the following (Short Answer).

$$2 \times 5 = 10 \text{ M}$$

6. Explain the principle of phase-contrast microscopy.
7. Describe the procedure of Gram staining.
8. Explain the pour plate method of isolation.

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P. Rani

Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR**SECOND MID (INTERNAL) EXAMINATION**

IV Semester B.Sc. (Minor Microbiology) Paper – II : TECHNIQUES IN MICROBIOLOGY

(Syllabus: Units III, IV & V)

Time: 1 Hour

Max. Marks: 20

SECTION – A

Answer ALL questions (Very Short Answer).

 $5 \times 2 = 10 \text{ M}$

1. Define standard plate count (SPC).
2. What is the Most Probable Number (MPN) method used for?
3. Define autoclaving.
4. Name two chemical sterilants.
5. What does BSL stand for?

SECTION – B

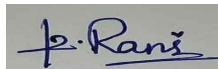
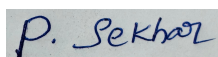
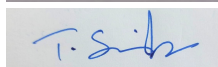
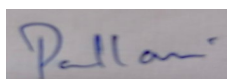
Answer any TWO of the following (Short Answer).

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6. Explain the serial dilution technique for microbial enumeration.
7. Describe the working principle of an autoclave.
8. Explain the laboratory biosafety levels (BSL-1 to BSL-3).

Signature of the Members

Signature of the BOS Chairman



Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR*(Re-Accredited by NAAC with 'A' Grade)***DEPARTMENT OF MICROBIOLOGY**

Board of Studies Meeting 2026-2027

PRACTICAL SYLLABUS**TECHNIQUES IN MICROBIOLOGY – PRACTICAL**

Code: 25MIC-402P Credits: 2 Hrs/Week: 2

Total Hours: 30

Practical Course Outcomes

1. Demonstrate good laboratory practices, biosafety procedures, and correct handling of the compound and phase-contrast microscope.
2. Perform simple, differential and special staining techniques and isolate pure cultures using standard plating methods.
3. Quantify microbial populations by serial dilution, standard plate count, MPN, and turbidometric methods, and sterilize media, glassware and instruments correctly.

Laboratory / Field Exercises

S.No	Experiment
1	Microbiology laboratory: biosafety rules, PPE and safe handling requirements.
2	Study of the compound microscope; principle and demonstration of phase-contrast microscopy.
3	Simple staining and Gram staining of bacterial smears.
4	Acid-fast staining and endospore staining.
5	Capsule staining (negative staining) of encapsulated bacteria.
6	Preparation of nutrient agar / nutrient broth media and sterilization by autoclaving.
7	Isolation of pure cultures by streak plate, spread plate and pour plate methods.
8	Sub-culturing and preservation (slant / stab) of pure cultures.
9	Serial dilution and standard plate count (SPC) technique.
10	Enumeration of microorganisms by the Most Probable Number (MPN) method.
11	Direct microscopic count using a counting chamber (haemocytometer) with vital staining.
12	Determination of bacterial growth by turbidometry (spectrophotometric method).
13	Sterilization of glassware by hot-air oven; demonstration of membrane filtration technique.

SUGESSTED PRACTICALS**I. Laboratory/Field exercises:**

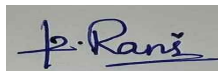
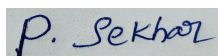
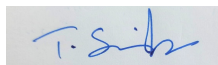
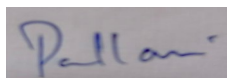
1. Compound Light microscope: Parts, handling
2. Gram Staining Technique.
3. Demonstration of biosafety cabinet usage.
4. Sterilization of Glassware using Hot Air Oven.
5. Preparation and Sterilization of Media using Autoclave.
6. Aseptic transfer of microbial cultures using loop and pipette.
7. Isolation of pure culture of bacteria by streak plate, pour plate and spread plate method.
8. Determination of bacterial count using standard plate count method.

Reference Books for Laboratory

1. Cappuccino & Sherman – Microbiology: A Laboratory Manual.
2. Dubey & Maheswari – Practical Microbiology, S. Chand & Co.
3. Aneja, K.R. – Experiments in Microbiology, Plant Pathology and Biotechnology.

Signature of the Members

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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR
PRACTICAL MODEL PAPER

IV Semester B.Sc. (Minor Microbiology) Paper – II
TECHNIQUES IN MICROBIOLOGY – PRACTICAL

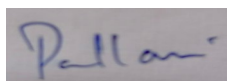
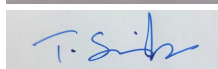
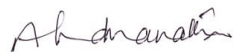
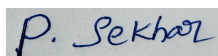
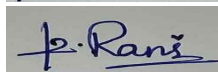
Time: 3 Hours Code: 25MIC-402P

Max. Marks: 50

Q	Question	Scheme of Valuation	Marks
A	Major Experiment: Perform any one allotted experiment (e.g., Gram staining / streak plate isolation / standard plate count).	Procedure 8 + Result & inference 7	15
B	Minor Experiment: Perform any one allotted experiment (e.g., acid-fast staining / MPN set-up / turbidometry).	Principle 5 + Procedure 5	10
C	Spotters: Identify and write notes on C, D, E (microscope parts / sterilization equipment / stained smears or micrographs).	Identification 1 + Reasons 2 + Diagram 2 (each)	$5 \times 3 = 15$
D	Record	–	5
E	Viva voce	–	5
	Total		50

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Board of Studies Meeting 2026-2027

QUESTION BANK WITH ANSWER KEY**TECHNIQUES IN MICROBIOLOGY (Minor Paper – II)****UNIT – I : Microscopy and Staining Techniques****A. Very Short Answer Questions (with key)**

1. What is the principle of light microscopy?

Ans: Visible light is passed through a specimen and focused by glass lenses to produce a magnified image; resolution depends on the wavelength of light and the numerical aperture of the objective.

2. Define resolving power.

Ans: The minimum distance by which two points must be separated to be seen as distinct entities under a microscope.

3. What is phase-contrast microscopy used for?

Ans: It converts differences in refractive index/thickness of unstained, living specimens into differences in brightness, allowing observation of living cells without staining.

4. Differentiate SEM and TEM (one point).

Ans: SEM scans the surface with an electron beam to produce a 3-D surface image; TEM passes electrons through an ultrathin section to reveal internal ultrastructure.

5. What is a mordant in staining?

Ans: A chemical (e.g., Gram's iodine) that fixes or intensifies a dye's binding to the specimen.

6. Name the reagents used in acid-fast staining.

Ans: Carbol fuchsin (primary stain), acid-alcohol (decolouriser) and methylene blue (counterstain).

B. Essay Questions (with key points)

1. Describe the principles and applications of light, phase-contrast and fluorescence microscopy.

Key points: Light microscopy – bright-field optics, magnification and resolution limits, uses in routine observation. Phase-contrast – exploits refractive-index differences to visualise living, unstained cells; used for motility and morphology studies. Fluorescence microscopy – fluorochrome-labelled specimens excited by UV/blue light emit visible light; used in immunofluorescence and viability studies. Compare advantages, limitations and typical applications of each.

2. Explain electron microscopy (SEM and TEM) with reference to sample preparation and applications.

Key points: Electron beam replaces light, giving far higher resolution. SEM – surface scanning, requires fixation, dehydration, critical-point drying and gold-coating; gives 3-D surface topography. TEM – ultrathin sectioning, staining with heavy metals (uranyl acetate, lead citrate); reveals internal cell ultrastructure. Applications: studying viral morphology, cell organelles, surface features of microorganisms.

UNIT – II : Culture and Isolation Techniques**A. Very Short Answer Questions (with key)**

1. Define selective medium.

Ans: A medium containing agents that permit growth of some organisms while inhibiting others, e.g., MacConkey agar for Gram-negative bacteria.

2. Define differential medium.

Ans: A medium that allows different organisms to be distinguished by a visible reaction, e.g., blood agar showing haemolysis.

3. What is an enrichment medium?

Ans: A liquid medium that favours the growth of a particular organism from a mixed population before it is plated out.

4. What is a pure culture?

Ans: A culture containing cells of only one species, derived from a single colony or cell.

5. Name the three streak-plate patterns.

Ans: Simple (continuous), quadrant (four-way) and radiant (T-streak) methods.

6. What is sub-culturing?

Ans: Transferring a portion of a culture to fresh medium to maintain viability and purity of the strain.

B. Essay Questions (with key points)

1. Describe the preparation and types of culture media – selective, differential and enrichment media.

Key points: General steps in media preparation – weighing ingredients, dissolving, pH adjustment, dispensing, autoclaving. Selective media (inhibitory agents, e.g., bile salts, antibiotics), differential media (indicator systems, e.g., lactose + neutral red), enrichment media (nutrient-rich broths favouring specific organisms). Give examples and applications of each type.

2. Explain the streak plate, spread plate and pour plate techniques of isolating pure cultures.

Key points: Streak plate – dilutes inoculum across the agar surface using a flamed loop to obtain isolated colonies; simple quadrant/radiant patterns. Spread plate – a measured aliquot is spread with a sterile spreader over solidified agar; gives surface colonies suitable for counting. Pour plate – inoculum is mixed with molten agar before solidification; gives both surface and sub-surface colonies. Compare merits, limitations and typical uses of each.

UNIT – III : Quantitative and Qualitative Microbial Analysis

A. Very Short Answer Questions (with key)

1. Define serial dilution.

Ans: A stepwise dilution of a sample (usually in factors of 10) to reduce microbial density to a countable level.

2. Define standard plate count (SPC).

Ans: A method of estimating viable microbial numbers by counting colonies grown from a known volume of diluted sample plated on nutrient agar.

3. What is the MPN method used for?

Ans: Estimating microbial density (especially coliforms in water/food) using a series of tube dilutions and statistical probability tables when direct plating is unsuitable.

4. What is a counting chamber?

Ans: A calibrated glass slide (e.g., haemocytometer) with a grid used to directly count microbial or blood cells under a microscope.

5. What is vital staining?

Ans: Staining (e.g., with methylene blue) that distinguishes living from dead cells based on differential dye uptake or reduction.

6. Define turbidity as a growth measure.

Ans: The cloudiness of a liquid culture caused by cell density, measured spectrophotometrically as optical density (OD) and correlated with cell number.

B. Essay Questions (with key points)

1. Describe the methods of microbial enumeration – serial dilution, standard plate count and MPN.

Key points: Serial dilution reduces sample density for accurate counting. SPC – dilutions are plated, incubated, and colonies within a countable range (30–300) are counted and back-calculated as CFU/mL. MPN – replicate tube dilutions scored positive/negative for growth/gas and compared to standard probability tables; used for coliform testing. Discuss accuracy, advantages and limitations of each.

2. Explain the methods used to assess microbial growth – turbidity measurement, spectrophotometry and dry weight.

Key points: Turbidometry/spectrophotometry – optical density at a fixed wavelength (e.g., 600 nm) correlates with cell mass; rapid, non-destructive, useful for growth-curve studies. Dry weight – cells are harvested, washed, dried to constant weight and weighed; gives direct biomass measurement but is time-consuming. Direct microscopic counts using counting chambers with vital staining distinguish live/dead cells. Compare speed, sensitivity and suitability of each method.

UNIT – IV : Sterilization Techniques

A. Very Short Answer Questions (with key)

1. Define sterilization.

Ans: The complete destruction or removal of all forms of microbial life, including spores, from an object or medium.

2. Define autoclaving.

Ans: Sterilization using saturated steam under pressure, typically 121 °C at 15 psi for 15–20 minutes, which kills vegetative cells and spores.

3. What is dry heat sterilization?

Ans: Sterilization using hot-air ovens at high temperature (160–180 °C) for 1–2 hours, suitable for glassware and heat-stable powders.

4. Define filtration sterilization.

Ans: Removal of microorganisms by passing a liquid or gas through a membrane filter with pores small enough to exclude microbes, without heat.

5. Name two chemical disinfectants.

Ans: Alcohols (ethanol, isopropanol) and phenolics (phenol, cresols); also aldehydes and quaternary ammonium compounds.

6. What is radiation sterilization?

Ans: Use of ionising (gamma) or non-ionising (UV) radiation to destroy microorganisms, commonly used for disposable plasticware and surface decontamination.

B. Essay Questions (with key points)

1. Describe the physical methods of sterilization – autoclaving, dry heat, filtration and radiation.

Key points: Autoclaving (moist heat under pressure, mechanism of protein/enzyme denaturation, applications for media and instruments). Dry heat/hot-air oven (oxidation of cell constituents, used for glassware, powders). Filtration (membrane/HEPA filters, used for heat-labile liquids and air). Radiation (UV for surface/air disinfection, gamma for industrial sterilization of disposables). Include principle, conditions and applications for each.

2. Explain the chemical methods of sterilization and their applications in the microbiology laboratory.

Key points: Alcohols (denature proteins, used for skin/surface disinfection), phenolics (disrupt cell membranes, used as laboratory disinfectants), aldehydes (formaldehyde/glutaraldehyde – cross-link proteins/nucleic acids, used for instrument sterilization), quaternary ammonium compounds (disrupt membranes, used for surface sanitation). Discuss mechanism of action, spectrum of activity and precautions for each group.

UNIT – V : Biosafety and Handling Biohazardous Materials

A. Very Short Answer Questions (with key)

1. Define biosafety level (BSL).

Ans: A graded set of laboratory containment practices (BSL-1 to BSL-4) designed to protect personnel and the environment from exposure to biological agents of increasing risk.

2. What is PPE?

Ans: Personal Protective Equipment – gloves, lab coats, masks, goggles and other gear used to protect personnel from exposure to biohazards.

3. What organisms are handled at BSL-1?

Ans: Well-characterised agents not known to consistently cause disease in healthy adults, e.g., non-pathogenic E. coli strains.

4. What is a biosafety cabinet?

Ans: A ventilated enclosure providing a controlled, filtered airflow (HEPA) to protect the worker, product and environment while handling infectious materials.

5. How are biohazardous wastes disposed of?

Ans: By autoclaving (decontamination) followed by incineration or approved biohazard-waste disposal, as per institutional biosafety guidelines.

6. Define good laboratory practice (GLP).

Ans: A quality framework of standardised procedures ensuring safety, reproducibility and data integrity in laboratory work.

B. Essay Questions (with key points)

1. Describe the laboratory biosafety levels (BSL-1 to BSL-3) and the PPE required at each level.

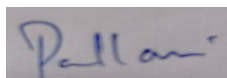
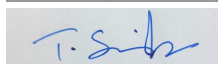
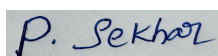
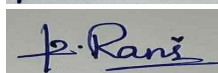
Key points: BSL-1 – basic practices, no special containment, standard PPE for non-hazardous agents. BSL-2 – moderate-risk agents, biosafety cabinets for aerosol-generating procedures, gloves/gowns/eye protection, restricted access. BSL-3 – agents causing serious/lethal disease via inhalation, controlled access, directional airflow, respiratory protection, decontamination of all waste. Relate containment level to agent risk group.

2. Explain the handling, transport and disposal of biohazardous materials, and outline good microbiological laboratory practices.

Key points: Handling – aseptic technique, use of biosafety cabinets, spill-response procedures. Transport – triple packaging (primary container, secondary leak-proof container, outer packaging) as per biosafety/IATA guidelines. Disposal – autoclaving/incineration of biohazardous waste, colour-coded waste segregation. Good laboratory practices – hand hygiene, no eating/drinking in the lab, labelling, documentation and regular biosafety training.

Signature of the Members

Signature of the BOS Chairman

A handwritten signature in black ink, appearing to read "Pallavi".A handwritten signature in blue ink, appearing to read "T. Sibi".A handwritten signature in black ink, appearing to read "Ahmanan".A handwritten signature in black ink, appearing to read "P. Sekhar".A handwritten signature in black ink, appearing to read "P. Rani".

Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

(Re-Accredited by NAAC with 'A' Grade)

DEPARTMENT OF MICROBIOLOGY

Board of Studies Meeting 2026-2027

ASSIGNMENT QUESTIONS & CO-CURRICULAR ACTIVITIES

Assignment Questions

1. Write an account of the principles and applications of light, phase-contrast and electron microscopy.
2. Describe the various staining techniques used to study bacterial morphology and structures.
3. Explain the preparation of culture media and the techniques used for isolation of pure cultures.
4. Describe the methods of microbial enumeration and assessment of microbial growth.
5. Explain the physical and chemical methods of sterilization used in the microbiology laboratory.
6. Discuss laboratory biosafety levels, PPE and good microbiological laboratory practices.

Co-Curricular / Skill-Based Activities (Skill Module – 10 hours)

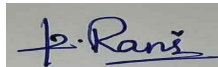
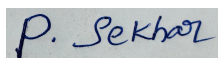
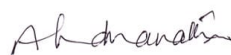
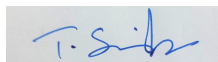
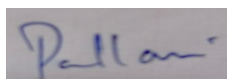
For the teacher: hands-on training of students in the laboratory on microscopy, staining, media preparation, isolation, enumeration, sterilization and biosafety techniques.

For the student (any three): seminars on advances in microscopy; preparation of stained-smear albums / charts of staining procedures; poster on sterilization methods and their comparative efficacy; virtual/in-person demonstration of biosafety cabinet use; quiz/debate ('Is chemical or physical sterilization more effective?'); laboratory e-portfolios documenting each technique performed.

Maximum marks for the above activities: 05.

Signature of the Members

Signature of the BOS Chairman



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Sujatha Taidala

Siva Raagini

H Pallavi

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Siva Raagini

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Rani murugesh

Prasanna kumari Pothala

Siva Raagini

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IN THE MEETING

Contributors 3

Siva Raagini (You)
Meeting host

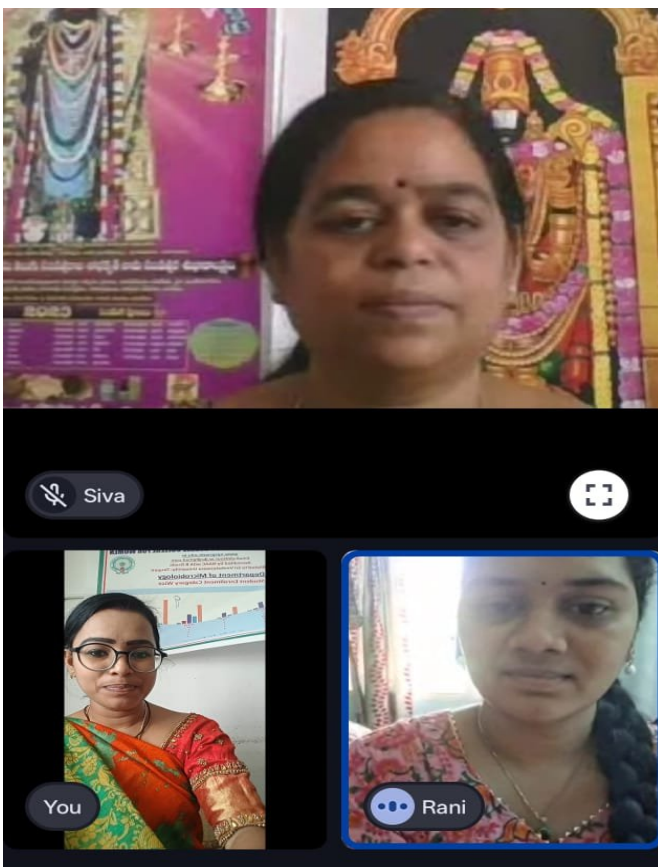
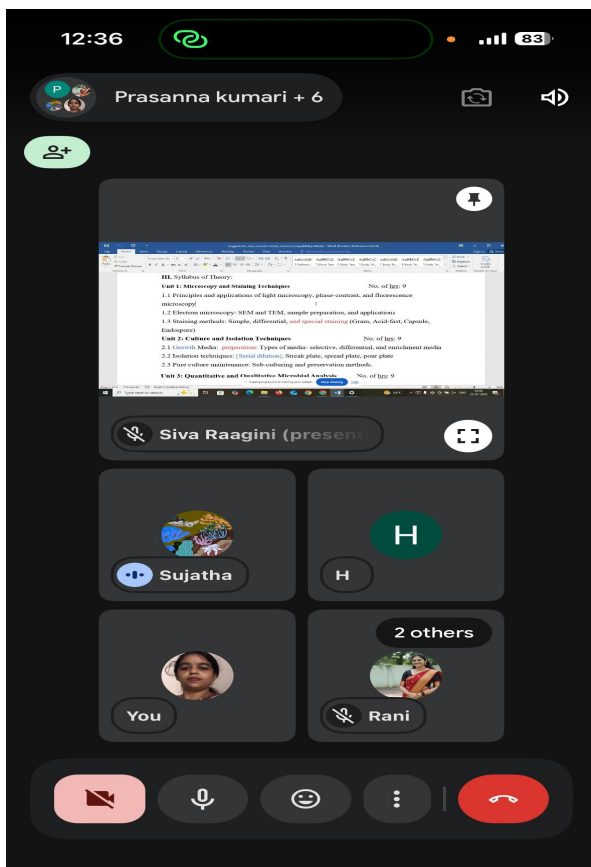
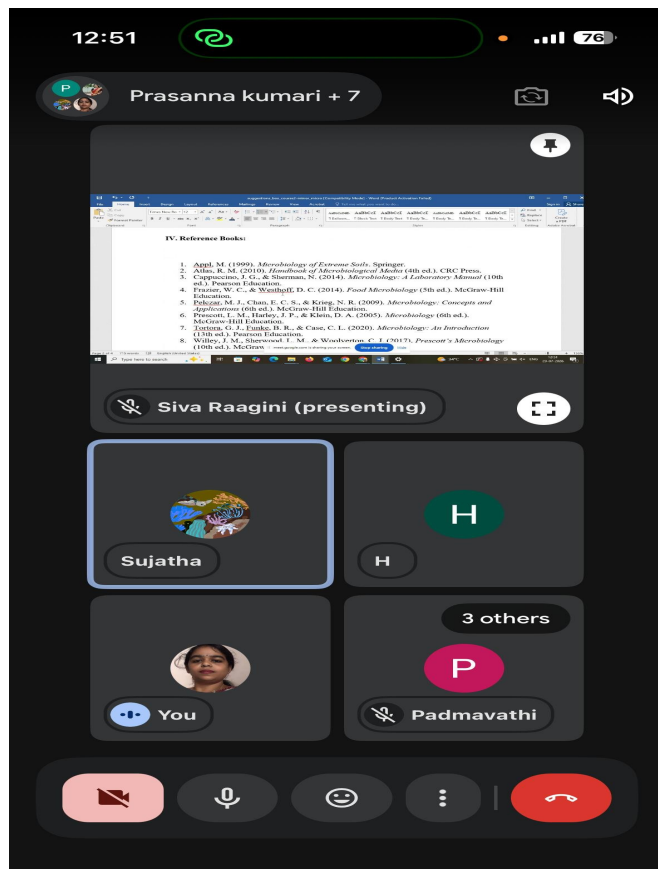
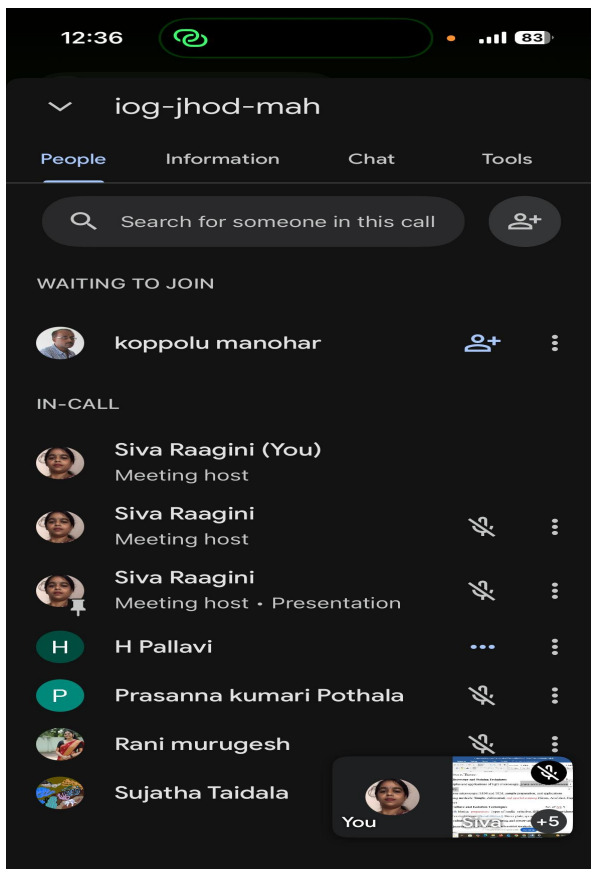
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BIOLOGY

STUDY OF MICROBES

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ACADEMIC YEAR 2026 – 2027
(W.E.F. 2026 – 27)**

***BOS HEALTH
AND HYGIENE***



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ACADEMIC YEAR 2026 – 2027 (W.E.F. 2026 – 27)

MULTIDISCIPLINARY

LIFE SKILL COURSE (OPTIONAL)
For all B.Sc. / B.A. / B.Com. UG Honours Programme Students

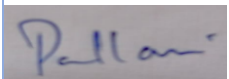
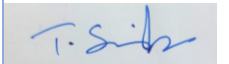
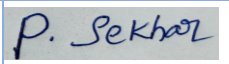
SEMESTER – III

LIFE SKILL COURSE : HEALTH AND HYGIENE

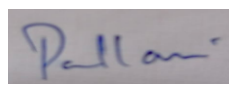
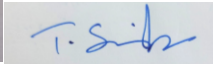
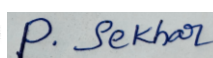
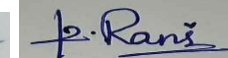
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(Adapted from the APSCHE Syllabus of Health and Hygiene, Life Skills Courses, CBCS Framework w.e.f. 2020-21)

Conducted on: 23 /07/ 2026

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(Re-Accredited by NAAC with 'A' Grade)
DEPARTMENT OF MICROBIOLOGY
Board of Studies Meeting 2026-2027
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S.No	Category	Name & Designation	Role / Contact	SIGNATURE
1	Chairman	Dr. P. Sivaraagini, M.Sc., M.Phil., Ph.D., DISM, DIPC – Lecturer in Microbiology	Chairperson 7569103565 sivaraagini@gmail.com	
2	Faculty Member	P. Prasanna – Lecturer in Microbiology, Smt. N.P.S. GDC(W)(A)	Member 7416357785 prasannakumari27598@gmail.com	
3	University Nominee (VC)	Dr. H. Pallavi – Lecturer in Microbiology, Govt. College (A), Anantapuramu	Member 9491233355 pallavi.pavan2003@gmail.com	
4	External Subject Expert	Dr. T. Sujatha – Lecturer in Microbiology, Govt. College (A), Rajahmundry	Member 9440392455 sujatha.taidala@gmail.com taidala.sujata@gmail.com	
5	External Subject Expert	Dr. A. Padmavathi – Lecturer in Microbiology, St. Theresa's College, Eluru	Member 9440581035 dr.padmavathi@stcelr.ac.in chsdtheresa@gmail.com	
6	Industry / Corporate	P.Sekhar VEG BY NATURE	Member 9963225486 sekhar.micro@gmail.com	
7	Meritorious Alumnus	A.M. Dilli Rani – Ph.D. Scholar, SPMVV, Tirupati	Member 7032316369 ranimuruges2105@gmail.com	

Signature of the Members:

Signature of the BOS Chairman

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LIFE SKILL COURSES COMMITTEE

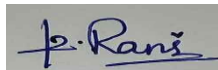
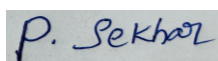
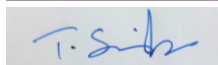
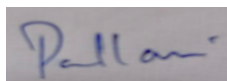
Board of Studies Meeting 2026-2027

AGENDA FOR THE MEETING

The following agenda was placed before the Board for the introduction of the Life Skill Course – HEALTH AND HYGIENE, offered as an optional course to Semester IV students across all UG Honours programmes, in accordance with APSCHE CBCS Framework (Life Skills Courses, w.e.f. 2020–21) and UGC Regulations 2025.

1. Approval of adoption and localisation of the APSCHE Life Skills Course syllabus of Health and Hygiene for the academic year 2026–27.
2. Approval of the course structure and placement of Health and Hygiene as an optional Life Skill Course in Semester IV.
3. Approval of Course Objectives, Course Outcomes (COs), Programme Outcomes (POs) and Programme Specific Outcomes (PSOs) and the CO–PO–PSO mapping.
4. Approval of the Blue Print (Bloom's Taxonomy) and the Model Question Paper for the Semester End Examination.
5. Approval of the Internal (CIA) assessment pattern.
6. Approval of the Question Bank with Answer Key.
7. Panel of question-paper setters and examiners.
8. Methodologies of teaching–learning and innovative pedagogy as per UGC guidelines.
9. Skill-based learning / community outreach activities and skill modules.
10. Proposals for health-awareness camps, field visits, guest lectures and MOUs with health agencies for the academic year 2026–27.
11. Any other proposal with the permission of the Chair.

Signature of the Members:



Signature of the BOS Chairman

Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

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LIFE SKILL COURSES COMMITTEE

Board of Studies Meeting 2026-2027

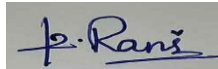
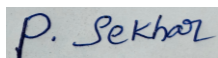
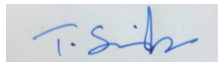
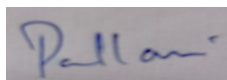
MINUTES OF THE MEETING

The 1st meeting of the Board of Studies (Life Skill Courses) was held at Smt. N.P.S. Govt. Degree College (W)(A), Chittoor, to consider the introduction of the Life Skill Course Health and Hygiene for Semester IV. The following resolutions were made and unanimously approved.

RESOLVED & APPROVED

1. Approved the adoption and localisation of the APSCHE Life Skills Course syllabus of Health and Hygiene for 2026–27.
2. Approved the course structure placing Health and Hygiene as an optional Life Skill Course of Semester IV.
3. Ratified the course titled HEALTH AND HYGIENE (Code 25LSC-401T).
4. Approved the Course Objectives, COs, POs, PSOs and the CO–PO–PSO articulation matrix.
5. Approved the Bloom's Taxonomy Blue Print and the Model Question Paper (SEE, 40 marks, 2 hours).
6. Approved the Internal assessment pattern: one Mid Examination (10 marks) constituting CIA.
7. Approved the Question Bank with Answer Key for all three units.
8. Accepted the panel of question-paper setters and examiners.
9. Approved innovative pedagogy, skill modules and community-outreach activities embedded in each unit.

Signature of the Members:



Signature of the BOS Chairman

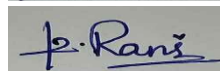
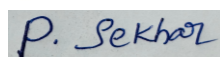
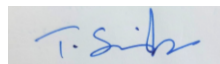
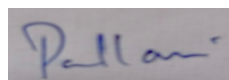
Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR
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LIFE SKILL COURSES COMMITTEE
Board of Studies Meeting 2026-2027
COURSE STRUCTURE – SEMESTER IV

Under CBCS, W.E.F. 2026–27. Position of the Life Skill Course within the IV-Semester structure, offered as an optional course to students across UG Honours programmes.

S.No	Component	Title of Paper & Code	Credits	Hrs/Week	Total Hrs	CIA	SEE	Total
1	Life Skill Course (Optional)	Health and Hygiene (25LSC-401T)	2	2	30	10	40	50

Scheme of Assessment: CIA 10 = One Mid (Internal) Examination covering all three units; SEE = 40; Total = 50. (Marks follow the college convention of 25 marks per credit, CIA : SEE $\approx$ 25 : 75.)

Signature of the Members:



Signature of the BOS Chairman

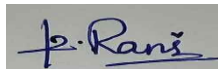
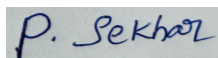
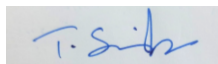
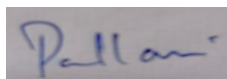
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Board of Studies Meeting 2026-2027
RATIONALE & SCOPE

Rationale: Health and Hygiene is offered as a Life Skill Course under the APSCHE CBCS framework to equip every UG Honours student, irrespective of major subject, with practical knowledge of nutrition, health systems and hygiene practices essential for personal well-being and responsible citizenship.

Scope and Importance: Good health and hygiene underpin individual productivity and community welfare. The course introduces students to the basics of nutrition, national health indicators, policies and care schemes, disaster and epidemic preparedness, and personal, community and digital approaches to hygiene, enabling students to make informed health choices and participate in public-health initiatives.

Eligibility: Open to all Semester IV students of the Four-Year UG Honours Programme as an optional Life Skill Course; no specific disciplinary pre-requisite.

Signature of the Members:



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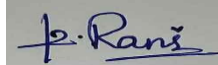
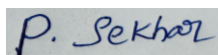
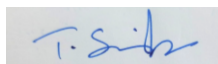
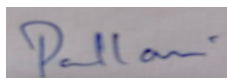
LIFE SKILL COURSES COMMITTEE

Board of Studies Meeting 2026-2027

COURSE DETAILS

Programme & Semester	IV Semester, Four-Year UG Honours Programme (all majors) – Optional Life Skill Course
Course Title	LIFE SKILL COURSE : HEALTH AND HYGIENE
Course Code	25LSC-401T (Theory)
Total Teaching Hours	30 hrs (Theory only)
Pre-requisite	None; open to all UG Honours students
L – T – P – C (Theory)	2 – 0 – 0 – 2
Source Syllabus	APSCHE Life Skills Course Syllabus – Health and Hygiene, CBCS Framework, w.e.f. 2020–21

Signature of the Members:



Signature of the BOS Chairman

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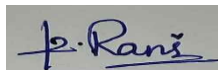
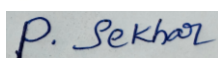
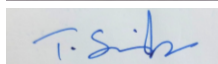
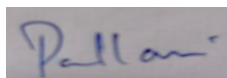
LIFE SKILL COURSES COMMITTEE

Board of Studies Meeting 2026-2027

PROGRAMME OUTCOMES (POs)

PO	Domain	Statement
PO1	Health Literacy	Acquire essential knowledge of nutrition, hygiene and health systems needed for informed personal decision-making.
PO2	Civic & Social Responsibility	Understand the role of government and community in ensuring public health and hygiene.
PO3	Critical Thinking	Evaluate health information, policies and schemes critically for personal and societal benefit.
PO4	Life Skills & Self-Management	Apply health and hygiene knowledge to manage personal well-being and respond to emergencies.
PO5	Digital & Information Literacy	Use digital platforms and government mobile applications to access verified health information and services.
PO6	Communication	Communicate health and hygiene knowledge effectively to peers, family and the community.
PO7	Ethics & Empathy	Demonstrate sensitivity towards public-health issues, disaster-affected populations and vulnerable groups.
PO8	Preparedness	Adopt appropriate personal and community hygiene and disaster-preparedness measures.
PO9	Teamwork	Collaborate on health and hygiene awareness activities in campus and community settings.
PO10	Lifelong Wellness	Cultivate lifelong habits that promote personal and community health.

Signature of the Members:



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LIFE SKILL COURSES COMMITTEE

Board of Studies Meeting 2026-2027

PROGRAMME SPECIFIC OUTCOMES (PSOs)

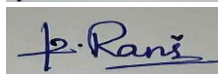
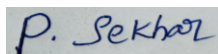
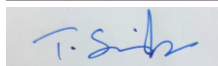
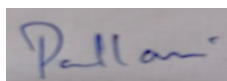
On completion of the Health and Hygiene Life Skill Course, students will be able to:

PSO1: Apply core concepts of nutrition and balanced-diet planning to personal and family well-being.

PSO2: Explain India's health policies, national health missions and healthcare schemes for women, children and adolescents.

PSO3: Demonstrate awareness of personal, community and public hygiene practices, disaster/epidemic preparedness, and the use of government digital health platforms.

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COURSE OBJECTIVES & OUTCOMES

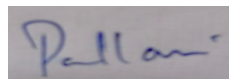
Course Objectives

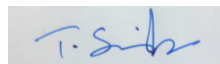
1. To provide knowledge on different health indicators and types of hygiene methods.
2. To impart knowledge on different health care programmes taken up by India.
3. To make students understand the latest concepts of health such as HIA, EIA, SIA and SEA.
4. To enable students with disaster mitigation strategies.
5. To create awareness on community health and hygiene.
6. To enrich knowledge on communicable and non-communicable diseases and their control.
7. To make students aware of the importance of food, social strategies, mental status and physical activity on health.
8. To introduce different community-based mobile apps on health to students and thereby to the community.

Course Outcomes (COs) with Bloom's Level

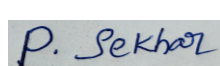
CO	On completion of the course the student will be able to	Bloom's Level
CO1	Explain the fundamentals of nutrition, balanced diet and the functions and deficiency effects of macro- and micronutrients.	Remember / Understand
CO2	Describe key health indicators, national health policy and the functioning of major health and nutrition organisations in India.	Understand
CO3	Explain the National Health Mission frameworks and women & child healthcare schemes implemented in India.	Understand / Apply
CO4	Discuss disaster-management strategies and the role of government and public in the containment, control and prevention of epidemics and pandemics.	Apply / Analyse
CO5	Apply principles of personal, community and culinary hygiene, and utilise government digital health platforms to promote community health awareness.	Apply / Evaluate

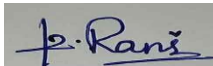
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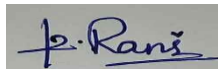
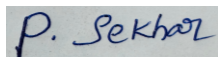
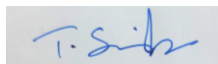
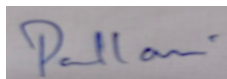
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CO – PO – PSO MAPPING MATRIX

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	1	2	2	1	2	1	1	1	3	3	1	1
CO2	2	3	2	1	1	2	1	1	1	2	1	3	1
CO3	2	3	2	1	2	2	2	1	1	2	1	3	2
CO4	2	3	2	3	2	2	3	3	2	2	1	2	3
CO5	1	2	2	3	3	3	2	3	2	3	1	1	3
Avg	2.0	2.4	2.0	2.0	1.8	2.2	1.8	1.8	1.4	2.4	1.4	2.0	2.0

Correlation scale: 1 = Slight (Low) | 2 = Moderate (Medium) | 3 = Substantial (High) | '-' = No correlation.

Signature of the Members:



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LIFE SKILL COURSES COMMITTEE
Board of Studies Meeting 2026-2027
THEORY SYLLABUS

LIFE SKILL COURSE : HEALTH AND HYGIENE

Code: 25LSC-401T Credits: 2 Hrs/Week: 2

Total Hours: 30

UNIT – I : Basics of Nutrition

No. of hrs: 10

1. Nutrition – definition, importance, good nutrition and malnutrition; balanced diet: basics of meal planning.
2. Carbohydrates – functions, dietary sources, effects of deficiency.
3. Lipids – functions, dietary sources, effects of deficiency.
4. Proteins – functions, dietary sources, effects of deficiency.
5. Brief account of vitamins – functions, food sources, effects of deficiency.
6. Macro and micro minerals – functions, effects of deficiency; food sources of calcium, potassium and sodium; food sources of iron, iodine and zinc.
7. Importance of water – functions, sources, requirement and effects of deficiency.

UNIT – II : Health

No. of hrs: 10

1. Health – determinants of health, key health indicators, environmental health & public health; health education: principles and strategies.
2. Health policy & health organisations – health indicators and National Health Policy of Govt. of India-2017; functioning of nutrition and health organisations in India, viz., NIN, FNB, ICMR, IDA, WHO-India, UNICEF-India.
3. National Health Mission – National Rural Health Mission (NRHM) framework, National Urban Health Mission (NUHM) framework.
4. Women & child health-care schemes – RMNCH+, Janani Shishu Suraksha Karyakaram (JSSK), Rashtriya Bal Swasthya Karyakram (RBSK), India Newborn Action Plan (INAP), Rashtriya Kishor Swasthya Karyakram (RKSK).
5. Disaster management – containment, control and prevention of epidemics and pandemics – acts, guidelines and role of government and public.

UNIT – III : Hygiene

No. of hrs: 10

1. Hygiene – definition; personal, community, medical and culinary hygiene; WASH (Water, Sanitation and Hygiene) programme.
2. Rural community health – Village Health Sanitation & Nutrition Committee (roles & responsibilities); about Accredited Social Health Activist (ASHA); Village Health Nutrition Day; Rogi Kalyan Samitis.
3. Community & personal hygiene – environmental sanitation and sanitation in public places.
4. Public awareness through digital media – introduction to mobile apps of Government of India: NHP, Swasth Bharat, No More Tension, Pradhan Mantri Surakshit Matritva Abhiyan (PM Suman Yojana), My Hospital (Mera Aspatha), India Fights Dengue, JSK Helpline, Ayushman Bhava, Arogya Setu, Covid19AP.

Reference Books

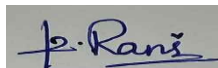
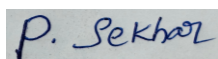
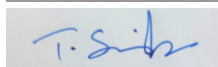
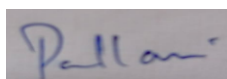
1. Bamji, M.S., Krishnaswamy, K. & Brahman, G.N.V. – Textbook of Human Nutrition (3rd edition), Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Swaminathan – Food & Nutrition (Vol. I, 2nd edition), The Bangalore Printing & Publishing Co. Ltd., Bangalore.
3. Vijaya Khader – Food, Nutrition & Health, Kalyani Publishers, New Delhi.
4. Srilakshmi, B. – Food Science (5th edition), New Age International Ltd., New Delhi.

Suggested Web Resources

1. National Health Mission – <https://nhm.gov.in/>
2. Health Impact Assessment (WHO) – <https://www.who.int/hia/about/faq/en/>
3. WASH (UNICEF) – <https://www.unicef.org/wash/>
4. Healthy Living (National Health Portal) – <https://www.nhp.gov.in/healthyliving>

Note: The above web links are drawn from MoHFW, Government of India resources. Teachers may prepare supplementary notes from other authentic sources.

Signature of the Members:



Signature of the BOS Chairman

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Board of Studies Meeting 2026-2027

BLUE PRINT – BLOOM'S TAXONOMY

Unit-wise distribution of Semester-End questions across Bloom's cognitive levels. Entries indicate the number of questions targeted at each level (Section A = very short, 2 marks; Section B = essay, 10 marks).

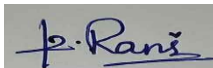
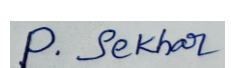
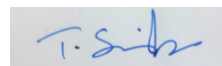
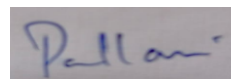
Unit	Remember	Understand	Apply	Analyse	Evaluate	Create	VSAQ	Essay	Unit Marks
I	1	1	—	—	—	—	2	1	14
II	—	1	1	1	—	—	2	1	14
III	—	1	1	—	1	—	2	1	14
Total	1	3	2	1	1	0	6	3	42*

* 42 = total marks of all questions SET (6 VSAQ×2 + 3 Essay×10 = 12 + 30). Marks to be ANSWERED = 40 (see paper pattern: any 5 of 6 VSAQ = 10, all 3 essays with choice = 30). Higher-order levels (Analyse / Evaluate) are emphasised in Units II & III.

CO – Bloom's Level Coverage

Bloom's Level	Mapped COs	Approx. Weightage
Remember	CO1	15%
Understand	CO1, CO2, CO3	30%
Apply	CO3, CO4	25%
Analyse	CO4	15%
Evaluate	CO5	15%
Create	—	0%

Signature of the Members:



Signature of the BOS Chairman

Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR

(Re-Accredited by NAAC with 'A' Grade)

LIFE SKILL COURSES COMMITTEE

Board of Studies Meeting 2026-2027

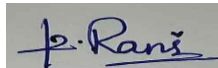
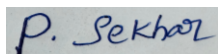
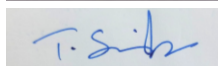
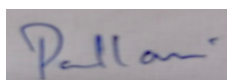
BLUE PRINT FOR QUESTION-PAPER SETTING

HEALTH AND HYGIENE (SEE – 40 Marks)

Unit	Section A VSAQ (2 M)	Section B Essay (10 M)	Marks Allotted per Unit
I	2	1	14
II	2	1	14
III	2	1	14
Total Questions Set	6	3	42

Note: Two VSAQ and one Essay (with internal choice) are set from each unit. In Section A the candidate answers any 5 of 6 ($5 \times 2 = 10$). In Section B the candidate answers all 3 essays, choosing (a) or (b) from each unit ($3 \times 10 = 30$). Total = 40.

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Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR
SEMESTER END EXAMINATION – MODEL QUESTION PAPER

IV Semester – Life Skill Course (Optional)

HEALTH AND HYGIENE

Subject Code: 25LSC-401T

Time: 1-30 Min

Max. Marks: 50

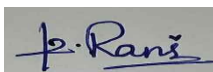
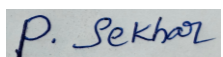
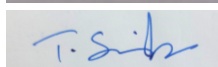
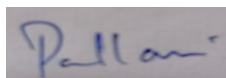
SECTION – A

Answer any FIVE of the following.

5 × 10 = 50 M

1. Define malnutrition.
2. Name two dietary sources of proteins.
3. What is the National Health Policy year for India?
4. Expand NRHM.
5. What is RBSK?
6. Define WASH.
- 7.
- 8.
- 9.
- 10.

Signature of the Members:



Signature of the BOS Chairman

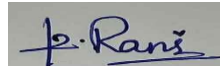
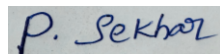
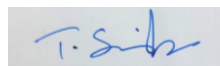
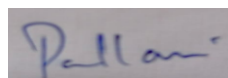
Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR
(Re-Accredited by NAAC with 'A' Grade)
LIFE SKILL COURSES COMMITTEE
Board of Studies Meeting 2026-2027
SEMESTER END EXAMINATION – PATTERN

The Semester End Examination (SEE) for the Life Skill Course is conducted for 40 marks over 2 hours, following the structure approved in the Blue Print.

Section	Description	To Answer	Marks
A	Very Short Answer Questions	Any 5 of 6	$5 \times 2 = 10$
B	Essay Questions (internal choice, one per unit)	All 3	$3 \times 10 = 30$
	Grand Total		40

Instructions to candidates: Answer all sections. Support answers with examples/illustrations wherever necessary. Figures to the right indicate marks.

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Signature of the BOS Chairman

Smt. N.P.S. GOVT. DEGREE COLLEGE FOR WOMEN (AUTONOMOUS), CHITTOOR
MID (INTERNAL) EXAMINATION
IV Semester – Life Skill Course : HEALTH AND HYGIENE
(Syllabus: Units I, II & III)

Time: 1 Hour

Max. Marks: 10

SECTION – A

Answer ALL questions (Very Short Answer).

5 × 1 = 5 M

1. Define nutrition.
2. What is a determinant of health?
3. Expand NUHM.
4. Define personal hygiene.
5. Name one government health mobile app.

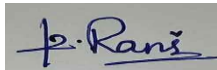
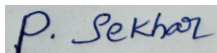
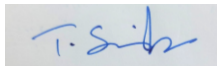
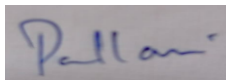
SECTION – B

Answer any ONE of the following (Short Answer).

1 × 5 = 5 M

6. Explain the role of ASHA workers in rural community health.
7. Describe the disaster-management measures for containment and control of epidemics.

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LIFE SKILL COURSES COMMITTEE

Board of Studies Meeting 2026-2027

QUESTION BANK WITH ANSWER KEY

HEALTH AND HYGIENE (Life Skill Course)

UNIT – I : Basics of Nutrition

A. Very Short Answer Questions (with key)

1. Define nutrition.

Ans: The science of food and its relationship to health, encompassing the intake, digestion, absorption and utilisation of nutrients by the body.

2. Differentiate good nutrition and malnutrition.

Ans: Good nutrition provides all required nutrients in adequate proportion for optimal health; malnutrition results from deficiency, excess or imbalance of nutrients, leading to under- or over-nutrition.

3. What is a balanced diet?

Ans: A diet that provides all essential nutrients – carbohydrates, proteins, fats, vitamins, minerals and water – in the right proportion to meet the body's requirements.

4. Name two dietary sources of carbohydrates.

Ans: Cereals (rice, wheat) and tubers (potato); also sugars and millets.

5. Name two functions of proteins.

Ans: Growth and repair of body tissues, and synthesis of enzymes, hormones and antibodies.

6. Name two food sources of iron.

Ans: Green leafy vegetables and jaggery; also red meat, legumes and dates.

B. Essay Questions (with key points)

1. Explain the concept of a balanced diet and describe the functions, dietary sources and deficiency effects of carbohydrates, lipids and proteins.

Key points: Balanced diet meets energy and nutrient needs through appropriate meal planning. Carbohydrates – primary energy source, sources: cereals, sugars; deficiency causes fatigue, weight loss. Lipids – concentrated energy source, insulation, sources: oils, ghee; deficiency causes poor absorption of fat-soluble vitamins. Proteins – growth/repair, sources: pulses, milk, eggs, meat; deficiency causes kwashiorkor/marasmus. Relate to meal-planning principles.

2. Describe the functions, food sources and effects of deficiency of vitamins and macro/micro minerals, including calcium, iron, iodine and zinc.

Key points: Vitamins (A, B-complex, C, D, E, K) – specific metabolic/protective roles; deficiency causes night blindness, beriberi, scurvy, rickets, etc. Macrominerals – calcium (bones/teeth, dairy, deficiency: osteoporosis), potassium and sodium (fluid balance). Microminerals – iron (haemoglobin synthesis, deficiency: anaemia), iodine (thyroid hormone, deficiency: goitre), zinc (immunity, deficiency: growth retardation). Note importance of water for hydration and metabolism.

UNIT – II : Health

A. Very Short Answer Questions (with key)

1. Define health (WHO).

Ans: A state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity.

2. Name two determinants of health.

Ans: Genetic/biological factors and socio-economic/environmental factors; also lifestyle and access to healthcare.

3. What year was India's National Health Policy released?

Ans: 2017.

4. Expand NRHM.

Ans: National Rural Health Mission.

5. What is RBSK?

Ans: Rashtriya Bal Swasthya Karyakram – a child health screening and early intervention programme of the Government of India.

6. Name one function of ICMR.

Ans: Formulating, coordinating and promoting biomedical research in India.

B. Essay Questions (with key points)

1. Explain the determinants and key indicators of health, and describe the National Health Policy 2017 and the functioning of major health organisations in India.

Key points: Determinants – genetic, environmental, socio-economic, behavioural, health-service access. Key indicators – infant/maternal mortality rate, life expectancy, disease prevalence. National Health Policy 2017 – goals of universal access, preventive/promotive care. Organisations – NIN (nutrition research), FNB, ICMR (biomedical research), IDA, WHO-India and UNICEF-India (technical/programmatic support).

2. Describe the National Rural and Urban Health Mission frameworks and the women & child healthcare schemes implemented in India.

Key points: NRHM – strengthens rural healthcare infrastructure, ASHA workers, village-level committees. NUHM – addresses urban health needs, especially of the urban poor. Women & child schemes – RMNCH+ (continuum of care), JSSK (free delivery care), RBSK (child screening), INAP (newborn survival), RKSK (adolescent health). Discuss objectives and target groups of each scheme.

UNIT – III : Hygiene

A. Very Short Answer Questions (with key)

1. Define hygiene.

Ans: Practices and conditions that help maintain health and prevent the spread of disease, encompassing personal, community, medical and food (culinary) hygiene.

2. Expand WASH.

Ans: Water, Sanitation and Hygiene – a programme promoting safe water, sanitation facilities and hygienic practices.

3. Who is an ASHA worker?

Ans: An Accredited Social Health Activist – a trained female community health volunteer who links the rural community with the public health system.

4. What is Village Health Nutrition Day?

Ans: A monthly outreach activity at the village level providing maternal and child healthcare, nutrition and immunisation services.

5. Name one government mobile app for health awareness.

Ans: Arogya Setu (or National Health Portal / Ayushman Bhava / Swasth Bharat).

6. What is environmental sanitation?

Ans: Measures for safe disposal of human waste, garbage and wastewater, and provision of clean water to prevent disease transmission.

B. Essay Questions (with key points)

1. Explain the concept of hygiene and describe personal, community, medical and culinary hygiene along with the WASH programme.

Key points: Hygiene as disease prevention. Personal hygiene – bathing, handwashing, oral care. Community hygiene – sanitation of shared spaces. Medical hygiene – asepsis in healthcare settings. Culinary hygiene – safe food handling and storage. WASH programme – integrated approach to safe water, sanitation and hygiene promotion for public health.

2. Explain the role of ASHA workers and Village Health Sanitation & Nutrition Committees, and describe the government mobile applications used for public health awareness.

Key points: ASHA workers – link communities to health services, promote institutional delivery, immunisation and hygiene awareness. VHSNC – plans and monitors village-level health and sanitation activities; Rogi Kalyan Samitis manage hospital-level patient welfare. Mobile apps – NHP, Swasth Bharat, Arogya Setu, Ayushman Bhava, India Fights Dengue, JSK Helpline, Mera Aspataal, Covid19AP – enable digital dissemination of health information and services.

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ASSIGNMENT QUESTIONS & CO-CURRICULAR ACTIVITIES

Assignment Questions

1. Prepare a balanced-diet chart for a young adult and justify the food choices in terms of nutrient requirements.
2. Write an account of India's National Health Policy 2017 and the major national health and nutrition organisations.
3. Describe the National Rural and Urban Health Mission and the women & child healthcare schemes of India.
4. Discuss disaster-management strategies for the containment and control of epidemics and pandemics.
5. Explain personal, community and culinary hygiene practices and the WASH programme.
6. Prepare a report on government mobile applications used for public health awareness and their usefulness to the community.

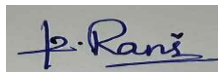
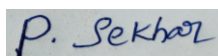
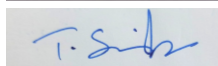
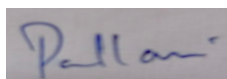
Co-Curricular / Skill-Based Activities (Skill Module – 5 hours)

For the teacher: organise awareness sessions and demonstrations on balanced-diet planning, handwashing technique and use of government health mobile apps.

For the student (any two): a health/hygiene awareness poster or pamphlet for the campus community; a short survey of local health/sanitation practices with a brief report; a seminar/quiz on National Health Missions and schemes; installation and demonstration of a government health app (e.g., Arogya Setu, National Health Portal); participation in a campus health-awareness or blood-donation camp.

Maximum marks for the above activities: to be considered as part of continuous assessment / co-curricular credit, as per college norms.

Signature of the Members:



Signature of the BOS Chairman