Total No. of Questions—**8**] [Total No. of Printed Pages—**3**

Seat No.	

[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_9 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 $CaCl_2$ 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 CO_2. [6]

(*b*) Give structure and properties of fulkrene. [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]