

Reg. No.

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**B.E / B.TECH. DEGREE EXAMINATIONS, MAY 2023**

Third Semester

**BT18304 – BIOCHEMISTRY***Biotechnology***(Regulation 2018/2018A)****TIME: 3 HOURS****MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Explain the structure of carbohydrates and their application in biological process.	2
CO 2	Summarize the structure of proteins and amino acids and their application in biological process.	3
CO 3	Relate the structure of lipids and their application in biological process.	3
CO 4	Distinguish the enzymes based on their properties and examine the application in biological process.	4
CO 5	Utilize the concepts of bioenergetics and their mechanism in human body.	3

**PART- A (10 x 2 = 20 Marks)**

(Answer all Questions)

	CO	RBT LEVEL
1. How will you quantify reducing sugars in a biological sample?	1	2
2. Differentiate glycolysis and gluconeogenesis.	1	2
3. Write the biological significance of essential fatty acids.	2	2
4. List out the important chemical properties of fats.	2	2
5. Classify proteins based on their structure and composition.	3	2
6. What are essential and non-essential amino acids? Give examples.	3	2
7. Write a note on Lock and Key model of enzyme action.	4	2
8. What are lyases? Mention their role with an example.	4	2
9. Calculate the net ATP production in glycolysis.	5	2
10. Point out the effects of uncouplers during oxidative phosphorylation.	5	2

**PART- B (5 x 14 = 70 Marks)**

	Marks	CO	RBT LEVEL
11. (a) Identify and explain the metabolic pathway which branches from glucose-6-phosphate into NADPH and ribose-5-phosphate and contributes to redox reactions and nucleic acid synthesis, respectively.	(14)	1	4
<b>(OR)</b>			
(b) Explain the steps involved in a metabolic pathway in which acetyl-CoA is oxidised to form carbon dioxide and coenzymes are reduced, which generate ATP in the electron transport chain.	(14)	1	4

12. (a) Elaborate on the steps involved in a metabolic pathway of synthesizing cholesterol from acetyl CoA. (14) 2 3
- (OR)
- (b) Describe the steps involved in mitochondrial fatty acid beta-oxidation with a schematic diagram. (14) 2 3
13. (a) Elaborate on the elimination of nitrogenous wastes generated by the breakdown of protein and other nitrogen-containing molecules. (14) 3 4
- (OR)
- (b) Discuss the biosynthetic pathway of L-threonine with a suitable flow diagram highlighting the utilization of NADPH and ATP. (14) 3 4
14. (a) What are Michaelis-Menten parameters? Write about their significances in enzyme catalyzed reactions. Elaborate on the different types of plots used to determine these parameters. (14) 4 3
- (OR)
- (b) Use an equilibrium assumption to explain the kinetics of enzyme-substrate reactions  $A \xrightarrow{\text{enzyme}} R$ . What final rate form  $-r_A$  in terms of  $[A]$ ,  $[E_0]$ ,  $k_1$ ,  $k_2$  and  $k_3$  does the mechanism give? (14) 4 3
15. (a) Comment on exergonic and endergonic processes. Classify high energy compounds involved in metabolic reactions. Explain them in detail with suitable examples. (14) 5 3
- (OR)
- (b) Brief about the location and functions of electron transport chain with suitable diagram. Elaborate on the role of different complexes involved in the electron transport chain. (14) 5 3

**PART- C (1 x 10 = 10 Marks)**

(Q.No.16 is compulsory)

- |   | Marks | CO | RBT<br>LEVEL |
|---|-------|----|--------------|
| 16. Evaluate the relationship between high concentration of circulating lipids and cardiovascular disease. Also propose suitable treatment strategies to reduce lipid levels. | (10)  | 3  | 5            |

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