]	Enrolln	nent No:		Exam Seat No:		
			C.U.SHAH	UNIVERSITY		
			Summer E	xamination-2018		
:	Subject	Name: A	Atomic and Molecular Ph	nysics		
;	Subject Code: 5SC02AMP1			Branch: M.Sc. (Physics)		
;	Semester: 2		Date: 25/04/2018	Time: 10:30 To 01:30	Marks: 70	
Q-1	Instructions: (1) Use of Programmable calculator and 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. SECTION – I Attempt the Following questions					
	a. b. c. d. e. f.	Differer What do What ar Give the State the approximation	by you mean by Central field $\mathbf{\sigma}$ and $\mathbf{\sigma}$ components of see expression to find probable advantages of Thomas-Femations	d Anomalous Zeeman effect d? spectral lines?		
Q-2	a. b.	Give an energy.	t all questions account on L-S coupling a	and deduce the expression for interaction and deduce the expression and deduce the express	on (14) 08 06	



OR

OR

a. How Vector Atom model helps to explain Anomalous Zeeman Effect?

Discuss in detail the Hartree theory for Central Field estimation

a. Explain Normal Zeeman Effect using Vector Atom Model

Derive the interaction energy term for JJ coupling

b. Write a note on Central Field Approximations

b. Discuss the Thomas-Fermi model to understand Central field approximation

(14)

07

07

(14)

08

06

06

08

Q-2

Q-3

Q-3

Attempt all questions

Attempt all questions



SECTION – II

Q-4		Attempt the Following questions	(07)			
	a.	What do you mean by Spontaneous emission?				
	b.	What are Einstein coefficients?				
	c.	Which one is better for explaining ionic bonds, VBT or MOT? Why?				
	d.	Give the expression for frequency of a rigid rotator				
	e.	Define Compton effect				
	f.	What do you mean by reduced mass?				
	g.	Define Pair production				
Q-5		Attempt all questions	(14)			
	a.	Write a note on LCAO	07			
	b.	Derive the expression for frequency of a rigid rotator	07			
		OR				
Q-5	a.	Discuss the processes: Absorption and Stimulated emission and comment on the	07			
		Einstein coefficients.				
	b.	Explain the different ways in which radiation interact with matter	07			
0.6		Attornet all angetions	(1.4)			
Q-6		Attempt all questions Explain in detail the Porn Opporhaimer Approximation	(14) 09			
	a. b	Explain in detail the Born-Oppenheimer Approximation Give the similarities and dissimilarities between VBT and MOT	05			
	b.	Give the similarities and dissimilarities between VB1 and MO1	US			
		OR				
Q-6		Attempt all Questions				
	a.	Compare in detail how VBT and MOT can explain the bond formation in molecules.	07			
	b.	Discuss diatomic molecule as a harmonic oscillator	07			

