C.U.SHAH UNIVERSITY Wadhwan City by act Code : 5SC02PHC2 Summer Examination-2014 Date: 11/06/2014 upper Code : 5SC02PHC2 Summer Examination-2014 Date: 11/06/2014 minition: Regular Time:2:00To 5:00 minition: Regular Time:2:00To 5:00 Matempt all Questions of both sections in same answer book / Supplementary Use of Programmable calculator & any other electronic instrument is prohibited. Instructions written on main answer Book are strictly to be obeyed. Or Programmable calculator & any other electronic instrument is prohibited. Instructions written on main answer Book are strictly to be obeyed. Sec TION-I 1 Answer All the following Questions Of 0 Of
appet Code : 5SC02PHC2 Summer Examination-2014 Date: 11/06/2014 appet Name Atomic & Molecular Physics mch/Semester:-M.Sc(Physics) /II mination: Regular tructions:- Attempt all Questions of both sections in same answer book / Supplementary Use of Programmable calculator & any other electronic instrument is prohibited. Instructions written on main answer Book are strictly to be obeyed. Draw neat diagrams & figures (if necessary) at right places Assume suitable & Perfect data if needed SECTION-I 1 Answer All the following Questions 07 1. Write down the azimuthal angle equation. 01 2. Write the Schrodinger equation in spherical co-ordinates for hydrogen 01 atom. 01 3. What is Pauli's exclusion principle? 01 4. What are the quantum rules to form J? 01 5. What are quantum numbers to define electrons in atom? 01 6. What is Zeeman effect? 01 7. Define symmetric top molecule. 01 2. A. The first rotational line of ¹² C ¹⁶ O is observed at 3,84235 cm ⁻¹ and that of ¹² C ¹⁶ O at 3,67337cm ⁻¹ . Calculate the atomic weight of ¹³ C. Assuming the mass of ¹⁶ O to be 15,9949. 05 B. What is the change in rotation constant B when hydrogen is replaced by deuterium in the hydrogen molecule? 04 OR 2. A. What is the effect of isotope on rotational spectra C. Discuss the significance of rotational spectra? C. Explain stark effect in briefly. 04
giet Name Atomic & Molecular Physics inch/Semester: M.Sc(Physics) /II Time:2:00To 5:00 miniation: Regular Time:2:00To 5:00 Tructions:- Attempt all Questions of both sections in same answer book / Supplementary Use of Programmable calculator & any other electronic instrument is prohibited. Instructions written on main answer Book are strictly to be obeyed. Draw neat diagrams & figures (If necessary) at right places Assume suitable & Perfect data if needed 07 1 Answer All the following Questions 07 1. Write down the azimuthal angle equation. 01 2. Write the Schrodinger equation in spherical co-ordinates for hydrogen atom. 01 3. What is Pauli's exclusion principle? 01 4. What are the quantum rules to form J? 01 5. What are quantum numbers to define electrons in atom? 01 6. What is Zeeman effect? 01 7. Define symmetric top molecule. 01 2 A. The first rotational line of ¹² C ¹⁶ O is observed at 3,84235 cm ⁻¹ and that of ¹² C ¹⁶ O at 3,67337cm ⁻¹ . Calculate the atomic weight of ¹³ C. Assuming the mass of ¹⁶ O to be 15.9949. 05 8. What is the effect of isotope on rotational spectra 04 02 A. What is the effect of isotope on rotational spectra?Describe
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C. Explain stark energy. 04
3 A Write Explanatory note on 'L-S coupling' 07
B. Explain the energy level and spectrum of non-rigid rotors. 07
OR
3 A. Show $[H, L_7] = 0.$ 07
B. Write the polar angular equation and solve it for hydrogen atom. 07
SECTION-II
4 Answer All the following Ouestions 07
1. Draw the normal modes of water molecules. 01
2. What are stretching and bending modes? 01
3. Divide the region wise IR spectroscopy. 01
4. Write the principle of IR detectors. 01
5. Write the principle of microwave detectors. 01
6. Write the expression for fundamental frequency of vibration.
7. What is zero point energy?

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Q.5	A.	Discuss vibration energy of diatomic molecule.	05
	B.	Explain Morse curve and energy level of diatomic molecule.	05
	C.	What are P and R branch in diatomic vibrating molecule.	04
		OR	
Q.5	A.	Differentiate unit cell and site symmetry approach.	05
	В.	Discuss about normal mode of vibrations in crystal.	05
	C.	Explain diatomic molecule.	04
Q.6	A.	Write the functional part source and measurement of frequency of microwave spectrometer.	07
	B.	Derive the expression of for zero point energy for vibration energy of diatomic molecule.	07
		OR	
Q.6	А.	Explain IR spectrometer.	07
	B.	Write the functional part guidance, sample cell and detectors of microwave spectrometer.	07
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