Subject Code-: R10104/R10 **Set No - 1**

I B.Tech I Semester Supplementary Examinations June - 2012

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) With the aid of a flow diagram explain air conditioning cycle.
(b) Explain salting out of soap and purification of common salt.
(c) Generally ammonia is manufactured by Haber's process using pressures of the order of 200 atmospheres, a temperature of about 450^{o}C and iron catalyst. How do you justify these conditions?

[5M + 5M + 5M]

2.(a) With suitable examples explain
(i) auto catalysis (ii) catalytic poisons (iii) promoters
(b) What is Tyndall effect? How do you demonstrate this?
(c) Give a brief account of production of ethanol from molasses.

[5M + 5M + 5M]

3.(a) Differentiate between fluorescence and phosphorescence.
(b) What are bio- sensors? How do the enzymes function as bio-sensors?
(c) Explain three of the important applications of NMR spectroscopy in engineering.

[5M + 5M + 5M]

4.(a) What are p-type extrinsic semiconductors and how does conduction take place in them?
(b) What are super conductors and what are their important properties?
(c) What are the commonly used secondary storage devices? Explain the basic aspects of their functioning.

[5M + 5M + 5M]

5.(a) What are the characteristics of a good fuel?
(b) Explain how the calorific value of a solid or liquid fuel is determined with a bomb calorimeter?
(c) How sulphur present in a coal sample determined? Comment on the desirability or otherwise of sulphur in coal.

[4M + 7M + 4M]

6.(a) What is electrochemical series? Discuss two uses of the this series.
(b) The potential of the cell $Zn/Zn^{++}_{Aq}(1M)$ // $Cu^{++}_{Aq}(1M)/Cu$ at 25^{o}C is 1.1 volt. Calculate the potential of the cell $Zn/Zn^{++}_{Aq}(0.5M)$ // $Cu^{++}_{Aq}(0.01M)/Cu$ at the same temperature.
(c) Describe hydrogen – oxygen fuel cell.

[5M + 5M + 5M]

7.(a) What are the advantages and disadvantages of solar energy?
(b) What is green house effect? What are the advantages and disadvantages of this effect?

[8M + 7M]

8.(a) Write short notes on methods of disposal of radio active wastes.
(b) Explain the role of
(i) $_{92}U^{235}$ (ii) Cadmium rods and (iii) Graphite rods in nuclear reactors

[6M + 9M]

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

I B.Tech I Semester Supplementary Examinations June - 2012

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 the Joule-Thomson effect. What is J.T. coefficient?
(b) What is reverse osmosis and how is this useful for desalination of brackish water?
(c) What are the conditions that are chosen for the production of sulphur trioxide from sulphur dioxide? Are these conditions in agreement with Lechatelier's principle? Explain.

[5M + 5M + 5M]

2.(a) What are the important characteristics of enzyme catalysed reactions?
(b) How do you demonstrate the Brownian movement in a colloidal solution and how do you explain the movement?
(c) Define the term viscosity of a liquid. What are the factors that influence the viscosity of liquid?

[5M + 5M + 5M]

3.(a) Using Jablonsky diagram explain briefly fluorescence and phosphorescence.
(b) What are sensors and how do they function? With a suitable example explain how a photo-electric sensor can be used.
(c) Glass membrane electrodes can be classified as ion selective electrodes. Justify.

[5M + 5M + 5M]

4.(a) What are the different types of semi-conductors? How does conduction take place in intrinsic semi-conductors?
(b) Write short notes on super conductivity.
(c) What are thermo-tropic liquid crystals? What are the types of liquid crystals that come under this class?

[5M + 5M + 5M]

5.(a) A liquid fuel weighing 0.98 g gave the following results in bomb calorimetric experiment:

Amount of water taken in the calorimeter	:	1 450 g
Water equivalent of calorimeter	:	450 g
raise in temperature of water	:	1.8^{o} C.
Latent heat of steam	:	587 cals. per g

If the coal sample contains 8% hydrogen, calculate the HCV and LCV of the fuel.
(b) How are the ash content and fixed carbon content of a sample of coal determined? What would be the significance of these results?
(c) Discuss briefly the outline of functioning of a thermal power station.

[4M + 4M + 7M]

6.(a) Write briefly about calomel electrode.
(b) How does a nickel – cadmium cell work? How does it differ from an ordinary dry cell
(c) Describe an oxygen – hydrogen fuel cell.

[5M + 4M + 6M]

7.(a) Explain, with the help of a neat sketch, the principle and working of a photovoltaic cell.
(b) What are the disadvantages of green house effect?

[10M + 5M]

8.(a) Draw a flow diagram of a nuclear reactor.
(b) Write short notes on ANY THREE of the following:
(i) Fuel (ii) Moderator (iii) Coolant
(iv) Control rods (v) Biological shielding

[6M + 9M]

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

I B.Tech I Semester Supplementary Examinations June - 2012

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 the thermodynamic terms
(i) Enthalpy (ii) Entropy (iii) Free energy

(b) What are the advantages and limitations of reverse osmosis method of producing pure water

(c) Illustrate common ion effect with a suitable example. Explain an application of common ion effect in analytical chemistry.

[5M + 5M + 5M]

2.(a) Give examples of homogeneous catalytic reactions in different phases. Explain the mechanism of homogeneous catalytic reaction.

(b) Write briefly about the use of colloid science in industries.

(c) How is vinegar produced from fermented liquors?

[5M + 5M + 5M]

3.(a) Explain, with a suitable example, the phenomenon of phosphorescence.

(b) Discuss the use of biosensors in some industrial / medical applications.

(c) Give a schematic of basic arrangement of NMR spectrometer indicating the parts.

[5M + 5M + 5M]

4.(a) What are n-type extrinsic semi conductors? How does conduction take place in them?

(b) What is the 1,2,3 ceramic compound that shows super conductivity properties? How is it prepared?

(c) What are liquid crystals? How do they differ from liquids and solids? What are the important properties of liquid crystal materials?

[5M + 5M + 5M]

5.(a) Define calorific value of a fuel. What is higher calorific value and how is it different from lower calorific value?

(b) What is pulverization of coal? What are the advantages and disadvantages of pulverized coal?

(c) A coal sample weighing 1.98 g on heating at 110^{o}C for one hour left a residue of 1.78 g. This residue was heated in a suitable crucible with a suitable lid at 950^{o}C for exactly seven minutes and the residue weighed 1.59 g. This residue was heated in presence of air till a constant weight was obtained. This residue weighed 0.231 g. Calculate the proximate analysis of the coal.

[5M + 5M + 5M]

6.(a) What is electrochemical series? Discuss two important uses of this series.
(b) Describe the construction of standard hydrogen electrode.
(c) What are fuel cells and how do they differ from ordinary galvanic cells.Give the outlines of the construction of a fuel cell.

[5M + 5M + 5M]

7.(a) What is parabolic trough power plant? With a neat diagram explain its principle and working.
(b) How green house effect is useful to mankind?

[10M + 5M]

8. Write notes on ANY THREE of the following :
(i) Mass defect (ii) Binding energy (iii) Radio active pollution
(iv) Thermal shielding (v) Half life period.

[5M + 5M + 5M]

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

I B.Tech I Semester Supplementary Examinations June - 2012

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) With the aid of a flow diagram explain the refrigeration cycle.
(b) What is osmosis and what is osmotic pressure? Describe one application of reverse osmosis.
(c) What is ionic product and how does it differ from solubility product? Illustrate with an example.

[5M + 5M + 5M]

2.(a) Explain the hydrogenation of an unsaturated organic compound in presence of nickel as a catalyst.
(b) What is electrophoresis and how does it differ from electro-osmosis?
(c) What is fermentation and what are the conditions that are favourable forfermentation process?

[5M + 5M + 5M]

3.(a) What is fluorescence? Give examples for this phenomenon and discuss two of its applications.
(b) What are solid state sensors? How is fluoride ion selective electrode constructed?
(c) Nuclei like ^{13}C, ^{1}H etc. exhibit nuclear spin while nuclei like ^{12}C, ^{16}O etc. do not show this nature. Explain why it is so.

[5M + 5M + 5M]

4.(a) Using band theory how do you distinguish between conductors and semi conductors?
(b) Discuss some of the important applications of superconductors.
(c) Write notes on important engineering applications of liquid crystals.

[5M + 5M + 5M]

5.(a) How are the moisture content and volatile content of a sample of coal determined? What is the significance of these results?
(b) How are fuels classified? Give examples for the different classes.
(c) Describe briefly the out-line of functioning of a thermal power station.

[5M + 3M + 7M]

6.(a) What is a galvanic cell and how does it differ from electrolytic cell? What are the electrode reactions that take place in Daniel cell?
(b) Explain the concentration cell with a suitable example?
(c) Explain the working of (i) ordinary alkaline battery and (ii) lead accumulator.

[5M + 5M + 5M]

7.(a) What are the advantages of nuclear energy over conventional energy sources?
(b) Write about nuclear fission reactions.
(c) Write a short note on radioactive decay.

[5M + 5M + 5M]

8.(a) Write about the contribution of following gases in enhancing green house effect:
(i) CO_2 (ii) CH_4 (iii) N_2O (iv) CF_xCl_y (v) Atmospheric O_3
(b) Explain the merits of solar energy.

[10M + 5M]