END TERM EXAMINATION

FIRST SEMESTER [B.TECH] JANUARY 2024

Paper Code: ETCH-113	**Subject: Applied Chemistry**
Time: 3 Hours	**Maximum Marks: 60**

Note: Attempt   five questions in all including Q. No.1 which is compulsory. Select one question from each unit. Assume missing data if any.

Q1   Attempt all questions:-   **(2x10=20)**
(a) Differentiate GCV and NCV. Give the relation between them.
(b) State Gibb's Phase rule. Discuss its significance.
(c) Differentiate positive and negative catalysis with suitable examples.
(d) What is Break-point chlorination? What is its significance?
(e) Why rusting of iron is fast in saline water than in ordinary water?
(f) Enzymes are highly specific in their actions. Explain the statement.
(g) A eutectic mixture has a definite composition and a sharp melting point, yet it is not a compound. Justify.
(h) What is Pilling-Bedworth Rule?
(i) Explain how the hardness of water is determined by EDTA method.
(j) Define the terms octane number and cetane number.

UNIT-I

Q2   (a) What is Boy's Gas Calorimeter? Discuss its construction, working and calculations with a labeled diagram.   **(5)**
(b) A sample of coal was found to contain the following:-   **(5)**
$C=80\%$, $H=5\%$, $O=1\%$, $N=2\%$ remaining being ash.
(i) Calculate the amount of minimum air required for complete combustion of 1Kg of coal sample.
(ii) If 45% excess air is supplied, estimate the percentage composition of the dry products of combustion.

Q3   (a) What are the advantages of catalytic cracking over thermal cracking? **(2.5)**
(b) Describe briefly the proximate analysis of coal.   **(2.5)**
(c) Explain the Otto-Hoffmann's by-product oven method for the manufacture of metallurgical coke with a suitable diagram.   **(5)**

UNIT-II

Q4   (a) Discuss the method for the determination of alkalinity.   **(5)**
(b) What is caustic embrittlement? What are the contributing factors for caustic embrittlement?   **(2)**
(c) A water sample is alkaline to both phenolphthalein as well as methyl orange. 100 ml of water sample on titration with N/50 HCl required 4.7 ml of the acid to phenolphthalein end point. When a few drops of methyl orange are added to the same solution and the titration further continued, the yellow colour of the solution just turned red after addition of another 10.5 ml of the acid solution. Elucidate on the type and extent of alkalinity present in the water sample.   **(3)**

Q5   (a) Explain the working (including regeneration) of an Ion-Exchange resin with a suitable diagram. Also report the reactions involved in each case.   **(5)**

(b) 1.0g of $CaCO_3$ was dissolved in dil.HCl and diluted to one litre. 100mL of this solution required 90mL of EDTA solution for titration. 100mL of sample hard water required 40mL of EDTA solution. In another titration, 100mL of same hard water sample on boiling, cooling and filtering etc. required 20 mL of EDTA solution EBT as indicator. Calculate total, temporary and permanent hardness of water sample. **(5)**

UNIT-III

Q6   (a) Draw and explain the phase diagram of Lead-Silver system.   **(5)**
     (b) Write short notes on: **(5)**
       (i) Promoters,   (ii) Inhibitors,   (iii) Catalytic Poisons

Q7   (a) Derive the Michaelis-Menten equation for enzyme catalysis. Discuss its cases.   **(5)**
     (b) Draw and explain the phase diagram of water system. Explain the terms-critical point and triple point.   **(5)**

UNIT-IV

Q8   (a) Explain the term "passivity". What are the factors which affect corrosion?   **(5)**
     (b) Write short notes on the following:- https://www.ggsipuonline.com **(5)**
      (i) Galvanizing and tinning (ii) Cathodic protection (iii) Electroplating

Q9   (a) Differentiate between dry corrosion and wet corrosion.   **(5)**
     (b) Explain the protective measures against corrosion.   **(5)**

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