15072

M.Sc. DEGREE EXAMINATION, NOVEMBER 2016.

FIRST SEMESTER

Physics

Paper II — ATOMIC AND MOLECULAR PHYSICS

Time : Three hours Maximum : 75 marks

(No additional sheet will be supplied)

PART A — (5 × 3 = 15 marks)

Answer any FIVE questions.

Each question carries 3 marks.

Each answer should not exceed 1 page.

1. What is Hund's rule of multiplicity?

2. What are allowed and forbidden transitions? Explain.

3. What is anomalous Zeeman effect?

4. Differentiate between Stark effect and linear stark effect.

5. What are various types molecules? Explain.

6. How do you explain the intensity variation in rotational lines?

7. Explain about Morse potential energy curve.

8. What are P.Q.R. branches in vibrational spectra?

PART B — (4 × 15 = 60 marks)

Answer ALL questions.

Each question carries 15 marks.

Each answer should not exceed 6 pages.

9. Explain the characteristic features of hydrogen spectra and spectra of alkali elements.

Or

10. Give the experimental details of stern – Gerlach (S – G) experiment.

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11. Obtain the Lande g-formula for LS and jj coupling schemes.

Or

12. Obtain the term value of an energy level in the case of Paschen – Back effect.

13. How do you evaluate the rotational constants using combination relations? Give an example.

Or

14. Explain the effect of isotopic substitution of rotational spectra.

15. How do you evaluate the vibrational constants from Deslauder's table?

Or

16. What is Franck – Condon principle? How it explains the variation of intensities in molecular spectra?

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