

**BACHELOR OF SCIENCE (CBCS-2018 COURSE)**  
**F. Y. B. Sc. Sem-II :SUMMER- 2022**  
**SUBJECT : CHEMISTRY : PHYSICAL & INORGANIC CHEMISTRY-II**

Day : Friday  
Date : 8/7/2022

**S-18322-2022**

Time : 11:00 AM-02:00 PM  
Max. Marks : 60

**N.B.:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SAME** answer book.
- 3) Draw neat and labelled diagrams wherever necessary.
- 4) Use of **log table/ scientific calculator** is allowed.

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**SECTION-I (Physical Chemistry)**

- Q.1** Attempt any **TWO** of the following: (12)
- a) Describe the Joule- Thomson effect.
  - b) Explain the method for the measurement of the viscosity.
  - c) What are photochemical reactions? Distinguish between thermal and photochemical reactions.
- Q.2** Attempt any **TWO** of the following: (12)
- a) Give the definitions of transmittance, opacity and optical density.
  - b) What are the critical temperature, critical pressure and critical volume?
  - c) Explain the effect of temperature on viscosity.
- Q.3** Attempt any **THREE** of the following: (12)
- a) Give the reasons for the low quantum yield.
  - b) The vander waal's constants for HCl are  $a = 0.3707 \text{ Nm}^4\text{mol}^{-2}$  and  $b = 4.08 \times 10^{-5} \text{ m}^3$ . Find critical constants. ( $R = 8.314 \text{ JK}^{-1}\text{mol}^{-1}$ )
  - c) A solution of  $\text{KMnO}_4$  shows 0.8 absorbance at 540 nm wavelength. Express the measurements in terms of transmittance units.
  - d) Calculate the energy in Calories per mole for UV light having wavelength of 850Å.

**SECTION-II (Inorganic Chemistry)**

- Q.4** Attempt any **TWO** of the following: (12)
- a) Explain the formation of  $\text{N}_2$  molecule on the basis of Valence Bond Theory.
  - b) List the assumptions of VSEPR theory.
  - c) Discuss the bonding in  $\text{CH}_4$  molecule using the concept of hybridization.
- Q.5** Attempt any **FOUR** of the following: (12)
- a) Explain Ionic bond and Covalent bond with suitable example.
  - b) Define hybridization. Explain s-p hybridization with suitable example.
  - c) Draw the structures of the following molecules using VSEPR theory and mention the type of hybridization:  
i)  $\text{TeCl}_4$                       ii)  $\text{BrF}_5$                       iii)  $\text{XeO}_3$
  - d) What is Atomic orbital overlap? What are the factors affecting atomic orbital overlap?
  - e) Write characteristics of hybrid orbitals and hybridization.
  - f) Explain the bonding in HF molecule using VBT.

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