Roll No: _____

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BSc (hons)/ (Hons with Research) Biochemistry,
Examination: Semester I Examination, 2024

Paper Code: BBC-MIC 101

Paper Title: Basics of Biochemical Reactions (Theory)

Time: **2½ h** Max Marks: **60**

Note: *This paper has 3 Sections, A, B, and C. Attempt all three sections. Section A: Answer all the questions; Section B: Answer any two; Section C: Answer all the questions, each question in this section has an internal choice.*

CLO: Course Learning Outcome, PLO: Program Learning Outcome, BTL: Blooms Taxonomy (BT) Level: BT Level 1-Remember, BT Level 2- Apply, BT Level 3-Analyse, BT Level 4-Evaluate, BT Level 5-Create.

Section A
OBJECTIVE TYPE QUESTION

Attempt ALL questions
(1x10=10 Marks)

Q1. A.	**Define:**	BTL	CLO	PLO
	(i) pH	1	5	3
	(ii) Thermodynamics Behind Melting or Evaporation of Ice	1	1	3
	(iii) Acid and bases.	1	1	3
	(iv) Fajan's Rule.	2	1	3
B.	**Distinguish betwn:**			
	(i) Trigonal planar and trigonal bipyramidal geometries	2	1	3
	(ii) Bonding and anti-bonding molecular orbitals	2	1	3
	(iii) Polar and non-polar solvents	2	2	3
	(iv) Free energy and Entropy	2	4	3
C.	**Give the structural formula of:**			
	(i) Adenosine triphosphate	2	4	3
	(ii) SF4	4	1	3

Section B
LONG ANSWER QUESTIONS

Attempt any TWO out of four question
(12.5x2=25 Marks)

Q. 2	Questions	BTL	CLO	PLO
a)	What is LCAO. Explain the combination of S-S orbitals, P-P orbitals and S-P orbitals diagrammatically.	2	1	3
b)	Describe types of Non-Covalent Interactions that occur between biological molecules and outline thermodynamics of Amphipathic compound when it is dissolved in aqueous solution.	5	3	2
c)	Derive the expression for the Henderson-Hasselbalch equation. Discuss two major applications of this equation.	2	2	1
d)	Describe in detail the origin of biomolecules through chemical stimulation and its simulation experiment.	1	3	3

Section C
SHORT ANSWER QUESTIONS

Attempt ALL
(5x5=25 Marks)

Q. No. 3	Questions	BTL	CLO	PLO
a)	How solutes affect the colligative properties of aqueous solution. **OR** Define Free Energy of Chemical System and explain how change in ΔG^{o} will determine the Spontaneity and direction of chemical reaction.	3	5	3
b)	Why do salts dissolve in water and what will be the change in thermodynamic properties upon dissolution of Crystalline Substances. **OR** Explain the four features of VSEPR Theory, with 1 example for each.	4	2	2
c)	Give a detail account of Bio elements and mention its classification according to their relative abundance in living organisms. **OR** Derive the expression of Ionization of water as Equilibrium Constant (k_w) and determine the concentration of H^+ in a solution of 0.5M NaOH.	2	3	3

d)	Draw the electronic configuration displaying atomic and molecular orbitals for O_2. Find its bond order. **OR** What is a hybridized orbital. Explain any five pre-requirements of hybridization.	3	1	3
e)	Write short notes on i. Structural hierarchy in molecular organization of cell. ii. Selection of Carbon for molecular machinery of cells **OR** i. Dynamic steady state of cells. ii. Closed system, open system and isolated system.	3	4	3

END OF THE QUESTION PAPER