Set No. 1

Code No: R10104/R10

I B.Tech I Semester Regular Examinations, February 2011

ENGINEERING CHEMISTRY - I

(Common to All Branches)

Time: 3 hours **Max Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1 (a) Explain with a flow diagram refrigeration process.
(b) State and explain Lechatelier principle with suitable examples
[7M + 8M]

2 (a) What are the important characteristics of catalysed reactions?
(b) Write about FOUR important industrial applications of colloid science
(c) Discuss the variation of viscosity of a liquid with temperature
[5M + 5M +5M]

3 (a) Explain how bomb calorimeter can be used to determine the calorific value of a fuel.
(b) What are the advantages of pulverized coal and what are its limitations?
(c) What are the byproducts that are recovered from coke-oven gas and how they are recovered
[7M + 4M +4M]

4 (a) Derive an expression for the potential of a single electrode
Calculate the standard electrode potential Cu^{++}/Cu, if the electrode potential at $25^{O}C$ is 0.296 volt when $[Cu^{++}]$ is 0.015 M
(b) Give an account of popularly used batteries indicating the reactions that take place in them
[8M + 7M]

5 (a) Explain fluorescence and phosphorescence. Under what conditions a substance exhibits phosphorescence?
(b) What is an ion selective electrode? Explain the determination of chloride and fluoride concentrations with ion selective electrodes.
[7M + 8M]

6 (a) What are intrinsic semiconductors? Explain the conduction in n- type and p- type semiconductors
(b) Define superconductivity. Discuss the properties and uses of superconducting materials.
[7M + 8M]

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Set No. 1

7 (a) What is binding energy of a nucleus?. Draw a curve between mass number and average binding energy. Give the salient features of the curve.

(b) What is meant by mass defect? How do you account for the mass defect of a nucleus?

[7M + 8M]

8 (a) How is global warming taking place? What are its effects? Suggest ways to prevent global warming.

(b) Write a note on the following:
(i) PV – cells (ii) concentrating solar power plants

[7M + 8M]

Set No. 2

Code No: R10104/R10

I B.Tech I Semester Regular Examinations, February 2011

ENGINEERING CHEMISTRY - I

(Common to All Branches)

Time: 3 hours **Max Marks: 75**

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

1 (a) Define and explain the terms enthalpy and free energy of a thermodynamic system.
(b) What is osmosis? Explain how this phenomenon can be utilized for desalination of water.
(c) The solubility product k_{sp} of the sparingly soluble salt Ag_2CrO_4 is 4×10^{-12} at a particular temperature. Calculate the solubility of silver chromate in grams per litre at that temperature. The molecular weight of silver chromate is 264.
[4M +7M +4M]

2 (a) What are the different theories of catalysis? Explain with examples.
(b) Write notes on (i) Tyndall effect (ii) protection and gold number
(c) Give a general outline of fermentation process.
[5M +5M +5M]

3 (a) How are fuels classified? Explain with examples
(b) What is proximate analysis of coal? What is the significance of the analyses
(c) Describe Beehive oven process of manufacture of coke.
[3M +7M +5M]

4 (a) What is electrochemical series? Explain three important uses of the series.
(b) How do the fuel cells differ from batteries? Explain how a hydrogen-oxygen fuel cell is constructed and what are the electrode reaction that take place.
[6M +9M]

5 (a) Write notes on biosensors and their applications
(b) Write a note on following electrodes.
(i) Glass electrodes
(ii) Solid matrix electrode
[7M +8M]

6 (a) Explain the working of different types of storage devices.
(b) What are different types of liquid crystals? Explain their structures and properties.
[7M +8M]

7 (a) Explain the principle and working of a nuclear reactor with the help of a labeled diagram.
(b) Explain nuclear fission and fusion with two examples.
[7M +8M]

8 (a) Explain how solar energy can be converted into electricity in solar thermal power plant systems.
(b) What do you understand by green house effect and how it affects mankind?
[7M +8M]

Set No. 3

Code No: R10104/R10

I B.Tech I Semester Regular Examinations, February 2011

ENGINEERING CHEMISTRY - I

(Common to All Branches)

Time: 3 hours **Max Marks: 75**

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

1(a) What is Joule Thomson effect? Derive the expression for J T coefficient.
(b) What is a semipermeable membrane? What are the different materials that can be used for semipermeable membranes?
(c) Using Lechatelier principle explain the conditions used for the production of ammonia by Haber's process.

[4M + 4M + 7M]

2(a) Write notes on
(i) contact catalysis (ii) catalytic poisons
(iii) Tyndall effect (iv) electro-osmosis
(b) What is viscosity of a liquid? What are the factors that influence the viscosity of a fluid?

[8M + 7M]

3(a) Compare the advantages and limitations of solid, liquid and gaseous fuels
(b) How sulphur present in coal is determined? Comment on the desirability of sulphur in coal.
(c) Compare the temperature and high temperature carbonization of coal.

[5M + 5M + 5M]

4(a) Describe the construction of hydrogen electrode.
(b) Explain the working of Lead accumulate
(c) What is emf of the following cell at 25ºC
Zn (s) / Zn^{++} (0.2M) // Ag^{+}(0.002M) / Ag (s)
The standard emf of the cell is 1.54V

[7M + 4M + 4M]

5(a) Define chemical shift. Write and explain the factors influencing chemical shift.
(b) Explain fluorescence and phosphorescence with Jablonski diagram. .

[7M + 8M]

6(a) Define super conductivity. Explain the preparation and structure of 1:2:3 super conducting compound
(b) Mention the applications of liquid crystals in varies fields. .

[7M + 8M]

7(a) What is nuclear fission? Give an example to illustrate it. Find the energy liberated in the nuclear fission of $_{92}U^{235}$
(b) Explain the principle and working of Breeder reactor

[7M + 8M]

8(a) Write the advantages and disadvantages of solar energy.
(b) How can you prevent green house effect by growing plants?
(c) Ozone is a pollutant and protector to the environment. Discuss.

[5M + 5M + 5M]

Set No. 4

Code No: R10104/R10

I B.Tech I Semester Regular Examinations, February 2011

ENGINEERING CHEMISTRY - I

(Common to All Branches)

Time: 3 hours Max Marks: 75

Answer any FIVE Questions

All Questions carry equal marks

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1(a) Define and explain entropy of a thermodynamic system

(b) What are the conditions used for the production of sulphur trioxide by contact process? How do you justify these conditions with reference to Lechatlier principle?

(c) What is solubility product of a salt? Explain with an example how the solubility of an ionic substance can be found if its solubility product value is known.

[3M + 6M + 6M]

2(a) What are the different classes of colloidal systems? Explain with examples

(b) Write briefly about enzyme catalysis

(c) Give an outline of obtaining vinegar from fermentation of liquors

[5M + 5M + 5M]

3(a) Describe the Hoffmann's byproduct oven process of manufacture of coke

(b) A bomb calorimeter whose water equivalent is 144gm, was filled with 1458gm of water. When 0.945gm of coal was burnt in it the temperature of water rose by 5.95ºC calculate the HCV of the fuel. If the hydrogen percentage in the fuel was 7 calculate LCV of the fuel (latent heat of condensation of steam is 587cal/gm)

[7M + 8M]

4(a) Describe the construction of calomel electrode

(b) Write briefly about fuel cells

[7M + 8M]

5(a) Explain the engineering applications of NMR spectroscopy.

(b) Write briefly about the following.

(i) Chemical shift

(ii) Coupling constant

(iii) Biosensor

(iv) Magnetic anisotropy

[7M + 8M]

6(a) Write a note on band theory of solids.

(b) Explain the conduction in the following semiconductors

(i) Stoichiometric semiconductors

(ii) Defect semiconductors

[7M + 8M]

7(a) In a nuclear reactor what is the function of

(i) moderator (ii) control rods

(iii) coolants (iv) protective shielding

(b) Distinguish between nuclear fusion and fission.

[8M + 7M]

8(a) How is global warming taking place? What are its effects? Suggest the ways to prevent global warming.

(b) Write notes on

(i) PV – cells (ii) concentrating solar power plants

[7M + 8M]