

**B.Sc MICROBIOLOGY (CBCS) SYLLABUS  
FIRST YEAR – SEMESTER- II**

**MBT- 201 : MICROBIAL BIOCHEMISTRY & METABOLISM**

**TOTAL HOURS: 48**

**CREDITS: 4**

**UNIT-I**

**No. of hours: 10**

Outline classification and general characteristics of carbohydrates (monosaccharides, disaccharides and polysaccharides).

General characteristics of amino acids and proteins.

Structure of nitrogenous bases, nucleotides, nucleic acids.

Fatty acids (saturated and unsaturated), lipids (spingolipds, sterols and phospholipids).

**UNIT-II**

**No. of hours: 8**

Principle and applications of Colorimerty

Chromatography (paper, thin-layer and column),

Spectrophotometry (UV & visible),

Centrifugation and Gel Electrophoresis.

**UNIT-III**

**No. of hours: 10**

Properties and classification of Enzymes.

Biocatalysis- induced fit and lock and key models.

Coenzymes and Cofactors.

Factors affecting catalytic activity.

Inhibition of enzyme activity- competitive, noncompetitive, uncompetitive and allosteric.

**UNIT-IV**

**No. of hours: 10**

Microbial Nutrition –Nutritional requirements and uptake of nutrients by cells.

Nutritional groups of microcroorganisms- autotrophs, heterotrophs, mixotrophs.

Growth media- synthetic, complex, selective, enrichment and differential media.

Microbial Growth- different phases of growth in batch cultures, Synchronous, continuous, biphasic growth.

Factors influencing microbial growth.

Methods for measuring microbial growth – Direct microscopy, viable count estimates, turbidometry and biomass.

**UNIT-V**

**No. of hours: 10**

Aerobic respiration -Glycolysis, HMP path way, ED path way, TCA cycle, Electron transport, oxidative and substrate level phosphorylation.

Anaerobic respiration (Nitrate).

Fermentation - Alcohol and lactic acid fermentations.

Outlines of oxygenic and anoxygenic photosynthesis in bacteria.

## MBP- 201: MICROBIAL BIOCHEMISTRY & METABOLISM

**TOTAL HOURS: 48**

**CREDITS: 2**

1. Qualitative Analysis of Carbohydrates
2. Qualitative Analysis of Aminoacids
3. Colorimetric estimation DNA by diphenylamine method
4. Colorimetric estimation of proteins by Biuret/Lowry method
5. Paper chromatographic separation of sugars and amino acids
6. Preparation of different media- Synthetic and Complex Media
7. Setting and observation of Winogradsky column.
8. Estimation of CFU count by spread plate method/pour plate method.
9. Bacterial growth curve.
10. Factors affecting bacterial growth – pH.
11. Factors affecting bacterial growth – Temperature.
12. Factors affecting bacterial growth –Salt

### **SUGGESTED READING**

Berg JM, Tymoczko JL and Stryer L (2011) **Biochemistry**, W.H.Freeman and Company

Caldwell, D.R. (1995). **Microbial Physiology and Metabolism**, W.C. Brown Publications, Iowa, USA.

Campbell, PN and Smith AD (2011) **Biochemistry** Illustrated, 4th ed., Published by Churchill Livingstone

Elliot, W.H. and Elliot, D.C. (2001). **Biochemistry and Molecular Biology**, 2 nd Edition, Oxford University Press, U.S.A.

Gottschalk, G. (1986). **Bacterial Metabolism**, SpringerVerlag, NewYork.

Lehninger, A.L., Nelson, D.L. and Cox, M.M. (1993). **Principles of Biochemistry**, 2 nd Edition, CBS Publishers and Distributors, New Delhi.

Madigan, M.T., Martinkl, J.M. and Parker, J. (2010). **Brock Biology of Microorganisms**, 9th Edition, MacMillan Press, England.

Moat, A.G. and Foster, J.W. (1995). **Microbial Physiology**, JohnWiley, New York.

Nelson DL and Cox MM (2008) Lehninger **Principles of Biochemistry**, 5th Edition., W.H. Freeman and Company.

Prescott, M.J., Harley, J.P. and Klein, D.A. (2010). **Microbiology**. 5th Edition, WCB Mc GrawHill, New York.

Reddy, S.R. and Reddy, S.M. (2004). **Microbial Physiology**, Scientific Publishers, Jodhpur, India.

Sashidhara Rao, B. and Deshpande, V. (2007). **Experimental Biochemistry**: A student Companion. I.K. International Pvt. Ltd.

Stanier, R.Y., Adelberg, E.A. and Ingram, J.L. (1991). **General Microbiology**, 5th Ed., Prentice Hall of India Pvt. Ltd., New Delhi.

Tymoczko JL, Berg JM and Stryer L (2012) **Biochemistry**: A short course, 2nd ed., W.H. Freeman

Voet, D. and Voet J.G (2004) **Biochemistry** 3<sup>rd</sup> edition, John Wiley and Sons

White, D. (1995). **The Physiology and Biochemistry of Prokaryotes**, Oxford University Press, New York.

Willey MJ, Sherwood, LM & Woolverton C J (2013) Prescott, Harley and Klein's **Microbiology** by. 9th Ed., McGrawHill

**SUBJECT:: B.Sc., MICROBIOLOGY (CBCS) MODEL QUESTION PAPER**  
**FIRST YEAR – SEMESTER II**  
**MBT-201 : MICROBIAL BIOCHEMISTRY & METABOLISM**

**Time 3 hrs**

**Max marks -75**

**SECTION-A**

**ANSWER ANY FIVE OF THE FOLLOWING      5 x 5 M= 25 marks**  
**Draw labeled diagrams wherever necessary**

1. Role of Sphingolipids
2. Principle of PAGE
3. Role of Co-factor
4. Allosterism means
5. Biphasic growth of bacteria
6. Principle of Turbidometry
7. Microbial Viable count
8. Define Mixotrophs

**SECTION- B**

**ANSWER ANY FIVE OF THE FOLLOWING      5 x 10 M= 50 marks**  
**Draw labeled diagrams wherever necessary**

9. a) Write the classification of Carbohydrates with suitable examples.  
Or  
b) Draw the structure of DNA and explain in detail.
10. a) Explain the principle and application of Thin layer chromatography.  
Or  
b) Discuss the factors affecting catalytic activity.
11. a) Differentiate the competitive and non-competitive inhibition of enzyme activity.  
Or  
b) What are the Nutritional requirements needs for microbial growth? Explain.
12. a) Discuss the factors influence the microbial growth in detail.  
Or  
b) Explain the mechanism of HMP pathway in a pictorial way.
13. a) What is fermentation? Discuss the alcohol fermentation method in detail.  
Or  
b) List out various selective media for microbial growth and write their significance.