Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2019

Subject Name: Atomic and Molecular Spectroscopy
Subject Code: 4SC05AMS1 Branch: B.Sc. (Physics)
Semester: 5 Date: 19/03/2019 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.

Q-1 Attempt the following questions: (14)

a) Define Pulse laser
b) What are continuous spectra?
c) Give the applications of Spectroscopy.
d) How diatomic molecules are formed?
e) Define Phosphorescence.
f) Explain what are electronic spectra?
g) Give the Wave length range for Microwave region in EM Spectra.
h) Define electronic transition process in atoms.
i) What do you mean by tunable laser source?
j) What are Atomic spectra?
k) Define Luminescence.
l) Give the reason behind the occurrence of rotational spectra in atoms/molecules.
m) What is fluorescence phenomenon?
n) What are X rays?

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

Q-2 Attempt all questions (14)
a) What is harmonic oscillator? **2**
b) Discuss Born Oppenheimer approximation and its usefulness in molecular energy level explanation. **8**
c) List the salient features of vibrational rotational spectra. **4**

Q-3 Attempt all questions (14)
a) Write a note on rotational spectra. **4**
b) Explain the isotope effect in rotational spectra. **6**
c) Explain briefly molecule as a rigid rotator. **4**

Q-4 Attempt all questions (14)
a) Enumerate on the types of spectra. **7**
b) Explain Anharmonic oscillator with its expression for vibrational frequency. **7**

Q-5 Attempt all questions (14)
a) Differentiate between Infrared spectra and Raman Spectra. **7**
b) Explain in detail classical theory of Raman effect. **7**

Q-6		**Attempt all questions**	**(14)**
	a)	Compare Paschen Back and Zeeman effect.	**7**
	b)	Explain the case of diatomic molecule as a non rigid rotator.	**7**
Q-7		**Attempt all questions**	**(14)**
	a)	Explain Zeeman effect and the experimental arrangement needed for the same.	**8**
	b)	Explain the quantum numbers also state their physical significance.	**6**
Q-8		**Attempt all questions**	**(14)**
	a)	Discuss Raman effect and the experimental set up used in detail.	**8**
	b)	What are the infrared bands?	**2**
	c)	Explain in brief the fine structure of infrared bands.	**4**