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V.P. & R.P.T.P.SCIENCE COLLEGE, V.V.NAGAR

B.Sc. (SEMESTER – VI) INTERNAL EXAMINATION

Subject: Physical Chemistry **Course code: US06CCHE05** **Time: 3:30 p.m. to 5:00 p.m.**

Date: 14-03-2012, Friday **Total Marks: 30**

Q – 1 Answer the following. (Any three) [06]

(i) Differentiate: IR spectroscopy and microwave spectroscopy.

(ii) Define: (i) wavelength (ii) frequency (iii) wave number (iv) stretching vibration

(iii) Define and explain critical angle concept in refractometry with suitable example.

(iv) State and define the four classes of physical properties.

(v) Discuss the importance and application of colloids in sewage disposal and rubber-plating.

(vi) What are the lyophilic sols? Give suitable examples.

Q–2 (a) Prove that moment of inertia of a rigid diatomic molecule is always equal to product of reduce mass of a molecule and square of intermolecular distances. [04]

(b) Calculate the theoretical number of vibrational degree of freedom in (i) benzene (ii) carbon dioxide (iii) water (iv) sulphur dioxide (v) dinitrogen monoxide (vi) hydrocyanic acid (vii) toluene (viii) methane. [04]

OR

Q–2 (a) Derive an expression for force constant considering diatomic molecule as a simple harmonic oscillator. [04]

(b) Hydro bromic acid has a bond length of $1.40A^0$. What would be the reduced mass, the moment of inertia, rotational constant and the spacing of spectral lines? (Given: At.wt. of Br = 80g/mole and H = 1g/mole. [04]

Q–3 (a) Derive the Clausius–Mosotti equation showing the relationship between the polarizability of a molecule and the dielectric constant of the medium. [04]

(b) A substance of molecular formula C_2H_6O gives the molar refraction of 16.982 $cm^3\ mol^{-1}$. Indicate whether the substance is acetone or allyl alcohol. (Given: R_M value for C = 2.591cm^3/g atom, H = 1.028 cm^3/g atom, O in >C=O = 2.573 cm^3/g atom, O in -OH = 1.518 cm^3/g atom and one double bond = 1.575 cm^3/g atom respectively. [04]

OR

Q–3 (a) Explain how dipole moment is useful to decide structure of molecules? [04]

(b) What is electrical polarization of molecule? Explain in details the different ways by which electrical field polarizes the molecules. [04]

Q–4 (a) Describe the condensation methods for the preparation of colloidal solution. [05]

(b) Write short note on: Electro-osmosis [03]

OR

Q–4 (a) Discuss the general properties of colloidal systems. [04]

(b) Write short note on: Electrical double layer. [04]