



C. U. SHAH UNIVERSITY, WADHWAN CITY.

Faculty of: **Sciences and Life Sciences**

Course: **Bachelor of Science(Microbiology)**

Semester: **I**

Subject Code: **MIM202 -1C**

Subject Name: **Bacteriology**

Sr. No	Category	Subject Code	Subject Name	Teaching hours/ Week			Credit hours	Credit Points	Evaluation Scheme/ Semester								Total
				Th	Tu	Pr			Theory				Tutorial / Practical				
									Continuous and Comprehensive Evaluation		End Semester Exams		Internal Assessment		End Semester Exams		
									Marks	Marks	Marks	Duration	Marks	Duration	Marks	Duration	
2	MAJOR	MIM202-1C	Bacteriology	3	-	2	5	4	10	Assignment	50	2	25	1	-	-	100

AIM:

- Acquaint the basic concept of structure of cell
- Basic concepts of organelles and their function
- Gain a knowledge about bacterial growth and reproduction

COURSE CONTENTS

Course Outline for Theory

UNIT	COURSE CONTENT	TEACHING HOURS
I	<p>CELL STRUCTURE AND ORGANIZATION:</p> <ul style="list-style-type: none"> • Cell Size, Shape and Arrangement. External Cell Surface Structures: Glycocalyx (Capsule and Slime Layer), S Layer, Flagella, Endoflagella, Fimbriae and Pili. Cell-Wall: Detailed Structure and Composition of Cell Wall of Eubacterial (Gram-Positive and Gram Negative) And Archaea. Mechanism Of Gram and Acid-Fast Staining, Effect of Antibiotics and Enzymes on The Cell Wall and Formation of Spheroplasts, Protoplasts And L-Forms. Cell Membrane: Structure, Functions and Chemical Composition of Eubacterial and Archaeal Cell Membranes. • Cytoplasm: Ribosomes, Mesosomes, Inclusion Bodies (PHB, Polyphosphate Granules, Sulphur Globules, Cyanophycin, Gas Vacuoles and Magnetosomes), Microcompartments (Carboxysomes), Nucleoid, Chromosome and Plasmids. Endospore: Structure, Formation, Stages of Sporulation and Germination of Endospore 	12
II	<p>BACTERIOLOGICAL TECHNIQUES:</p> <ul style="list-style-type: none"> • Pure Culture Isolation: Streaking, Serial Dilution and Plating Methods. Cultivation, Maintenance and Preservation/Stocking of Pure Cultures. Culture Collection Centres. Cultivation Of Anaerobic Bacteria and An Overview of 	10

	Accessing Non-Culturable Bacteria. Bright Field Microscopy: Principle and Functions of Compound Microscope. Concept Of Resolving Power and Magnification	
III	BACTERIAL NUTRITION: <ul style="list-style-type: none"> Nutritional requirements in bacteria and nutritional categories. Culture media: components of media, natural and synthetic media, chemically defined media, complex media, selective, differential, indicator, enriched and enrichment media. 	10
IV	REPRODUCTION AND GROWTH: <ul style="list-style-type: none"> Asexual methods of reproduction, phases of growth curve in batch culture, generation time and growth rate. 	13

Course Outline for Practical

SR. NO	COURSE CONTENT	HOURS
1	Introduction of aseptic techniques: Methods of bacterial control: Mechanical(filtration); Physical (Heat, Radiation); Chemical (Alcohol)	30
2	Preparation of different media: Synthetic Media (BG11), Complex media (Nutrient Agar, MacConkey agar).	
3	Isolation of pure cultures of bacteria by Quadrant streaking method.	
4	Enumeration of bacteria by CFU count using spread plate method/pour plate method.	
5	To observe size, shape and arrangement of given bacterial sample using simple and negative staining.	
6	To differentiate between different types of bacteria using differential staining methods: Gram staining, Capsule staining, Spore staining, Acid fast staining (Permanent slides)	
7	Demonstration of motility by hanging drop method.	
8	Temporary mount preparation of Rhizopus, saccharomyces, aspergillus to study thallus organization and asexual reproductive structures.	

TEACHING METHODOLOGY:

- Conventional method (classroom blackboard teaching)
- ICT Techniques
- Teaching through the classroom, laboratory work
- Variety of learning styles and tools (PowerPoint presentations, audio-visual resources, e-resources, seminars, workshops, models)
- Teaching through laboratory work

LEARNING OUTCOME:

- At the end of this course the students would have sufficient knowledge of bacteria.
- Obtain the knowledge about growth and reproduction of bacteria.
- Understanding the bacterial nutrition and different culture media.
- To gain a knowledge about an application of microorganism in different field.
- Learn different bacteriological technique for bacterial growth.
- To understand the working system of various microscope

Arrangement of lectures duration and practical session as per defined credit numbers:

Units	Lecture Duration (In Hrs.)		Calculation of Credits (In Numbers)		Total Lecture Duration	Credit Calculation
	Theory	Practical	Theory	Practical	Theory+ Practical	Theory+ Practical
Unit – 1	12	30	3	1	45+30	3+1
Unit – 2	10					
Unit – 3	10					
Unit – 4	13					
TOTAL	45	30	3	1	75	4

Evaluation:

Theory Marks	Practical Marks	Total Marks
75	25	100

REFERNCE BOOKS:

- Craig, J.R., Vaughan. D.J. & Skinner. B.J. 1996. Resources of the Earth: Origin, Use, and Environmental Impacts (2nd edition). Prentice Hall, New Jersey
- Freeman, A.M. 2001. Measures of value and Resources: Resources for the Future. Washington DC.
- Freeman, A.M. 2003. Millennium Ecosystem Assessment: Conceptual Framework. Island Press.
- Ginley, D.S. & Cahen, D. 2011. Fundamentals of Materials for Energy and Environmental Sustainability. Cambridge University Press
- Klee, G.A. 1991. Conservation of Natural Resources. Prentice Hall Publication.