

C.U.SHAH UNIVERSITY

Winter Examination-2017

Subject Name: Atomic and Molecular Spectroscopy

Subject Code: 4SC05AMS1

Branch: B.Sc. (Physics)

Semester: 5 Date: 03/12/2018

Time : 10:30 To 01:30

Marks : 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
 - (2) Instructions written on main answer book are strictly to be obeyed.
 - (3) Draw neat diagrams and figures (if necessary) at right places.
 - (4) Assume suitable data if needed.
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Q-1 Attempt the following questions: (14)

- a) What are Atomic spectra?
- b) What are continuous spectra?
- c) What is Microwave or far infra red region?
- d) What is X ray region?
- e) What is spectroscopy, how it's useful?
- f) Explain what are electronic spectra?
- g) What is rotational or spectra
- h) What is electronic transition?
- i) What is tunable laser source?
- j) What is pulse laser?
- k) What is luminescence?
- l) What is Phosphorescence?
- m) What is fluorescence phenomenon?
- n) What is diatomic molecule?

Attempt any four questions from Q-2 to Q-8

Q-2 Attempt all questions (14)

- (a) Explain the types of spectra with regions of spectrum. **6**
- (b) Explain Born Oppenheimer approximation, why it's useful in molecular energy level. **8**

Q-3 Attempt all questions (14)

- (a) Explain the silent features of rotational spectra. Explain molecule as a rigid rotator. **8**
- (b) Explain the isotope effect on rotational spectra. **6**

Q-4 Attempt all questions (14)

- (a) What is harmonic oscillator? Explain the silent features of vibrational rotational spectra. **7**
- (b) Explain the vibration frequency for anharmonic oscillator. **7**



Q-5	Attempt all questions	(14)
(a)	What are the infrared bands? Explain the fine structure of infrared bands.	7
(b)	Explain the diatomic molecule as a non rigid rotator.	7
Q-6	Attempt all questions	(14)
(a)	Explain the quantum numbers and their physical interpretation.	7
(b)	Explain the classical theory of Raman effect.	7
Q-7	Attempt all questions	(14)
(a)	What is Zeeman effect? Explain the experimental arrangement of Zeeman study.	8
(b)	Explain the Paschen back effect. Why its different from Zeeman effect.	6
Q-8	Attempt all questions	(14)
(a)	What is Raman effect? Explain the experimental arrangement of of Raman effect.	8
(b)	Explain “ infrared spectra verses Raman Spectra” what are major differences between then.	6

