(FOR THE CANDIDATES ADMITTED   SUBJECT CODE [21 PCY 311]

DURING THE ACADEMIC YEAR 2021-22 ONLY)   REG.NO. [   ]

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

END-OF-SEMESTER EXAMINATIONS : DECEMBER – 2022

M.Sc. – CHEMISTRY   **MAXIMUM MARKS: 70**

III SEMESTER   **TIME : 3 HOURS**

PHYSICAL CHEMISTRY – III :
CLASSICAL AND STATISTICAL THERMODYNAMICS

SECTION – A   **(10 X 1 = 10 MARKS)**

ANSWER THE FOLLOWING QUESTIONS.
MULTIPLE CHOICE QUESTIONS.   **(K1)**

1. For an ideal gas, fugacity and pressure are ……………

   a) equal   b) not equal   c) zero   d) infinity

2. Entropy of pure crystalline substance at absolute zero………………

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

3. $\ln N! = N \ln N - N$. This is known as…………………

   (a) Boltzmann expression   (b) Maxwell's formula

   (c) Stirling's formula   (d) Fermi expression

4. Relation between partition function and molecular partition function is ……………..

   (a) $Q = q^N$ (b) $Q = N^q$ (c) $q = Q^N$ (d) $q = N^Q$

5. Bose Einstein statistics deals with —— particles

   (a) distinguishable   (b) indistinguishable   (c) both a & b   (d) interacting

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES.   **(K2)**

6. Define activity co-efficient.

7. Indicate the law that defines zero entropy.

8. Give equation for state of maximum thermodynamic probability.

9. As the temperature increases, what happens to the value of q_{vib}, ? .

10. Relate the specific heat capacity at constant volume.

SECTION – B   **(5 X 4 = 20 MARKS)**
ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS.

(K3)

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

(OR)

   b) Show the relation between fugacity and activity coefficient of gas.

ETHICAL PAPER

12. a)   Solve Nernst heat theorem and give your findings.

(OR)

     b)   Describe the significance of canonical ensemble.

13. a)   Solve Stirling's approximation equations.

(OR)

     b)   Derive equation for States of maximum thermodynamics probability.

14. a)   Examine the Effect of molecular symmetry on rotational partition function

(OR)

     b)   Derive equation for translational partition function.

15. a)   Determine Bose Einstein distribution law- derivation.

(OR)

     b)   Comparison of Maxwell Boltzmann, Bose Einstein, Fermi - Dirac statistics

SECTION - C   (4 X 10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS
(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE
QUESTIONS (FROM Qn. No : 17 to 21)   (K4 (Or) K5)

16. Derivation of Planck's black body radiation law .

17. Find the fugacity of gases by graphical method and approximate calculation method.

18. Analyze microstates and macro states.

19. Evaluate of alpha(α) and beta (β) in M.B. distribution law.

20. Determine equation for rotational and vibrational   partition function.

21. Derive equation for Fermi – Dirac distribution law.

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