M. Sc. Chemistry Examination, 2019

(2nd Semester)

Biochemistry & Environmental Chemistry

Paper - V

Time : Two hours Full Marks : 50

($12\frac{1}{2}$ marks for each unit)

Use a separate answerscript for each unit.

UNIT - 2051a

1. a) What do you mean by picket-fence models? What is Collman's compound? 2

   b) What do you mean by cooperative interaction in O_2 affinity of hemoglobin? How do you express the phenomenon by Hill equation and Hill plot ? 3

   c) How is NH_4^+ incorporated in glutamate? $2\frac{1}{2}$

   d) Discuss about the evidences which sugest dicopper center is at active site of pMMO. 2

   e) Discuss the drug action of the chelating antidotes (i) BAL (ii) DMPS, (iii) NAPA, (iv) Puchel, (v) desferrioxamine (vi) EDTA in metal ion detoxification. 3

   Or

   Discuss elaborately about the requirements of a chelating antidote in metal ion detoxification. 3

UNIT - 2051b

Answer question no. ***2*** and ***any two*** from the rest :

2. With a critical use of the SHAB principle, present a discussion on the role of metal ions in both fast and relatively slow forms of electron transport in biological systems. $3\frac{1}{2}$

3. a) Discuss O_2 transport by haemoglobin with particular emphasis on the role played by Fe (structure and function) in one complete cycle. $2\frac{1}{2}$

   b) Distinguish clearly between primary and secondary pollutants. Which according to you is more harmful and why ? 2

4. a) Industrialization and rapid urbanization has affected our immediate environment. With the help of an experiment discuss with particular reference to increased presence of CO in the atmosphere. 3

   b) Greenhouse effect is often misinterpreted as evil not considering its beneficial component. Justify or contradict. $1\frac{1}{2}$

UNIT - 2052b

8. Answer ***any five*** questions : $2\frac{1}{2} \times 5$

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

   b) Describe the meaning of hysteresis in physical adsorption and discuss about permanent hysteresis.

   c) Considering micelle as a separate phase, obtain a relation for the free energy change of micellization of ionic surfactants.

   d) For a protein having two interacting binding sites, find an expression of apparent intrinsic binding constant when binding of one ligand inhibits the binding of other.

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

   f) Draw the structure of a micelle. What is gemini surfactant?

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

5. a) With the help of suitable reactions show the conversion of gaseous hydrocarbons into different substances in the atmosphere. Although such processes have been going on from time immemorial why has it become a matter of concern today ? $1\frac{1}{2}+1$

   b) Describe a spectrophotometric method for the determination of CO in an air sample. 2

UNIT - 2052a

6. What is β -oxidation of fatty acid metabolism ? Write down the steps involved in β - oxidation, and calculate the number of ATP molecules generated on metabolism of a molecule of palmitic acid ($C_{15}H_{31}COOH$) $\frac{1}{2}+2+1$

7. Answer ***any three*** of the following questions :

   a) What is Lineweaver-Burk equation ? How can K_M and V_{max} values be determined with this equation ? What is K_M ? $1+1\frac{1}{2}+\frac{1}{2}$

   b) Comment on the importance of 'Preparatory' and 'pay off' phases of glycolysis. Write down the ATP producing steps involved in glycolysis pathway. 1+2

   c) Write down the steps for the interconversion of UDP-glucose and UDP-galactose involving UDP-glucose-4-epimerase and NAD^+. What is Zymogen? 2+1

   d) What is urea cycle ? Write down the biochemical steps involved in urea cycle. 1+2

   e) Distinguish the following pairs **(*any two*)** : $1\frac{1}{2}\times2$

      i) Lyases and Ligases

      ii) Induced-fit model and Lock-Key model

      iii) Isozyme and C89o-enzyme.