

Code: 9ABS103

1

B. Tech I Year (R09) Regular & Supplementary Examinations, May 2012

ENGINEERING CHEMISTRY

(Common to all Branches)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) What is the role of buffer solution in EDTA titrations?
(b) Write structure of EDTA and its reaction with calcium and magnesium.
(c) Calculate temporary and permanent hardness of water sample collected in Anantapur district.
The analysis of water is as follows:
 $\text{Ca}(\text{HCO}_3)_2 = 16.2\text{ppm}$, $\text{Mg}(\text{HCO}_3)_2 = 14.6\text{ppm}$, $\text{CaSO}_4 = 13.6$, $\text{MgSO}_4 = 12\text{ppm}$, $\text{MgCl}_2 = 9.5$.
- 2 (a) Write a note on evolution hydrogen type of corrosion with mechanism.
(b) Write a note on Inhibitors.
- 3 Explain the following terms in detail:
(a) Polymer.
(b) Degree of polymerization.
(c) Functionality.
(d) Isoprene.
- 4 Write short note on the following propellants:
(a) Initiative explosive.
(b) Low explosive.
(c) High explosive.
- 5 (a) Discuss the titration curve obtain in conductometric titration of weak acid and strong base.
(b) What are the limitations of conductometric titrations?
- 6 (a) What is a metastable equilibrium? Explain this state in water system.
(b) State the limitations of phase rule. Give applications of eutectics.
- 7 (a) With a neat diagram describe the orsats gas analysis method. What are the special precautions to be taken in the measurement?
(b) Define calorific values of a fuel. Distinguish gross and net calorific value of fuel.
- 8 (a) Outline the importance of refractories and their applications.
(b) Discuss the criteria of a good refractory material.

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- 1 (a) Explain the principle involved in the estimation of dissolved oxygen in water samples.
(b) Give detailed procedure for the determination of dissolved oxygen in water.
- 2 (a) Define the corrosion and explain with suitable examples.
(b) Write a note on evolution hydrogen type of corrosion with mechanism.
- 3 Write a brief account on the following:
(a) Tacticity of polymer.
(b) Functionality of polymer.
(c) Degree of polymerization.
- 4 Write a chemical equation of the following:
(a) When toluene reacts with 1:1 ratio of nitration mixture?
(b) When glycerol reacts with cool nitration mixture?
(c) When penta erithritol reacts with 3:1 ratio of nitration mixture?
- 5 Define the standard electrode potential. What are its applications?
- 6 (a) What is condensed system? Write the reduced phase rule equation.
(b) Write short notes on freezing mixtures
- 7 (a) An oil analysis gave the following results. C=85%, H=12% and O=3%. Find the weight of minimum air required for burning of 1kg of the fuel.
(b) Write a note on synthetic petrol.
- 8 (a) Define refractory. Illustrate main objective of the refractory materials.
(b) What are the various applications of refractory materials?

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- 1 (a) What are the chemical reactions takes place in boiler corrosion?
(b) Write a note on scales and sludges in boilers.
- 2 (a) Explain the mechanism of dry corrosion.
(b) Write a note on galvanic corrosion.
- 3 (a) Why natural rubber needs vulcanization?
(b) Write short notes on compounding of rubber.
- 4 Explain the measurement and significance of the following properties of lubricant:
(i) Viscosity. (ii) Flash point. (iii) Fire point.
- 5 (a) Write a note on conductivity cell.
(b) What is cell Constant? How is it determined?
- 6 (a) Explain how phase rule is helpful in studying heterogeneous equilibria. What do you understand the term degree of freedom?
(b) Define the eutectic point with suitable example.
- 7 (a) Describe the method of determination of calorific value of a gaseous fuel by Junker's gas calorimeter.
(b) On burning 0.85 g of a solid fuel in a bomb calorimeter, the temperature of 3500 g of water increased from 25.60 C to 28.20 C. Water equivalent of calorimeter & latent heat of steam are 385 g & 587 cal/g respectively. If the fuel contains 0.7% of hydrogen, calculate the gross & net calorific value.
- 8 (a) Distinguish between dry and wet process of cement.
(b) What is a hardening of cement? What are the different theories to explain the hardening of cement?

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- 1 (a) Explain the chemical reactions takes place in the determination of dissolved oxygen.
(b) Explain the possible combinations of ions causing alkalinity in water.
- 2 (a) Differentiate chemical and electrochemical corrosion.
(b) Explain rusting of iron with the help of electrochemical theory of corrosion.
- 3 (a) Why vulcanized rubber is superior to non-vulcanized rubber? Give an account of the application of vulcanized rubber.
(b) Write a note on compounding of rubber.
- 4 Write a short note on:
(a) Cloud point and pour point.
(b) Flash point and fire point.
(c) Viscosity of a lubricant.
- 5 (a) What is meant by galvanic cell? Explain.
(b) What is EMF of a cell? How it is measured experimentally?
- 6 (a) Define the terms: Phase, component and degree of freedom with suitable examples to each.
(b) Discuss the application of phase rule to the system of water, vapor and ice.
- 7 What are the characteristics of metallurgical coke? Describe the manufacture of metallurgical coke by Ott - Hoffman's method.
- 8 (a) Describe the classification and general properties of refractories.
(b) What is Seger cone number? What is its significance? Seger cone number of two refractory materials A and B are 12 and 35 respectively. Which of these refractories possess higher refractoriness?
