Subject Code: R13104/R13 **Set No - 1**

I B. Tech I Semester Supplementary Examinations Sept. - 2014

ENGINEERING CHEMISTRY

(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, AME, Min E, PE, and Metal E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

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PART-A

1.(i) Write notes on
(a) Zeigler-Natta polymerization
(b) proper design to protect corrosion
(c) deterioration of cement concrete

(ii) Explain the principle involved in potentiometric titrations with examples.

(iii) A water sample on analysis gives the following analysis in mg/L: $MgSO_4$ = 12; $Ca(HCO_3)_2$ = 8.1; $CaSO_4$ = 16.3; $Mg(HCO_3)_2$ = 14.6;, NaCl = 5.6. Calculate in quantities (in Kgs) of lime and soda required to soften 10,000 litres of this water. Also calculate temporary and permanent hardness of water

[12+3+7]

PART-B

2.(a) Discuss the permutit process of softening of hard water with a neat sketch.
(b) Define Kohlraush Law and explain its applications.
(c) Write a note on cathodic protection.

[8+4+4]

3.(a) Explain with a neat sketch Bergius process for the synthesis of gasoline.
(b) How is BUNA – S prepared? Write any 2 uses and properties of it.
(c) Discuss the types of liquid crystals.

[8+4+4]

4.(a) Discuss the compounding of rubber.
(b) Discuss paints and their constituents and functions.
(c) Explain the working of glass electrode with a neat diagram.

[8+4+4]

5.(a) Describe chemical vapour deposition method and arc discharge method in preparation of carbon nanotubes.
(b) Write notes on (i) octane and cetane numbers (ii) sterilization of water.

[8+8]

6.(a) Describe the working of lead acid battery with reactions involving in it.
(b) What are scales and sludges? How can they be minimized?
(c) A sample of coal was found to contain 85 % C, 7% H, 3% O, 2.5% S and remaining ash. Find its gross and net calorific values. Latent heat of condensation of steam: 580 cal./gram.

[8+4+4]

7.(a) Discuss the factors affecting the rate of corrosion of a metal.
(b) Discuss the mechanism of free radical polymerization.
(c) Write notes on solar cells.

[8+4+4]

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Subject Code: R13104/R13 **Set No - 2**

I B. Tech I Semester Supplementary Examinations Sept. - 2014

ENGINEERING CHEMISTRY

(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, AME, Min E, PE, and Metal E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

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PART-A

1.(i) Write notes on
(a) reversible and irreversible galvanic cells (b) Pilling-Bedworth rule
(c) Kevlar (d) glass transition temperature of polymers

(ii) A water sample contains $Ca(HCO_3)_2$ = 35 mg/L; $Mg(HCO_3)_2$ = 26 mg/L; $CaSO_4$ = 13.5 mg/L; $MgSO_4$ = 14 mg/L. Calculate temporary and permanent hardness of water.

(iii) A sample of coal was found to have the following percentage composition: C = 78%, H = 6%, O = 11 %, N = 2%, and remaining is ash. Calculate the minimum air required for complete combustion of 1 Kg of coal. Calculate the HCV and LCV of coal sample. Latent heat of condensation of steam: 580 cal./gram.

[12+4+6]

PART-B

2.(a) Describe with neat diagram the working of ion-exchange process.
(b) Explain the working of a fuel cell with a neat sketch.
(c) Discuss the chemical conversion coatings.

[8+4+4]

3.(a) Explain with a neat sketch fluid bed catalytic cracking to produce gasoline.
(b) Write notes on (i) mechanical properties of polymers (ii) green house effect

[8+8]

4.(a) Discuss on any 2 moulding techniques of plastics.
(b) The equivalent conductance values of 0.05 M (at 25^0C) NaCl, NH_4Cl, NaOH and NH_4OH are 124, 159.7, 235.8 and 10.56 $mhocm^2equiv^{-1}$ respectively. Calculate the dissociation constant of NH_4OH.
(c) Write notes on passivity of a metal to corrosion.

[8+4+4]

5.(a) Explain phase transfer method and aqeous phase method of green synthesis with examples.
(b) Discuss (i) thermal cracking (ii) caustic embrittlement

[8+8]

6.(a) Discuss the conductometric titrations.
(b) Explain cold lime soda process.
(c) What is knocking? What are antiknocking agents?

[8+4+4]

7.(a) Explain wet theory of corrosion with neat sketches.
(b) How is Thiokol prepared? Mention its properties and uses.
(c) Write notes on fullerenes.

[8+4+4]

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Subject Code: R13104/R13 **Set No - 3**

I B. Tech I Semester Supplementary Examinations Sept. - 2014

ENGINEERING CHEMISTRY

(Common to CE, ME, CSE, PCE, IT, Chem E, Aero E, AME, Min E, PE, and Metal E)

Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

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PART-A

1.(i) Write notes on (a) knocking and antiknocking (b) photovoltaic cells (c) mechanism of anionic polymerization

(ii) Calculate the temporary and permanent hardness of water containing Ca $(HCO_3)_2$ = 162 ppm, $Mg(HCO_3)_2$ = 146 ppm, $MgCl_2$ = 95 ppm, $CaSO_4$ = 68 ppm, NaCl = 125 ppm.

(iii) The standard oxidation potential of Cd/Cd^{2+} electrode is 0.403 V. Calculate the Cd^{2+} concentration if the electrode oxidation potential is 0.5 V at 25 ^{0}C.

(iv) Differentiate between tinning and galvanizing.

[12+3+5+2]

PART-B

2.(a) With a neat sketch explain the working of (i) reverse osmosis and (ii) lime soda process

(b) Explain the working of lead acid battery.

(c) Write notes on differential aeration corrosion.

[8+4+4]

3.(a) Describe fractional distillation of crude oil. Write the various fractions obtained at different boiling ranges and their uses.

(b) How is polyvinyl chloride prepared? Give its uses and properties.

(c) Discuss any one method of green synthesis.

[8+4+4]

4.(a) Discuss compounding of plastics giving examples for each.

(b) Write notes on bimetallic corrosion and stress corrosion.

(c) Explain standard electrode potential.

[8+4+4]

5.(a) Write notes on (i) fullerenes (ii) green house effect

(b) A sample of coal containing 93% C; 5% H and remaining ash. When this coal was tested in the laboratory for its calorific value in bomb calorimeter, the following data was obtained. Weight of coal burnt = 0.95g, Weight of water taken = 650g, Water equivalent of bomb and calorimeter = 2,000 g, Rise in temperature = 2.48^{0}C, Cooling correction temperature = 0.02^{0}C, Fuse wire correction = 10.0 cal, Acid correction = 50.0 cal. Calculate the net and gross calorific value of coal in cal/g. Assume latent of heat of condensation = 580 cal per gram.

(c) Discuss internal treatment of hard water.

[8+4+4]

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6.(a) Explain the working of calomel electrode and glass electrode with neat sketches.
(b) What is the principle of EDTA titration? Briefly describe the estimation of hardness of water by EDTA method.
(c) Mention the characteristics of a good fuel.

[8+4+4]

7.(a) What is corrosion? Discuss the theory of dry corrosion.
(b) How are Aramid-reinforced plastic prepared? What are its uses and properties?
(c) What are the drawbacks of rubber? How is rubber vulcanized?

[8+4+4]

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Subject Code: R13104/R13 **Set No - 4**

I B. Tech I Semester Supplementary Examinations Sept. - 2014

ENGINEERING CHEMISTRY

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Time: 3 hours **Max. Marks: 70**

Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**

*****

PART-A

1.(i) Describe the Orsat process for estimation of flue gases with a neat sketch.

(ii) A water sample on analysis gives the following in ppm:
$MgSO_4$ = 32; $Ca(HCO_3)_2$ = 23; $CaSO_4$ = 20, $Mg(HCO_3)_2$ = 21, NaCl = 4. Calculate the quantities (in Kgs) of lime and soda required to soften 10,000 litres of this water.

(iii) Discuss (a) differential aeration corrosion (b) galvanic cells (c) stereoregular polymers

[8+5+9]

PART-B

2.(a) Discuss any one external treatment of hard water.

(b) Describe galvanizing process with neat sketch.

(c) Calculate the emf of the cell at 25^0C
(Pt)/H_2 (1 atm) / HCl (0.1M) // AgCl, Ag. Given the standard emf of the cell is 0.223V

[8+4+4]

3.(a) Discuss proximate analysis and its significance.

(b) Mention the principles of green chemistry.

(c) How are crepe and smoked rubbers obtained from natural rubber.

[8+4+4]

4.(a) Explain with neat sketches injection and extrusion moulding techniques.

(b) Discuss electroplating of metals with example.

(c) Define specific and equivalent conductivities. How do specific and equivalent conductivity of an electrolyte vary with dilution.

[8+4+4]

5.(a) Write the engineering applications of carbon nanotubes. Mention the properties of fullerenes.

(b) Write notes on break point chlorination.

(c) Discuss with a neat sketch Fischer-Tropsch method to produce gasoline.

[8+4+4]

6.(a) Explain the working of glass electrode and fuel cell with neat sketches.

(b) A gas has the following composition by volume: H_2 = 36%, CH_4 = 12%, O_2 = 14%, N_2 = 38%. If 20 % excess of air is used, find the weight of air actually supplied per m^3 of this gas.

(c) Write notes on phosphate and calgon conditioning of water.

[8+4+4]

7.(a) Discuss any THREE of the following
(i) cladding (ii) phosphate coatings
(iii) chromate coatings (iv) anodizing

(b) Write notes on
(a) photovoltaic cells (b) mechanism of cationic polymerization

[8+8]

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