

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF MICROBIOLOGY

COURSE CURRICULUM

PART – A: Introduction			
Program: Bachelor in Life Science (Degree/Honors)		Semester - V	Session: 2024-25
1	Course Code	MBSC – 05 T	
2	Course Title	Microbial Physiology and Metabolism	
3	Course Type	DSC	
4	Prerequisite (If Any)	As per Program	
5	Course Learning Outcome (CLO)	At the end of this course the student will able to – <ul style="list-style-type: none"> ➤ explain the growth characteristics of the microorganisms ➤ outline bacterial photosynthesis ➤ relate the translocation of metabolic products ➤ examine types of carbohydrate metabolism ➤ summarize lipid and amino acid metabolism 	
6	Credit Value	03 Credits	Credit = 15 Hours - Learning & Observation
7	Total Marks	Max. Marks: 100	Minimum Passing marks: 40
PART – B: Content of the Course			
Total No. of Teaching-Learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Microbial Growth: Definition, Generation time, Phases of growth curve, measurement of microbial growth, Batch culture, Continuous culture, synchronous growth, diauxic growth curve. Factors affecting the growth of microbes, Nutritional types of bacteria.		12
II	Bacterial photosynthesis: Photosynthetic pigments- bacteroid chlorophyll, carotenoids, bacteriorhodopsin and phycobilins. Photosynthetic bacteria- purple sulphur bacteria, purple non- sulphur bacteria, green sulphur bacteria & Green non-sulphur bacteria, heliobacteria Membrane transport: Passive and facilitated diffusion. active transport, concept of uniport, symport and antiport Group translocation.		11
III	Carbohydrate metabolism: Glycolysis, TCA cycle, ED, Pentose phosphate pathway. Electron transport chain: components of ETC, Fermentation - Alcohol fermentation and Pasteur effect; Lactate fermentation. Glycogenolysis, Gluconeogenesis.		11
IV	Lipid catabolism: alpha, beta and omega oxidation of fatty acids. Amino acid catabolism: Deamination, Transamination and Decarboxylation of amino acids. Urea cycle.		11
Key Words	Microbial growth, Photosynthetic bacteria, carbohydrate metabolism, lipid catabolism		

Name and Signature of Convener and Members of CBoS

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Roshmi
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Part – C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. General Microbiology; Vol II C B Pawar & H F Dagainawala.
2. A textbook of Microbiology; R C Dubey & D K Maheshwari.
3. Fundamentals of Biochemistry; J.L. Jain, Dr. Sunil Jain and Nitin Jain, S. Chand Pub.
4. Biochemistry; U. Satyanarayana and U. Chakrapani

Reference Books:

1. Microbiology; Prescott, Harley and Klein, 5th edition, Mc Graw Hill, New York .
2. Brock Biology of Microorganisms; Madigan.
3. Bacterial physiology; Moat & Foster.

Online Resources – e-Resources/ e-Books and e- learning portals

- <https://byjus.com/biology/carbohydrate-metabolism/>
- <https://www.slideshare.net/subramaniansethupath/overview-of-lipid-metabolism.>
- <https://www.britannica.com/science/bacteria/Growth-of-bacterial-populations>

Part – D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks
Continuous Internal Assessment (CIA): 30 Marks
End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz – (2): 20+20	Better marks out of the two Test/ Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment/ Seminar – 10	
	Total Marks – 30	

End Semester Exam (ESE):	Two Section – A & B
	Section A: Q1. Objective 10 X 1 = 10 Mark; Q2. Short answer type – 5X4= 20 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit – 4X10 = 40 Marks

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COURSE CURRICULUM

PART – A: Introduction			
Program: Bachelor in Life Science (Degree/Honors)		Semester V	Session: 2024-25
1	Course Code	MBSC - 05 P	
2	Course Title	Lab. Course - MBSC - 05	
3	Course Type	Laboratory Course	
4	Prerequisite (If Any)	As per Program	
5	Course Learning Outcome (CLO)	At the end of this course the student will able to – <ul style="list-style-type: none"> ➤ relate the growth pattern of bacteria ➤ determine the effect of various environmental factors on growth of microorganisms ➤ apply the factors for microbial control ➤ demonstrate the fermentation process 	
6	Credit Value	1 Credit	Credit = 30 Hours. Laboratory or Field learning/ Training
7	Total Marks	Max. Marks: 50	Min. Passing marks: 20

PART – B: Content of the Course

Total No. of learning-Training/ Performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
Lab./ Field Training/ Experiment contents of Course	1. Study of growth curve of bacteria by turbidometric and standard plate count methods. 2. Calculations of generation time and specific growth rate of bacteria from the graph. 3. Effect of temperature/ pH/ salt on growth of bacteria. 4. Demonstration of alcoholic fermentation. 5. Demonstration of the thermal death time and decimal reduction time of <i>E.coli</i> . 6. Isolation of Saccharophilic (starch hydrolysis), Proteolytic (casein and gelatin hydrolysis) and Lipolytic microorganisms. 7. Oxidative and Fermentative test of bacteria.	30
Key Words	Growth Curve, Generation time, Factors of Growth, Fermentation, Microbial Enzymes	

PART – C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. Experiments in microbiology, plant pathology and biotechnology by K R Aneja
2. Practical microbiology by R C Dubey and D K Maheshwari.

Online Resources:

- https://books.google.co.in/books/about/Practical_Microbiology.html?id=Wh9OTbjcsfUC&redir_esc=y
- **Practical Microbiology: Microbial Physiology and Biochemistry**

PART – D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks

Continuous Internal Assessment (CIA): 15 Marks

End Semester Exam (ESE): 35 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test/ Quiz – (2): 10 & 10 Assignment/ Seminar + Attendance: 05 Total Marks: 15	Better Marks out of the two Test/ Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Laboratory/ Field Skill Performance: On spot Assessment A. Performed the Task based on lab. work – 20 Marks B. Spotting based on tools & technology (written) - 10 Marks C. Viva-voce (based on principle/ technology) – 05 Marks	Managed by course teacher as per lab. status

Name and Signature of Convener and Members of CBoS

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