

BACHELOR OF SCIENCE (CBCS-2018 COURSE)
T. Y. B. Sc. Sem-VI :SUMMER- 2022
SUBJECT : CHEMISTRY : PHYSICAL CHEMISTRY-II

Day : Saturday.
Date : 2/7/2022

S-18470-2022

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) Draw neat and labeled diagram wherever necessary.

Q.1 Attempt **ANY TWO** of the following : **(12)**

- a) Sketch and label the molecular energy level diagram.
- b) Define the terms : wavelength, frequency, velocity and wave number.
- c) Elaborate on fundamental equation of molecular spectroscopy.

Q.2 Attempt **ANY TWO** of the following : **(12)**

- a) Explain vapour temperature method for the determination dipole moment.
- b) Discuss use of dipole moment in determine of molecular structure.
- c) Give the list of different types of crystal systems.

Q.3 Attempt **ANY TWO** of the following : **(12)**

- a) Derive Bragg's condition for maximum reflection.
- b) Explain experimental setup for the study of Raman Spectroscopy.
- c) Elaborate on refractive index.

Q.4 Attempt **ANY THREE** of the following: **(12)**

- a) Calculate the frequency and wavenumber associated with radiation of wavelength $400 \text{ m}\mu$.
- b) If the bond length of $^1\text{H}^{35}\text{Cl}$ is 1.274 \AA , calculate reduced mass and moment of inertia of the molecule. ($N=6.023 \times 10^{23}$)
- c) The half-life period of radium is 1580 years. Calculate its disintegration constant.
- d) A crystal plane intercepts the three rectangular axes at the multiples of unit distance 1, $3/2$ and 2. What will be the Miller indices of the plane?

Q.5 Attempt **ANY FOUR** of the following : **(12)**

- a) Explain types of β -decay.
- b) Obtain the expression for decay constant.
- c) Sketch and label the Raman spectrum.
- d) Draw diagrams of (100), (110) and (111) planes of simple cubic system.
- e) Explain the Laue method for determination of crystal structure.
- f) Draw diagrams of simple cubic lattice, face centered cubic lattice and body entered cubit lattice.
