Set No - 1

I B. Tech I Semester Regular Examinations Jan./Feb. - 2015
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. (a) Calculate the amount of lime (82% pure) and soda (91% pure) for treatment of 60, 000 litres of water, whose analysis is as follows: $Ca(HCO_3)_2 = 40$ ppm, $Mg(HCO_3)_2 = 30$ ppm, $MgSO_4 = 10$ ppm, $CaSO_4 = 40$ ppm, $CaCl_2 = 25$ ppm, $NaCl = 8$ ppm and also calculate carbonate and non carbonate hardness of water sample.
   (b) Discuss the properties of liquid crystals.
   (c) Write notes on (i) Ni-Cd battery   (ii) Sacrificial anodic protection
                          (iii) Atactic and syndiotactic polymers (iv) CNG

[7+3+12]

PART –B

2. (a) Explain permutit process for removal of hardness of water.
   (b) Explain the mechanism of anionic polymerization with a suitable example.
   (c) Discuss the constituents of paints and their functions.

[6+5+5]

3. (a) Discuss the construction and working of fuel cells.
   (b) Discuss proximate analysis of coal.
   (c) Write notes on breakpoint chlorination.

[6+5+5]

4. (a) Describe dry theory of corrosion.
   (b) Explain with a neat sketch arc discharge method involved in synthesis of carbon nanoparticles.
   (c) Write notes on single electrode potential.

[6+5+5]

5. (a) Write notes on compounding of rubber.
   (b) Define Kohlrausch law and discuss its applications.
   (c) A gas has the following composition by volume: $H_2 = 28\%$, $CH_4 = 13\%$, $N_2 = 42\%$, $O_2 = 17\%$. If 20% excess air is used, find the weight of air actually supplied per m^3 of this gas.

[6+5+5]

6. (a) Explain with a neat sketch moving bed catalytic cracking method to produce gasoline.
   (b) Differentiate between anodic and cathodic coatings.
   (c) Write notes on biodegradable polymers.

[6+5+5]

7. (a) Discuss the reactions occurring during setting and hardening of cement.
   (b) How is water purified for drinking purposes by municipalities?
   (c) Discuss the preparation, properties and uses of PVC.

[6+5+5]
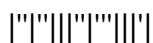
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PART-A

1. (a) Explain the effect of CO_2 and SO_2 on cement concrete.
   (b) A gaseous fuel has the following composition by volume: $H_2 = 28\%$, $CH_4 = 32\%$, ethane 13%, $O_2 = 7\%$, $N_2 = 15\%$ and butane = 5%. Find out the analysis of dry products of combustion using 30 % excess air.
   (c) Describe the principle of EDTA method in determination of hardness of water.
   (d) Write notes on
   (i) Specific and molar conductance   (ii) stereo regular polymers
   (iii) Impressed current cathodic protection   [4+6+3+9]

PART -B

2.(a) Discuss the various reactions occurring in lime soda process.
  (b) With a neat sketch discuss compression moulding technique used for fabrication of plastics.
  (c) Write notes on cladding and electroplating of metal.

              [6+5+5]

3.(a) Explain the construction and working of lead acid battery.
  (b) Discuss refining of petroleum.
  (c) Explain scale and sludge formation in boilers. How are they removed?

              [6+5+5]

4.(a) Describe wet theory of corrosion.
  (b) Discuss the types of liquid crystals.
  (c) The equivalent conductance of 0.01 N acetic acid is 17.30 $ohm^{-1}cm^2eq^{-1}$. The ionic conductance of H^+ and CH_3COO^- ions at infinite dilution are 278 and 87 $ohm^{-1}cm^2eq^{-1}$ respectively. What percentage of acetic acid dissociates at this concentration.

              [6+5+5]

5.(a) Discuss the preparation, properties and uses of BUNA-S.
  (b) Explain with an example concentration cells.
  (c) Write notes on petrol knocking and diesel knocking.

              [6+5+5]

6.(a) Explain analysis of carbon and sulphur present in coal.
  (b) Explain differential aeration corrosion.
  (c) Explain phase transfer method in green synthesis.

              [6+5+5]

7.(a) Write notes on doped conducting polymers.
  (b) What are the advantages and limitations of softening of water by ion-exchange process compared to other methods?
  (c) Write notes on mechanical properties of polymers.

              [6+5+5]
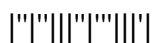
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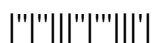
Question Paper Consists of **Part-A** and **Part-B**
Answering the question in **Part-A** is Compulsory,
Three Questions should be answered from **Part-B**
*****

PART-A

1. (a) Explain supercritical fluid extraction method in green synthesis.
   (b) A sample of coal was found to contain the following C = 80%, H = 7%; O = 3%, N = 5% remaining being ash. (i) Calculate the amount of minimum air required for complete combustion of kg of coal sample. (ii) If 30% excess air is supplied, estimate the % composition of dry products of combustion.
   (c) Discuss the chemical reactions occurring during charging and discharging of lead acid storage battery.
   (d) Write notes on (i) priming and foaming   (ii) physical properties of polymers

   [4+7+5+6]

PART –B

2. (a) Discuss demineralization process of softening of water.
   (b) With a neat sketch discuss injection moulding technique used for fabrication of plastics.
   (c) Write notes on galvanic series and passivity.

   [6+5+5]
3. (a) What are primary and secondary batteries. Explain the construction and working of dry battery cell.
   (b) Explain the construction of Orsat apparatus for the estimation of flue gases.
   (c) Discuss electrodialysis with a neat sketch diagram.

   [6+5+5]
4. (a) Explain the factors affecting the rate of corrosion.
   (b) Discuss green house effect.
   (c) What is the emf of the following cell at 25^0C, Zn (s)/ Zn^{2+} (0.1 M) // Ag^+ (0.002M)/Ag(s). The standard emf of the cell is 1.54V

   [6+5+5]
5.(a) Discuss the preparation, properties and uses of Bakelite.
   (b) Discuss the working of the glass electrode.
   (c) Write notes on octane and cetane number.

   [6+5+5]
6. (a) Describe with a neat sketch fixed bed catalytic cracking method to produce petrol.
   (b) Differentiate between galvanizing and tinning.
   (c) With a help of neat figure explain the working of photovoltaic cells.

   [6+5+5]
7. (a) Write notes on fiber reinforced plastics.
   (b) Describe a method of desalination of brackish water.
   (c) Write notes on free radical mechanism of addition polymerization.

   [6+5+5]

Subject Code: R13104/R13

Set No - 4

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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)   Calculate the volume of air required for complete combustion of 1 m^3 of gaseous fuel
    having the following composition : CO = 40, CH_4 = 15%, H_2 = 35 %, C_2H_2 = 3%, N_2 = 1 %
    and remaining is CO_2.
  (b)   How is rubber vulcanized? What are its advantages?
  (c)   Write notes on (i) ion selective fluoride electrode   (ii) alkaline batteries
  (d)   Discuss (i) types of carbon nanotubes   (ii) requirements of potable water

                                                                            [5+3+6+8]

PART –B

2. (a)   Discuss the various types of boiler troubles. How can they be minimized?
  (b)   With a neat sketch discuss extrussion moulding technique used for fabrication of plastics.
  (c)   Discuss Pilling Bed worth rule.

                                                                                 [6+5+5]

3. (a)   Write notes on conductometric titrations.
  (b)   Calculate the lime and soda required per litre for the chemical treatment of water
    containing Ca^{2+} = 82 ppm, Mg^{2+} = 30 ppm, K^+ = 40 ppm, HCO_3^- = 200 ppm; $FeSO4.7H_2O$
    = 62 ppm.
  (c)   Write notes on antiknocking agents and thermal cracking of gasoline.

                                                                                 [6+5+5]

4. (a)   Explain the electroless plating and electroplating of metals.
  (b)   Write short notes on solar reflectors and solar dishes.
  (c)   Define specific conductivity, equivalent conductivity. Explain how these are affected by
    dilution.

                                                                                 [6+5+5]

5. (a)   Discuss the preparation, properties and uses of Thiokol.
  (b)   Discuss concentration cells.
  (c)   What are the advantages and disadvantages of liquid fuels.

                                                                                 [6+5+5]

6. (a)   Write a short note on Orsat method of flue gas analysis and its significance.
  (b)   How could proper design and selection of material inhibit corrosion?
  (c)   Explain the properties of fullerenes.

                                                                                  [6+5+5]

7. (a)   Explain aqueous phase method in green synthesis.
  (b)   Describe zeolite process of softening of hard water.
  (c)   Write notes on stereo specific polymers.

                                                                                  [6+5+5]