WA-5328

M. Sc. (Sem. II) Examination, June-2024

PHYSICS

PAPER - PHY - 2004

Atomic & Molecular Physics

Time Allowed : **Three Hours**

Max. Marks : **70**

Min. Marks : **28**

This question paper contains two sections as under.

https://www.uokonline.com

Section-A ***Max. Marks-20***

This section will have 10 questions, having 02 questions from each unit with no internal choice. Answer in about 20 words. All questions will have equal marks. (10×2=20)

Section-B ***Max. Marks-50***

This section will have 10 questions, having 02 questions from each unit, one question to be attempted from each unit. Words limit approximately 400-500 words. Questions may have sub divisions. All questions will have equal marks. (10×5=50)

SECTION - A

10×2=20

1 (i) Define Lamb Shift.

(ii) What do you understand by space quantization?

(iii) Write down Pauli's exclusion principle.

(iv) Explain jj coupling.

(v) Define first order Stark effect.

(vi) What do you understand by anomalous Zeeman effect?

(vii) What is isotope effect?

(viii) Explain rotational spectra of a molecule.

(ix) Write Franck-Condon's Principle.

(x) What do you mean by electronic spectra?

SECTION - B

10×5=50

UNIT - I

2 Explain relativistic and spin orbit corrections to energy levels of Hydrogen.

OR

Write short note on :

(i) Space quantization
(ii) Effect of Spin
(iii) Magnetic dipole in external magnetic field
(iv) Lamb Shift

UNIT - II

3 Write down the Heitler-London method for molecule.

OR

Explain LS Russel Saunders coupling.

UNIT - III

4 Calculate the Polarizability of the ground state of H-atom.

OR

What is Paschen Back effect? Write the difference between Zeeman and Paschen Back effect.

UNIT - IV

5 Explain Born-Oppenheimer approximation.

OR

Write a short note on :

(i) The rigid rotator
(ii) Non-rigid rotator
(iii) Anharmonic oscillator
(iv) Molecule as vibrating rotator.

UNIT - V

6 Explain Classical and Quantum theory of Raman effect.

OR

What do you understand by fine structure of electronic bands? Explain P, Q and R branches.
