



Register Number:

Date:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BANGALORE-27
B. Sc. CHEMISTRY - VI SEMESTER
SEMESTER EXAMINATION: APRIL 2022
(Examination conducted in July 2022)
CH 6215 - BIOCHEMISTRY

Time- 2 ½ hrs

Max Marks-70

This paper contains **THREE** printed pages and **THREE** parts

PART A

Answer any 6 questions. Each question carries 2 marks. 2x6 = 12

- List any two noncovalent interactions occurring in biological systems.
- Name and draw the disaccharide obtained by the partial hydrolysis of cellulose.
- What is rancidity? How can it be prevented?
- Give an example of a structural protein present in human hair and a transport protein present in blood.
- Distinguish between a nucleotide and nucleoside.
- Write the Michaelis -Menten equation. Explain the terms involved in it.
- Where do glycolysis and Krebs's cycle take place in the cell?
- Mention any two salient features of the genetic code.

PART B

Answer any 8 questions. Each question carries 6 marks. 6x8 = 48

- (a) What are the consequences of the following properties of water in living systems.
 - high dielectric constant
 - maximum density at 4°C
 (b) How are polysaccharides classified? Give an example for each class, and mention their biological significance.

(3+3)
- (a) Explain graphically how the rate of an enzyme catalyzed reaction is affected by substrate concentration.
 (b) Give three differences between DNA and RNA.

(3+3)
- Classify enzymes according to the type of reactions they catalyze with suitable examples for each class. (No chemical reaction needed)

12. With the help of a neat diagram, explain the features of the fluid mosaic model of the animal cell membrane.
13. (a) How do amino acids react with 2,4 – dinitrofluorobenzene? What is the significance of this reaction?
 (b) Give structures of amino acids at physiological pH having
 (i) positively charged R group
 (ii) aromatic R group
 (iii) polar uncharged R group
(3+3)
14. (a) What are hormones? Classify them.
 (b) Draw the structure of ATP. What makes it a high energy compound.
(3+3)
15. Give the reaction catalyzed by the following enzymes, along with coenzymes, wherever necessary.
 (i) Phosphofructokinase
 (ii) α -ketoglutarate dehydrogenase
16. What are the important characteristics of a peptide bond? Draw the α -helix and the β -pleated sheet.
17. Give the reactions for the degradation of fatty acids, via β -oxidation.
18. Describe briefly the role of various enzymes involved in DNA replication?

PART C

Answer any 2 questions. Each question carries 5 marks (5x2 = 10)

19. (a) The E° values for the NAD^+/NADH and pyruvate/ lactate conjugate redox pairs are -0.32V and -0.19V respectively
 (i) Which conjugate pair has the greater tendency to loose electrons?
 (ii) Which is the stronger oxidizing agent?
 (b) Calculate the actual free energy change of hydrolysis of ATP, ΔG in erythrocytes. The standard free energy change of hydrolysis of ATP is -30.5KJ/mol and the concentration of ADP, ATP, and P_i in erythrocytes are $0.25 \times 10^{-3}\text{mM}$, $2.25 \times 10^{-3}\text{mM}$ and $1.65 \times 10^{-3}\text{mM}$.
(2+3)

20.(a) Complete hydrolysis of a glycerophospholipid yields glycerol, two fatty acids (16:1(Δ^9) and 16:0), phosphoric acid and choline in the molar ratio 1:1:1:1. Name this class of glycerophospholipid, and draw its structure.

(b) You discover a new inhibitor to an enzyme and its crystal structure clearly shows that it binds to the active site at the same location as the substrate. Identify the type of inhibition. Suggest an experimental proof to confirm, your remark.

(3+2)

21.(a) A segment of DNA contains 20,000 base pairs. How many phosphate units are present in this segment of DNA?

(b) Deficiency of certain hormones cause the following symptoms in individuals. Identify the hormones (i) Fear and anxiety (ii) Dehydration due to loss of water

(3+2)

.....THE END.....