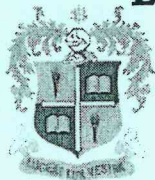# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – CHEMISTRY

THIRD SEMESTER – APRIL 2022

18/17/16UCH3MC01 – THERMODYNAMICS

Date: 28-06-2022   Dept. No.   Max. : 100 Marks
Time: 09:00 AM - 12:00 NOON

Part-A

Answer ALL questions.   (10 x 2= 20)

1. Differentiate intensive and extensive properties with examples.
2. State the principle of equipartition energy.
3. Mention the significances of Joule-Thomson coefficient.
4. What is meant by integral heat of dilution?
5. State Clausius statement of second law of thermodynamics.
6. Write the criteria for spontaneity of a reaction.
7. List any three characteristics of equilibrium constant.
8. What is the effect of temperature on the dissociation of N_2O_4?
9. Define thermodynamic probability.
10. What is meant by residual entropy?

Part-B

Answer any EIGHT questions.   (8 x 5= 40)

11. Write the postulates of kinetic theory of gases.
12. Derive van der Waals equation of state.
13. 2.0 moles of an ideal gas expand isothermally and reversibly from a volume of 2 dm³ to a volume of 10 dm³ at 25°C. What is the maximum work done? Express the result in joules.
14. Explain the variation of temperature with the heat of a reaction.
15. Prove that PV^γ is a constant for an ideal gas.
16. Obtain any two Maxwell relations.
17. Heat supplied to a Carnot engine is 453.6 Kcal. Calculate the work done by the engine in KJ between 0°C and 100°C.
18. Derive Gibbs-Helmholtz equation. What are its applications?
19. Show that Joule- Thomson expansion is isoenthalpic and adiabatic.
20. Derive the relationship between K_p and K_c.
21. State and explain Nernst heat theorem.
22. Explain how absolute entropy of a substance can be determined with the help of third law of thermodynamics.

Part-C

Answer any FOUR questions.   (4 x 10= 40)

23. Write the expression for Maxwell's distribution of molecular velocities and discuss its characteristics.
24. Define heat capacities at constant volume and at constant pressure and deduce the relationship between them.
25. Describe in detail the Carnot reversible cycle for stabilising the maximum convertibility of heat into work.
26a. State Hess's law of constant heat of summation. Discuss any one of its applications.
  b. Discuss the effect of temperature, pressure and concentration on the dissociation of ammonia.
                                                                    (5+5)

27. Derive the integrated form of van't Hoff equation.
28a. Write the assumptions of Maxwell–Boltzmann statistics.
  b. What is meant by partition function? Obtain the relation between partition function and energy.
                                                                    (5+5)

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