

B. Sc (CBCS) Industrial Microbiology – II Year
Semester-III
DSC: MICROBIAL PHYSIOLOGY AND BIOCHEMISTRY

Theory syllabus

Credits – 4

UNIT - I

1. Physiological properties - Diffusion, gaseous exchange, osmosis, plasmolysis, biochemical properties of membrane, passive and active transport.
2. Photosynthesis - Photosynthetic microbes, oxygenic/anoxygenic reaction centres, electron transport, photophosphorylation, Calvin cycle (dark reaction) phosphoenol carboxylase, photorespiration and its significance.
3. Respiratory pathways - Respiratory pathways, breakdown of carbohydrates through Glycolysis, Krebs cycle, fermentation, pentose phosphate pathway, oxidative and substrate level phosphorylation, significance of Krebs cycle. Gluconeogenesis and its significance.

UNIT - II


1. Nitrogen metabolism – Diversity of nitrogen fixers, symbiotic and non-symbiotic nitrogen fixation, regulation of nitrogen fixation, nitrification, denitrification and ammonifying bacteria.
2. Methylophils - Methanogens and methylophils, sulphur utilizing bacteria, sulphate reduction pathway, economic importance of methylophils and sulphur utilizing bacteria.
3. Basic concepts of primary and secondary metabolism.

UNIT - III

1. Carbohydrates - classification of carbohydrates, chemical structure and properties of starch, cellulose, glycogen,
2. Lipids - saturated and unsaturated fatty acids, classification of lipids. Properties and functions of neutral lipids, phospholipids, glycolipids, steroids.
3. Amino acids - structure and classification of aminoacids, essential and non essential amino acids.

UNIT - IV

1. Enzymes – Basics of enzymology, properties and classification of enzymes.
2. Biocatalysis - induced fit, and lock and key model, coenzymes, cofactors, factors affecting catalytic activity of enzymes.
3. Derivation of Michaelis-Menton equation, Inhibition of enzyme activity - competitive, noncompetitive, uncompetitive and allosteric mechanisms. Enzyme extraction, purification, recovery and yield.



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Practical syllabus

Credits – 1

1. Study and plot the growth curve of *E. coli* by turbidometric method.
2. Effect of temperature on growth of *E. coli*.
3. Effect of pH on growth of *E. coli*.
4. Effect of osmotic pressure (salt and sugar concentration) on bacterial growth.
5. Setting and observation of Winogradsky column.
6. The oligodynamic action of heavy metals on bacterial growth.
7. Quantitative estimation of protein by Lowry's method.
8. Quantitative estimation of glucose by Anthrone method.
9. Qualitative tests for carbohydrates.
10. Qualitative tests for amino acids.

References:

1. Campbell, MK (2012) Biochemistry, 7th ed., Published by Cengage Learning.
2. Campbell, PN and Smith AD (2011) Biochemistry Illustrated, 4th ed., Published by Churchill Livingstone.
3. Tymoczko JL, Berg JM and Stryer L (2012) Biochemistry: A short course, 2nd ed., W.H.Freeman.
4. Berg JM, Tymoczko JL and Stryer L (2011) Biochemistry, W.H.Freeman and Company.
5. Nelson DL and Cox MM (2008) Lehninger Principles of Biochemistry, 5th Edition., W.H. Freeman and Company.
6. VoetD. and Voet J.G (2004) Biochemistry 3rd edition, John Wiley and Sons.
7. Madigan MT, and Martinko JM (2014). Brock Biology of Microorganisms. 14th edition. Prentice Hall International Inc.
8. Moat AG and Foster JW. (2002). Microbial Physiology. 4th edition. John Wiley & Sons.
9. Reddy SR and Reddy SM. (2005). Microbial Physiology. Scientific Publishers India.
10. Gottschalk G. (1986). Bacterial Metabolism. 2nd edition. Springer Verlag.
11. Stanier RY, Ingrahm JI, Wheelis ML and Painter PR. (1987). General Microbiology. 5th edition, McMillan Press.
12. Willey JM, Sherwood LM, and Woolverton CJ. (2013). Prescott's Microbiology. 9th edition. McGraw Hill Higher Education.

