

**T.Y.B.SC. SEM – VI (2014 COURSE) : SUMMER - 2018**  
**SUBJECT: ATOMIC AND MOLECULAR PHYSICS**

Day : **Thursday**  
Date : **12/04/2018**

Time : **12.00 NOON TO 02.00 PM**  
Max. Marks : 40.

**S-2018-0767**

**N.B.:**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate full marks.
- 3) Draw diagrams **WHEREVER** necessary.

**Q.1** Attempt any **TWO** of the following: **(10)**

- a) Explain Bohr's theory and discuss its three postulates.
- b) Explain classical theory of Raman effect.
- c) A sample was excited by the 4358Å line of mercury. A Raman line was observed at 4447Å. Calculate Raman shift.

**Q.2** Attempt any **TWO** of the following: **(10)**

- a) State and explain Moseley's law.
- b) What is an electronic spectrum of molecules? Discuss its fluorescence and phosphorescence in detail.
- c) When CO is dissolved in liquid carbon tetra chloride, IR radiation of frequency  $6 \times 10^{13}$  Hz is absorbed. Carbon tetrachloride is transparent itself at this frequency so that absorption must be done to CO, what is the force constant of the bond in the CO molecule? (Given: Reduced mass of carbon is  $1.14 \times 10^{36}$  kg).

**Q.3** Attempt any **TWO** of the following: **(10)**

- a) Explain quantum theory of Raman effect.
- b) State and explain Lande interval rule.
- c) What voltage must be applied to an X-ray tube for it to emit X-ray with minimum wavelength 5000Å?

**Q.4** Attempt any **FIVE** of the following: **(10)**

- a) Write any two application of X-ray.
- b) Write the electronic configuration of fluorine and neon.
- c) State Duane and Hunt's Rule.
- d) What is Pauli's exclusion principle?
- e) Find orbital angular momentum of d-electron. (Given:  $h = 6.63 \times 10^{-34}$  Js)
- f) What is vibrational-Rotational spectra?
- g) Define Reduced mass of the molecule.

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