Total No. of Questions—**8**] [Total No. of Printed Pages—**4**

Seat No.	

[5151]-105

F.E. EXAMINATION, 2017

ENGINEERING CHEMISTRY

(2015 PATTERN)

Time : Three 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*) What are zeolites ? Explain zeolite process for softening of water. Give regeneration reactions, advantages and disadvantages of the process. [6]

(*b*) What is reference electrode ? Draw neat labelled diagram of calomel electrode and give its representation. [3]

(*c*) Explain conductometric titration curve for the reaction between KCl and $AgNO_3$. [3]

Or

2. (*a*) Explain the pH metric titration of mixture of weak acid-strong acid against standard alkali, giving chemical reactions, procedure, titration curve and calculations. [6]

P.T.O.

(*b*) 50 ml of water sample requires 15 ml of 0.02 M EDTA during titration. Whereas 50 ml of boiled water sample requires 11 ml of same EDTA in the titration. Calculate total, temporary and permanent hardness of water sample. [3]

(*c*) What are the merits of green synthesis and demerits of traditional synthesis of polycarbonate. [3]

3. (*a*) What is vulcanisation of rubber ? Explain chemical reaction involved in vulcanisation process. Compare natural rubber with vulcanised rubber. [6]

(*b*) Define : [3]

(*i*) Octane number

(*ii*) Power alcohol

(*iii*) Gross calorific value.

(*c*) A fuel has the following comosition by mass :

e = 83%, H_2 = 12%, S = 1%, O_2 = 3.2% and remaining being ash. Calculate quantity of air. [3]

Or

4. (*a*) What is proximate analysis of coal ? Explain the procedure for determination of each constituent with its formula. [6]

(*b*) Distinguish between LDPE and HDPE. [3]

(*c*) What is biodegradable polymer ? Give the structure of PHBV and its applications. [3]

5. (*a*) State the difficulties in storage of hydrogen gas. Give its chemical storage in analates and metal hydrides. [5]

(*b*) Give the preparation reaction and applications of germane and lithium hydride. [4]

(*c*) Explain the structure and properties of graphite. [4]

Or

6. (*a*) Explain the structure of fullerene. Give any *two* properties and *two* applications of fullerene. [5]

(*b*) Explain the production of hydrogen by water splitting using solar energy. [4]

(*c*) Explain the isotopes of carbon with their applications. [4]

7. (*a*) Explain the mechanism of dry corrosion. Discuss the oxidation corrosion in case of Mg, Cr, Mo. [5]

(*b*) What is the principle of cathodic protection. Explain it with any *one* suitable method. [4]

(*c*) Explain cementation and cladding methods for applying metallic coatings on base metal. [4]

Or

8. (*a*) Define wet corrosion. Explain corrosion by oxygen absorption mechanism. [5]

(*b*) What are the factors affecting corrosion ? (Explain nature of metal only) [4]

(*c*) Discuss various steps involved in powder coating. [4]