

22362

23124

3 Hours / 70 Marks

Seat No. 

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- Instructions* – (1) All Questions are *Compulsory*.  
(2) Answer each next main Question on a new page.  
(3) Abbreviations used convey usual meaning.  
(4) Figures to the right indicate full marks.  
(5) Use of Non-programmable Electronic Pocket Calculator is permissible.  
(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

- 1. Attempt any FIVE of the following: **10****
- a) Write 'characteristics' of a good fuel.
- b) i) Define 'oleum'.  
ii) Write weight % acid in :  
(1) Concentrated hydrochloric acid.  
(2) Concentrated sulphuric acid.
- c) Write structured formula of:  
i) Caustic Soda  
ii) Ammonium chloride.
- d) State applications of 'hydrochloric acid.'
- e) Define a 'triglyceride'. Represent its structural formula. State its relation with a FA.
- f) Define 'co-ordination number'. Write co-ordination number of  $K_3\{Fe(CN)_6\}$

P.T.O.

- g) i) Define a 'Ligand'.  
ii) Give an example of Ligand each which is:  
(1) Monodentate  
(2) Didentate

**2. Attempt any THREE of the following: 12**

- a) Differentiate between a 'Sludge' and a 'Scale'. Schematically retirement them.
- b) Explain 'effects' of sludges and scales formation on a boiler with a labelled diagram, describe a method to determine 'moisture content' in a boiler fluid sample.
- c) 'Concentrated sulphuric acid is a powerful dehydrating agent and an oxidising agent'. Explain with examples and reactions.
- d) State difference between:  
i) Qualitative - and quantitative - analysis.  
ii) Accuracy and precision.

**3. Attempt any THREE of the following: 12**

- a) i) Define mg/4 and ppm 'hardness of water'. Derive relation between them.  
ii) Define 'temporary hardness' of water. Indicate as to how, it is 'removed'.
- b) i) Name a cation exchange resin and an anion exchange resin. Write reactions involved in softening water by ion-exchange method.  
ii) Write a method to 'regenerate' the resins.
- c) Describe a method to find 'wetting time' of a given fabric sample.
- d) Differentiate between 'primary standard' and a 'secondary standard'. Give examples.

- 4. Attempt any THREE of the following:** **12**
- a) Calculate GCV and NCV for a fuel having composition:  
C (85%), H(8%), S(1%), N(2%), ash (4%). Latent heat of vaporisation of water = 587 cal/g.
  - b) i) Compare basic nature of sodium carbonate and caustic soda.  
ii) Write two chemical properties of 'sodiumhydrosulphite.'
  - c) Write stepwise procedure to determine 'S.V.' of an oil.  
What is the usual S.V. of an oil having EW 293?
  - d) Explain with reactions, 'redox titration'. State utility of the method.
  - e) Explain 'Werner's co-ordination theory in light of modern electronic theory of valence.
- 5. Attempt any TWO of the following:** **12**
- a) Describe with a diagram, method to determine total solids, suspended solids, dissolved solids in water.
  - b) Explain with reactions, use of hydrogen peroxide in textiles.
  - c) Describe stepwise procedure of 'complexometric titration'.  
Write reactions involved in the method and name the indicator used.  
  
State utility of such titration in textile field.
- 6. Attempt any TWO of the following:** **12**
- a) Distinguish between solid -, liquid - and gaseous - fuels.  
Give examples of each.
  - b) i) Describe the process of 'hydrogen nation' of oil, stating temperature -, pressure-conditions; and naming type of catalyst system used.  
  
ii) Name types of oils suitable and used for hydrogenation.
  - c) Describe 'stability' of 'co-ordinating compounds' and 'factors' affecting the stability.
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