

QP CODE: 23800332



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 $\Delta Hmix = 0$.
- 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)

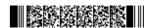
Answer any six questions.

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".



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- 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 $\alpha = (kV)1/2$.

(2×5=10 weightage)

