Set No - 1

Code No: R10104/R10

I B.Tech I Semester Supplementary Examinations, July - 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) What do you mean by Enthalpy? How is it related to internal energy of a system? Calculate the work done in the expansion of 3 moles of hydrogen reversibly and isothermally at 27^{o}C from 21.0 lit to 70.3 lit.
(b) State and explain Le Chateliers principle. With the help of this principle, work out the conditions which would favor the formation of ammonia and sulphuric acid

2 (a) Give examples of catalyst poisoning. How is action of catalyst linked to energy of activation of a reaction?
(b) Explain the terms Colloids and crystalloids. How would you separate one from the other?
(c) Give an account of various types of products obtained by fermentation process.
(d) Water requires 120.5 seconds to flow through a viscometer and the same volume of acetone requires 49.5 seconds. If the densities of water and acetone at 293K are $9.982X10^{2}$ Kgm^{-3} and 7.92 Kgm^{-3} respectively and the viscosity of water at 293K is 10.05 Pascal, calculate the viscosity of acetone at 293K.

3 (a) What are biosensors? What are the requirements of good biosensors?
(b) Explain the industrial application of chemiluminiscent compounds.
(c) What is an ion selective electrode? Explain the measurement of concentration of fluoride and nitrate ions in a solution using ion-selective electrode.

4 (a) What is meant by doping? Name a compound in which both Schottky and Frankel defects are present.
(b) Explain the materials used in making floppy, CD and pendrive. Write about their working mechanism.
(c) What are liquid crystals? Give an account of Bose's 'Swarm' theory of liquid crystals. What are its limitations?

5 (a) Write a brief about proximate analysis of coal and its significance.
(b) Define calorific value of a solid fuel. How is it determined experimentally using Bomb Calorimeter?
(c) Write short notes on carbonization of coal.

6 (a) What are the different types of fuel cells available? Discuss the principles involved in the working of hydrogen-oxygen fuel cell.
(b) Describe the construction of calomel electrode. Why it is used as reference electrode in place of standard hydrogen electrode? How potentional measured using a calomel electrode.
(c) Derive Nernest's equation for single electrode potentional and explain the terms involved in it. Write its applications.

7 (a) What is mass defect. How is it related to the binding energy and stability of the nucleus.
(b) Describe the various components of nuclear power reactor and their functions.
(c) Write a brief note on the disposal of nuclear wastes.

8 (a) Discuss the use of solar energy for space heating, water heating and for production of electricity.
(b) What is meant by green house effect? What are its consequences? Give two examples of green house gases.

Code No: R10104/R10 **Set No - 2**

I B.Tech I Semester Supplementary Examinations, July - 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) Prove that the value of Joule Thomson coefficient is zero for an ideal gas.
(b) Write the principles of osmosis and reverse osmosis. How this is applied for desalination process?
(c) Explain solubility product of a sparingly soluble salt. How is it determined from conductance measurements?

2 (a) Write an essay on enzyme catalysis.
(b) Explain the uses of (i) Dialysis (ii) Ultra filtration in the purification of colloidal solutions.
(c) Define the viscosity and discuss the effect of temperature on it.

3 (a) Discuss the construction and working of a typical biosensor.
(b) Distinguish between
(i) Thermal and photochemical reactions.
(ii) Fluorescence and phosphorescence.
(iii) Singlet and triplet states of molecule.

4 (a) Explain the semi conductivity in non-stoichiometric oxide crystals
(b) Explain the materials used in making floppy, CD and pen drive. Write about their working mechanism.
(c) Draw and discuss the vapour pressure-temperature diagrams of true liquids and liquid crystals.

5 (a) Define calorific value of a solid fuel. How is it determined experimentally using Bomb Calorimeter?
(b) What do you understand by high and low calorific value of the fuels? How is it determined by the Junker's calorimeter? Describe with neat labeled diagram.

6 (a) Write a detailed account of carbon-zinc primary cells with respect to their construction, cell reactions and uses.
(b) Derive Nernst's equation for single electrode potential and explain the terms involved in it. Write its applications.

Code No: R10104/R10 **Set No - 2**

7 (a) Describe the various components of nuclear power reactor and their functions.
(b) What are nuclear reactions? How they are classified? What is the advantage of using α-particles as projectile to cause these reactions?

8 (a) Discuss the use of indirect solar energy for generation of electrical power.
(b) What is meant by green house effect? What are its consequences? Give two examples of green house gases.

Code No: R10104/R10 **Set No - 3**

I B.Tech I Semester Supplementary Examinations, July - 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) What is Joule Thomson effect and what is it due to? Explain the difference in case of an ideal gas and a real gas.
(b) Write a detailed note on the application of Le Chatleier's principle to physical equilibria.

2 (a) Differentiate between homogenous and heterogeneous catalysis. Explain both of these giving one example each with their mechanism.
(b) Write a note on the industrial applications of fermentation.
(c) Describe methods commonly used for the measurement of viscosity of a liquid.

3 (a) Write a note on the application of biosensors.
(b) Explain the industrial application of chemiluminisencent compounds
(c) Write a short note on
(i) Photo sensitization
(ii) Inter system crossing
(iii) Internal conversion with Jablonski diagram

4 (a) Explain the preparation properties and engineering applications of super conductors.
(b) State and explain the various properties of liquid crystals on the basis of the Swarm theory of Bose.

5 (a) Write in brief about proximate analysis of coal and its importance.
(b) Name the analysis of coal in which moisture volatile, ash and fixed carbon are determined. Give significance of each component.
(c) Write short note on carbonization of coal.

6 (a) Write short notes on (i) Solar cells (ii) Molten carbonate fuel cells. (iii) Ion-exchange membrane fuel cells.
(b) Write informative note on Lithium cells with special reference to cell reactions and applications.

Code No: R10104/R10 **Set No - 3**

7 (a) Discuss the theoretical principles involved in the generation of power by nuclear fission and nuclear fusion.
(b) Write a brief note on the disposal of nuclear wastes
(c) Write short notes on application of radio isotopes.

8 . Write informative note on the following
(i) Flat plate solar collectors .
(ii) Photovoltaic cells
(iii) Solar trough collectors
(iv) Solar energy for producing fuel for vehicles

Code No: R10104/R10 **Set No - 4**

I B.Tech I Semester Supplementary Examinations, July - 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) What are various types of membranes used in desalination process. Explain their limitations.
(b) State the law of chemical equilibrium. How it can be derived on thermodynamic considerations.
(c) At 410K and a total pressure of 1atm, a mixture of $N_{2(g)}$ and $H_{2(g)}$ in the mole ratio 1:3 contains 16% of $NH_3(g)$ at equilibrium. Calculate Kp for the reaction

2 (a) Write mechanisms of the following reactions
(i) Acid hydrolysis of methyl acetate
(ii) Hydrogenation of ethylene using nickel catalyst.
(b) Discuss the origin of charge on colloidal particles. What is meant by electrical double layer?
(c) Give an account of various types of products obtained by fermentation process.
(d) Define the viscosity and discuss the effect of temperature on it.

3 (a) Distinguish between
(i) Thermal and photochemical reactions.
(ii) Fluorescence and phosphorescence.
(iii) Singlet and triplet states of molecule.
(b) What is an ion selective electrode? Explain the measurement of concentration of fluoride and nitrate ions in a solution using ion-selective membrane electrode.

4 (a) Explain the preparation properties and engineering applications of super conductors.
(b) State and explain the various properties of liquid crystals on the basis of the Swarm theory of Bose.
(c) What are secondary cells? Describe the construction of Daniel cell. Write the cell reactions and mention its applications.

5 (a) What do you understand by high and low calorific value of the fuels? How is it determined by the Junker's calorimeter? Describe with neat labeled diagram.
(b) Write a brief account of ultimate analysis of coal. What is its significance?

Code No: R10104/R10 **Set No - 4**

6 (a) Write short notes on
(i) Solar cells (ii) Solid-oxide fuel cells. (iii) Phosphoric acid fuel cells.
(b) Describe the construction of calomel electrode. Why it is used as reference electrode in place of standard hydrogen electrode? How potentional measured using a calomel electrode.

7 (a) Discuss the theoretical principles involved in the generation of power by nuclear fission and nuclear fusion.
(b) What is mass defect? How is it related to the binding energy and stability of the nucleus?
(c) Give the Engineering applications of radioactive isotopes.

8 (a) Discuss the use of solar energy for space heating, water heating and for production of electricity.
(b) Discuss the use of indirect solar energy for generation of electrical power.