22362

11819

3 Hours / 70 Marks   Seat No. ☐☐☐☐☐☐☐☐

Instructions :   (1)   All Questions are *compulsory.*

(2)   Answer each next main Question on a new page.

(3)   Illustrate your answers with neat sketches wherever necessary.

(4)   Figures to the right indicate full marks.

(5)   Assume suitable data, if necessary.

(6)   Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1.   **Attempt any FIVE :**   **10**

(a)   Define the term 'Bio-chemical oxygen Demand'.

(b)   Define the term 'Calorific value' of fuel.

(c)   Draw the chemical structure of :

(i)   Sodium hydro sulphite

(ii)   Hydrogen peroxide

(d)   State the physical properties of soaps.

(e)   Define the term 'Iodine value' of oil.

(f)   Define the terms :

(i)   Qualitative Analysis

(ii)   Quantitative Analysis

(g)   Define the term 'co-ordination number'.

2. **Attempt any THREE :** 12

   (a) Compare between temporary and permanent hardness.

   (b) Compare the characteristics of a solid, liquid and gaseous state fuel.

   (c) Explain the chemical properties of hydrochloric acid.

   (d) Describe an analytical method to find saponification value of oil.

3. **Attempt any THREE :** 12

   (a) Two fabric samples X and Y are supplied to test the wetting property. Fabric sample X does not undergo wetting while sample Y undergo wetting within no time.

      Suggest the method to improve wetting property of sample X.

      Predict the reason for better wetting property of sample Y.

   (b) Differentiate between primary and secondary standard used in titration with relevant examples.

   (c) Explain the following types of titrations with relevant examples :
      (i) Precipitation titration
      (ii) Redox titration

   (d) Explain the factors affecting the stability of complex ions and co-ordination compounds.

4. **Attempt any THREE :** 12

   (a) A sample of fuel contains C = 50%, O = 38%, H = 6%, S = 5%, N = 0.3 % & Ash = 0.3 %. Calculate the higher calorific value and lower calorific value of fuel.

   (b) Classify the fuels based on their physical state with relevant examples.

(c) Constant burette reading by an expert is 12.5 ml. Observed burette reading for the same titration is 12.8 ml.

Determine accuracy and precision in the performed titration.

(d) Describe the role of EDTA for determining hardness of water.

(e) A water sample contains dissolved salts of calcium and magnesium bicarbonate. Suggest the procedure for separating these salts from water.

5. **Attempt any TWO :** 12

(a) Choose relevant chemicals along with formulae for following wet processes. Explain their role in corresponding process.
   (i) Desizing
   (ii) Scouring
   (iii) Bleaching

(b) A sample of water contains the following impurities in mg/lit.

$Ca(HCO_3)_2$ = 9.80 mol.wt = 162

$Mg(HCO_3)_2$ = 6.4 mol.wt = 146

$CaSO_4$ = 3.2 mol.wt = 136

$MgSO_4$ = 8.40 mol.wt. = 120

$CaCl_2$ = 3.14 mol.wt = 111

KCl = 10.0 mol. Wt = 75

Calculate temporary and permanent hardness of water.

(c) Select the procedure to determine the purity of hydrochloric acid using following chemicals :

    (i) Oxalic acid

    (ii) NaOH

    (iii) Phenolphthalein

6. **Attempt any TWO :** **12**

(a) Select the type of titration required for determination of dissolved oxygen in water. Describe the procedure of determining the same.

(b) Draw a sketch indicating reverse osmosis process of purifying water.

(c) Complete the following chemical reactions :

    (i) $Na_2CO_3 + HCl \longrightarrow$

    (ii) $H_2O_2(aq) + 2e^- \longrightarrow$

    (iii) $H_2O_2(aq) + 2H^+ + 2e^- \longrightarrow$

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