

BS-2051

QUANTUM MECHANICS-II

(Semester-IV)

Paper-III

Time : Three Hours]

[Maximum Marks : 30

Note : Attempt *two* questions each from Section A and B, in Section C attempt any *five* parts.

SECTION-A

- I. What do you understand by reduced mass of an electron ?
How does the finite mass of nucleus effect the spectrum of hydrogen like atom ? 5
- II. Discuss the Stern-Garlach experiment. Discuss its result. 5
- III. Explain anomalous Zeeman effect. Discuss this effect in case of sodium D-lines. 5
- IV. What is Lande's g factor of an electron ? How does it explain the splitting of levels and fine structure of hydrogen atom ? 5

SECTION-B

- V. What do you understand by coupling schemes ? Discuss (L-S) coupling and (J-J) coupling. 5
- VI. Differentiate between continuous and characteristic spectrum of X-rays and explain their origin. Discuss Mosley's law. 5
- VII. What are stokes and antistokes lines in Raman spectra ? Give selection rule for Raman Transition. Explain experiment setup for Raman effect. 5
- VIII. Discuss the helium atom spectrum and explain the difference between ortho helium and para-helium. 5

SECTION-C

- IX. Attempt any *five* parts :
- (a) What are equivalent electron ?
 - (b) Discuss ionization potential.
 - (c) Give the physical significance of Franck Hartz experiment.
 - (d) Find the wavelength of first line of Lyman series if the wavelength of first Balmer series of hydrogen is 6563 Å.

- (e) Give the difference between photo electric effect and Auger effect.
 - (f) Discuss molecular spectra.
 - (g) What do you understand by Pauli's exclusion principle? (5×2=10)
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