

[6]

UNIT - 2052b

6. Deduce Harkins Jura equation for adsorption isotherm and compare this equation with BET equation. 5
7. Answer *any three* questions : $2\frac{1}{2} \times 3$
- a) Derive free energy change of micellization for an ionic micelle considering mass action model.
- b) For a protein having two identical non interacting binding sites, determine the statistical factor.
- c) A micellar solution gives an intrinsic viscosity of 6.0 ml gm^{-1} at 25°C . Assuming 1 gm/gm hydration of the surfactant, calculate the shape factor and comment on the result. [The density of surfactant = 0.80 gm. ml^{-1} and density of water = 1 gm. ml^{-1}]
- d) It is found that 0.106 mg of stearic acid covers 500 cm^2 of water surface at the point where the pressure just begins to rise sharply. Given the molar mass (284 g mol^{-1}) and density (0.85 gm cm^{-3}) of stearic acid, estimate the cross sectional area per stearic acid molecule and thickness of the film.

Ex/M.Sc/CHEM/V/2051a/101/2018

M. Sc. CHEMISTRY EXAMINATION, 2018

(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) Which hemoglobin has a higher affinity for Oxygen under physiological conditions, Hb-A or Hb-F ? Explain. 2
- b) The distal histidine drastically reduces the CO affinity of hemoglobin—justify the statement. 2
- c) What is the role of ATP hydrolysis in nitrogen fixation ? 1
- d) How is NH_4^+ incorporated in glutamate ? $2\frac{1}{2}$
- Or
- Value of Hill coefficient (n) is greater than 1 for hemoglobin and is equal to 1 for myoglobin – Explain.
- e) Discuss about the methane oxidation by sMMO (with catalytic cycle). 3

[Turn over

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- f) In the treatment of chronic metal poisoning, lipophilicity of a chelating antidote is an important requirement—explain with example. 2

[5]

UNIT - 2052a

4. Derive the Michaelis-Menten expression for an enzyme-catalyzed single substrate reaction. What is K_M ? How can it be determined? $1\frac{1}{2}+1+1$
5. Answer **any three** of the following questions :
- a) i) What is NAD^+ ? How does NAD^+ act as a coenzyme during the conversion of an alcohol into an aldehyde? $\frac{1}{2}+1\frac{1}{2}$
- ii) What is an isozyme? 1
- b) Write down the metabolic steps involved in urea cycle and comment on their respective sites of metabolism. 2+1
- c) Mention the reactions involved in gluconeogenesis and compare it with glycolysis. 2+1
- d) Comment on the importance and steps involved in glycogenesis and glycogenolysis. 1+1+1
- e) Write short note on (**any two**) : $1\frac{1}{2}\times 2$
- i) Active site of an enzyme
- ii) Lyases and ligases
- iii) Induced-fit model

[Turn over

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- d) Which biological disorder is referred to as “Minamata”?
Elaborate on the causes and effects of this disorder.
- e) With a proper sequence of reactions show how CH₄ is converted to CO in the atmosphere. Show how some of the radical and molecular products formed as intermediates can also be very harmful. $2\frac{1}{2} + \frac{1}{2}$

[3]

UNIT - 2051b

2. Explain the role of metal ions with regard to signal transduction across biological membranes. How was their mechanism of action first visualized by scientists ? With a suitable model system show active transport of K⁺ ions across a membrane. $1 + \frac{1}{2} + 2$
3. Answer *any three* questions : 2
- a) Vitamin B₁₂, the only naturally occurring organometallic compound, is very essential for mammals, However, it was also responsible for a very severe metal ion toxicity that occurred some years back. With proper equations cite both its beneficial and detrimental effects. $1\frac{1}{2} + 1\frac{1}{2}$
- b) The consequences of “Green House Effect” is actually the fallout of nature “doing IR spectroscopy” of some of its samples in the atmosphere. Explain. What would have happened if this was not occurring at all ? What is the real cause for concern then ? $2 + \frac{1}{2} + \frac{1}{2}$
- c) Discuss why particle pollutants present in the atmosphere can be harmful and why are they considered important components able to modulate the pollution of a local area.

3

[Turn over