

B.Sc. 3rd Semester (New Scheme)

Examination, November-2017

(Bio Technology)

Paper-BT-305

**PHYSICAL CHEMISTRY**

*Time allowed : 3 hours]*

*[Maximum marks : 40*

*Note: Attempt five questions in all, selecting one question from each section. Question No. 1 is Compulsory. All questions carry equal marks.*

1. (a) What is path function?  
(b) Define extensive properties.  
(c) What do you understand by isothermal process?  
(d) Define state of system.  
(e) What is equilibrium constant?  
(f) Define Law of chemical equilibrium.  
(g) State Nernst distribution law.  
(h) The formula of distribution law when solute undergoes association in one of the solvents.

1 x 8 = 8

**Section-A**

2. (a) Describe various types of thermodynamic systems. 4  
(b) State and explain Zeroth law of thermodynamics. 4
3. (a) Explain the relationship between  $C_p$  and  $C_v$ . 4  
(b) What do you understand by Joule-Thomson coefficient. 4

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**Section-B**

4. (a) Derive an expression for work done during adiabatic reversible expansion of an ideal gas. 4  
(b) Calculate the maximum work done when 5 moles of an ideal gas expand isothermally and reversibly at 25°C from 1 litre to 10 litres. ( $R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$ ) 4
5. What is the significance of Kirchoff's equation? Derive the Kirchoff's equation. 8

**Section-C**

6. Discuss the Clausius-Clapeyron equation and give its applications. 8
7. (a) Derive the Vant Hoff equation or reaction isochore. 4  
(b) What is the effect of temperature on equilibrium as predicted by Le-Chatelier. 4

**Section-D**

8. Explain the distribution law in:  
(a) Process of extraction 4  
(b) Study of complex formation 4
9. (a) Give the thermodynamic derivation of Nernst distribution law. 4  
(b) Write the condition for the validity of distribution law. 4