SEMESTER – III

METABOLISM OF BIOMOLECULES

THEORY

Programme: B.Sc. **Max. Hours: 60**
Course Code: U20/BIC/DSC/301 **Hours per week: 4**
Course Type: DSC – 3 **Max. Marks: 100**
No. of credits: 4

Course objective:

Students with their knowledge on metabolism will be able to effectively apply them in the current research field after their master's, especially in molecular biology fields.

Course Outcomes:

CO1: The students will have understand of the main principles of metabolic biochemistry Concepts.

CO2: With the knowledge gained in the previous level of course, the students will be able to appreciate and understand the key metabolic biochemistry and molecular biology concepts.

CO3: Understand the function of specific anabolic and catabolic pathways and how these pathways are controlled and interrelated.

CO4: Students will analyze and understand the relation between biochemical defects and metabolic disorders.

MODULE I: CARBOHYDRATE METABOLISM (15 Hrs)

Glycolysis pathway, regulation and energy yield. Pasteur Effect and Crabtree effect, fate of Pyruvate - formation of lactate and ethanol.
Citric acid cycle, regulation and energy yield, Anaplerotic reactions, Pentose Phosphate pathway, Gluconeogenesis, Glycogenolysis and glycogenesis.
Diabetes Mellitus (elementary treatment) Diabetes ketoacidosis.

MODULE II: LIPID METABOLISM (15 Hrs)

Catabolism of lipids – β oxidation of fatty acids (odd & even number of carbons), energy yield. Ketogenesis, De novo synthesis of fatty acids, Elongation of fatty acids in mitochondria and microsomes, Biosynthesis of triacylglycerols and lecithin. Biosynthesis of cholesterol.

MODULE III: AMINOACID METABOLISM (15 Hrs)

Biochemical nitrogen fixation, utilization of ammonia.
General reactions of amino acid metabolism – deamination, decarboxylation, transamination, glucogenic and ketogenic amino acids. Biosynthesis and catabolism of Leucine, Phenylalanine, Tyrosine, Asparatic acid, Methionine, Serine, Glycine. Urea cycle, regulation and biological significance. Nitrogen containing compounds with special reference to creatine.
Inborn errors of aromatic and branched chain amino acid metabolism
(Phenylketonuria, Alkaptonuria, Albinism and Maple syrup urine disease)

MODULE IV: NUCLEOTDSE METABOLISM (15 Hrs)

Biosynthesis and regulation of purine and pyrimidine nucleotides - de novo and salvage pathways. Catabolism of purine and pyrimidine nucleotides. Deoxyribonucleotides, Thymidylate synthase and their significance. Disorders of nucleic acid metabolism- Gout, Lesch- Nyhan Syndrome.

Reference Books:

1. Robert.K. Murray, Daryl.K.Granner, Peter.A.Mayes, Victor.W.Rodwel Harper's Biochemistry 23rd edition, 1993, Prentice-Hall International Inc. ISBN: 0-8385-3658-0.

2. Albert. L. Lehninger- Biochemistry: 2008, Kalyani Publishers. ISBN – 81-7663-096-9.

3. Lehninger Nelson, D.L. and Cox : Principles of Biochemistry (2013) 6th ed., M.M.W.H. Freeman and Company (New York).

4. Mathews: Biochemistry – 3rd edition. Pearson Education Limited. 2003. ISBN: 81-297-0215-0.

5. LubertStryer. Biochemistry, 1999, W. H. Freeman & Company, New York.

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MODEL QUESTION PAPER

THEORY

Course Code: U20/BIC/DSC/301 **Max Marks: 60**
Credits: 4 **Time: 2 Hrs**

SECTION – A

I. Answer the following **4 x 10 = 40 M**

1. Write down the reactions of glycolysis. Add a note on its bioenergetics.

OR

2. Explain Glycogenolysis. Add a note on Diabetes Mellitus.

3. What are fatty acids? How are they oxidized by β oxidation?

OR

4. Name the ketone bodies and write the reactions of Ketogenesis.

5. Write the mechanism of transamination

OR

6. How is urea formed? Write a note on its regulation.

7. Write down the steps involved in the de novo synthesis of pyrimidine nucleotides.

OR

8. What are the various disorders involved in the metabolism of purines

SECTION – B

II. Answer any <u>FOUR</u> **4 x 5 = 20 M**

9. Pyruvate Dehydrogenase Complex
10. Anaplerotic reactions
11. Inborn Errors of Metabolism
12. Lipoproteins
13. Regulation of Purine Metabolism
14. Cholesterol Biosynthesis