

Parvatibai Chowgule College of Arts and Science
Autonomous

BSc Semester End Examination, January 2022

Semester: I

Subject: Chemistry (Core)

Title: General Physical and Inorganic Chemistry

Duration: 2 Hours

Max. Marks: 45

Instructions: 1. All Questions Are Compulsory

2. Figures To The Right Indicate Full Marks

3. Use Of Calculators Is Allowed

4. Physical constants: $R=0.08314\text{Lbar K}^{-1}\text{mol}^{-1}$, $C=3\times 10^8\text{m/sec}$, $N=6.023\times 10^{23}$

1. a Answer **any 3**
- (i) Find the maximum and minimum values of the function **3**
- $$2x^3 - 21x^2 + 36x - 60$$
- (ii) Define unit cell. With the help of an appropriate figure explain Triclinic crystal system. **3**
- (iii) Write a short note on the graphical method to determine the order of a reaction. **3**
- (iv) Derive an expression $b = \frac{1}{3}V_c$ **3**
2. Answer **any 2**
- a (i) State the law of constancy of interfacial. Convert the following Weiss indices (0,4,7) to Miller indices **3**
- (ii) A second order reaction in which the concentration of both reactants is same, is 13% complete in 720 seconds. How much more time will it take for the reaction to go to 67% completion. **3**
- b (i) Sketch the curve for the equation $y + x = x^2 + 4x$ **3**
- (ii) Calculate the angle of reflection from the second order 100 plane of a cubic crystal if the distance between the planes is 5.74 \AA and x rays of wavelength 0.154 nm are used. **3**
- c (i) Evaluate to obtain the value of k **3**
- $$\int_2^k (x^2 + 3x - 2)dx = 12$$
- (ii) Derive an expression for the rate constant of zero order kinetics **3**

P.T.O.

- 3. Answer any 2**
- a (i) Explain dual nature of matter. **3**
 - (ii) State and explain Pauli's Exclusion Principle. **3**
 - b (i) What is hybridization? Give at least 3 different types of hybridization **3**
 - (ii) Write a note on Sigma bond. **3**
 - c (i) On the basis of hybridization, discuss the geometry of Methane. **3**
 - (ii) Write down some of the limitations of Valence bond theory. **3**

- 4. Answer any 1**
- a (i) Calculate the RMS and most probable velocity of Oxygen gas molecules at 23°C **5**
 - (ii) Consider a reaction $A + B \rightarrow C$, Give detailed methodology for confirming the order of this reaction experimentally. **4**
 - (iii) Explain with an example: Chemical bond **3**

OR

- b (i) Prove that the ratio of critical constants of a gas is independent of the type of gas **5**
- (ii) If reaction of Hydrolysis of ester is 15 % complete in 68 minutes, calculate the amount of product formed in 78 minutes. **4**
- (iii) On the basis of VSEPR explain the structure of Ammonia. **3**
