QP CODE: 21101096

21101096

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) EXAMINATION, APRIL 2021

Sixth Semester

CORE COURSE - CH6CRT11 - PHYSICAL CHEMISTRY - III

Common for B.Sc Chemistry Model I, B.Sc Chemistry Model II Industrial Chemistry & B.Sc Chemistry Model III Petrochemicals

2017 Admission Onwards

BB9E2041

Time: 3 Hours

Max. Marks : 60

Part A

*Answer any **ten** questions.*

*Each question carries **1** mark.*

1. Define heat capacity of a system.
2. State the first law of thermodynamics in two different ways.
3. What is the Joule-Thomson coefficient for an ideal gas?
4. Explain how thermodynamic scale of temperature was developed?
5. Define efficiency of a heat engine.
6. Explain an experimental method for measuring the rates of reactions.
7. What is meant by buffer action?
8. Is it possible for a one component system to have more than one triple point? Give an example.
9. What is a condensed system?
10. Explain chain reactions and parallel reactions with a suitable example.
11. Show that half-life period of a first order reaction is independent of the initial concentration.
12. Give an example for a catalytic promoter, giving the reaction in which it is used.

(10×1=10)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. State and explain the following terms with suitable examples: (a) Extensive and Intensive properties and (b) State function and path function.

14. Bring out the significance of the terms work and heat.

15. Calculate the change in the melting point of ice for a change of pressure of 1 atm. Ice melts at $0^{o}C$ at 1 atm. The molar volumes of ice and water are 0.019643 and 0.018012 $dm^3\ mol^{-1}$ respectively. The heat of fusion of ice is 60281 mol^{-1}.

16. On the basis of reversible Carnot cycle, how was the concept of entropy developed? Define entropy and state its units.

17. Differentiate between Gibbs free energy and Helmholtz free energy. How does decrease in free energy signify the chemical affinity of a reaction? Explain with suitable examples. What do you understand by the terms free energy and work function? Derive a relationship between the two. Under what conditions does ΔG become equal to ΔA?

18. Derive the van't Hoff reaction isotherm and, from it, arrive at the relationship connecting standard Gibbs energy change with the equilibrium constant for a reaction.

19. Explain the term amphoteric substance with suitable examples.

20. Derive an expression for the degree of hydrolysis of a salt of weak acid and a strong base.

21. Give an example each to illustrate (i) opposing reactions, (ii) parallel reactions and (iii) consecutive reactions.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **10** marks.*

22. State the Zeroth Law of thermodynamics and establish its significance. Explain the significance and connection between work, heat and energy.

23. State and explain the Third law of thermodynamics. How is it found useful in determining the absolute entropies of solid, liquid and gaseous systems?

24. Discuss the phase diagram of ferric chloride-water system.

25. Explain the significance of Eyring equation in the activated complex theory in relating the thermodynamic parameters of activation.

(2×10=20)