1E3103

Total No. of Questions : 22 Total No. of Pages : 04

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1E3103

B.Tech. I-Sem. (Main/Back) Exam. - 2024

1FY2-03/Engineering Chemistry

Time : 3 Hours Maximum Marks : 70

Instructions to Candidates :

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in Form No. 205)

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1. ..... 2. .....

PART-A **[10×2=20]**

(Answer should be given upto 25 words only)

All questions are compulsory

Q.1 Hardness of a given water sample is 250 ppm. Express the hardness in degree Clarke and degree French. [2]

Q.2. What do you understand by Break Point Chlorination. [2]

Q.3. The Gross calorific value of a coal sample is 9650 kcal/kg. Calculate the Net calorific value if it contains 6% hydrogen. (latent heat of steam = 587 kcal/kg). [2]

Q.4. What is synthetic petrol? Name the two methods used to convert coal to gasoline. [2]

Q.5. Under identical conditions why does impure metal corrode faster than pure metal? [2]

Q.6. What is 'Flash set' of cement the name the compound responsibel for it. [2]

Q.7. What do you understand by annealing of glass and what is its significance? [2]

Q.8. What is Steam Emulsion Number of a lubricant?

Q.9. Why anodic coatings are better than cathodic coatings for corrosion control? [2]

Q.10. What type of addition reactions occur in carbonyl compounds and why? [2]

PART-B **[5×4=20]**

(Analytical/Problem Solving Questions)

Attempt any five questions

Q.1. Calculate the amount of lime and soda required to soften 10,000L of a water sample containing the following impurities : [4]

$Ca(HCO_3)_2$ = 16.2 mg/L; $Mg(HCO_3)_2$ = 14.6 mg/L; $CaSO_4$ = 13.6mg/L;

$MgSO_4$ = 12.0 mg/L; $MgCl_2$ = 9.5 mg/L.

Q.2. Define knocking. Explain the phenomenon of knocking in a petrol engine. [1+3]

Q.3. What is Pitting corrosion? Explain the mechanism. [1+3]

Q.4. Define cloud and pour point of a lubricating oil. How can you determine the cloud and pour point of a lubricating oil, explain with the help of a well labeled diagram. [1+3]

Q.5. Describe the synthesis, properties and uses of Paracetamol. [4]

Q.6. Explain the following : [2+2=4]

(a) Role of gypsum in cement

(b) Borosilicate glass

Q.7. What is Proximate analysis of fuel and what is its significance? [3+1]

PART-C **[3×10=30]**

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions

Q.1. (a) What do you understand by Priming and Foaming? [5]

(b) 0.5g of $CaCO_3$ was dissolved in HCl and the solution was made upto 500 mL with distilled water. 50 mL of this water sample required 48 mL of EDTA solution for titration. 50 mL of the sample water required 15 mL of EDTA and 50 mL of boiled water sample required 10 mL of EDTA solution for titration. Calculate the temporary, permanant and total hardness of the given water sample. [5]

Q.2. (a) Explain the determination of calorific value of a fuel using a Bomb Calorimeter. [5]

(b) A sample of coal contains the following constituents :

C = 88%; H = 4%; O = 4%; N = 2%; S = 2%

Calculate the minimum weight of air required for the complete combustion of 1 kg of this coal sample. [5]

Q.3. (a) Explain the mechanism of chemical (dry) corrosion. [5]

(b) Explain the sacrificial anode cathodic protection method for corrosion control. [5]

Q.4. Write short notes on : [5+5]

(a) Manufacture of cement by Rotary kiln method

(b) Classification of Lubricants

Q.5. Explain the mechanism of : [5+5]

(a) Electrophilic aromatic substitution in benzene

(b) Nucleophilic substitution reaction in t-butylbromide. Also discuss the stereochemistry of the product.

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