

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-III • EXAMINATION – SUMMER • 2014****Subject Code: 133504****Date: 30-05-2014****Subject Name: Physical Chemistry****Time: 02.30 pm - 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain first law of thermodynamics. Obtain the mathematical expression for the law with conversions. Explain enthalpy and relation between  $\Delta E$  and  $\Delta H$ . **07**  
(b) Explain second order reaction with suitable examples. **07**
- Q.2** (a) Derive equation  $PV = nRT$ . Ethanol boils at  $78.4^\circ\text{C}$  and the standard enthalpy of vaporization of ethanol is  $42.4 \text{ KJ mole}^{-1}$ . Calculate the entropy of vaporization of ethanol. **07**  
(b) Explain chemical potential and its variation with temperature and pressure. **07**
- OR**
- (b) Write a short note on supercritical  $\text{CO}_2$  with applications. **07**
- Q.3** (a) Define the term reversible reaction? Derive rate constant  $K$  for Reversible reaction if both the reactions are of  $1^{\text{st}}$  order. **07**  
(b) Derive Nernst equation. Calculate current strength in ampere required to deposit 10gm Ag in 2 hours. Atomic weight of Ag = 108. **07**
- OR**
- Q.3** (a) Define the term chemical kinetics? Derive rate constant  $K$  for Parallel reaction if both the reactions are of  $1^{\text{st}}$  order. **07**  
(b) Explain Principle and working of Dannel cell. **07**
- Q.4** (a) Define the term phase rule. Explain phase rule for silver and lead system. **07**  
(b) Define the term adsorption and absorption. Explain Adsorption theory of Catalysis. **07**
- OR**
- Q.4** (a) Discuss the salient features of phase diagram of sulphur system. **07**  
(b) Write a note on liquefaction of gases with one example **07**
- Q.5** (a) Define the following terms with examples: **07**  
1. Thermodynamics 2. Eutectic point 3. Intensive and extensive properties  
4. Diffusion and effusion 5. Catalysis 6. Critical constants  
7. Third law of thermodynamics.  
(b) Write a note on enzyme catalysis. **07**
- OR**
- Q.5** (a) Define the term surfactants? Give the classification of surfactants according to their charges. **07**  
(b) Derive Young-Laplace and Kelvin Equation for droplets. **07**

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