QP CODE: 24803036

24803036

Reg No : .....

Name : .....

INTEGRATED MSC DEGREE EXAMINATION, MAY 2024

Seventh Semester

INTEGRATED MSC BASIC SCIENCE-CHEMISTRY

CORE - ICH7CR04 - ADVANCED PHYSICAL CHEMISTRY- I

2020 Admission Onwards

3AE26A20

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Verify whether dz = (51x2y + 47 y4) dx + (17x3+ 188 xy3) dy is an exact differential or not.
2. Write down the equation for thermodynamic function energy, E as a function of T and V.
3. Define binodal curves in liquid-liquid equilibria.
4. Give the general theory of non equilibrium processes.
5. Explain the role of ATP in bioenergetics.
6. Discuss the relation between molecular partition function and molar partition function.
7. Give the relationship between partition function and entropy and explain the terms.
8. Write a short note on statisttical formulation of thermodynamics.
9. With the help of example, explain first order phase transition.
10. Represent the equation for most probable distribution in M-B, B-E, and F-D statistics.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. State and explain extensive and intensive properties. Give examples.
12. Calculate the free energy change (ΔG) which occurs when 1 mole of an ideal gas expands reversibly and isothermally at 37°C from an initial volume of 55 dm3 to 1000 dm3

13. Define chemical affinity. Find out the relation between internal energy and affinity.

14. Explain the processes involved in glycolysis.

15. Distinguish microcanonical ensemble and canonical ensemble.

16. The rotational constant of gaseous HCl, determined from microwave spectroscopy, is 10.59 cm-1. Calculate the rotational partition function of HCl at (a) 100 K and (b) 500 K.

17. Derive the expression for most probable distribution of particles in Bose-Einstein statistics.

18. Discuss the vibrational properties of solids.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. a) Explain the effect of temperature and pressure on chemical equilibrium. b) Derive the vant Hoff's reaction isotherm and isochore.

20. Explain a) Third law of thermodynamics and Nernst Heat theorem b) Determination of absolute entropy using third law c) Experimental verification of third law law of thermodynamics.

21. a) Derive Stirling’s approximation b) Differentiate permutation and probability c)Explain microstates and macrostates.

22. How does Einstein explain the observed low heat capacities of atomic crystals at low temperature by the application of quantum theory to the problem?

(2×5=10 weightage)