

Reg. No .....

Name .....

22U143

**B. Sc. DEGREE END SEMESTER EXAMINATION : OCTOBER 2022**

**SEMESTER 1 : COMPLEMENTARY CHEMISTRY FOR B. Sc. PHYSICS / BOTANY / ZOOLOGY**

**COURSE : 19U1PCHE1 : GENERAL CHEMISTRY**

*(For Regular – 2022 Admission and Improvement / Supplementary - 2021/2020/2019 Admissions)*

Time : Three Hours

Max. Marks: 60

**PART A**

**Answer All (1 mark each)**

1. Describe packing fraction?
2. Calculate the normality of 3M sulphuric acid?
3. Concordance between the experimental result and the true or most probable value is called.....
4. Give an example of a spontaneous process?
5. Write the relationship between  $\Delta G$ ,  $\Delta H$  and  $\Delta S$ ?
6. Represent the electronic configuration of N atom.
7. How pOH and  $pK_b$  are related?
8. How  $H^+$  ions and  $OH^-$  ions are related in acidic solution.

**(1 x 8 = 8)**

**PART B**

**Answer any 6 (2 marks each)**

9. Determine the packing fraction of Argon if the actual isotopic mass is 39.962384 amu.
10. Give an example for an indicator used in acid - base titrations
11. Calculate the entropy change for the vaporization of liquid water at 100 °C.  $\Delta H_{vap} = 37.3$   $kJmol^{-1}$
12. State first law of thermodynamics. Give its mathematical expression.
13. Name the orbital with  $l = 0$  and  $m = 0$ . What is the shape of the orbital?
14. State and explain Heisenberg's uncertainty principle
15. What is a buffer solution? Give an example for an acidic buffer.
16. What is Lewis concept of acids and bases?

**(2 x 6 = 12)**

**PART C**

**Answer any 4 (5 marks each)**

17. Describe nuclear fission and nuclear fusion reactions with suitable examples.
18. Explain the terms – weight percentage, normality, molarity, ppm and millimoles.
19. State and explain second law of thermodynamics?
20. Calculate the momentum of a moving particle which has a de Broglie wavelength of 100 pm.

21. a) What is de Broglie relation? Moving with the same velocity will an electron or proton be associated with a larger wavelength. Why?  
b) Calculate the wavelength associated with a bullet of mass 1g moving with a velocity of  $4 \times 10^2$  m/s ( $h = 6.62 \times 10^{-34}$  Js).
22. Discuss on buffer solutions? A buffer solution contains 0.10 mole of  $\text{NH}_4\text{OH}$  and 0.15 mole of  $\text{NH}_4\text{Cl}$  per litre. Calculate the pH of the solution. Dissociation constant of  $\text{NH}_4\text{OH}$  at room temperature is  $1.81 \times 10^{-5}$ .

**(5 x 4 = 20)**

#### **PART D**

**Answer any 2 (10 marks each)**

23. Explain carbon dating and its applications
24. a) Discuss the limitation of first law of thermodynamics and explain second law of thermodynamics based on entropy. (4 marks)  
b) What is spontaneity? How will you predict spontaneity in terms of entropy and free energy? (6 marks)
25. a) Discuss on: (i) Paulis exclusion principle (ii) Aufbau Principle (iii) Hund's rule of maximum multiplicity (6marks)  
b) Calculate frequency and wave length corresponding to the spectral line of lowest frequency in Lyman series in the spectra of hydrogen atom.  
Given  $R = 1.09678 \times 10^7 \text{ m}^{-1}$ ,  $c = 3 \times 10^8 \text{ ms}^{-1}$  (4marks)
26. Deduce Henderson equation for an acidic buffer. What would be the pH of a solution obtained by mixing 5g acetic acid and 7.5g sodium acetate and making a volume to 500mL? Dissociation constant of acetic acid is  $1.75 \times 10^{-5}$  at  $25^\circ\text{C}$ .

**(10 x 2 = 20)**