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(FOR THE CANDIDATES ADMITTED

SUBJECT CODE **22PCY311**

DURING THE ACADEMIC YEAR 2022 ONLY)

REG.NO. :

**N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI**

**END-OF-SEMESTER EXAMINATIONS : NOVEMBER-2023**

**M.Sc CHEMISTRY**

**MAXIMUM MARKS: 50**

**SEMESTER:III**

**TIME : 3 HOURS**

**PART - III**

**PHYSICAL CHEMISTRY-III CLASSICAL AND STATISTICAL THERMODYNAMICS**

**SECTION – A**

**(10 X 1 = 10 MARKS)**

**ANSWER THE FOLLOWING QUESTIONS.**

**(Objective Questions with four Multiple Choices)**

**(K1)**

1. \_\_\_\_\_ is the measure of effective concentration of a species in a mixture.

(a) Activity (b) Fugacity (c) Partial pressure (d) Entropy

2. Entropy of pure crystalline substance at absolute zero

(a) increases (b) decreases (c) becomes zero (d) remains constant

3. According to M-B distribution the particles are

(a) dependent (b) independent (c) interacting (d) non identical

4. Microcanonical ensemble deals with

(a) open system (b) closed system

(c) isolated system (d) adiabatic system

5.  $C_p = [dH/dT]_p$  – Here  $C_p$  denotes

(a) Heat capacity at constant volume

(b) Heat capacity at constant pressure

(c) Heat capacity at constant temperature

(d) Heat capacity at constant entropy

**ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES**

**(K2)**

6. Define activity

7. Which law explains the Unattainability of absolute zero?

8. What is the value of alpha in M.B distribution law?

9. What is ortho para ratio for hydrogen molecule?

10. Illustrate the entropy of F – D distribution.

**SECTION – B**

**(5 X 3 = 15 MARKS)**

**ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.(K3)**

11. a) Explain the variation of fugacity with temperature and pressure.

**(OR)**

b) Describe Lewis Randal rule.

12. a) Discuss the theorems of permutations

**(OR)**

b) Differential micro canonical and grand canonical ensemble.

**(CONTD .... 2)**

13. a) Derive equation for Stirling's approximation. Write its uses.  
(OR)  
b) Explain the Boltzman expression of entropy and probability
14. a) Evaluate translational partition function equation.  
(OR)  
b) Find the relation between partition function and thermodynamic function (E, H and S)
15. a) Calculate the entropy of fermions.  
(OR)  
b) Determine Debye T- cube law.

**SECTION – C****(5 X 5 = 25 MARKS)****ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.****(K4 /K5)**

16. a) Determine fugacity of gases by graphical method and from equation of state.  
(OR)  
b) Illustrate the variation of activity of a gas with temperature and pressure.
17. a) Find the states of maximum thermodynamic probability of systems involving energy levels.  
(OR)  
b) Explain Nernst heat theorem and need for third law of thermodynamics.
18. a) Deire alpha and beta in M.B. distribution law.  
(OR)  
b) Determine the thermodynamic probabilities of systems in equilibrium.
19. a) Evaluate the relation between partition function and Cp and Cv.  
(OR)  
b) Derive the rotational and vibrational partition function equation.
20. a) Explain the Planck's black body radiation law.  
(OR)  
b) Derive Fermi – Dirac distribution law- derivation.

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