LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

THIRD SEMESTER – **NOVEMBER 2019**

16/17/18UCH3MC01 – THERMODYNAMICS

Date: 29-10-2019   Dept. No.   Max. : 100 Marks
Time: 01:00-04:00

PART-A (Answer All Questions)   **(10 $\times$ 2 = 20)**

1. Mention the reasons for the deviation of gases from ideal behavior.
2. Distinguish state functions from path functions.
3. State Joule-Thomson effect
4. Define heat of combustion
5. Indicate the limitations of first law of thermodynamics.
6. Point out the criteria for spontaneity of chemical reactions.
7. State the law of mass action
8. What is the effect of temperature in the dissociation of N_2O_4?
9. Mention the exceptions to third law of thermodynamics.
10. Give the expressions for translational and rotational partition functions.

PART-B (Answer any EIGHT Questions) (8 $\times$ 5 = 40)

11. Derive PV = 1/3 mnc^2
12. Explain exact and inexact differentials with suitable example.
13. Derive the relation between Cp and Cv
14. What is inversion temperature? How does it relate with van der Waals constant.
15. State Hess's law and discuss its applications.
16. Enumerate and explain different statements of second law of thermodynamics.
17. Differentiate Helmholtz work function and Gibbs free energy function.
18. Derive the relation between Kp and Kc
19. State and explain Le-chatlier principle.
20. Explain Nernst heat theorem
21. Derive Sackur-Tetrode equation
22. 10 J of work is required when a gas expands from a volume of 25 litres to a volume of 30 litres, reversibly and

   isothermally. Calculate the maximum work and the net work

PART-C (Answer any FOUR Questions) (4 $\times$ 10 = 40)

23. Explain Maxwell's distribution of molecular velocities with relevant graph and discuss the effect of temperature.
24. Derive Maxwells relations .
25. a. Derive Kirchoff's equation.
    b. The equilibrium constant of a reaction doubles on raising the temperature from
    25 ^{0}C to 35 ^{0} C. Calculate ΔH^0 for the reaction   (6+4)
26. Explain the various stages in Carnot cycle and obtain the expression for efficiency.
27. Derive an expressin for van't Hoff isochore
28. Write a brief account of Maxwell Boltzmann statistics and obtain the expression for most probable distribution.

****