24000601

QP CODE: 24000601

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR / REAPPEARANCE EXAMINATIONS, MARCH 2024

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

902D19CF

Time: 3 Hours Max. Marks : 60

Part A

*Answer any **ten** questions.*

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

1. Explain the terms system and surroundings as commonly used in Thermodynamics.
2. Give the expressions for heat capacity at constant volume and heat capacity at constant pressure.
3. Give the statement of the First Law of thermodynamics.
4. How is Gibbs energy related to temperature and entropy ?
5. Give the Gibbs-Helmholtz equation.
6. What is a buffer solution?
7. Give the conjugate acid and conjugate base of OH^- ion.
8. A one component system has two phases in contact with each other. What will be its degree of freedom?
9. Explain the term 'incongruent melting point'
10. Distinguish between homogeneous catalysis and heterogeneous catalysis. Give an example for each.
11. What happens to the rate of a reaction with increase in temperature?
12. What is meant by a catalytic poison?

(10×1=10)

Part B

*Answer any **six** questions.*

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

13. Explain any two methods for the liquifaction of gases.
14. Derive an expression for the work done in a reversible isothermal expansion of an ideal gas.
15. Derive relationship between heat of reaction at constant pressure and that at constant volume.
16. 14 grams of N_2 at 290 atm are compressed adiabatically from 8 to 5 litres. Calculate the final temperature and the work done on the gas. Assume C_P = 7/2 R.
17. Describe Carnot's cycle. Derive an expression for the efficiency a reversible heat engine working between temperatures T_1 and T_2 ($T_2 > T_1$).
18. Kp for a reaction at 327 K and 347 K are 1 x 10^{-12} and 5 x 10^{-12} respectively. Assuming ΔH to be constant in the above temperature range, calculate ΔH.
19. Explain the terms levelling solvents and differentiating solvents with a suitable examples.
20. Calculate the pH of (a) 0.01 N H_2SO_4 and (b)0.02 M H_2SO_4.
21. Explain chain reactions and parallel reactions with a suitable example.

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. What is Joule - Thomson effect? Justify that during this process, enthalpy of the system remains constant. Derive the expression for Joule - Thomson coefficient. Explain its values for ideal gases and real gases.
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 a simple eutectic sytstem with reference to lead-silver system. Explain its relevance with the pattinson's process.
25. Discuss the Lindemann theory of unimolecular reactions with special reference to the use of steady state approximation.

(2×10=20)