QP CODE: 23800332

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Reg No : .....

Name : .....

INTEGRATED PG DEGREE EXAMINATION, DECEMBER 2023

Third Semester

INTEGRATED MSC BASIC SCIENCE-CHEMISTRY

CORE - ICH3CR03 - PHYSICAL CHEMISTRY - 1

2020 ADMISSION ONWARDS

2BEE2E75

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Define enthalpy and write down the equation for calculating enthalpy.
2. Derive the relationship between pressure and volume in a reversible adiabatic expansion of an ideal gas.
3. Derive Kirchoff's equation.
4. What are the different statements of second law? Explain.
5. Define efficiency of heat engine.
6. Write a short note on entropy as a function of pressure and temperature.
7. Define Gibbs free energy.
8. Show that $\Delta H_{mix} = 0$.
9. Explain how the pressure effect on chemical equilibrium with example.
10. What is meant by degree of ionization or dissociation?

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Write a short note on a) system and surroundings b) state functions and path functions (c) extensive & intensive properties.
12. Define mathematically the first law of thermodynamics. Comment on the statement "while U is a definite property, q and w are not definite properties".

13. The Vander Waals constants a & b for hydrogen are 0.246 dm3 mol-1 and 2.67x10-2 dm6 atm mol-2 respectively. Calculate the inversion temperature of hydrogen.

14. Define fugacity. Derive the expression for the variation of fugacity with temperature and pressure.

15. Derive the expressions for excess thermodynamic functions.

16. What are the various statements of third law of thermodynamics? Explain.

17. Derive the relationship between Gibb's free energy, enthalpy and internal energy with chemical affinity.

18. Obtain the relationship between degree of hydrolysis of a salt of a strong acid and a weak base and its hydrolysis constants.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. What is thermochemistry? Explain the various types of enthalpy changes in thermochemistry.

20. Define partial moar property. Derive Gibbs-Duhem equation.

21. How the fugacity can be determined?

22. Explain Ostwald dilution law and its limitations. Derive mathematical representation of Ostwald dilution law and prove that α = (kV)1/2.

(2×5=10 weightage)