



QUANTUM MECHANICS AND MOLECULAR SPECTROSCOPY

S21

PROFESSOR'S NAME	PROF. G NARESH PATWARI
DEPARTMENT	Chemistry
INSTITUTE	IIT Bombay
COURSE OUTLINE	This course is based on application of quantum mechanics to molecular systems to probe their energy levels. Prior understanding of solutions to the time-independent Schrodinger equation is assumed. The major emphasis of this course is to derive the 'Transition Moment Integral' using semi-classical approach. Further, the relationship between the transition moment integral to experimental observables such as extinction coefficient (from Beer-Lambert law) will be evaluated.

COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1	L1	Introduction to quantum Mechanics-(Part-1)
2	L2	Introduction to quantum Mechanics-(Part-2)
3	L3	Introduction to quantum Mechanics-(Part-3)
4	L4	Time Dependent Perturbation Theory of Two states-(Part-1)
5	L5	Time Dependent Perturbation Theory of Two States-(Part-2)
6	L6	Time Dependent Perturbation Theory of Two States-(Part-3)
7	L7	Time Dependent Perturbation Theory of Many States-(Part-1)

8	L8	Time Dependent Perturbation Theory of Many States-(Part-2)
9	L9	First-Order Correction to Time- Dependent Perturbation Theory
10	L10	Properties of Light(Classical Treatment)
11	L11	Interaction Hamiltonian (Part-1)
12	L12	Interaction Hamiltonian (Part-2)
13	L13	Interaction Hamiltonian (Part-3)
14	L14	Transition Moment Integral
15	L15	Absorption Probability
16	L16	Absorption Probability (Part-2)
17	L17	Transition to Continuum States: Fermi's Golden Rule
18	L18	Einstein's Coefficient (Part-1)
19	L19	Einstein's Coefficient (Part-2)
20	L20	Einstein's Coefficient (Part-3)
21	L21	Spontaneous Emission Lifetime
22	L22	Relationship between Transition Dipole and Extinction Coefficient
23	L23	Spectral Lineshapes
24	L24	Selection Rules
25	L25	Molecular Rotations (Part-1)
26	L26	Molecular Rotations (Part-2)
27	L27	Molecular Rotations (Part-3)
28	L28	Rotational Selection Rules
29	L29	Rotational Spectrum

30	L30	Molecular Vibrations Part-1
31	L31	Molecular Vibrations Part-2
32	L32	Vibrational Selection rules
33	L33	Electronic Transition
34	L34	Rotations of Polyatomic Molecules (Part 1)
35	L35	Rotations of Polyatomic Molecules (Part 2)
36	L36	Selection Rules for particle in a box
37	L37	Interpretation of Rotational Spectra
38	L38	Features of vibrational and electronic spectroscopy

References if Any: