

# END TERM EXAMINATION

FIRST SEMESTER [B.TECH] DECEMBER 2017

Paper Code: ETCH 113

Subject: Applied Chemistry

Time : 3 Hours

Maximum Marks : 75

Note: Attempt any five questions including Q. No. 1 which is compulsory. Select one question from each unit. Assume suitable missing data, if any.

- Q1. a) Define: i) Octane and Cetane number (3x7=21)  
ii) Synthetic Petrol and Power alcohol
- b) Distinguish between softening and demineralization of water with chemical equations.
- c) Name the disinfecting agents of water.
- d) What is corrosion? How is it different from erosion?
- e) Explain the following terms: i) Tinning ii) Metal cladding  
iii) Electroplating.
- f) Define: i) Gibb's Phase rule ii) Degree of freedom
- g) Draw the phase diagram of water and explain the significance of triple point.
- h) Name the catalyst of the following reactions: (4)  
i) Hydrogenation of vegetable oils  
ii) Homogeneous catalysis of alkenes  
iii) Zeigler- Natta Polymerisation  
iv) Haber's Process

## Unit-I

- Q2. a) Explain the working of Bomb Calorimeter in detail with neat diagram. (6)
- b) Calculate the GCV and NCV of a gaseous fuel from the following data: -  
Volume gaseous fuel burnt at STP = 0.1 m<sup>3</sup> weight of water used for cooling = 26 kg  
Temperature of inlet = 25°C  
Temperature of outlet = 35°C  
Weight of water produced by steam condensation = 0.02 kg  
Latent heat of steam = 587 kcal/kg. (6.5)
- Q3. a) Describe the method of a carbonization of coal to yield coke. (6)
- b) Distinguish between proximate and ultimate analysis. Calculate the weight and volume of air required for condensation of 1 kg of carbon. (6.5)

## Unit-II

- Q4. a) Explain Heterogeneous catalysis with examples. Discuss the elementary steps of heterogeneous catalysis according to Langmuir- Hinshelwood mechanism. (6)
- b) Derive the Michaelis-Menten equation for an enzyme catalysed reaction. Discuss the role of inhibitors in catalysis. (6.5)

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- Q5. a) What are phase diagrams? Draw the cooling curves for the following:-  
i) Pure substance in molten state.  
ii) Molten mixture of two solids.

Also, define the eutectic point. (6.5)

- b) Draw and explain the phase diagram of Pb-Ag system. (6)

**Unit-III**

- Q6. a) Discuss the lime-soda process used for removal of calcium and magnesium hardness. (6.5)  
b) Calculate the amount of lime required for softening of 6000 L of hard water containing 90 ppm of  $MgSO_4$ . (6)

- Q7. a) What is alkalinity of water and explain a method for its determination using methyl orange and phenolphthalein indicators. (6.5)

- b) 100 ml of a sample required 10 ml of  $\frac{N}{50}$  HCl using methyl orange as indicator. Another 100 ml of sample required 4 ml of  $\frac{N}{50}$  HCl using phenolphthalein as indicator. Express the alkalinities in terms of mg of  $CaCO_3$  per litre. (6)

**Unit-IV**

- Q8. a) What are factors influencing corrosion? (6.5)  
b) Define the following terms: (6)  
i) Cathodic Protection  
ii) Galvanization  
iii) Sheradising

- Q9. a) Discuss the mechanism of the following: (6)  
i) Oxidation Corrosion  
ii) Electrochemical or wet corrosion  
b) Discuss in detail the protective measures used against corrosion. (6.5)

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