

Total No. of Questions—8]

[Total No. of Printed Pages—3

Seat No.	
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[5558]-102

**F.E. EXAMINATION, 2019**  
**ENGINEERING CHEMISTRY**  
**(2015 PATTERN)**

**Time : Two Hours**

**Maximum Marks : 50**

- N.B. :-**
- (i) Neat diagrams must be drawn wherever necessary.
  - (ii) Figures to the right indicate full marks.
  - (iii) Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.
  - (iv) Assume suitable data, if necessary.

1. (a) Define scale and sludge. Give the causes, disadvantages of scales in boiler. [6]
- (b) Explain titration curve of conductometric titration between strong acid and weak base. [3]
- (c) Define the following terms : [3]
- (i) Auxochrome
  - (ii) Red shift
  - (iii) Blue shift.

*Or*

2. (a) Discuss the titration curve for pH metric titration between mixture of strong acid-weak acid and strong base. Give reactions involved. [6]
- (b) Give any *three* principles of green chemistry. [3]

P.T.O.

- (c) A zeolite softner was completely exhausted and was regenerated by passing 100 litre of NaCl containing 150 gm/lit of NaCl. How many liters of a sample of water containing hardness 600 ppm can be softened by this softner ? [3]
3. (a) What is glass transition temperature of a polymer ? [6]  
Discuss any *five* factors affecting  $T_g$  value of polymer.
- (b) Define : [3]
- (i) Cetane number
- (ii) Power alcohol
- (iii) N.C.V.
- (c) 0.15 gm coal sample on burning in combustion chamber in presence of pure oxygen was found to increase weight of  $\text{CaCl}_2$  U-tube by 0.08 gm and KOH U-tube by 0.49 gm. Calculate carbon and hydrogen present in coal sample on percent basis. [3]

Or

4. (a) Draw neat labelled diagram and give construction, working of Bomb calorimeter to determine G.C.V. of fuel using corrected formula. [6]
- (b) Discuss bulk polymerization technique with diagram. Give its limitations. [3]
- (c) Give preparation reaction, properties and applications of SBR. [3]

5. (a) Explain production of hydrogen by steam reforming of methane and coke with reaction conditions and removal of  $\text{CO}_2$ . [6]  
(b) Give structure and properties of fullerenes. [4]  
(c) Differentiate between diamond and graphite. [3]

Or

6. (a) What are carbon nano tubes (CNTs) ? Give their types and any *four* applications. [6]  
(b) Give any *four* methods of storage of hydrogen. [4]  
(c) Explain isotopes of hydrogen with applications. [3]
7. (a) Explain hydrogen evolution and oxygen absorption mechanism of wet corrosion. [6]  
(b) State the principle of electroplating. Explain the method with diagram and reactions involved. [4]  
(c) Define corrosion of metals. How the method of metal cladding is useful in protection of metal against corrosion.

Or

8. (a) Explain any *six* factors affecting corrosion. [6]  
(b) Write Pilling Bedworth Ratio. Give its significance. What would be the type of oxide film in case of corrosion of (i) Mo and (ii) Al. State with reactions. [4]  
(c) Describe any *one* method of cathodic protection of metal. [3]