23U516 (Pages: 2) Name: .....

Reg.No: .....

FIFTH SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19UCHE5B08 - PHYSICAL CHEMISTRY - II

(Chemistry - Core Course)

(2019 Admission onwards)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

Answer ***all*** questions. Each question carries 2 marks.

1. Give an example to illustrate the term parallel reations.
2. What is meant by activated complex?
3. Give the BET equation, specifying the terms involved.
4. Define 'metastable equilibrium' and illustrate it with a suitable example.
5. What is a eutectic? Is it a chemical compound?
6. Define efflorescence.
7. What is the essential condition for a molecule to absorb microwave radiation?
8. State the selection rule for rotational transitions of a rigid rotator.
9. What is meant by zero point energy?
10. How is the magnitude of the nuclear magnetic moment of a nucleus related to its spin quantum number?
11. What kind of species can be investigated by ESR spectroscopy?
12. What is meant by a primary process in a photochemical reaction?

(Ceiling: 20 Marks)

Part B (Short essay questions - Paragraph)

Answer ***all*** questions. Each question carries 5 marks.

13. How is the order of a reaction determined by the initial rate method?
14. Calculate the activation energy of a reaction if its rate constant gets tripled due to an increase of temperature from 295 K to 305 K. (Hint: k2/k1 =3]
15. Explain the term chemisorption with suitable examples.

16. What is a condensed system? Explain how the phase rule is modified for applying to such a system. Draw a general phase diagram for a simple eutectic system A-B.

17. Explain the terms bathochromic and hypsochromic shifts with suitable examples.

18. Draw the schematic sketches of the PMR spectra of (1) ultrapure ethanol and (ii) acidified ethanol and highlight the difference between the two.

19. Draw the Jablonsky diagram and explain the various types of transitions.

(Ceiling: 30 Marks)

Part C (Essay questions)

Answer any ***one*** question. The question carries 10 marks.

20. Briefly explain how the method of thermal analysis utilizing cooling curves can be used to construct phase diagrams.

21. Discuss the quantum mechanical concept of Raman effect and explain Stokes and anti-Stokes lines.

(1 × 10 = 10 Marks)

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