Section – C

Q-5. (a) Why should the following be added to the lubricants (i) antioxidants (ii) corrosion inhibitors (iii) pour point depressants. How are these believed to function? [10]

(b) How are the lubricants classified? What are the various factors which govern the choice of a lubricant? [10]

Q-6. (a) 100 ml of a water sample required 15.5 ml of 0.02 N sulphuric acid for neutralization using phenolphthalein indicator. 100 ml of the same water sample required 7.1 ml of 0.02 N sulphuric acid for neutralization using methyl orange. Calculate the hardness present. [10]

(b) Why is demineralization process preferred over zeolite process for softening of water for use in boilers? [5]

(c) Why should natural water not be fed to boilers? [5]

Q-7. (a) Discuss the use of protective coatings in combating corrosion. [10]

(b) Give an outline of the electrochemical theory of corrosion and explain the mechanism of rust formation in (i) acid (ii) neutral media. [10]

Q-8. (a) Calculate the entropy change if two moles of N_2 three moles of H_2 and two moles of NH_3 are mixed, assuming no chemical reaction. [6]

(b) State second law of thermodynamics and derive Gibbs Helmholtz equation. [8]

(c) Prove that an ideal gas variation of free energy change at constant temperature is given by

$$\Delta G = nRT \ell n \frac{P_2}{P_1}$$

where P_1 and P_2 are initial and final pressure of the gas respectively. [6]

Lingaya's University
B.Tech 1st Year (Term – III)
Examination – May 2011
Applied Chemistry (CH - 101)

[Time: 3 Hours]   **[Max. Marks: 100]**

Before answering the question, candidate should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note: – Attempt five questions in all. All questions carry equal marks. Question no. 1 (Section A) is compulsory. Select two questions from Section B and two questions from Section C.

Section – A

Q-1. Part – A

Select the correct answer of the following multiple choice questions. [10×1=10]

(i) In (+) Glucose the number of chiral centres is

(a) One   (b) Two

(c) Three   (d) Four

(ii) Proteins consist of

(a) D – aminoacids   (b) L – amino acids

(c) DL – amino acids   (d) Units of glucose & aminoacids

(iii) Which of the following is true for the reaction?

$$H_2O_{(l)} \rightleftharpoons H_2O_{(g)} \text{ at } 100^0C \text{ and } 1 \text{ atmosphere.}$$

(a) $\Delta S = 0$ (b) $\Delta H = \Delta E$

(c) $\Delta H = T\Delta S$ (d) $\Delta H = 0$

(iv) In which of the following does the entropy decrease.

(a) A college class being dismissed after a lecture.

(b) Preparation of tea

(c) Diffusion of $H_2O_{(g)}$ into $O_{2(g)}$

(d) Freezing of water

(v) An excited atom or molecule formed in primary process may emit radiations. The emission is

(a) Fluorescence only   (b) Phosphorescence only

(c) May be either Fluorescence or Phosphorescence

(d) Chemiluminescence only

(vi) Excess of impurities, if present in boiler feed water generally cause,

(a) Sludge and scale formation corrosion

(b) Corrosion   (c) Primming and foaming

(d) All of these

(vii) Corrosion is an example of

(a) Oxidation   (b) Reduction

(c) Electrolysis   (d) Erosion

(viii) Non Carbonate hardness in water is caused by,

(a) Calcium chloride   (b) Magnesium sulphate

(c) Both of them   (d) None of them

(ix) The most usual solid lubricant employed is

(a) Tricresyl phosphate

(b) Sodium salt of sulphonic acid

(c) Salt of Phenol & carboxylic acid

(d) Graphite

(x) How many stereoisomer of D-glucose are possible?

(a) One   (b) Two

(c) Three   (d) Four

Q-1. Part – B

(a) How phosphate and chromate ions reduce corrosion?

(b) Why is reverse osmosis so popular?

(c) Delayed Fluorescence is Phosphorescence, comment.

(d) What is reduced phase rule?

(e) Gas under pressure can act as a lubricant. What factors effect the lubrication qualities of a gas? [5×2=10]

Section – B

Q-2. (a) State the law of photochemical equivalence. How is the law verified experimentally? [7]

(b) A 1.0×10^{-3} mol dm^{-3} solution of a certain substance absorbs 10.0% of the incident light. What concentration will be required to absorb 90.0% of the incident light? [5]

(c) Distinguish between:

(i) A photochemical reaction from a thermal reaction.

(ii) A primary photochemical reaction from a secondary photochemical reaction. [2×4=8]

Q-3. (a) Though deuterium and tritium usually occur with hydrogen yet hydrogen is regarded as one component. "Comment." [3]

(b) A eutectic mixture has a definite composition and a sharp melting point, yet it is not a compound. Explain. [3]

(c) In one component system of (H_2O), the fusion curve is tilted towards pressure axis, why? [4]

(d) Derive Gibbs phase rule equation $F = C - P + 2$ where symbols have their usual meaning. [6]

(e) Give one example, each of two component system having congruent melting point and incongruent melting point. [4]

Q-4. (a) Define Lipids, give their broad classification. [5]

(b) What are Ketogenic and glucogenic amino acids? Explain with suitable example. [5]

(c) Explain stereoisomerism and optical isomerism of sugars. [5]

(d) Give one example each of primary, secondary tertiary and quaternary structure of proteins. [5]