ST. JOSEPH’S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

III SEMESTER **BIOTECHNOLGY**  TIME: 4Hrs/Week

BTH-Ma-4-3701 (3) **METABOLISM** Max. Marks: 100

W.e.f. 2023-24 admitted batch (23AK) **SYLLABUS**

**OBJECTIVES:** To enable the students to

1. Sketch the entire carbohydrate metabolism and its energetics.
2. Comprehend lipid metabolism & its role in human body maintenance.
3. Swot the amino acid metabolism and their inborn errors.
4. Gain the basic concepts of enzymology and their interactions with substrates.
5. Understand the basic kinetics of enzymes and role of factors involved.

**COURSE OUTCOMES: Students will**

* **CO1:** Familiarized with major pathways of carbohydrates.
* **CO2:** Be realize physiological fates of lipids.
  + - **CO3:** Acquaint on amino acid metabolism.
    - **CO4:** Be proficient in nomenclature & nature of various enzymes.
* **CO5:** Acquire fundamental insights of enzyme kinetics.

**UNIT-I: Carbohydrate Metabolism**

1. Anabolism & catabolism, Photosynthesis – light and dark reactions.
2. C3 cycle & C4 pathway.
3. Glycolysis – formation of lactate and pyruvate, TCA cycle and its regulation.
4. Gluconeogenesis, HMP stunt pathway.
5. Disorders of Carbohydrate metabolism-Diabetes mellitus.

**UNIT – II: Lipid Metabolism**

* 1. *Denovo* synthesis of Fatty Acids, Biosynthesis & degradation of TAG (Triacyl Glycerol).
  2. Disorders of Lipid metabolism
  3. Biosynthesis of cholesterol, Ketogenesis

**UNIT – III: Amino Acid Metabolism**

* + 1. General reactions of amino acids: deamination, decarboxylation & transamination.
    2. Urea cycle. Biosynthesis of creatine
    3. Inborn errors of aromatic and branched-chain amino acid metabolism.

**UNIT – IV: Enzymes**

1. Difference between chemical and biological catalyst, definitions of Holoenzyme apoenzyme & coenzyme
2. Classification and nomenclature of enzymes.
3. Enzyme specificity, interaction between enzyme and substrate – lock & key and induced fit models.

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**UNIT V: Enzyme Kinetics**

1. Michaelis–Menten equation, Factors affecting enzyme activity: substrate concentration, enzyme concentration, pH and temperature.
2. Enzyme inhibition kinetics – competitive, uncompetitive, and non-competitive.
3. Immobilized enzymes and their applications.

**REFERENCES**

1. Understanding enzymes: Palmer T., Ellis Harwood ltd., 2001.
2. Enzyme structure and mechanism. Alan Fersht, Freeman & Co. 1997
3. Principles of enzymology for food sciences: Whitaker Marc Dekker 1972.
4. Principles of Biochemistry, White. A, Handler, P and Smith.
5. Biochemistry, Lehninger A.L.
6. Biochemistry, Lubert Stryer.
7. Review of physiological chemistry, Harold A. Harper.
8. Text of Biochemistry, West and Todd.
9. Metabolic pathways – Greenberg.

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