

Code No: 09A1BS03

R09

Set No. 2

I B.Tech Regular Examinations, JUNE 2010

ENGINEERING CHEMISTRY

**Common to CE, ME, CHEM, BME, IT, MECT, MEP, AE, BT, AME, ICE,
E.COMP.E, MMT, ETM, EIE, CSE, ECE, EEE**

Time: 3 hours

Max Marks: 75

**Answer any FIVE Questions
All Questions carry equal marks**

1. (a) What is Gibbs phase rule, its significance and limitations?
(b) Explain with suitable examples the terms involved in Gibb's phase rule. [8+7]
2. Write an account on the refining of petroleum by explaining the composition, boiling range and uses of different fractions obtained during refining. [15]
3. (a) What are concentration cells? How can the EMF of a concentration cell be evaluated?
(b) Write short notes on single electrode potential and its significance. [9+6]
4. Explain the following statements with proper illustrations.
(a) Tyndal cone is observed when a beam of light is concentrated on colloidal systems.
(b) Alums are used for the treatment of water supplied by municipalities. [8+7]
5. Write a brief account on the following:
(a) Heat capacity of a refractory material.
(b) Porosity of a refractory material.
(c) Thermal expansion and contraction.
(d) Refractoriness. [15]
6. (a) How are synthetic high polymers classified?
(b) Discuss the preparation, properties and uses of various grades of polythenes. [8+7]
7. (a) What are the factors that lead to caustic embrittlement in boilers? How can this be prevented?
(b) Distinguish between Zeolite process and Ion-Exchange process. [8+7]
8. (a) Explain the process of galvanizing and tinning.
(b) What are organic paints? Describe their constituents. [8+7]

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1. What is meant by a phase diagram? With the help of a phase diagram, explain the following ?
- (a) Triple point
(b) Eutectic point. [15]
2. Classify the following fuels space by furnishing proper reasons.
- (a) Coke
(b) Petroleum
(c) Benzol
(d) Biogas
(e) Lignite
(f) LPG
(g) Natural gas
(h) Anthracite. [15]
3. What is meant by coagulation of colloids? How is it brought out? [15]
4. (a) Why is hard water harmful to boilers?
(b) Describe the causes and harmful effects of scale formation.
(c) One liter of water from Khammam Dist. in Andhra Pradesh showed the following analysis: $\text{Mg}(\text{HCO}_3)_2 = 0.0256$ gms, $\text{Ca}(\text{HCO}_3)_2 = 0.0156$ gms, $\text{NaCl} = 0.0167$ gms, $\text{CaSO}_4 = 0.0065$ gms, and $\text{MgSO}_4 = 0.0054$ gms. Calculate the lime & soda required for softening of 10,000 litres of water. [4+4+7]
5. (a) What is the difference between free-radical and ionic chain polymerization?
(b) Write a note on preparation, properties and uses of
- i. bakelite
ii. PVC. [5+5+5]
6. How are the following properties influence the stability of refractories?
- (a) Chemical inertness.
(b) Refractoriness under load.

- (c) Refractoriness.
- (d) Dimensional stability. [15]
7. (a) What do you understand by electrochemical series? How is this series useful in the determination of corrosion of metals. 8M
- (b) The resistance of a 0.1N solution of an electrolyte of 40 ohms. If the distance between the electrodes is 1.2 cm and area of cross section is 2.4 cm². calculate equivalent conductivity. [8+7]
8. (a) Discuss the influence of following factors on corrosion:-
- i. Over voltage
 - ii. Nature of the metal
 - iii. Nature of environment.
- (b) Explain the nature and role of constituents of organic paints. [9+6]

Code No: 09A1BS03

R09

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1. (a) Explain the electrochemical theory of corrosion of metals with special reference to rusting of iron.
(b) Write a note on galvanizing and metal cladding. [8+7]
2. Write a brief account on the following:
(a) Wet Process for the manufacture of cement.
(b) Setting and hardening of cement. [8+7]
3. (a) What are colloids? How are they classified?
(b) Differentiate the dispersed phase from dispersion medium. [8+7]
4. What is meant by cracking of hydrocarbons? What are its objectives? With the help of neat sketches explain the production of petrol by catalytic cracking. [15]
5. Give proper explanations for the following statements
(a) The fusion curve of ice has a negative slope whereas the sublimation curve has positive slope in the phase diagram
(b) In lead-silver system, isobaric phase diagrams are studied. [7+8]
6. Explain the synthetic methods, properties and applications of the following elastomers:-
(a) Buna-S rubber
(b) Butyl rubber
(c) Thiokol rubber. [5+5+5]
7. (a) Differentiate between lime-soda and zeolite processes for softening of water giving merits and demerits of the two processes.
(b) How is the hardness of water expressed? What are the various units employed? Explain their interconversion. [9+6]
8. (a) Give reasons for the following statements:-
 - i. When a zinc rod is dipped in a solution of aq. copper sulphate, copper is precipitated out.

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ii. Nernst equation is applicable for the determination of emf of a concentration cell.

(b) State and explain the Kohlrausch's law and its applications. [6+9]



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1. (a) What are fuels? How are they classified? What are the advantages of gaseous fuels?
(b) Give an account of the analysis of coal by ultimate analysis and its significance. [7+8]
2. (a) How are metals protected by impressed current method?
(b) Explain the galvanisation and tinning processes of metals. [6+9]
3. Differentiate the following with suitable examples:-
 - (a) Polymer from monomer
 - (b) Homo polymer from co-polymer
 - (c) Step growth polymerization from chain polymerisation. [5+4+6]
4. (a) Define the terms specific, equivalent and molar conductivities. How do they vary with dilution.
(b) Calculate the cell constant of a cell having a solution of concentration N/30 gm. equiv/litre of an electrolyte which showed the equivalent conductance of $120 \text{ Mhos cm}^2 \text{ gm equiv}^{-1}$. [8+7]
5. (a) Explain the various reasons for failure of a refractory material.
(b) Differentiate refractories from insulators. [7+8]
6. (a) Write a note on complexometric titrations used for estimation of hardness of water by EDTA.
(b) Explain the process of electro dialysis. [8+7]
7. Explain how iron-carbon phase diagram provides information about the formation of different phases in iron-carbide system. [15]
8. What are fullerenes? Present an account of applications of fullerenes. [15]
