

I B.Tech - Regular Examinations, June 2009
ENGINEERING CHEMISTRY
(Common to Mechanical Engineering, Mechatronics and Production Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Discuss the method used for the estimation of chlorides in water samples.
(b) Calculate the hardness of water sample whose 10 ml required 20 ml of EDTA. 20 ml of calcium chloride solution, whose strength is equivalent to 105 g of CaCO₃ per litre, required 30 ml of EDTA solution. [9+7]
2. (a) What are external treatment and internal treatment of water? Describe ion exchange process of softening of water.
(b) Write a note on mechanical deaeration. [12+4]
3. (a) Explain the following factors influencing the rate of corrosion.
 - i. Nature of corrosion product
 - ii. Position in electrochemical series
 - iii. pH.
(b) Differentiate between dry corrosion and wet corrosion. [8+8]
4. (a) Describe the principle, process of electroplating with an example.
(b) Why utensils coated with zinc are not used for storing food stuff whereas tin coated utensils are used? [12+4]
5. Explain how the polymers are classified on the basis of their thermal behaviour and method of polymerization. Give one example for each class. [16]
6. (a) Describe refractoriness, refractoriness under load, PCE, Proximity of refractory material
(b) Describe the steps involved in the manufacture of refractories. [10+6]
7. (a) What are solid lubricants? Explain any two solid lubricants and where they are used.
(b) Write short note on Aniline point. [12+4]
8. (a) Discuss the relative merits and demerits of solid, liquid and gaseous fuels.
(b) Explain the significance of the following constituents present in coal.
 - i. Total carbon
 - ii. Hydrogen
 - iii. Nitrogen

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- iv. Sulphur and
- v. Oxygen.

[6+10]

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1. Discuss briefly the following :
 - (a) Estimation of hardness of water
 - (b) Dis-infection of water. [8+8]
2. Write short notes on :
 - (a) Priming and Foaming
 - (b) Phosphate conditioning
 - (c) Caustic embrittlement. [5+6+5]
3. (a) Discuss stress corrosion metals. Explain in detail the conditions responsible for it.
(b) Explain the theory of passivity with an example. [8+8]
4. (a) What are the applications of sheradizing process?
(b) What is Current density? What happens to the electrodeposit at high and low current densities?
(c) Describe how throwing power is determined using Harring-Blum cell. [4+6+6]
5. (a) How is HDPE is prepared? Give its properties and uses?
(b) Explain the injection moulding process with a neat diagram? Mention its advantages. [8+8]
6. (a) What is pyrometric cone equivalent? How it is determined for a refractory? What is its significance?
(b) Write a short note on:
 - i. porosity
 - ii. Thermal Conductivity
 - iii. Dimensional Stability.
 - iv. strength [8+8]
7. (a) What are synthetic lubricants? How are they superior to petroleum based lubricants?
(b) Define Grease. Under what conditions they are used as lubricants?

- (c) What is the effect of temperature on viscosity? Explain with an example. [6+6+4]
8. (a) Explain Junker's gas calorimeter for the determination of calorific value of a gaseous fuel?
- (b) Distinguish between the followings.
- i. Gross and net calorific values
 - ii. Octane number and cetane number. [10+6]

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1. Write a short note on the following:
 - (a) Ozonization
 - (b) Caustic embrittlement.
 - (c) Zeolite softeners. [4+6+6]
2. (a) What are the chemical reactions involved in the conditioning of water by lime soda process? Explain the hot lime soda process with a neat diagram.
(b) What are the requirements of boiler feed water? [12+4]
3. (a) What is galvanic series? How does it help to predict corrosion of metals and alloys? Give examples.
(b) Compare the merits and demerits of sacrificial anode method and impressed current method of protection. [8+8]
4. Briefly discuss the various metallic coatings that prevent corrosion. [16]
5. (a) PVC can't be moulded without blending with a plasticizer why?
(b) Write the mechanism of cationic polymerization.
(c) Discuss the preparation, properties and applications of Thiokol rubber. [3+6+7]
6. (a) What is pyrometric cone equivalent? How it is determined for a refractory? What is its significance?
(b) Write a short note on:
 - i. porosity
 - ii. Thermal Conductivity
 - iii. Dimensional Stability.
 - iv. strength [8+8]
7. (a) Give the functions of lubricants.
(b) Describe the mechanism of extreme pressure lubrication.
(c) How a viscous lubricant is converted into grease? [6+6+4]
8. (a) Explain proximate analysis of coal and its significance

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- (b) What is petrol knock? How is related to chemical structure? Explain octane number. [8+8]

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1. (a) 20 ml of standard hard water (containing 15 g of CaCO₃ per litre) required 25 ml of EDTA solution for titration. 100 ml of water sample required 18 ml of EDTA solution; While same water after boiling required 12 ml of EDTA solution. Calculate carbonate and non carbonate hardness of water.
(b) What is hardness of water? Mention various units used for its expression and state their relation . [8+8]
2. (a) What are ion-exchange resins? Discuss their application in water softening. How are spent resins regenerated?
(b) Write a note on priming and foaming and their disadvantages. [10+6]
3. (a) What is galvanic series? How does it help to predict corrosion of metals and alloys? Give examples.
(b) Compare the merits and demerits of sacrificial anode method and impressed current method of protection. [8+8]
4. (a) What are paints? Mention the ingredients of paint?
(b) Write the requisites of a good paint?
(c) What is pigment volume concentration? Explain its significance. [4+4+8]
5. (a) What are elastomers? Give the preparation, properties and uses of Buna S.
(b) Describe a method for moulding of thermoplastic resin. [8+8]
6. (a) Detail out the engineering applications of thermal and electrical insulators.
(b) What are the causes leading to the failure of a refractory? [8+8]
7. (a) Give the functions of lubricants.
(b) Describe the mechanism of extreme pressure lubrication.
(c) How a viscous lubricant is converted into grease? [6+6+4]
8. (a) What is the principle of calorimeter? How is the calorific value of a solid fuel determined with the help of the Bomb calorimeter?
(b) Compare straight run petrol and cracked petrol. [12+4]
