GUJARAT TECHNOLOGICAL UNIVERSITY
Master of Science (Integrated-Biotechnology)
Semester: I
Subject Name: Concepts in Microbiology
Subject Code: 1310403

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE (E)	PA (M)	ESE (V)	PA (I)	
4	0	8	8	70	30	30	20	150

Prerequisite:
Students should know the basic knowledge of Biology. They have a basic idea about the types of different kinds of microorganisms.

Rationale:
Microbiology includes study of microorganisms such as bacteria, virus, and fungi etc. that are visible only under microscope. It concern with structure, classification and genetics of microorganism

Course Content:

Unit No.	Content	No. of Hours	Weightage (%)
1	**Introduction of microbiology** Introduction, history of microbiology, its branches, scope and its importance Classification: Different methods of classification of microbes and study of Bacteria, Fungi, Virus, Rickettsiae, Spirochetes.	5	8
2	**Sterilization techniques** Study of principle, procedure, merits, demerits and applications of physical, chemical gaseous, radiation and mechanical method of sterilization. Designing of aseptic area, laminar flow equipments; study of different sources of contamination in an aseptic area and methods of prevention, clean area classification	10	17
3	**Bacteriology:** Morphology and ultra-structure of bacteria, cell wall, Archaebacteria, Gram- negative and Gram Positive bacteria, Structure and function of cilia, chromosome, Bacterial spore structure, formation and germination. **Nutritional requirement for growth of bacteria** Nutritional requirements, growth and cultivation of bacteria and viruses. Study of different important media required for the growth of aerobic and anaerobic bacteria Differential media, enriched media and selective media.	15	25
4	**Isolation and identification of Bacteria** Different methods used in isolation and identification of bacteria with emphasis to different staining techniques and biochemical reactions. Counting of bacteria -Total and Viable counting techniques. Isolation and preservation methods for pure cultures, maintenance of lab cultures. Industrial applications of microbes.	15	25

5	**Disinfectants** Study of disinfectants, antiseptics, fungicidal and virucidal agents, factors affecting their activation and mechanism of action.	15	25
	Total Hours:	60	

Textbook:

1. Prescott, Harley, and Klein's Microbiology.7th Edition. The McGraw-Hill Companies, Inc., 1221 Avenue of the Americas, New York, NY 10020. 2008.

Reference Books:

1. Pelczar MJ, Chan ECS and Krieg NR.Microbiology. 5th edition. McGraw Hill Book Company. 1993.
2. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. General Microbiology. 5th edition. McMillan. 2005.

Course Outcomes:

No.	Course Outcomes	RBT Level*
1	Acquire knowledge about history and scope of Microbiology	RM,UN
2	Understand various methods of microbial classification	UN,AP
3	Learn about aseptic conditions and nutritional requirements for growth of microbes.	AP,UN,RM

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Suggested Course Practical List:

1. Introduction and study of different equipment and processing, e.g., B.O.D. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, microscopes used in experimental microbiology.
2. Sterilization of glassware, preparation and sterilization of media.
3. Isolation of pure culture of micro-organisms by multiple streak plate technique and other techniques.
4. Enumeration of micro-organisms (Total and Viable).
5. Sub culturing of bacteria and fungus. Nutrient stabs and slants preparations.
6. Staining methods- Simple, Grams staining and acid fast staining.
7. Motility determination by Hanging drop method.
8. Microbiological assay of antibiotics by cup plate method and other methods.

List of Laboratory/Learning Resources Required:

1. https://nptel.ac.in/courses/102103015
2. https://onlinecourses.swayam2.ac.in/cec19_bt11/preview