LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – **NOVEMBER 2017**

16UCH3MC01 – THERMODYNAMICS

Date: 04-11-2017 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART – A

Answer ALL the questions. **(10x2=20)**

1. Define Internal energy.
2. State principle of equipartition of energy.
3. What is meant by Joule-Thomson effect?
4. What is an endothermic process?
5. Calculate the maximum efficiency of a Carnot engine operating between 27^oC and 110^oC.
6. What is entropy? What is the unit of entropy?
7. Define the term 'equilibrium constant'.
8. State Le-Chatelier-Braun principle.
9. State the third law of thermodynamics.
10. Define partition function.

PART – B

Answer any EIGHT questions. **(8x5=40)**

11. What are intensive and extensive variables? Give one example for each.
12. Explain Maxwell's distribution of molecular velocities.
13. Bring out the relationship between C_p and C_v.
14. State and explain Hess's law.
15. How is the enthalpy of neutralisation measured?
16. Explain the thermodynamic principle of the working of refrigerator.
17. Derive the equation for the entropy of mixing of gases.
18. Derive Van't Hoff reaction isochore.
19. For a water gas reaction at 1000 K the standard Gibb's energy change is -8.1 $kJmol^{-1}$. Calculate the value of equilibrium constant.
20. Explain Planck's and Randall formulation of third law of thermodynamics.
21. Derive Sackur – Tetrode equation.
22. Explain Maxwell Boltzmann statistics.

PART – C

Answer any FOUR questions: **(4x10=40)**

23. (a)	Derive Vander Waal's equation of state.	**(5)**
(b)	Explain the work done in an isothermal and reversible expansion of a gas.	**(5)**
24. (a)	Discuss the method of determination of calorific values of fuels using Bomb's calorimeter.	**(5)**
(b)	Derive Kirchoff's equation.	**(5)**
25. (a)	Calculate the change in entropy accompanying the heating of one mole of helium gas (assume ideal) from a temperature of 298K to a temperature of 1000K at constant pressure.	**(5)**
(b)	How is the standard entropy of oxygen gas evaluated?	**(5)**
26. (a)	Derive Gibbs-Helmholtz equation.	**(5)**
(b)	Describe in details the carnot cycle for establishing the maximum convertibility of heat into work.	**(5)**
27. (a)	State and explain Law of mass action.	**(5)**
(b)	Discuss the effect of temperature, pressure and concentration on the reaction for the formation of ammonia.	**(5)**
28.	Explain the following :	
(a)	Thermodynamic probability	**(3)**
(b)	Stirling's approximation	**(3)**
(c)	Rotational partition function.	**(4)**

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