B.Sc. II Year **Semester – III**

BIM -C301
DSC-3 MICROBIAL PHYSIOLOGY AND METABOLISM

MM : 100
Time : 3 hrs
L Credit
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Sessional : 30
ESE : 70
Pass Marks : 40

Total Hours: 60

Learning objectives:

- To understand different phases of bacterial growth and its kinetics
- To understand how microbes do catabolism to get energy to build structure.
- To understand different metabolic pathways and enzymes involved by which energy will be generated
- To acquire knowledge of classifying enzymes and how they functions.
- To understand how the nitrogen is fixed by symbiotic and non-symbiotic nitrogen fixation and genes involved in nitrogen fixation

Learning outcomes:

At the end of course student will be able to

- Calculate generation time and number of generation.
- Explain principles and mechanism of aerobic and anaerobic respiration in microorganisms.
- Explain the concept nitrogen metabolism, assimilation of nitrates, ammonia assimilation. and fixation of nitrogen
- explain the bacterial photosynthesis and also the differentiation between oxygenic and anoxygenic photosynthesis bacteria
- Classify enzymes and demonstrate the mechanism of enzymes and their functions.

UNIT-I

Bacterial Growth Curve; Synchronous growth; microbial growth kinetics in batch cultures; growth measurement: by cell mass, cell count and cell turbidity;factor affecting the growth of microorganism.

(12 Lectures)

UNIT II

Enzymes: characteristics, nomenclature, classification and application of enzymes;Factors influencing enzymatic activity;Mechanism of enzyme action;Allosteric enzymes.

(10 Lectures)

UNIT-III

General concepts of respiration and fermentation: aerobic and anaerobic respiration, fermentation; alcoholic fermentation, lactic acid fermentation

(10 Lectures)

UNIT-IV

Microbial metabolism: General strategy of metabolism, anabolism, catabolism, ATP, Phosphorylation, Oxidative phosphorylation and substrate level phosphorylation, primary metabolic pathway, secondary metabolic pathway, metabolism of carbohydrates (glycolysis, TCA cycle)

(14 Lectures)

UNIT-V

Nitrogen fixation in symbiotic and free-living microorganisms, root nodule formation, leghaemoglobin, nitrogenase enzyme;Photosynthetic bacteria and their classification.

(14 Lectures)

Suggested Reading

1. Dubey R.C. and Maheshwari, D.K. *A Textbook of Microbiology*. 3rd ed., S. Chand & Co, Ram Nagar, New Delhi, p. 1034. ISBN 81-219-2620-3
2. Dubey, R.C. and Maheshwari, D.K. *Practical Microbiology*. 2nd ed., S. Chand & Co. P Ltd, New Delhi, p. 413. ISBN: 81:219-2559-2
3. Roger Y. Stanier, John L. Ingraham. General Micobiology, Palgrave Macmillan, **ISBN-13:** 978-0333763643
4. Powar and Daginawala. General Microbiology Vol1 and Vol2, Himalaya Publishing House,**ISBN-13:** 978-9350240892
5. M.T.Madigan, J.M.Mahinko Jack Parkar Brock: Biology of Microorganisms, Pearson Education ISBN 978-9332586864

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