GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY, ODISHA, GUNUPUR
(GIET UNIVERSITY)
M. Sc. (First Semester - Regular) Examinations, February – 2025
24MCYPC11004 – Molecular Spectroscopy
(Chemistry)

Time: 3 hrs   Maximum: 60 Marks

Answer ALL questions
(The figures in the right hand margin indicate marks)

PART – A   **(2 x 5 = 10 Marks)**

		CO #	Blooms Level
Q.1.	Answer ALL the questions		
a.	What is emission and absorption spectra?	CO2	K2
b.	Write the formula for finding wave length of emitted photon.	CO2	K2
c.	What is fermi resonance?	CO2	K2
d.	Give the equation of Rotational constant and moment of inertia.	CO2	K2
e.	Define Drago's rule?	CO4	K1

PART – B   **(10 x 5 = 50 Marks)**

	Answer ALL the questions	Marks	CO #	Blooms Level
2.a.	Draw and explain the spectra of hydrogen atom.	6	CO2	K2
b.	Find the shortest and longest wave length of Balmer series for Hydrogen atom.	4	CO1	K1
	(OR)			
c.	Describe aim and features of hydrogen alkali spectra.	6	CO2	K2
d.	State and Explain Frank Condon principle.	4	CO2	K1
3.a.	What is Raman spectroscopy and describe the structure illustration by Raman spectroscopy	4	CO3	K1
b.	Derive the expression of transition energy for fundamental band.	6	CO2	K2
	(OR)			
c.	Write the Principle, instrumentation and Application of Auger electron spectroscopy.	6	CO1	K1
d.	What is Hot bands and Overtone?	4	CO2	K2
4.a.	What is IR spectroscopy? Describe vibrational spectra of diatomic molecule.	4	CO1	K1
b.	What are symmetric and asymmetric vibrations? Explain with the example of H_2O molecule.	6	CO2	K2
	(OR)			
c.	Derive the change in energy of Vibrational- Rotational spectra of diatomic molecules. Write the selection rule and PQR branch.	8	CO3	K1
d.	Write the selection rule and PQR branch of Vibrational- Rotational spectra of diatomic molecules.	2	CO2	K2
5.a.	Derive the expression of rotational energy of rigid diatomic molecule	6	CO2	K1
b.	Describe the basic principle of UPES and XPES?	4	CO3	K1
	(OR)			
c.	Write the classification of molecules according to molecular spectroscopy.	6	CO4	K1
d.	Define Koopman's Theorem.	4	CO4	K1
6.a.	Describe the basic principle of ESR spectroscopy.	6	CO4	K2

b. Explain the basic principle of Mossbauer spectroscopy.   4   CO4   K1

<div align="center">(OR)</div>

c. Write Short notes on   6   CO2   K2
   i.   Zero-field splitting
   ii. Kramer's Degeneracy

d. Write a short note on hyperfine theory of ESR.   4   CO3   K1

<div align="center">--- End of Paper ---</div>