

ಸೂಕ್ಷ್ಮಜೀವಿಶಾಸ್ತ್ರ ಅಧ್ಯಯನ ವಿಭಾಗ ಶಿವಗಂಗೋತ್ರಿ, ದಾವಣಗೆರೆ- 577007

ಡಾ. ಎಸ್ ಶಿಶುಪಾಲ ಅಧ್ಯಕ್ಷರು ಅಧ್ಯಯನ ಮಂಡಳಿ

ಪೋ.ನಂ.8792674905

ಸಂಖ್ಯೆ:ದಾವಿವಿ:ಸೂಅವಿ:2024-25/76

ದಿನಾಂಕಃ04.07.2024

ನೆ. ಕುಲಸಚಿವರು ದಾವಣಗೆರೆ ವಿಶ್ವವಿದ್ಯಾನಿಲಯ ಶಿವಗಂಗೋತ್ರಿ. ದಾವಣಗೆರೆ-577007

ಮಾನ್ಯರೇ,

ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿರನ್ವಯ ಸ್ನಾತಕ ಪದವಿಯ ಬಿಎಸ್ಪಿ. (ಸೂಕ್ಷ್ಮಜೀವಿಶಾಸ್ತ) 1 ಮತ್ತು 2ನೇ ಸಮಿಸ್ಟರ್ಗಳ ಪಠ್ಯಕ್ರಮವನ್ನು ಸಲ್ಲಿಸುತ್ತಿರುವ ಬಗ್ಗೆ. ಉಲ್ಲೇಖಃ ಸಂ:ದಾವಿವಿ/ಅಮಂ/304/2024-25/ ದಿನಾಂಕಃ21.05.2024

ಮೇಲ್ಕಂಡ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಿಸಿದಂತೆ, ಉಲ್ಲೇಖದನ್ವಯ ಸ್ನಾತಕ ಸೂಕ್ಷ್ಮಜೀವಿಶಾಸ್ತ್ರ ವಿಷಯದ ರಾಜ್ಯ ಶಿಕ್ಷಣ ನೀತಿಯನುಸಾರ (SEP) ಬಿ.ಎಸ್ಸಿ. (ಸೂಕ್ಷ್ಮಜೀವಿಶಾಸ್ತ್ರ) ದ ಕೋರ್ಸ್ ಸ್ಟಕ್ಷರ್, 1 ಮತ್ತು 2ನೇ ಸೆಮಿಸ್ಟರ್1 ಪಠ್ಯಕ್ರಮ, 3 ಕ್ರೆಡಿಟ್, 4 ಗಂಟೆಯಂತೆ ಬೋಧನಾವಧಿ ಹಾಗೂ ಒಟ್ಟು ಬೋಧನಾ ಅವಧಿ 56 ಗಂಟೆಗೆ ಮತ್ತು ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ ಮಾದರಿಗಳನ್ನು ಪರಿಚಲನೆಯ ಮೂಲಕ ಅಧ್ಯಯನ ಮಂಡಳಿ ಸದಸ್ಯರಿಂದ ಅನುಮೋದಿಸಿ ಸೂಕ್ತ ತಿದ್ದುಪಡಿ ಮಾಡಿ ಸಾಫ್ಸ್ ಕಾಪಿ ಮತ್ತು ಹಾರ್ಡ್ ಪ್ರತಿಗಳನ್ನು ಸಿದ್ದಪಡಿಸಿ ಈ ಪತ್ರದೊಂದಿಗೆ ಲಗತ್ತಿಸಿ ತಮ್ಮ ಮುಂದಿನ ಸೂಕ್ತ ಕ್ರಮಕ್ಕಾಗಿ ಕಳುಹಿಸಲಾಗಿದೆ..

ಪಂದನೆಗಳೊಂದಿಗೆ,

ಅಡಕ:

2. ಸ್ನಾತಕ ಸೂಕ್ಷ್ಮಜೀವಿಶಾಸ್ತ್ರ 1 ಮತ್ತು 2ನೇ ಸೆಮಿಸ್ಟರ್ ಗಳ ಪಠ್ಯಕ್ರಮ

3. ಪ್ರಶ್ನೆ ಪತ್ರಿಕೆ ಮಾದರಿ

ತಮ್ಮ ವಿಶ್ವಾಸಿ, ಅಧ್ಯಕ್ಷರು ಅಧ್ಯಯನ ಮಂಡಳಿ BOS in Microbiology Department of Microbiology Shivagangothri, Davangere-577 002

APPRICIO Microbiology

Davangere 3 University Bachelor of Science (B.Sc.) Semester Scheme **B.Sc.** Microbiology Course structure (SEP-2024)

		(SEI-2024)								
SI. No.	Course/Paper Code	Title of the Paper	Subject Category	Teaching Hours/ week	Semester End Exam.	Internal Assessment	Total Marks	Credits	Examinatio n Duration	
1	2	3	4	5	6	7	8	9	10	
		Semester-		0.4	0.0	20	100	0.2	3 Hrs.	
1	24-MC-I Basic Microb Practical – I Basic Mic		MC-T MC-P	04	80 40	20	100 50	03	3 Hrs.	
	Fractical – 1 Basic Ivili	Total	IVIC-I	08	120	30	150	05		
		Semester-		00	120		100			
	24-MC-II Environmen		MC-T	04	80	20	100	03	3 Hrs.	
2	Practical – II Environn		MC-P	04	40	10	50	02	3 Hrs.	
		Total		08	120	30	150	05		
		Semester-I	II							
	24-MC-III Microbial P	hysiology	MC-T	04	80	20	100	03	3 Hrs.	
3	Practical – III Microbia		MC-P	04	40	10	50	02	3 Hrs.	
5	Elective/Optional – I*I welfare	Microbiology for human	EL/O P-I	02	40	10	50	02	2 Hrs.	
		Total		10	160	40	200	07		
		Semester-I	V						,	
	24-MC-IV Microbial G	enetics and Molecular biology	MC-T	04	80	20	100	03	3 Hrs.	
4	Practical –IV Microbial	Genetics and Molecular biology	MC-P	04	40	10	50	02	3 Hrs.	
	Elective/Optional-II* M	icrobial entrepreneurship	EL/O P-II	02	40	10	50	02	2 Hrs.	
		Total		10	160	40	200	07		
		Semester-	V			,				
	24-MC-VA Agricultur		MC-T	04	80	20	100	03	3 Hrs.	
5	24-MC-VB Food and I	, ,,	MC-T	04	80	20	100	03	3 Hrs.	
		re Microbiology/ Food y Microbiology	МС-Р	04	40	10	50	02	3 Hrs.	
		Total		12	200	50	250	08		
		Commonday V	JI		-					
		Semester-\		T					1	
		ogy and Medical Microbiology	MC-T	04	80	20	100	03	3 Hrs.	
	24-MC-VIB Industrial Biotechno	ogy and Medical Microbiology Microbiology and blogy		04	80	20	100	03		
6	24-MC-VIB Industrial Biotechno Practical – VI Immuno	ogy and Medical Microbiology Microbiology and ology llogy and Medical ology/ Industrial ology and	MC-T						3 Hrs. 3 Hrs. 3 Hrs.	
	24-MC-VIB Industrial Biotechno Practical – VI Immuno Microbio Microbio Biotechn Project/Internship/Diss	ogy and Medical Microbiology Microbiology and ology logy and Medical ology/ Industrial ology and ology ertation	MC-T MC-T MC-P	04 04 02	40	20	100 50 50	03	3 Hrs. 3 Hrs.	
	24-MC-VIB Industrial Biotechno Practical – VI Immuno Microbio Microbio Biotechn Project/Internship/Diss	ogy and Medical Microbiology Microbiology and ology logy and Medical ology/ Industrial ology and ology	MC-T MC-T MC-P	04 04 02	40	20	100 50 50	03	3 Hrs. 3 Hrs.	

THEORY PAPER **SEMESTER I** 24MCT-MBI; THEORY PAPER-I: BASIC MICROBIOLOGY **TOTAL HOURS-56**

Course Learning Objectives

- a) To acquire basic knowledge of Microbiology
- b) To understand the contributions of Scientists in the field of Microbiology and study different types of microscopes.
- c) To learn the basics of cell and cell organelles both in prokaryotes and eukaryotes
- d) To study different methods followed in microbiology laboratory.
- e) To learn different staining techniques employed in microbiology.

Course Outcome: At the end of the course the student will be able to

- a) understand the basic concepts of microbiology and contribution of scientists
- b) practice good laboratory methods used in microscopy.
- c) distinguish the prokaryotic & the eukaryotic cellular organization
- d) demonstrate methods of microbial culturing and staining.

	T- 1: History and Scope of Microbiology & Microscopy	14 Hrs
8	Introduction and history of Microbiology, Scope and importance of Microbiology, Branches of Microbiology. Origin of life - Abiogenesis & Biogenesis, general properties of viruses, viroids, prions, bacteria, fungi, algae, protozoa.	
b	Contributions of scientists to the field of Microbiology- Antony Von Leewenhoek, Louis Pasteur, Robert Koch, Edward Jenner, Joseph Lister, Alexander Fleming, M S Swaminathan, N S Subbarao, Kurian	
c.	numerical aperture, magnification, working distance. Principles, construction and applications of Bright field microscope-compound microscope, Stereo microscope. Dark field microscope, fluorescent microscope, phase contrast microscope, electron microscope (TEM and SEM)	
NIT	-II Cell Biology	
a.	Structure and organization of probability	14 hr
b.	Prokaryotic cell and its components, cell wall, cell membrane, ribosomes, nuclear material, plasmid, capsule, clim layer, it.	
	endospore, inclusion bodies. Ultrastructural details. Eukaryotic cell and its components, cell membrane, cytoplasmic matrix, cytoskeleton, endoplasmic reticulum, Golgi complex, lysosomes, vesicles, ribosomes, nucleus, mitochondria, chloroplast	

UNIT	-III: Microbiological techniques:	14 hrs
a.	C + 1 C +	
	UNIT-IV: Staining techniques	14 hrs
	 a. Nature & types of dyes, Principles of staining b. Types of staining techniques: Bacterial smear preparation, Simple-positive & negative staining, Differential- Gram's staining, acid-fast staining, Structural staining- endospore, capsule and flagella c. Tease mount of fungi and algae: Fungal staining using cotton blue in lactophenol, algal staining with safranin. Methods of preparation of samples for electron microscopy. 	

Internal Assessment:

Sl. No. Continuous Assessment Programme/Internal Assessment		Maximum Marks
(1)	(2)	(3)
01	Two Session Tests with proper record for assessment $(5+5=10)$	10
02	Assessment of Skill Development activities/Seminars/Group Discussion/ Assignment etc., with proper record	05
03	Attendance with proper record	05
	TOTAL MARKS	20

• Attendance Marks-breakup

<75%	-	00 Marks
75-80%	-	01 Mark
80-85%	-	02 Marks
85-90%	-	03 Marks
90-95%	-	04 Marks
>95%	-	05 Marks

24MCP-MBPI; PRACTICAL-I: BASIC MICROBIOLOGY 4HRS/WEEK

- 1. Safety measures in microbiology laboratory
- 2. Study of Bright field microscope- Compound microscope and use of oil immersion objective
- 3. Calculation of magnification, numerical aperture and resolving power.
- 4. Principles and practice of dry heat and moist heat sterilization methods.
- 5. Demonstration and applications of basic microbiology tools & glassware: Petri plates, conical flask, test tubes, burettes, beakers, separating funnel, measuring jar, standard measuring flask, electronic balance, Pipette, micropipette, inoculation loop, spreader, incubator, pH meter, Autoclave, Cooker, Hot air oven, membrane filters.
- 6. Temporary mount preparation: Cyanobacteria- *Nostoc*, Algae-*Chlorella*, Fungus- *Aspergillus*
- 7. Staining techniques-Positive staining, Negative staining
- 8. Grams staining
- 9. Preparation of Media- Nutrient broth, Nutrient agar, Potato dextrose agar, Sabouraurd's dextrose agar, Blood agar, EMB agar
- 10. Study of the contributions of Scientists (through photographs) to the field of microbiology

Internal Assessment for Practical Paper I-VI semesters

• Attendance - 05 Marks

Record/Journal -

05 Marks

Total

10 Marks

I BSc, I SEMESTER MC-MBPI: PRACTICAL-I BASIC MICROBIOLOGY SCHEME OF EXAMINATION

TIME: 3 HOURS MAX MARKS: 40

- Stain the given material 'A' by Gram Staining Method/Positive staining technique/ Negative staining/algal mount/fungal mount technique. Write the Principle, Procedure and Comment on the result. Leave the preparation for evaluation. 15
 Principle-2, Procedure- 3 Preparation-6 Result & Diagram-4
- 2. Prepare & write the composition of the media B- NB, NA, PDA,,EMBPreparation-2, Composition 2 Application-1
- 3. C, D, E, F & G: Comment on the principle, construction and applications of the Instruments/ glassware/calculation of magnification/NA/ RP/ Identify the scientist and give his contribution to the field of Microbiology
- 4. Viva-voce 05

NOTE: Candidates should submit evaluated class records; without which he/she will not be allowed to take up the practical examination.

References

- 1. Atlas R.M., Microbiology- Fundamentals and applications, Macmillan Publishing Company, New York.
- 2. Alexopoulos, C.J., Mims, C.W., and Blackwell, M. 2002. Introductory Mycology. John Wiley and Sons (Asia) Pvt. Ltd. Singapore. 869 pp.
- 3. Sullia, S.B., and Shantharam, S. 2000. General Microbiology, Oxford IBH.
- 4. Aneja K.R., Experiments in Microbiology, Plant pathology, Tissue culture and Mushroom cultivation, New Age International, New Delhi.
- 5. Harold, B.J.2004. Microbiological Applications, WCB McGraw-Hill, New York.
- 6. Black, J.G. 2008. Microbiology principles and explorations. 7edn. John Wiley and Sons Inc., New Jersey 846 pp.
- 7. Madigan, M.T., Martinko, J.M., Dunlap, P. V., Clark, D. P. 2009. Brock Biology of Microorganisms, 12th edition, Pearson International edition, Pearson Benjamin Cummings.
- 8. Talaro, K. P. 2009. Foundations in Microbiology, McGraw Hill.
- 9. Tortora, G.J., Funke, B. R. and Case, C. L. Microbiology An Introduction, 10th ed. 2008, Pearson Education.
- 10. Pelczar M.J., Chan E.C.S. and Krieg N.R., Microbiology, McGraw Hill Book Company, New York.
- 11. Pommerville, J.C. Alcamo's Fundamentals of Microbiology. Jones and Bartlett Pub..Sudburry, 835 pp.
- 12. Lansing M., John, H P. and Klein Donald's A., Microbiology, WCB McGraw Hill New York.
- 13. Salle A.J., Fundamental Principles of Bacteriology, Tata McGraw-Hill Publishing Company Limited, New Delhi.
- 14. Schlegel, H.G. 1995.General Microbiology. Cambridge University Press, Cambridge.
- 15. Steiner R.Y., Ingraham J.L., General Microbiology, Prentice Hall of India Private Company Limited, New Delhi

Blue Print Question Paper pattern for I & II Semester

UNIT	Allotted	2 marks	5marks	10 marks	Total Marks
	hours	questions	questions	questions	
SECTION		A	В	C	
I	12	2	2	. 1	26
II	12	2	2	- 1	26
III	12	3	2	1	24
IV	12	3	2	1	24
Total	48	10Q=20 marks	8Q=40 marks	4Q=40 marks	
		Answer all	Answer any 6	Answer any 3	
		2x10=20	5x6=30	10x3=30	80

THEORY EXAMINATION QUESTION PAPER PATTERN FOR MAJOR

SUBJECTS

(Semesters I -VI)

B.Sc. Semester-I Degree Examination; 2024-25

(SEP: 2024-25) SUBJECT: MICROBIOLOGY

Paper Code: Max. Marks: 80 Time: 3 Hours Instructions to candidates: 1) All sections are compulsory 2) Draw neat and labelled diagrams wherever necessary. **SECTION-A** 1. Answer all the following questions: $(2 \times 10 = 20)$ a) b) c) d) e) f) g) h) i) j) **SECTION-B** $(5 \times 6 = 30)$ Answer any **SIX** of the following: 2. 3. 4. 5. 6. 7. 8. 9. **SECTION -C** $(10 \times 3 = 30)$ Answer Any Three of the following: From Unit-I/Unit-I 10.

11.

12.

13.

From Unit-II/Unit-II

From Unit-III/Unit-III

From Unit-IV/Unit-IV

THEORY PAPER

SEMESTER II

24MCT-MBII; THEORY PAPER-II: ENVIRONMENTAL MICROBIOLOGY

TOTAL HOURS-56

Course Learning Objectives:

- a. To understand microbial ecology
- b. To study soil types and microbial interactions.
- c. To understand air microflora and its impact.
- d. To determine microbial quality of water and its significance.
- e. To demonstrate microbial culture preservation techniques.

Course Outcome: At the end of the course the student will be able to

- a. identify microorganisms from soil
- b. isolate and identify water borne microorganisms.
- c. understand the air quality in relation to microorganisms.
- d. isolate and culture microorganisms from varied sources.

Content		
UNIT-II: Soil Microbiology	14 hrs	
 a. Soil- types, physical and chemical characters, soil profile, soil microorganisms-bacteria, fungi, algae, protozoa, and viruses. b. Interactions among soil microorganisms-types of interactions (positive and negative), microorganisms of rhizosphere, rhizoplane and mycorrhiza (Types and its applications). c. Microbes and biogeochemical Cycles-Nitrogen, Sulphur, Carbon and Phosphorous. Biodegradation-cellulose, pectin, starch. 		
UNIT-III: Aquatic Microbiology	14 hrs	
 a) Sources and types of water, Water cycle, distribution of microorganisms in the aquatic environment, water pollution, biological indicators of water pollution. b) Determination of the quality of Water-Physical, chemical and biological. parameters of potable water -MPN index, membrane filtration, Standard Plate count, Biological oxygen demand, Chemical Oxygen Demand c) Water purification methods in municipal water supply 		
Unit – III Aerobiology	14 hrs.	
 a. Atmospheric layers, sources of microorganism, airborne microflora. Indoor and outdoor air-spora and their significance. a. Principles of air trapping techniques – Sedimentation, impingement, impaction, filtration. Methods and instruments used in trapping techniques- gravity slide, petri plate exposure, vertical cylinder, Hirst 		

b.	spore trap, Rotorod sampler, Anderson sampler, Burkard trap. Advantages and disadvantages of these techniques. Airborne diseases & aeroallergens	
UNIT	-IV: Pure culture techniques	14 hrs
a.	Physiological saline and its importance, serial dilution technique from soil, and water	
b.	Microbial isolation techniques- Pour plate, spread plate, streak plate- continuous, discontinuous, quadrant and radiant streaking, slant, broth and stab culturing	
c.	Preservation and maintenance of pure culture, sub culturing, refrigeration, preservation under soil, preservation under oil, lyophilisation, cryophilisation. Microbial culture collection centers –MTCC, ATCC	

24MC-MBPII; PRACTICAL-II: Environmental Microbiology 4HRS/WEEK

- 1. Preparation of agar slants, broth cultures and stab cultures
- 2. Demonstration of aseptic transfer techniques
- 3. Isolation and enumeration of bacteria and fungi from soil by serial dilution technique.
- 4. Pure culture techniques- Streak, Spread, Pour plate techniques
- 5. Study of Antagonism between soil microbes
- 6. Study of airborne microorganisms (bacteria and fungi) in different environments by plate exposure method.
- 7. Study of air Samplers-Anderson's sampler, Hirst Spore trap, Rotorod sampler and vertical cylinder.
- 8. Determination of biological oxygen demand.
- 9. Microbial examination of water by coliform, MPN methods-for potable
- 10. Charts study of municipal water treatment, Biogeochemical cycle of C, N & P

I BSc, II SEMESTER 24MC-MBPII: PRACTICAL-II ENVIRONMENTAL MICROBIOLOGY SCHEME OF EXAMINATION

TIME: 3 HOURS MAX MARKS: 40

- Perform experiment A by Serial dilution technique/ exposure method/ BOD 15
 Principle 2 Procedure- 3 Performance-5 Result 3 & Diagram-2
- 2. Demonstrate the experiment B- Antagonism/ Spread plate/ Pour plate/Streak Plate 5 Preparation-2 Composition & Application-3
- 3. C, D, E, F & G: Comment / MPN/ Exposure plate/ Anderson's sampler/ Hirst Spore trap/ Rotorod sampler/ vertical cylinder/Slant/Stab culture / Antagonism / Charts of Municipal water treatment, Biogeocycle of C, N & P
- 4. Viva-voce 5

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References

- 1. Alexopoulos, C.J., Mims, C.W., and Blackwell, M. 2002. Introductory Mycology. John Wiley and Sons (Asia) Pvt. Ltd. Singapore. 869 pp.
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- 3. Alexander M. Introduction to Soil Microbiology, Wiley Eastern Limited, New
- 4. Hirst, C.J. Environmental Microbiology, ASM Press, Washington D.C.
- 5. Pelczar M.J. Chan E.C.S and Krieg N.R. Microbiology McGraw Hill Book Company, New York.
- 6. Prescott Lansing M. Harley John P. and Klein Donald A. Microbiology, WCB McGraw-Hill New York. Salle A.J. Fundamental Principles of Bacteriology, Tata McGraw-Hill Publishing Company Limited, New Delhi.
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- 8. SubbaRao N.S Soil Microorganisms and Plant Growth, Oxford and IBH Publishing Company, New Delhi.
- 9. Harold, B.J.2004. Microbiological Applications, WCB McGraw-Hill, New York.
- 10. Black, J.G. 2008. Microbiology principles and explorations. 7edn. John Wiley and Sons Inc., New Jersey 846 pp.
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13. Tortora, G.J., Funke, B. R. and Case, C. L. Microbiology – An Introduction, 10th ed. 2008, Pearson Education.

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