e) Illustrate the metabolic reaction pathways of Urea cycle and mention its significance.

f) Depict only the energy producing steps of Kreb's cycle. Calculate the number of moles of ATP produced on metabolic degradation of 10 moles of D-Glucose in Glycolysis.

6. Answer *any five* questions: 2×5

   a) Write down B. E. T. equation explaining all the terms.

   b) What do you mean by hysteresis in physical adsorption and discuss about permanent hysteresis.

   c) Explain the thermodynmic stability of a microemulsion.

   d) For a protein having two identical non-interacting binding sites, determine the statistical factor.

   e) Micellization results in an increase in entropy – explain.

   f) How can soap and detergent molecules behave against corona virus?

   g) Deduce the pressure of a surface film of a soluble substance in water.

M. Sc. (Chemistry) Examination, 2022

(2nd Semester, CBCS)

Biochemistry and Environmental Chemistry

Paper – V

Time : Two hours   Full Marks : 40

Use a separate answer script for each Unit.

UNIT – 2051 a & 2051 b

Answer either Question no. 1 or Question no. 2

1. a) What is trigger mechanism for the cooperativity of oxygenation of hemoglobin? Explain with details.

   3

   b) What are nitrogenase enzymes? Discuss the structure and function of different components of nitrogenase enzymes in detail. 1+3

   c) In the treatment of chronic metal poisoning, lipohilicity of a chelating antidote is an important requirement — explain with an example. $1\frac{1}{2}$

   d) Discuss difference between essential metal and beneficial metal with examples. $1\frac{1}{2}$

2. a) What is hemocyanin? Briefly describe the active site structure of oxyhemocyanin. 1+3

   b) Deoxyhemoglobin is paramagnetic whereas oxyhemoglobin is diamagnetic? Explain. 2

[Turn over

c) What is Wilson Disease? What is the treatment of Wilson's disease? 2

d) Match the following: 2

A	B
i. Carboxypeptidase	a. Cd
ii. Aldehyde oxidase	b. Mo
iii. Anemia	c. Zn
iv. itai-itai byo	d. Fe

3. Explain the formation of a Criegee intermediate with particular reference to atmospheric pollution. What are the various forms of such intermediates? What is the source of their stability? Why are they considered important in enhancing secondary pollution?

$$1+1+\frac{1}{2}+1\frac{1}{2}$$

4. Answer **any two** questions: 3×2

a) Highlight toxicity due to mercury in a biological system. With the help of suitable biochemical transformations show various reasons that led to the "Minamata" disaster in the port city of Japan. 1+2

b) With the help of a proper sequence of reactions show how CH_4 is converted to CO in the atmosphere. 3

c) What are particle pollutants? Explain how the presence of particle pollutants in the atmosphere

enhances the chances of secondary pollution of a local area. Give one reason why secondary pollution is more harmful than primary? $\frac{1}{2}+2+\frac{1}{2}$

d) Highlight role of metal ions in maintaining structures of complex biological molecules. With suitable experimental evidence, indicate that this is operative. What form or forms of toxicity could disrupt this?

$$1+1\frac{1}{2}+\frac{1}{2}$$

UNIT – 2052 a & 2052 b

5. Answer **any four** of the following questions. $2\frac{1}{2}\times4$

a) Derive Michaelis-Menten equation for an enzyme catalyzed single substrate reaction. How K_M and V_{max} can be calculated from Michaelis-Menten plot.

b) What is NAD^+? How does it act as a conzyme with alcohol dehydrogenase during the conversion of ethanol to acetaldehyde?

c) Write short notes on (**any two**):

i) Zymogen

ii) Induced-fit model

iii) Baker's yeast

d) Write down the metabolic pathways of Glycogenolysis and comment on its importance.