VII SEMESTER B.TECH. (CHEMICAL ENGINEERING)

END SEMESTER EXAMINATIONS, DEC 2021

SUBJECT: **ANALYTICAL TECHNIQUES AND INSTRUMENTATION**

[CHM 4053]

REVISED CREDIT SYSTEM

(17 /12/2021)

Time: 75 Minutes   MAX. MARKS: 20

Instructions to Candidates:

- ❖ Answer **ALL** the questions.
- ❖ Missing data may be suitable assumed
- ❖ Write diagrams, equations wherever necessary

1A. Explain the process of plate preparation and activation for thin layer chromatography. What is R_f value? Explain its significance.

1B. Derive an expression for the equivalence potential using redox potentiometric titration of Fe^{2+} and Ce^{4+} salts.

1C. Explain the effect of dilution on the equivalent and molar conductance. Why conductometric titrations provide unsatisfactory results for precipitation titrations?

(5+3+2)

2A. i) Derive the expression for the frequency (in terms of wave number) of harmonically oscillating diatomic rigid rotator. ii) The microwave spectrum of HCl molecule consists of a series of equidistant lines with a spacing of 20.7 cm^{-1}. Calculate the bond length of the molecule.

2B. Give the expression for vibrtion-rotation energy of Raman spectra and explain the Q, S and R barnaches in the spectrum. ii) Calculate the bond length of H_2 if the rotational constant of Raman spectra of H_2 gas is 60.73 cm^{-1}. (Atomic mass of hydrogen is 1.008 amu).

2C. What are allowed and forbidden transitions in UV-VIS spectroscopy? Explain with examples.

(5+3+2)

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