B. Sc. (Microbiology) Semester VI

Course Code	US06CMIC55	Title of the Course	Microbiology Practical
Total Credits of the Course	08	Hours per Week	16

Course Objectives:	• Students understand the biological assay of antibiotics and Pharmaceutical compounds. • Cultivation of nitrogen fixing and other important bacteria from environment to understand their characteristics and importance • Introduce basic principles and application of analytical techniques in clinical microbiology and Haematology for students. • To Identify Pure culture on the basis of various characteristics. • To gain concept of marker genes, cell immobilization and sterility testing of pharmaceutical products.

Course Content : Practical based on core theory papers		
No	**Practical Section-1**	Weightage* (%)
1.	Study of marker genes for gene cloning: Isolation of antibiotic resistant mutants (gradient/ replica/ grid plate technique)	100
2.	Study of marker genes for gene cloning: Isolation of pigment less mutant of *Serratia marcescens* using UV radiations as mutagen.	
3	Isolation, cultivation and study of morphological and cultural characters of symbiotic and non symbiotic nitrogen fixing bacteria that can be exploited as bio fertilizer. a) Azotobacter b) Rhizobium.	
4	Isolation, Cultivation and study of morphological and cultural characters of *Bacillus subtilis, Bacillus megaterium, Bacillus cereus.*	
5	Isolation, Cultivation and study of morphological and cultural characters of filamentous bacteria: Actinomycetes	
6	Study of a bio film (aquatic)	
	Practical Section-2	
1	Determination of human blood group: ABO and Rh systems.	
2.	Estimation of haemoglobin by Sahli's acid haematin method	
3.	Total count of leucocytes.	

4	Total Count of erythrocytes	
4.	Differential count of leucocytes by Field's method	
5.	Physical and Chemical analysis of urine.	
6.	Estimation of blood sugar by Glucose oxidase and peroxidase method (GOD-POD)	
	Practical Section-3	
1.	Isolation, cultivation and study of cultural characters of Gram positive bacterium *Staphylococcus aureus*	
2.	Isolation, cultivation and identification of gram-negative bacteria Gram negative, lactose fermenter bacteria: *Escherichia coli, Enterobacter aerogens.*	
3.	Isolation, Cultivation and identification of *Gram negative lactose non fermenter bacteria: Proteus vulgaris, Pseudomonas aeruginosa*	
4.	Isolation, Cultivation and identification of *Gram negative lactose non fermenter bacteria: Salmonella typhi, Salmonella paratyphi* A, *Salmonella paratyphi* B.	
	Practical section -4	
1	Immobilization of yeast cells by sodium alginate method. (Demonstration or group experiment)	
2	Bioassay of Streptomycin.	
3	Sterility testing of a pharmaceutical product	
4	Study of Minimum inhibitory concentration (MIC) of an antibiotic for a well isolated bacterium.	
5	Study of antibiogram for a well isolated bacterium.	

Teaching-Learning Methodology	By practical batches .Giving students concepts, guidance and demonstration to perform specific practical.

Evaluation Pattern
Evaluation of practical at University level requires **three** consecutive days and minimum **12 hours** (4 h x 3 days). Student should be evaluated for minimum four exercises for performance, well documented certified Journal and a viva voce.

Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Apply the practical skill at pathological laboratories and pharmaceutical Industries.
2.	Aquatinted with routine laboratory techniques and tests used to analyze Blood and Serum samples.
3	Will be able to understand cultivation and characterization of microorganisms that are important in agriculture and can be exploited as bio fertilizers.
4.	Gain knowledge of basic characteristics of microbial cultures which can be used to identify the disease causing agent.
5	Conceptualize the importance of sterility for pharmaceutical products.

Suggested References:	
Sr. No.	References
1.	Practical protocols and guidelines given in laboratories
2.	Microbiology : A Practical Approach – Dr Bhavesh Patel and Dr Nandini Phanse
3.	Experimental Microbiology - Rakesh J.Patel & Kiran R. Patel, Volume I & II
4.	Medical laboratory technology by K L Mukherjee , published by Tata McGraw Hill, New Delhi
On-line resources to be used if available as reference material	