

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VIII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2180409

Date: 19/11/2018

Subject Name: Biochemical Calculations

Time: 02:30 PM TO 05:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Notations and symbols have conventional meaning and need no further clarification.

		Marks
Q.1	(a) What is enthalpy? Give examples to explain it.	03
	(b) What do you mean by enzyme turnover ratio?	04
	(c) Calculate the pH, pOH, and number of H^+ and OH^- ions per liter in $3 \times 10^{-5} N H_2SO_4$.	07
Q.2	(a) Explain the term: Heat capacity	03
	(b) Write the principle of gel electrophoresis.	04
	(c) Write note oxidation and reduction reaction with reference to mechanism depicting cellular respiration.	07
OR		
	(c) Glucose-6-phosphate was hydrolyzed enzymatically (at pH 7 and $25^{\circ}C$) to glucose and inorganic phosphate. The concentration of glucose-6-phosphate was 0.1M at the start. At equilibrium, only 0.05% of the original glucose-6-phosphate remained. Calculate	07
	(a) K'_{eq} for the hydrolysis of glucose-6-phosphate,	
	(b) $\Delta G'$ for the hydrolysis reaction,	
	(c) K'_{eq} for the reaction by which glucose-6-phosphate is synthesized from inorganic phosphate and glucose.	
Q.3	(a) How do glass or platinum electrode work?	03
	(b) Give the basics of transition state theory.	04
	(c) Discuss inhibition of enzymes with its features for substrates.	07
OR		
Q.3	(a) What is the effect of temperature on the stability of proteins or enzymes?	03
	(b) Briefly explain the active transport and passive transport from viewpoint of energetics.	04
	(c) Calculate the energy per Einstein of photons for light of wavelengths (a) 400 nm (Violet) and (b) 600nm (orange).	07
Q.4	(a) What is the role of ATP hydrolysis to understand the mechanisms of energy transfers?	03
	(b) What is the stature of activation energy for exothermic and endothermic reactions?	04
	(c) Estimate the $\Delta G'$ values for the following reaction:	07
	(a) $ATP + GDP \rightleftharpoons GTP + ADP$	
	(b) $Glycerol + ATP \rightleftharpoons \alpha\text{-glycerophosphate} + ADP$	
	(c) $3\text{-phosphoglycerate} + ATP \rightleftharpoons 1,3\text{-diphosphoglycerate} + ADP$.	

- Q.4** (a) Enlist enzymes of medical importance. 03
 (b) Discuss the suitable equation for ΔG in relation with pH change. 04
 (c) How do second and third laws of thermodynamics help to understand the bioenergetics of various biomolecules like protein and carbohydrates? 07
- Q.5** (a) Explain principle of electrophoresis. What is meaning of electrophoretic mobility? 03
 (b) A suspension of bacteria containing 400 mg dry weight per liter has an absorbance of 1.00 in 1 cm cuvette at 450 nm. What is the cell density in a suspension that has a transmission of 30% in a 3 cm cuvette? 04
 (c) Concentrated HCl is 37.5% HCl by weight and has a density of 1.19. a) Calculate the molarity of the concentrated acid. b) Describe the preparation of 500 ml of 0.2 M HCl. c) Describe the preparation of 350 ml of 0.5 N HCl. 07

OR

- Q.5** (a) Narrate *Lambert and Beer* Law with its interpretation. 03
 (b) A standard solution of BSA protein containing 1.0 mg/ml had an absorbance of 0.58 at 280 nm. a) What is the protein concentration in a partially purified enzyme preparation if the absorbance is 0.12 at 280 nm? 04
 (c) The ribosomes in *E.coli* account for about 5% of the cell volume. Assuming that each ribosome is approximately a sphere of 180 Å in diameter, calculate the number of ribosomes in *E.coli* cell. Assume that the *E.coli* is a cylinder 1 μ in diameter and 2 μ long. 07

www.FirstRanker.com