Enrollment No:-_____ Exam Seat No:-_____

C.U.SHAH UNIVERSITY

Summer-2015

Subject Code: 5SC02PHC2 **Subject Name: Atomic and Molecular Physics**

Course Name: M.Sc. (Physics) Date: 20/5/2015

Semester: II Marks: 70

Time: 10:30 TO 01:30

Instructions:

1) Attempt all Questions in same answer book/Supplementary.
2) Use of Programmable calculator & any other electronic instrument prohibited.
3) Instructions written on main answer book are strictly to be obeyed.
4) Draw neat diagrams & figures (if necessary) at right places.
5) Assume suitable & perfect data if needed.

SECTION-I

Q.1	**Answer in short :**	**7**
(a)	What is meant by Bohr magneton?	
(b)	Give names of different atomic models?	
(c)	Give set of all quantum numbers?	
(d)	What is equation for ground state energy of an anharmonic oscillator?	
(e)	Write equation for rotational constant.	
(f)	State Pauli's exclusion principle.	
(g)	What is Zeeman effect?	
Q.2		
(a)	Find the solution of Schrodinger's equation for H atom.	**7**
(b)	Explain dependence of wave function on r, θ and Ø.	**7**
	OR	
Q.2		
(a)	Explain Quantum number notation in detail.	**7**
(b)	Explain Hydrogen spectrum in detail.	**7**
Q.3		**7**
(a)	Explain normal & analomous Zeeman effect in detail.	**7**
(b)	Explain J-J coupling in detail.	
	OR	
Q.3		
(a)	Explain L-S coupling.	**7**
(b)	Explain Stark effect in detail.	**7**

SECTION-II

Q.4	**Answer in short :**	**7**
(a)	Define Isotope effect.	
(b)	What is Stark effect?	
(c)	What is Paschen-Beck effect?	
(d)	Give Morse equation for energy of an anharmonic oscillator.	
(e)	What is Screening Effect?	
(f)	What is meant by reduced mass?	
(g)	State Hooke's law.	
Q.5		
(a)	Explain symmetric and asymmetric top molecules in detail.	**7**
(b)	Explain Rotational spectra in detail and $F(J) = BJ(J+1)$ cm^{-1}.	**7**
	OR	
Q.5		
(a)	Explain spectrum of alkali atoms in detail.	**7**
(b)	Explain hyperfine structure and Isotopic shift.	**7**
Q.6		
(a)	Explain Vibrational Spectra of a harmonic oscillator in detail.	**7**
(b)	Explain general mechanism responsible for width of spectral line.	**7**
	OR	
Q.6		
(a)	Explain Vibrational Spectra of anharmonic oscillator in detail.	**7**
(b)	Explain IR spectrophotometer in detail.	**7**