Roll No:

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B.Sc. (Hons) with Research, Semester-I Examination-2023
Paper Title: Basics of Biochemical Reactions
Paper Code: BBC MIC 101

Time: 2.5 hour

Max Marks: 60

Note: This paper has 3 sections A, B, and C, Attempt all the three sections. Section A: Answer all the questions; Section B: Answer any 2 out of 4; Section C: Answer all the questions, each question has an internal choice

Course Learning Outcomes:

On successful completion of the course students will be:
CLO-1: Understanding of molecular structures and associated bonds
CLO-2: Concepts of weak interactions in biological system
CLO-3: Understanding of basic principles of biochemical reactions
CLO-4: Be able to comprehend simulation of chemical evolution, energy transductions and transformations
CLO-5: Students learn to critically analyze chemical information, synthesize the information, and present the information to a technical audience

Section A (Attempt ALL questions) (1X10=10 Marks)

Q. No	Questions	BTL	CLO	PLO
A	Electropositive and electronegative elements combine to form a ..... bond.	1	1	3
B	As per Fajan's rule, ... charge of a cation and ..... size of an anion, gives ionic character to the bond between them.	3	1	2
C	The repulsion between BPs is .....in NF3 than in NH3. (less/more)	4	5	3
D	Entropy.....as crystalline substances dissolve.	1	2	2
E	Dipole moment is measured in terms of	3	2	3
F	The ionization of water is expressed by an .....constant	5	5	3
G	Buffers are formed by combination of.....and its conjugate.....	4	4	2
H	The monomeric subunits of proteins, nucleic acids, and polysaccharides are joined by ..... bonds; while macromolecules in supramolecular complexes are held together by..... interactions.	4	4	3
I	.....are example of Primary bio elements.	2	3	2
J	ATP hydrolysis is highly Exergonic process (True/False)	2	3	3

SECTION B: Long type Questions (Attempt any TWO out of four) **(2X12.5=25 Marks)**

Q. No	Questions	BTL	CLO	PLO
1	Explain Molecular orbital theory with LCAO. Explain the ss, pp and sp combination of atomic orbitals. Highlight, with an example, the order of molecular orbitals for a homonuclear diatomic molecule.	3	1	3
2	Discuss Types of Non-Covalent Interactions that occur between biological molecules and its biological importance.	5	3	2
3	Give a detail account of Bio elements and mention its classification according to their relative abundance in living organisms.	2	2	1
4	Explain the origin of biomolecules through chemical evolution and its simulation. Name the discoverers for each.	1	4	2

SECTION C: Short-type Questions. (Attempt ALL questions, each question has an internal choice) **(5X5=25 Marks)**

Q. No	Questions	BTL	CLO	PLO
1	Explain the 3 salient features of valence bond theory. Highlight any 2 of its limitations. OR Explain the 4 main features of VSEPR theory. Highlight its 6 shapes/bond angles with 1 example for each.	4	1	3
2	Explain Fajan's rule? Explain the order of covalency in: RbF, CsF, NaF, KF, LiF. (grp I elements order: Li,Na,K,Rb,Cs) OR Justify the Statement "Non-Polar Gases are poorly soluble in water".	3	5	3
3	Why do salts dissolve in water. Also Discuss the Change in thermodynamic properties upon dissolution of Crystalline Substances. OR Give a detail account of Vander Wall's Interaction and its biological importance in context of Macromolecule Structure.	4	2	2
4	Derive the expression for the Henderson-Hasselbalch equation. Discuss two major applications of this equation. OR Derive the expression of Ionization of water as Equilibrium Constant (k_w) and determine the concentration of H^+ in a solution of 0.1M NaOH.	2	3	3
5	Define Free Energy of Chemical System and explain how change in ΔG° will determine the Spontanity and direction of chemical reaction. OR Explain the shapes of biomolecules including monomeric units of proteins, components of nucleic acids, components of lipids.	5	4	2

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