QP Code: RM22MSC035 | Reg. No | | | | | | | | | | | AR 22

GIET UNIVERSITY, GUNUPUR – 765022

M. Sc. (First Semester) Examinations, March – 2023

22CHPC104 - Molecular Spectroscopy-I

(Chemistry)

Time: 3 hrs | Maximum: 70 Marks

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

PART – A **(2 x 10 = 20 Marks)**

Q.1. Answer all questions	CO #	Blooms Level
a. In terms of B where I is the moment of inertia, what is the energy, ΔE, For the rigid rotor transition, J=4 → J=5 ?	CO2	K2
b. Define Hooke's law.	CO1	K1
c. Determine the ground state term symbol for Mn^{2+}, V^{3+}, and Fe^{2+}.	CO2	K2
d. Write note on Mutual exclusion principle.	CO2	K1
e. Draw Morse Potential Curve.	CO1	K1
f. What is molecular spectroscopy	CO1	K1
g. Why N_2 molecule is inactive to rotational spectroscopy?	CO3	K2
h. Define Koopman's Theorem?	CO3	K1
i. Define hyperfine coupling?	CO1	K1
j. What are the conditions for ESR active?	CO4	K2

PART – B **(10 x 5 = 50 Marks)**

Answer ***ANY FIVE*** questions	Marks	CO#	Blooms Level
2. a. Write note on Frank Condon Principles.	6	CO2	K2
b. Describe the formula for finding wave length of emitted photon. Find the wave length of photon when electron falls from n=2 to n=1 (For Hydrogen atom).	4	CO1	K1
3.a. Describe aim and features of sodium alkali spectra.	6	CO2	K2
b. Write down the principle of Photo electron spectroscopy.	4	CO2	K1
4. a. Derive the expression of energy level in vibrational rotational transition.	6	CO1	K1
b. What is Raman spectroscopy and describe the structure illustration by Raman spectroscopy.	4	CO2	K2
5.a. Calculate the number of vibrational mode for CO_2 and H_2O molecule.	4	CO3	K1
b. Derive the expression of rotational energy of rigid diatomic molecule?	6	CO3	K2
6. a. What is Starck Effect? Explain in details about the splitting of rotational levels in different category molecules?	4	CO1	K1
b. What is Fundamental Vibration?	6	CO4	K2
7.a. Principle, instrumentation and Application of Auger electron spectroscopy	8	CO4	K1
b. What is Hot bands.	2	CO3	K1
8. a. Write Short notes on I. Zero-field splitting II. Kramer's Degeneracy	6	CO2	K2
b. Describe the basic principle of ESR spectroscopy?	4	CO1	K1

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