

INSTITUTE	FACULTY OF SCIENCE
PROGRAM	BACHELOR OF SCIENCE (MICROBIOLOGY)
SEMESTER	4
COURSE TITLE	EXPERIMENTAL LABORATORY-IV
COURSE CODE	02MB0256
COURSE CREDITS	3

Objective:

- 1 To enable students with practical skills of Bacterial Systematics, Environmental Microbiology and allied subject like Chemistry or Physics.

Course Outcomes: After completion of this course, student will be able to:

- 1 Students will able to isolate and cultivate bacterial culture.
- 2 Students will able to perform various biochemical test
- 3 Students will be able to learn environmental sample techniques.
- 4 Students will be able to learn different practical techniques of Biology, Chemistry and Physics.
- 5 Students will be able to analyze, interpret and record the experimental results

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
0	0	6	0	0	0	50	50

Contents : Unit	Topics	Contact Hours
Total Hours		

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Bacterial Systematics and Environmental Microbiology Isolation of Gram- positive bacteria from given sample., Isolation of Gram- negative bacteria from given sample., Isolation and cultivation of Actinomycetes from given sample., Isolation of Nitrogen fixing bacteria from root nodules., To perform Sugar Utilization Test of given culture sample., To perform M- R Test and V- P Test of the given culture sample, To perform Citrate Utilization Test of the given culture sample., To perform Hydrogen Sulphide Production Test from the given culture sample., To perform Starch Hydrolysis Test from the given culture sample., To perform Catalase Test from the given culture sample., To study sampling techniques and preservation methods. , Isolation of symbiotic nitrogen fixing bacteria., Isolation of non-symbiotic nitrogen fixers (Azotobacter sp.) from soil., To perform Standard Plate Count (SPC) of soil sample by serial dilution technique., Bacteriological analysis of water: To perform presumptive test for sewage water., Determination of Total Solids (TS), Total Dissolved Solids (TDS) and total Suspended Solids (TSS) of water sample., To measure of hardness of water sample., To measure chloride content of water sample., To measure Dissolved Oxygen of water sample., To measure Biochemical Oxygen Demand (BOD) of water.	20
2	General Chemistry-IV Qualitative analysis of given unknown organic compound. [Bifunctional, compound, 1], Qualitative analysis of given unknown organic compound. [Bifunctional, compound, 2], Qualitative analysis of given unknown organic compound. [Bifunctional, compound, 3], Qualitative analysis of given unknown organic compound. [Bifunctional, compound, 4], Aim: Qualitative analysis of given unknown inorganic salt. [Four radicals, mixture 1], Aim: Qualitative analysis of given unknown inorganic salt. [Four radicals, mixture 2], Aim: Qualitative analysis of given unknown inorganic salt. [Four radicals, mixture 3], Aim: Qualitative analysis of given unknown inorganic salt. [Four radicals, mixture 4].	10

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
3	Wave Dynamics & Crystal Structures To determine the wavelength of given sodium light source using plane transmission grating., To study of polarization of light by reflection and thus verify Brewster law., To determine the restoring force per unit extension of a spiral spring (Spring Constant) by stastical and dynamical method., To study the dead time of GM Counter., To measure the speed of sound using Resonance tube., To find the value of bending stress and young's modulus of elasticity of the material of cantilever beam and carrying a concentrated load at the end., To determine frequency of A.C. Mains using Sonometer., To study the variation of light intensity with distance from source., To determine of surface tension of liquid (water) by capillary tube using travelling microscope., To determine of resistivity and band gap of semiconductor by four probe method at different temperature. (V. Lab)	10
Total Hours		40

Textbook :

- 1 The Textbook of Optics, N. Subrahmanyam Brijlal, S. Chand, 2001
- 2 Microbiology, Pelczar, M.J., Chan E.C.S., Krieg, N.R., Tata McGraw Hill Publication, 1993
- 3 Experimental Microbiology, Patel. R.J., Patel. K.R., Aditya Publications, Ahmedabad, 2016

References:

- 1 Solid State Physics, Solid State Physics, R. K. Pure and V. K. Bubbar., S. Chand, 2009
- 2 General Microbiology, General Microbiology, Stanier, R.Y., Ingraham, J.L., Wheelis, M.L., Painter, R.K., MacMillan Press Ltd., London, 1987

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by white board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

Instructional Method:

- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.
- 5 Use of hazardous/toxic chemicals should be avoided as far as possible in laboratory.
- 6 All students in the laboratory must wear lab coats during lab session.
- 7 During practical and experimental section student must wear shoes to avoid accidents cause by spilling or rush handling of acidic chemicals (Especially during inorganic estimation experiments).

Supplementary Resources:

- 1 <https://archive.nptel.ac.in/courses/112/104/112104026/>
- 2 <https://nptel.ac.in/courses/104106093>
- 3 <https://archive.nptel.ac.in/courses/115/107/115107131/>
- 4 <https://www.youtube.com/user/PradeepKshetrapal>