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

I B. Tech I Semester Supplementary Examinations Aug. - 2015

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**

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PART-A

1.(a) Explain why hard water is not fed into boilers.
(b) Give reasons why gasoline mixed with anti-knocking agents is used as fuel in internal combustion engine.
(c) Explain the importance of vulcanization of natural rubber.
(d) Differentiate between galvanic cell and concentration cell.
(e) Write notes on (i) Galvanizing and tinning (ii) biodegradable Polymers

[4+3+4+3+8]

PART-B

2.(a) Write a note on sterilization and disinfection of water.
(b) Find the emf of the following cell
Zn/Zn^{2+} (0.002M)//Fe^{2+} (0.001M)/Fe, given that E^{0}_{CELL} : 1.2 volt.
(c) Discuss differential aeration corrosion.

[6+5+5]

3.(a) What are elastomers? Explain the preparation and uses of styrene butadiene rubber.
(b) With a neat labeled diagram explain any one method of desalination of water.
(c) Write notes on CNG and LPG.

[6+5+5]

4.(a) What is Kohlraush Law. Discuss its applications.
(b) Give any five engineering applications of liquid crystals.
(c) Discuss how water is softened by cold lime soda process.

[6+5+5]

5. (a) Write notes on metallic coatings.
(b) Explain the construction and working of concentration cell.
(c) Discuss the mechanical properties of polymers.

[6+5+5]

6.(a) A sample of coal was analyzed as follows: 3.0 g was weighed into a silica crucible. After heating to one hour at 110^{0}C, the residue was 2.845 g. The crucible next was covered with a vented lid and strongly heated exactly 7 min at 950 + 20^{0}C. The residue weighed 2.235g. The crucible was heated without the cover, until constant weight was obtained. The last residue was found to be 0.355g. Calculate the % results of the above analysis.
(b) Discuss chemical theory of corrosion.
(c) Describe supercritical fluid extraction method for green synthesis.

[6+5+5]

7.(a) Discuss the working of photovoltaic cells and solar reflectors.
(b) Discuss fixed bed catalytic cracking method for synthesis of gasoline.
(c) Describe a moulding process for fabrication of thermosetting plastics.

[6+5+5]

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

I B. Tech I Semester Supplementary Examinations Aug. - 2015

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 down the chemical reactions that are taking place in removal of temporary and permanent hardness by lime soda treatment.
(b) Define the units (British thermal unit and centrigrade unit) of heat and their interconversion
(c) Why plasticizers, fillers and stabilizers are used during moulding of plastics? Give examples for each of them.
(d) Define specific and equivalent conductance, mention their units.
(e) Explain the need of green chemistry.
(f) Explain how corrosion of iron is prevented by galvanization.

[4+2+5+3+4+4]

PART-B

2.(a) Discuss the formation of scales and sludges in boilers. Explain how they can be removed.
(b) Explain the construction and working of calomel electrode.
(c) Explain the role of metal oxide film in dry corrosion and classify them.

[5+6+5]

3.(a) Write the structures of (i) Thiokol (ii) PVC (iii) BUNA-S (iv) Bakelite
(b) Discuss the requirements of potable water.
(c) Discuss the fractional distillation of petroleum.

[6+5+5]

4.(a) Explain the variations in conductance during titrations between (i) strong acid vs weak base and (ii) weak acid and weak base
(b) Explain the influence of CO_2 and SO_2 deterioration of cement concrete.
(c) Discuss the advantages of permutit process over lime soda process.

[6+5+5]

5.(a) What are paints? Discuss its constituents and their functions.
(b) Discuss with a labeled diagram the construction and working of H_2-O_2 cell.
(c) Give any five applications of elastomers.

[6+5+5]

6.(a) Explain petrol knocking and diesel knocking.
(b) Explain how proper design and material selection minimize the metallic corrosion.
(c) Discuss any one preparation method of carbon nanotubes.

[6+5+5]

7.(a) Discuss the types of liquid crystals.
(b) Calculate gross and net calorific value of coal having the following composition: C= 83%; H = 7.5%; S = 3%, N = 5% remaining ash. Assume latent heat of steam.
(c) Discuss the preparation and properties of poly ethylene.

[6+5+5]

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

I B. Tech I Semester Supplementary Examinations Aug. - 2015

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) What is buffer solution? Why is it used in the determination of hardness of water by EDTA method.
(b) Discuss the preparation of Thiokol and write its applications.
(c) Explain how specific and equivalent conductance varies with dilution.
(d) Write notes on conducting polymers.
(e) Discuss gross and net calorific value.

[4+4+4+5+5]

PART-B

2.(a) Describe the principle and procedure involved in zeolite process for treatment of water.
(b) Discuss the anodic, cathodic and net reactions occurred in methanol - oxygen fuel cell.
(c) Explain electrochemical theory of wet corrosion.

[6+5+5]

3.(a) Explain how natural rubber is obtained from latex and mention its disadvantages.
(b) Write notes on boiler corrosion.
(c) A gas has the following composition by volume: H_2 = 38%, CH_4 = 17%, N_2 = 32%, O_2 = 12 %. If 25 % excess air is used, find the volume of air required for complete combustion of 1 m^3 of gaseous fuel.

[6+5+5]

4.(a) Explain potentiometric titrations.
(b) Discuss the preparation of Kevlar and its engineering applications.
(c) What are anionic and cationic exchange resins? Give examples and write their structures.

[6+5+5]

5.(a) Explain the following factors that influence the rate of corrosion
(i) Over voltage (ii) ratio of anodic and cathodic area (iii) passive character of metal
(b) Explain the determination of pH of a solution by using glass electrode.
(c) Describe moulding technique for fabrication of thermoplastic materials.

[6+5+5]

6.(a) Explain refining of petroleum.
(b) Distinguish between anodic and cathodic coatings.
(c) Discuss the properties of fullerenes.

[6+5+5]

7.(a) Discuss the principles of green chemistry.
(b) Explain the preparation and properties of Bakelite.
(c) Discuss the advantages of gaseous fuels.

[6+5+5]

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

I B. Tech I Semester Supplementary Examinations Aug. - 2015

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) Explain why hardness of water is expressed in terms of calcium carbonate.
(b) Mention any five characteristics of a good coal.
(c) Write the differences between addition and condensation polymerization.
(d) Write the mathematical expression of Nernst equation for the potential of the cell Zn(s)/Zn(aq)// Ag^{2+}(aq)/Ag(s)
(e) Discuss sacrificial anodic and impressed current cathodic protection.
(f) Write notes on fiber reinforced plastics.

[2+4+5+2+4+5]

PART-B

2.(a) What are temporary and permanent hardness. Explain how hardness can be removed by ion-exchange method.
(b) What are secondary batteries? Explain the construction and working (charging and discharging) of lead acid storage battery.

[8+8]

3.(a) Discuss (i) ion-selective electrode (ii) electrochemical series
(b) Describe Orsat process for analysis of flue gases.

[8+8]

4.(a) Discuss hot dipping and electroless plating methods for protection of metal from corrosion.
(b) Write notes on (i) caustic embrittlement (ii) Priming and foaming

[8+8]

5.(a) Write notes on (i) stereospecific polymers (ii) Physical properties of polymers.
(b) Describe setting and hardening of cement.

[8+8]

6.(a) Write briefly about ultimate analysis of coal.
(b) Explain compounding of plastics.

[8+8]

7.(a) Describe phase transfer and aqueous phase methods for green synthesis.
(b) Explain the following factors affecting rate of corrosion:
(i) Humidity of air
(ii) Presence of impurities in atmosphere
(iii) nature of surface film

[8+8]

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