

T.Y.B.SC. SEM – VI (CBCS - 2016 Course) : SUMMER - 2019
SUBJECT : CHEMISTRY: PHYSICAL CHEMISTRY – II

Day : Monday		Time : 03.00 P.M. To 06.00 P.M
Date : 08/04/2019	S-2019-0898	Max. Marks : 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of scientific non-programmable **CALCULATOR** is allowed.

Q.1 Attempt **ANY TWO** of the following: [12]

- a) Define the terms: wavelength, frequency, velocity and wave number.
- b) State and explain selection rule for rotational transitions.
- c) Elaborate on the fundamental equation of molecular spectroscopy.

Q.2 Attempt **ANY TWO** of the following: [12]

- a) Discuss the effect of isotopic substitution on rotational spectrum.
- b) Explain dilute solution method used for the measurement of dipole moment.
- c) List the different types of crystal systems.

Q.3 Attempt **ANY TWO** of the following: [12]

- a) Discuss the elements of symmetry.
- b) Represent [100], [110] and [111] planes in the simple cubic system.
- c) Derive an equation for decay constant of the radioactive element.

Q.4 Attempt **ANY THREE** of the following: [12]

- a) Calculate the reduced mass and moment of inertia of $\text{Br}^{79} - \text{Cl}^{35}$ molecule. The bond length of Br – Cl is 0.214 nm. ($N = 6.024 \times 10^{23}$)
- b) A crystal plane intercepts the crystallographic axes at the following multiple of unit distances, 1, 1 and 2/3. What will be the Miller indices?
- c) The half-life period of radium is 1580 years. Calculate its disintegration constant.
- d) The activity of radioactive element reduces to 80% in 15 minutes. Calculate decay constant and half-life period.

Q.5 Attempt **ANY FOUR** of the following: [12]

- a) What is geometrical crystallography?
- b) Define the terms radioactivity and half-life period.
- c) What are different types of β - decay?
- d) How atomic and molecular spectra are caused?
- e) Write the equation for the force constant and give physical significance of the terms involved in it.
- f) Distinguish between IR and Raman Spectroscopy.

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