BIT1007	Microbiology	L	T	P	J	C
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Pre-requisite	**NIL**	**Syllabus version**				
		1.1				

Course Objectives:

1. Build knowledge and skill in isolation, identification, cultivation, multiplication and preservation of microorganisms
2. Demonstrate the expertise in handling and controlling of microorganisms in labs as well as in various industries.
3. Illustrate the microbial knowledge in day to day life

Expected Course Outcome:

1. Distinguish and compare microorganisms
2. Categorize, screen and preserve the industrially exploited microbes
3. Classify and grow microorganisms by using various culture media
4. Evaluate, control and inhibit the bacterial growth
5. Analyze the bacterial infection and contamination
6. Demonstrate the practical skills by using various microbiology tools

Student Learning Outcomes (SLO):	**2,4,11**

2. Have a clear understanding of subject related concepts and contemporary issues
4.Have sense-making skills of creating unique insights in what is being seen or observed (Higher level thinking skills which cannot be codified)
11.Have interest in lifelong learning

Module:1	**World of microorganisms**	**3 hours**

Historical development of Microbiology as applied engineering science , microbial nutrition and role of major, minor elements

Module:2	**Tools in Microbiology**	**4 hours**

Microscopy – different types of microscopes and micrometry, types of media, enrichment techniques for screening and cultivation of microorganisms, maintenance and preservation of microbial cultures.

Module:3	**Bacterial Morphology**	**3 hours**

Prokaryotes and eukaryotes – bacteria types and cell components and staining techniques.

Module:4	**Microbial Taxonomy**	**4 hours**

Classification of microorganisms — bacterial classification schemes and identification methods (special note to Actinobacteria), Fungal classification and key identification characters. Algal characteristics, groups, and classification. Viruses – types, classification and characters. Sources

of microorganisms - Microbial Type Collection Centres in India and abroad.			
Module:5	**Microbial Metabolism**		**5 hours**
Respiratory metabolisms of microorganism – aerobic and anaerobic paths of energy production. Fermentative pathways – organisms, substrates, intermediates and end products. Storage polymers and excretory metabolism. Membrane transport – nutrient uptake and protein secretion in bacteria.			
Module:6	**Microbial Growth**		**5 hours**
Definition, cell division in microbes, factors affecting growth, techniques for measurements of growth and enumeration, Batch culture, continuous culture and synchronous growth; growth phases and growth curves - Chemostat, Turbidostat. Filamentous growth and measurement. Control of growth, principles, physical and chemical agents - their mode of action and application.			
Module:7	**Applied Microbiology**		**4 hours**
Microorganisms as human pathogens – role of bacteria, fungi and viruses in human diseases – Recent out breaks and various detection methods. Aquatic microorganisms – water testing and biological analysis – Industrial microbes			
Module:8	**Contemporary issues:**	**2 hours**	
Lecture by Industrial Expert			
	Total Lecture hours:	**30 hours**	

Text Book(s)	
1.	Black, 2016.Text book of microbiology. Freeman Publishers
Reference Books	
1.	Pelczar MJ, Chan ECS and Krieg. NR. Microbiology, Tata MCGraw Hill Edition, New Delhi, India
2.	Ananthanarayan, CK JayaramPanikars. Text book of Microbiology, 2005, Orient BlackswanPublishers
Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar	

List of Challenging Experiments (Indicative)		
1.	Light and electron microscopy (components, principle and working mechanism of microscope)	3 hours
2.	Morphology of bacteria, fungi and algae	3 hours
3.	Simple and Differential staining - Gram's staining, Endospore staining, Negative staining and Hiss staining.	3 hours

4.	Micrometry –measurement of bacteria			3 hours
5.	Preparation and sterilization of media and glassware			3 hours
6.	Screening and cultivation of microorganisms by serial dilution and pour plate technique			3 hours
7.	Streak plate technique and single spore isolation			3 hours
8	Biochemical tests for identification of microorganisms			2 hours
9	Antibiotic profiling of microorganisms and Kirby-Bauer Test			3 hours
10	Growth of microorganism under shake flaks culture –generation and Doubling time determination			2 hours
11	Water testing –MPN count			2 hours
			Total Laboratory Hours	**30 hours**
Mode of evaluation:				
Recommended by Board of Studies	03-08-2017			
Approved by Academic Council	No. 46	Date	24-08-2017	