HDU-003-001114

HDU-003-001114 Seat No. _____

B. Sc. (Biochemistry) (Sem. I) (CBCS) Examination

November / December – 2017

101 : Physical & Chemical Aspect of Biochemistry

(Old Course)

Faculty Code : 003
Subject Code : 001114

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

SECTION - I

1 Select the correct answer for the questions from the given choices : **20**

(1) Which solution will change red litmus to blue?

(a) HCl(aq) (b) NaCl(aq)

(c) CH_3OH(aq) (d) NaOH(aq)

(2) When HCl(aq) is exactly neutralized by NaOH(aq), the hydrogen ion concentration in the resulting mixture is

(a) always less than the concentration of the hydroxide ions

(b) always greater than the concentration of the hydroxide ions

(c) always equal than the concentration of the hydroxide ions

(d) sometimes greater and sometimes less than the concentration of the hydroxide ions

(3) A Bronsted-Lowry base is defined as:

(a) a proton donor

(b) a hydroxide acceptor

(c) a proton acceptor

(d) a hydroxide donor

(4) The conjugated base of sulfuric acid is :

(a) SO_3 (b) HSO_4^-

(c) H_2SO_3 (d) HSO_3^-

(5) Polar refers to _____.

(a) bonds that have an uneven distribution of charge

(b) the formation of uneven size ions

(c) bonds that have an even distribution of charge

(d) even-sized electro negativity in a bond

(6) The molecule having one unpaired electron is :

(a) O_2 (b) CO

(c) NO (d) CN^-

(7) Which kinds of bonding can be found in a sample of $H_2O(l)$?

(a) Both polar covalent and hydrogen bonds

(b) Hydrogen bonds only

(c) Ionic and nonpolar hydrogen bonds

(d) Nonpolar covalent bonds only

(8) Which of the following molecules has a net dipole moment?

(a) CO_2 (b) CS_2

(c) SO_2 (d) CCl_4

(9) The pH of the soft drink is determined to be 4.0. What is the concentration of OH^- of the drink?

(a) 1×10^{-4} M (b) 1×10^{-10} M

(c) 4 M (d) 10 M

(10) What does a buffer do?

(a) Keeps the pH of a solution constant

(b) Keeps the salt concentration of a solution constant

(c) Keeps the cation concentration constant

(d) Keeps the anion concentration constant

(11) The Henderson-Hasselbalch equation :

(a) allows the graphic determination of the molecular weight of a weak acid from its pH alone.

(b) does not explain the behavior of di- or tri-basic weak acids

(c) employs the same value for pKa for all weak acids

(d) relates the pH of a solution to the pKa and the concentrations of acid and conjugate

(12) Consider a solution which is 0.10 M in CH_3COOH and 0.20 M in $NaCH_3COO$. Which of the following statements is true?

(a) If a small amount of NaOH is added, the pH decreases very slightly.

(b) If NaOH is added, the OH^- ions react with the CH_3COO^- ions.

(c) If a small amount of HCl is added, the pH decreases very slightly.

(d) If HCl is added, the H^+ ions react with CH_3COOH ions.

(13) The number of atoms in a mole of any pure substance is equals to

(a) its atomic number (b) Avogadro's number

(c) Its mass number (d) Its isotopic number

(14) To prepare 50 mL 2% solution, how much solute do you need?

(a) 2 gm (b) 0.2 gm

(c) 0.1 mg (d) 1 gm

(15) Calculate the molarity of 18 mg% of glucose solution.

(a) 1 M (b) 10 mM

(c) 1 mM (d) 100 mM

(16) 0.2 M solution contains how many moles in 500 ml of the solution?

(a) 0.1 (b) 0.01

(c) 0.2 (d) 0.02

(17) Chamber A contains 40% helium and Chamber B contains 20% helium. Chambers are connected by a tube the molecules are free to cross. Which of the following will occur?

(a) some helium will move from chamber A to chamber B

(b) some helium will move from chamber B to chamber A

(c) helium will remain concentrated in chamber A

(d) all of the helium will move into chamber B

(18) What will happen to an animal cell placed in a normal saline solution?

(a) The cell will shrink

(b) The cell will burst

(c) The cell will expand

(d) No effect on cell

(19) Which of the bond participate in the process of chemisorption ?

(a) dispersion force (b) induction force

(c) covalent bond (d) none of these

(20) Which one of these is the function of reverse osmosis?

(a) To desalinate the water

(b) both (a) and (c)

(c) produce pure water for industries

(d) None

SECTION - II

2 (a) Answer any **three** of the following questions : **2×3=6**

(1) How will you define Lewis acid and base?

(2) Write the types of covalent bond with examples.

(3) Calculate the concentration of OH^- in a solution in which concentration of H^+ is 2×10^{-5} M.

(4) Sea water contains roughly 28.0 g of NaCl per liter. What is the molarity of sodium chloride in sea water?

(5) Describe reverse osmosis technology in water purification.

(6) Give the difference between strong acid and weak acid.

(b) Answer any three of the following questions : **3×3=9**

(1) What do you mean by Redox reaction?

(2) Give the importance of hydrophobic interaction.

(3) Derive Handerson-Hasselbalch equation for pH.

(4) Define solution and write down the types of percent solution.

(5) List applications of viscosity measurements.

(6) Calculate the pH of the solution that results from the addition of 0.040 moles of HNO_3 to a buffer made by combining 0.500 L of 0.380 M $HC_3H_5O_2$ ($K_a = 1.30 \times 10^{-5}$) and 0.500 L of 0.380 M $NaC_3H_5O_2$.

(c) Answer any **two** of the following questions : **5×2=10**

(1) Explain Arrhenius acid base theory with any example and write the properties of acid and base.

(2) Describe resonance bond with examples.

(3) What is buffer? Explain Hemoglobin as a biological buffer.

(4) Define molar and normal solution. Calculate the molarity and normality of 3.7mg/10 ml of $Ca(OH)_2$ solution (M.Wt = 74)

(5) Write about factors affecting process of diffusion.

3 (a) Answer any three of the following questions : **2×3=6**

(1) Explain oxidation number. Write any two examples of it.

(2) Give characteristic features of ionic bond.

(3) Explain pH Scale.

(4) How much grams of fructose do you need to prepare 100ppm solution?

(5) Define adsorption and give examples of adsorbents.

(6) Describe the role of osmosis in living system.

(b) Answer any three of the following questions : **3×3=9**

(1) Explain conjugated acid base with any one example.

(2) Write in short about coordination covalent bond.

(3) Aspirin has a pK_a of 3.4. What is the ratio of A^- to HA in :

(a) the blood (pH = 7.4)

(b) the stomach (pH = 1.4)

(4) What do you understand by stock and working solution? Write its significance.

(5) How respiratory gases oxygen and carbon dioxide are transported across the biological membranes?

(6) Prepare 100 ml of 0.5 M solution of NaCl.

(c) Answer any **two** of the following questions : **5×2=10**

(1) Explain titration curve of strong acid into weak base with any one example.

(2) With a labeled diagram, explain the bonds involved in tertiary structure of protein.

(3) Explain pH meter in detail.

(4) Prepare 20 mL of 5mg% solution from the 2M stock solution of NaCl.

(5) Explain applications of adsorption.