



Date: 03-04-2019

Dept. No.

Max. : 100 Marks

Time: 09:00-12:00

Part-A

Answer any FOUR questions.

(4 × 10 = 40)

- 1a. What are the postulates of Bohr's atomic theory?
- b. Derive the expression for energy of an electron in hydrogen like species based on Bohr's atomic theory. (5+5)
2. Derive time-independent Schrodinger equation.
3. Explain the following
(i) Operators (ii) Eigen functions (iii) Zeeman effect. (3+3+4)
4. Name any four quantum numbers and explain their significance.
5. Derive Sackur-Tetrode equation.
6. State (a) Grotthuss-Draper law (b) Stark-Einstein's law and (c) Beer-Lambert's law. (3+3+4)
- 7a. Write the differences between thermal and photochemical reactions.
- b. Write a short note on 'Chemiluminescence'. (5+5)
8. Explain the principle and procedure involved in flash photolysis.

Part-B

Answer any THREE questions.

(3 × 20 = 60)

9. Discuss the following failures of classical mechanics in detail.
(i) Black body radiation (ii) Photoelectric effect (iii) Hydrogen atomic spectrum. (7+7+6)
- 10a. Derive the expression of energy for a particle in one dimensional box.
b. Write the significance of ψ and ψ^2 . (10+10)
- 11a. Explain the postulates of quantum mechanics.
b. Describe the mechanism of photosynthesis. (10+10)
- 12a. Derive Maxwell-Boltzmann statistics. Give its applications.
b. What is meant by partition function? Derive an expression for translational partition function. (10+10)
- 13a. With a neat sketch of Jablonski diagram, explain the various photophysical and photochemical processes that occur during a photochemical reaction.
b. Discuss the kinetics of photochemical reaction between H_2 and Cl_2 . (10+10)
- 14a. Derive stern-volmer equation. Write its applications.
b. What is photosensitization? Explain with suitable examples. (10+10)
