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

I B. Tech I Semester Regular Examinations Feb./Mar. - 2014
ENGINEERING CHEMISTRY
(Common to CE,ME,CSE,PCE,IT,Chem E,Aero E,AME,Min E,PE,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**
*****

PART-A

1.(a)　Discuss (i) p-type doped conducting polymers (ii) phosphate conditioning
　　　(iii) antiknocking agents
　(b)　Write a note on protection (against corrosion) of a metal by metallic coatings.
　(c)　A 0.1 M KCl solution, whose specific conductance is 0.01571 mho cm^{-1}, has a
　　　conductance of 0.014 mho. When the same conductivity cell is used a 0.1 M chloroacetic
　　　acid solution has a conductance of 7.84 x 10^{-3} mho. If the ionic conductance of
　　　$ClCH_2COO^-$ and H^+ are 59.8 and 449.8 mhocm^{2}equiv.$^{-1}$, find the degree of dissociation
　　　of chloroacetic acid.

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[12+4+6]

PART-B

2.(a)　Describe cold and hot lime soda processes with a neat diagram.
　(b)　A sample of water on analysis has been found to contain the following in ppm:
　　　Ca (HCO$_3$)$_2$ = 4.86; Mg (HCO$_3$)$_2$ = 5.84, CaSO$_4$ = 6.8, MgSO$_4$ = 8.4. Calculate the
　　　temporary and permanent hardness of water.
　(c)　Discuss (i) stereospecific polymers (ii) mechanical properties of polymers

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[6+4+6]

3.(a)　What is ion-selective electrode? Explain its working.
　(b)　Discuss potentiometric titrations.
　(c)　Write notes on (i) Refining of petrol (ii) reforming

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[6+4+6]

4.(a)　Explain the factors effecting the rate of corrosion.
　(b)　Write notes on Electroplating
　(c)　Discuss (i) bullet proof plastics (ii) green house effects

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[6+4+6]

5.(a)　Explain compounding and vulcanization of rubber.
　(b)　What is copolymerization. Give any two examples.
　(c)　Write notes on (i) caustic embrittlement (ii) galvanizing

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[7+3+6]

6.(a)　Write notes on (i) LPG (ii) diesel knocking　(iii) Ni-Cd battery
　(b)　A sample of coal was found to contain the following constituents: C = 81%; O=7%;
　　　S=2%; N=5.5% and ash=4.5%. Calculate the minimum amount of air required for
　　　complete combustion of 1 kg of coal.
　(c)　Explain break-point chlorination of water.

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[9+4+3]

7.(a)　Write any four applications of carbon nanotubes.
　(b)　Explain the working of photovoltaic cells with a neat sketch.
　(c)　Write notes on (ii) Impressed current cathodic protection (ii) galvanic cell

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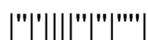
Subject Code: R13104/R13　　　　　　　　　　　　　　　| **Set No - 2** |

I B. Tech I Semester Regular Examinations Feb./Mar. - 2014
ENGINEERING CHEMISTRY
(Common to CE,ME,CSE,PCE,IT,Chem E,Aero E,AME,Min E,PE,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**
*****

PART-A

1.(a)　Name the various fractions obtained during fractional distillation of crude oil and indicate their boiling point ranges and uses of various fractions.

　(b)　The ion conductance of H^+ and butyrate ions are 339.8 and 30.6 Scm^2 $equiv^{-1}$ respectively. When same conductance cell is employed 0.1 M KCl and 0.1 M butyric acid recorded conductances of 1.3×10^{-2} and 5.25×10^{-4} Scm^2 respectively. If the conductivity of the above KCl solution is 0.0121 S cm^{-1}, calculate the degree of dissociation of butyric acid.

　(c)　Write notes on (i) turbine deposits (ii) Anodized coatings (iii) Solar reflectors

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[6+7+9]

PART-B

2.(a)　Describe (i) zeolite process (ii) Priming and foaming

　(b)　Calculate the amount of lime and soda required for the softening of 150 liters of water, which is analyzed as: temporary hardness = 20 ppm; permanent hardness = 15 ppm; permanent Mg hardness = 10 ppm.

　(c)　Discuss the preparation of Bakelite and Thiokol and mention their uses.

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[6+4+6]

3.(a)　Explain with neat diagrams the working of (i) glass electrode (ii) concentration cell (iii) Lechlanche cell

　(b)　Describe any one method of catalytic cracking process for obtaining gasoline.

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[10+6]

4.(a)　Explain electrochemical corrosion.

　(b)　Explain galvanizing and tinning.

　(c)　Describe any two methods of synthesis in green chemistry.

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[6+4+6]

5.(a)　Describe with neat sketches, any two moulding techniques of plastics.

　(b)　What are the drawbacks of natural rubber.

　(c)　What are the different constituents of paints and give their function.

　(d)　Write notes on caustic embrittlement.

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[6+4+3+3]

6.(a)　Define calorific value, HCV and LCV. Calculate the gross and net calorific value of coal having the following compositions C = 83%; H = 10%; S = 1%, N = 3%, Ash = 3%. Latent heat of steam = 587 cal/g.

　(b)　Discuss (i) applications of Kohlrausch law (ii) scales and sludges

　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　[10+6]

7.(a)　Write notes on (i) deterioration of cement concrete (ii) Types of Liquid crystals (iii) Need of green chemistry

　(b)　Explain (i) electrochemical cell (ii) metal cladding

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Subject Code: R13104/R13

Set No - 3

I B. Tech I Semester Regular Examinations Feb./Mar. - 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.(a) Write notes on (ii) CNG (ii) properties of Thiokol (iii) phosphate coatings
   (b) Explain the mechanism of setting and hardening of cement.
   (c) Calculate the amount of lime (84% pure) and soda (92% pure) required for softening 10, 000 litres of water containing the following salts per litre:
   $Ca(HCO_3)_2$ = 40.5 mg; $Mg(HCO_3)_2$ = 36.5 mg; $MgSO_4$ = 30 mg; $CaSO_4$ = 34 mg; $CaCl_2$ = 27.75 mg and NaCl = 10 mg. Also calculate the temporary hardness and permanent hardness of the water sample.

[7+6+9]

PART-B

2.(a) Describe with neat sketch ion exchange process of softening of water.
   (b) Write notes on (i) scales and sludges (ii) tacticity
   (c) What is condensation polymerization? Explain with example.

[6+8+2]

3.(a) Describe the construction and working of hydrogen-oxygen fuel cell.
   (b) At 25 ^{0}C, the equivalent conductivities at infinite dilution of HCl, CH_3COONa and NaCl are 428.03, 93.3, and 125.78 ohm^{-1}cm^2 equiv^{-1} respectively. Calculate the equivalent conductance of acetic acid at infinite dilution
   (c) Discuss the ultimate analysis of coal

[7+3+6]

4.(a) Discuss the mechanism of dry corrosion. Explain the role of oxide film in dry corrosion.
   (b) Explain the importance of design and selection of materials in controlling corrosion.
   (c) Describe any two preparation methods for carbon nanotubes with neat sketch diagrams.

[6+4+6]

5.(a) Explain free radical mechanism of addition polymerization.
   (b) Write the preparation and uses of (i) PVC (ii) Bakelite
   (c) Write notes on (i) Reverse Osmosis (ii) anodic and cathodic inhibitors

[4+6+6]

6. Write notes on (i) refining (ii) octane number (iii) antiknocking agents (iv) cold lime soda process (v) calomel electrode

[16]

7.(a) Write any four applications of (i) green chemistry (ii) liquid crystals (iii) fullerenes
   (b) Write notes on (i) drying, semidrying and nondrying oils (ii) Kohlrausch law

[10+6]

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Subject Code: R13104/R13

Set No - 4

I B. Tech I Sem Regular Examinations Feb./Mar. - 2014
ENGINEERING CHEMISTRY
(Common to CE,ME,CSE,PCE,IT,Chem E,Aero E,AME,Min E,PE,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**
*****

PART-A

1.(a)   Write notes on (i) breakpoint chlorination (ii) ionic liquids as green solvents for green synthesis (iii) electroless plating

  (b)   A sample of coal containing 93% C; 5% H; 2% ash. When this coal was tested in the laboratory for its calorific value in the bomb calorimeter, the following data was obtained: Weight of coal burnt = 0.95 g; Weight of water taken = 600g water equivalent of bomb and calorimeter = 2,000 g, rise of temperature = 2.84^0C; Cooling correction = 0.02^0C; Fuse wire correction = 12.0 cal; acid correction = 55 cal. Calculate the net and gross calorific value of the coal in cal/g. (Assume the latent heat of condensation of steam as 580 cal/g)

  (c)   Compare galvanic series with electrochemical series.

[12+5+5]

PART-B

2.(a)   Write notes on (i) demineralization process (ii) sterilization of water

  (b)   A sample of water contains the following dissolved salts per litre: $Mg(HCO_3)_2$ = 25 mg; $MgCl_2$ = 28 mg; $CaSO_4$ = 24 mg; $CaCl_2$ = 84 mg. Calculate the temporary and permanent hardness.

  (c)   Discuss the physical and mechanical properties of polymers.

[6+4+6]

3.(a)   What are secondary batteries? Give an example and explain its construction and working.

  (b)   Describe conductometric titrations of acids and bases.

  (c)   Write notes on (i) petrol knocking and diesel knocking (ii) characteristics of a good fuel.

[5+5+6]

4.(a)   Discuss on differential aeration corrosion

  (b)   Write notes on (i) Pilling- Bed worth rule (ii) passivity (iii) solar cells (iv) chemical vapour deposition method of CNTs

[4+12]

5.(a)   Write notes on (i) stereospecific polymers (ii) Injection moulding (iii) vulcanization

  (b)   Explain (i) metal cladding (ii) calgon and phosphate conditioning

[10+6]

6.(a)   Describe moving bed catalytic cracking method with a neat labeled diagram.

  (b)   Write notes on flue analysis and its significance.

  (c)   Explain how specific and equivalent conductances of a strong electrolyte vary with dilution.

  (d)   Discuss boiler corrosion.

[6+4+3+3]

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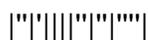
Subject Code: R13104/R13

$\boxed{\textbf{Set No - 4}}$

7.(a)   Write notes on (i) applications of liquid crystals (ii) any one method of green synthesis (iii) fiber reinforced plastics
   (b)   Discuss sacrificial anodic protection method.
   (c)   Calculate the emf of the following cell: Zn (s)/Zn^{2+} (0.1 M)// Cu^{2+} (1.50M)/Cu(s) at 25°C. $E^o{}_{Zn2+/ Zn (s)}$ = -0.76 V and $E^o{}_{Cu2+ /Cu(s)}$ = +0.34 V.

[10+3+3]

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