

26014

5 Year M.Sc. INTEGRATED DEGREE EXAMINATION, MARCH/APRIL, 2019.

SECOND SEMESTER

Biotechnology and Bioinformatics

Paper IV — PHYSICAL SCIENCES – II

(Common to Earth Sciences)

Time : 3 hours

Maximum : 70 marks

(No additional sheet will be supplied)

SECTION A

(PHYSICS OF THERMODYNAMICS AND OPTICS)

PART A — (3 × 5 = 15 marks)

Answer any THREE questions.

Each question carries 5 marks.

Each answer should not exceed 1 page.

1. State and explain the zeroth law of thermodynamics.
2. Derive the Clausius – Clapeyron equation.
3. Explain the principle of refrigeration.
4. Write the differences between interference and diffraction.
5. What is a diffraction grating? Explain the formation of spectra by diffraction grating.
6. What are quarter – wave and half – wave plates? Explain.

PART B — (2 × 10 = 20 marks)

Answer ALL questions.

Each question carries 10 marks.

Each answer should not exceed 6 pages.

7. State and prove Carnot's theorem.

Or

8. What is Joule – Kelvin effect? Derive an expression for Joule – Kelvin coefficient.
9. Explain the Young's double slit theory and experiment.

Or

10. Describe how the specific rotation of a sugar solution is determined using polarimeter experiment?

SECTION B

(PHYSICAL CHEMISTRY)

PART A — (3 × 5 = 15 marks)

Answer any THREE questions.

Each question carries 5 marks.

Each answer should not exceed 1 page.

11. Distinguish between molecularity and order.
12. Show the time for half – change in a unimolecular reaction is independent of initial concentration.
13. Discuss the effect of temperature upon the rate of reaction.
14. State phase rule and explain the terms involved. Illustrate your answer with suitable examples.
15. What is meant by triple point of water? Why is it different from the normal melting point of ice?
16. What is eutectic mixture? Explain with one example.

PART B — (2 × 10 = 20 marks)

Answer ALL questions.

Each question carries 10 marks.

Each answer should not exceed 6 pages.

17. Derive the first order rate equation and deduce from it an expression for the time at half – change.
18. Discuss methods available for determining the order of a reaction.
19. Draw a labelled phase diagram of water system and discuss its salient features.

Or

20. Explain the phase diagram of salt – water system.