

Hall Ticket No:

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Question Paper Code :

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)

B. Tech II Semester Regular Examinations May - 2016

(Regulations: R15)

PHYSICAL CHEMISTRY
(CHEMICAL)

Date:

Time: 3 hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT-I

1. a) What do you understand by isothermal and adiabatic changes? Derive the equation for work of expansion in reversible adiabatic process 6M
- b) Define Heat of combustion. The standard enthalpies of formation of $C_6H_6(l)$, $CO_2(g)$ and $H_2O(l)$ at 298K are +49.04, -393.5 and -285.85 KJ/mol respectively. Calculate the heat of combustion of benzene. 6M
- OR**
2. a. i) Explain the term entropy. What are its units? 2M
ii) State Second law of Thermodynamics. 2M
- b) Deduce free energy function for isothermal conditions. What is the physical significance of Gibbs free energy 8M

UNIT-II

3. a) State law of mass action. Derive the equation for equilibrium constant for manufacturing of sulphur trioxide by contact process 6M
- b) Derive the relationship between K_P and K_C 6M
- OR**
4. a) State Lechatlier Principle. Explain the various optimum conditions required in the manufacturing process of Ammonia by Haber's process 8M
- b) Write a note on effect of temperature on Equilibrium. 4M

UNIT-III

5. a) What is vapour pressure? Explain the effect of temperature on vapour pressure. 4M
- b) Describe the process of determination of viscosity of a liquid by Ostwald's method 8M
- OR**
6. a) i) Define the terms Eutectic composition and Eutectic temperature 2M
ii) Determine the values of F, C, P for the reaction decomposition of $CaCO_3(s)$ in a closed vessel 2M
- b) Describe the application of phase rule to the water system 8M

UNIT-IV

7. a) What is a First order reaction? Give examples. Derive the first order rate equation 8M
b) A first order reaction is 30% complete in 40 minutes. Calculate the half life of the reaction 4M

OR

8. a) Define the term catalysis. Explain the mechanism of Heterogeneous catalysis with illustrations 8M
b i) Distinguish between order and molecularity. 2M
ii) Hydrolysis of ester is a pseudo first order reaction. Justify. 2M

UNIT-V

9. a) Write a note on conductometric titrations. 8M
b) The specific conductance of water at 298K is $0.58 \times 10^{-7} \text{ cm}^{-1}$. Calculate the degree of dissociation of water. Equivalent conductance of water at 298K is $548.6 \text{ Scm}^2 \text{ eq}^{-1}$ and density of water = 0.997 gcm^{-3} 4M

OR

10. a) State Kohlrausch's law. Give its applications 6M
b) What do you understand by the term transport number? How is the transport number of Ag^+ and NO_3^- ions determined experimentally by Hittorff's method? 6M

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UNIT-I

1. a) State and Explain Hess law of Constant heat summation. 4M
b) Explain First law of thermodynamics and derive the mathematical form of first law of thermodynamics 8M

OR

2. a) Define the term Entropy. Mention its Physical Significance. 6M
b) The heat of combustions of CH₄(g), H₂(g) and carbon(s) are -890.99KJ, -285.84KJ and -393.81KJ respectively. Calculate the heat of formation of methane at 298K 6M

UNIT-II

3. a) Explain Reversible reactions with suitable illustrations. 4M
b) Explain the process of producing sulphur trioxide by contact process by following Lechatlier principle. 8M

OR

4. a) Define the term Equilibrium. Discuss the factors that influence Equilibrium. 8M
b) 2g molecules of PCl₅ are heated in a closed two litre vessel. When equilibrium is attained, the pentachloride is 40% dissociated into PCl₃ and Cl₂. Calculate the Equilibrium constant. 4M

UNIT-III

5. a) How Surface tension of a liquid is determined by Capillary rise method. 4M
b) Discuss the variation of vapour pressure of liquid with temperature. Derive clausius-Claypreyon Equation 8M

OR

6. a) Derive the expression for Gibb's Phase rule. 4M
b) Describe the application of phase rule for silver lead system. 8M

UNIT-IV

7. a) Derive the expression for rate equation for second order reaction of the type
 $2A \rightarrow X$ 6M
b) What is Enzyme catalysis? Discuss the various reactions in which enzymes are used as catalysts. 6M

OR

8. a) Explain the various methods for determination of order of a reaction. 8M
b) What is influence of temperature on rate of the reaction? Explain 4M

UNIT-V

9. a) Explain the terms specific conductance and Equivalent conductance. Mention their units. 8M
Explain the effect of dilution on them
b) Write a note on measurement of electrical conductivity. 4M

OR

10. a) How does Kohlrausch's law of independent migration of ions help in determining Equivalent conductivity of weak electrolyte at infinite dilution? 8M
b) Ionic conductance's of Na^+ and Cl^- ions at infinite dilution are 50.11 and 76.32Scm^2 respectively. Estimate the transport numbers of Na^+ and Cl^- ions.