Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem- 1st Regular Examination January 2011

Subject code: 110001 **Subject Name: CHEMISTRY**

Date: 03 / 01 /2011 **Time: 10.30 am - 01.00 pm**

Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Distinguish between softening & demineralization of water. **07**
With the help of a neat schematic diagram, describe ion exchange process for purification of water.

(b) Discuss setting & hardening of Portland cement with the sequence of chemical reaction involved in it. **04**

(c) Explain with examples the terms addition polymerization, condensation polymerization & copolymerization. **03**

Q.2 **(a)** Give details of scale & sludge formation in boiler & describe the methods used for their prevention. **07**

(b) Calculate the amount of lime (91% pure) & soda (97.2% pure) required for softening one million litres of water containing: **03**
$Ca(HCO_3)_2$ = 30.5 ppm; Mg $(HCO_3)_2$ = 35.5 ppm; $CaSO_4$ = 240.0 ppm;
$CaCl_2$ = 25.0 ppm & NaCl = 10.0 ppm.

(c) Explain pitting & waterline corrosion. **04**

OR

(b) Three samples A, B & C were analyzed for their salt contents: **03**

1. Sample A was found to contain 168 mg of Magnesium Carbonate per litre.
2. Sample B was found to contain 820 mg of Calcium Nitrate & 2 mg of Silica per litre.
3. Sample C was found to contain 20 gm of Potassium Nitrate & 2 gm of Calcium Carbonate per 500 ml.

Determine the hardness in all the above three samples in ppm & in grains per gallon.

(c) Mention different methods used for prevention of corrosion of metal & discuss any one method. **04**

Q.3 **(a)** Describe in brief, the manufacture of metallurgical coke by Otto Hoffman's oven method. Also describe recovery of by-product & its advantage. **06**

(b) Define the terms: annealing, normalizing, hardening & tempering. **04**

(c) Describe preparation, properties & use of nylon-6 & polyester. **04**

OR

Q.3 **(a)** Write the structure of natural rubber & gutta percha. What are the deficiencies of natural rubber? **06**

(b) Explain the term alloy. State purpose of alloying with suitable example. **04**

(c) With a schematic diagram, describe the process of wet spinning of fibre. **04**

Q.4 **(a)** Describe the various types of metallic coating to protect the metal from corrosion. **06**

(b) Explain the following properties of lubricants & give their significances; **04**

1. Flash & fire point.
2. Cloud & pour point.

(c) Differentiate between global warming & global disaster. Explain green house effect. **04**

OR

Q.4 **(a)** Discuss various steps involved in electroless plating. Write down advantage of electroless plating over electro plating. **06**

(b) What are the refractories? How are they classifies? Give examples of each type. Explain the terms refractoriness. **04**

(c) Write a short note on: Public awareness for environment. **04**

Q.5 **(a)** Differentiate between renewable & non renewable sources of energy. Explain two examples of each in detail. **06**

(b) What is hardness of water? How it is determined by EDTA method? **04**

(c) During the determination of calorific value of a gaseous fuel by Boy's calorimeter, the following results were recorded; **04**

- Volume of gaseous fuel burnt at N.T.P = $0.093m^3$.
- Weight of water used for cooling the combustion products = 30.5 kg.
- Temperature of steam condensed = 0.031 kg.
- Temperature of inlet water = 26.1^0 C.
- Temperature of outlet water = 36.5^0 C.

Determine the gross & net calorific value.

OR

Q.5 **(a)** Write a route on Bio Fuels & Bio Membrance. **06**

(b) What is principle underlying conductometric titration? Discuss the titration curve obtained in the case of weak acid with strong base. **04**

(c) Calculate the minimum amount of air required for the complete combustion of 100 kg. of the fuel containing 80% C, 6% H_2, 5% O_2, 2% S & the rest N_2 by weight. **04**

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