E 6355

Reg. No.............................

Name................................

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2019

Sixth Semester

Core Course—EQUILIBRIUM AND KINETICS

[Common for B.Sc. Chemistry Model I, Model II B.Sc. Petrochemicals B.Sc. Chemistry Environment and Water Management]

(2013 Admission onwards)

Time : Three Hours

Maximum Marks : 60

Part A

Answer all the eight questions.
Each question carries 1 mark.

1. Give one example for a path function.

2. Give the mathematical statement of first law of thermodynamics.

3. How is Gibbs energy of a system related to it entropy at TK ?

4. How is standard free energy change related to equilibrium constant ?

5. What is meant by metastable equilibrium ?

6. What is meant by efflorescence ?

7. Define threshold energy of a reaction.

8. What is meant by catalytic Poison ?

$(8 \times 1 = 8)$

Part B

Answer any six questions.
Each question carries 2 marks.

9. Define isobasic process and isochoric process.

10. What happens to the internal energy of a system if : (a) Work is done on the system ; and (b) Work is done by the system.

11. How does the entropy of a gaseous substance changes with : (a) Increase in temperature ; and (b) Decrease of pressure.

12. State the zeroth and third law of thermodynamics.

13. Is it possible that one-component system may have more than one triple point ? Illustrate with a suitable example.

14. Explain the term eutectic point.

Turn over

15. Hydrolysis of methylacetate in acid median is a first order reaction bat is alkaline medium, it is a second order reaction. Why ?

16. The rate constant of a first order disintegration of a substance is $0.5 \times 10^{-2}\ 5^{-1}$. Calculate the time required for 10 g of the substance to disintegrate to 5 g.

17. What is autocatalysis ? Give one example.

18. Calculate Δs, if one mole of an ideal gas (monoatomic) is heated from 27°C to 227°C at constant pressure.

$$(6 \times 2 = 12)$$

Part C

*Answer any **four** questions.*
Each question carries 4 marks.

19. Why is it that only non-ideal gases can be liquified using Joule-Thomsons expansion ? Explain it ? Define Joule-Thomson co-efficient.

20. Discuss the phase diagram of sulphur system.

21. What is residual entropy ? Explain the physical significance of the term entropy.

22. Write down the integrated form of Gibb's-Helmholtz equation and explain the term. What is the significance of Gibbs energy.

23. What is meant by chemical potential ? Explain how chemical potential vary with temperature and pressure.

24. Explain the influence of temperature on reaction rate on the basis of collision theory.

$$(4 \times 4 = 16)$$

Part D

*Answer any **two** questions.*
Each question carries 12 marks.

25. Draw and discuss the phase diagram for ferric chloride-water system. What changes are observed if a solution of ferric chloride is subjected to isothermal evaporation at 50°C.

26. Explain Lindemann theory of unimolecular reaction.

27. Define Clasius-Clapeyron equation.

28. (a) State Carnot's theorem.

    (b) Derive the expression for the efficiency of C and cycle.

$$(2 \times 12 = 24)$$