

Seat No.	
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**[4856]-102**

**F.E. EXAMINATION, 2015**  
**ENGINEERING CHEMISTRY**  
**(2012 PATTERN)**

**Time : Two Hours****Maximum Marks : 50****N.B. :-** (i) All questions are compulsory.

(ii) Figures to the right indicate full marks.

1. (a) Discuss the Ion-Exchange method for softening of hard water with the help of reactions involved in removal of ions and regeneration of the exchangers. Draw a neat labelled diagram and give limitations of the process. [6]
- (b) Define the following terms : [3]
- (i) Bathochromic shift
- (ii) Hypochromic shift
- (iii) Chromophore.
- (c) Explain the conductometric titration curve for the reaction between KCl and  $\text{AgNO}_3$ . [3]

Or

2. (a) Explain the potentiometric titration of  $\text{Fe}^{2+}$  against  $\text{Ce}^{4+}$  giving reactions. Draw the titration curve and give the formulae for calculating emf of the cell at various stages of the titration. [6]

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- (b) Give the demerits of the traditional route and merits of the green route of synthesis of polycarbonate. [3]
- (c) 50 ml of water sample required 12.1 ml of N/50 HCl to reach the phenolphthalein end-point and 18.5 ml of the same acid for the methyl orange end-point. Calculate types and amount of alkalinities present. [3]
3. (a) Define glass transition temperature. Give its significance and discuss any *four* factors affecting it. [6]
- (b) Define GCV and NCV. Give the justification of how they are related. [3]
- (c) A coal sample has the following composition :  
C = 70%, H = 10%, N = 3%, S = 3%, O = 2% and ash = 12%.  
If 20% excess air is required for complete combustion, then calculate the amount of air required for complete combustion of 1 kg of coal. [3]

Or

4. (a) Explain in brief the process of fractional distillation of petroleum with diagram. Give the composition and boiling range of petrol and diesel obtained. [6]
- (b) Give the purpose and examples of the following constituents used during the compounding of plastics : [3]
- (i) Fillers
  - (ii) Lubricants
  - (iii) Plasticisers.

- (c) Explain solution polymerisation technique. Draw the figure and state the disadvantages of this technique. [3]
5. (a) Explain the structure of fullerene. Give any *two* properties and *two* applications of fullerene. [5]
- (b) Give the preparation reaction and applications of germane and lithium hydride. [4]
- (c) Discuss the properties of hydrogen which make it difficult for storage. [4]

Or

6. (a) Explain the production of hydrogen by water splitting using solar energy. [5]
- (b) Discuss the different types of carbon nano tubes with respect to their structure. Give any *two* applications of it. [4]
- (c) Explain the structure of graphite. Give its properties and applications. [4]
7. (a) Give the Pilling-Bedworth ratio and its significance. Give the oxidation reaction involved and state the type of film formed on the surface in the case of Mg, Cr and Mo. [5]
- (b) Explain the process of galvanising with labelled diagram. Give the applications and limitations of this technique. [4]
- (c) State the different types of corrosion inhibitors with their examples. Discuss in brief their role in corrosion prevention. [4]

Or

8. (a) Discuss any *five* factors affecting corrosion. [5]
- (b) Define corrosion. Explain the hydrogen evolution mechanism of wet corrosion. [4]
- (c) What is the principle of cathodic protection ? Discuss any *one* technique of cathodic protection and give its applications. [4]

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