GIET UNIVERSITY, GUNUPUR – 765022
M. Sc. (First Semester) Examinations, May – 2021
20CHPC104 – SPECTROSCOPY-I
(CHEMISTRY)

Time: 2 hrs   Maximum: 50 Marks

(The figures in the right hand margin indicate marks.)

PART – A   **(2 x 10 = 20 Marks)**

Q.1. Answer *ALL* questions

   a.   What is Russell-Saunders coupling?

   b.   List the failures of Bohr's theory.

   c.   Explain why Trans-4-Octene does not show any IR absorption for its carbon-carbon double bond.

   d.   What are Stokes and antistokes line?

   e.   Why are pure rotational spectra studied only in the gaseous states of atoms and molecules?

   f.   What is photoelectron? What is the conditions for its ejection?

   g.   In an ESR spectrophotometer operating at 9.302GHz, the ESR spectrum of hydrogen atom gave two lines one at 357.3 mT and other at 306.6mT. What is the hyperfine coupling constant of hydrogen atom?

   h.   What is isomer shift?

   i.   List some important characteristics for Mossbauer nuclides.

   j.   A sample was excited by the 4358 A$^\circ$ line of mercury. A Raman line was observed at 4447A$^\circ$. Calculate the Raman shift in cm^{-1}.

PART – B   **(6 x 5 = 30 Marks)**

<u>Answer *ANY FIVE* questions</u>   Marks

   2.   Discuss the spectra of Hydrogen atom   (6)

   3.   Discuss about Coherent antistokes Raman Spectroscopy, emphasizing its salient features.   (6)

   4.   Discuss the application of microwave spectroscopy in the study of inversion spectrum of ammonia.   (6)

   5.   Explain Kramer's degeneracy and zero field splitting.   (6)

   6.   The g-factor for the benzene radical anion $C_6H_6^-$ is 2.0025. At what magnetic field intensity would you search for its ESR spectrum in a spectrometer operating at 9.302GHz.   (6)

   7.   How does Raman spectroscopy used in identification of structure of water and CO_2?   (6)

   8.   Write brief notes on ESCA.   (6)

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