Roll No. | | | | | | | |

TCH–101

B. Tech. (First Semester)
End Semester EXAMINATION, 2017
(All Branches)
ENGINEERING CHEMISTRY

Time : Three Hours] [*Maximum Marks : 100*

Note : (i) This question paper contains two Sections.
(ii) Both Sections are compulsory.

Section—A

1. Fill in the blanks : (1×5=5 Marks)
   (a) Bond order of NO^+ is ..... .
   (b) Chemical name of EDTA is ..... .
   (c) Good fuel has ..... calorific value.
   (d) During electrolysis oxidation reactions occur at ..... reduction reaction occur at ..... .
   (e) Water which produces ..... easily on shaking with soap solution is called soft water.

2. Attempt any *five* parts : (3×5=15 Marks)
(Define/Short Numerical/Short Programming/Draw)
   (a) Draw the MO diagram for O_2. Specify its bond order and magnetic property.

(b) Explain stability of Carbonium ion with *one* example.

(c) Define Pseudo Order Reaction with *one* example.

(d) What is meant by Fibers ? Give uses of Kevlar and PMMA.

(e) What is Corrosion ? Give the factors affecting corrosion.

(f) Define the term Lubricants. What are their functions ?

(g) The rate constant of zero order reaction is 0.2 moles/litres $hour^{-1}$. What will be the initial concentration of the reactant if after half an hour its concentration is 0.05 moles/litre.

Section—B

3. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)

(a) What are the main postulates of VSEPR theory ? How does this account for the geometries of the following molecules ?

(i) H_2O

(ii) XeF_4

(b) State the Zeolite process for the removal of hardness of water. Discuss its merits over soda-lime process.

(c) Calculate the weight and volume of air required for combustion of 3 kg of carbon.

4. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)

(a) Explain Hyper-conjugation with examples and give its applications.

(b) What do you understand by Electrophilic Substitution ? Discuss the mechanism of Nitration of benzene.

(c) Describe the Nernst equation for simple electrode potential.

5. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)

(a) Explain the mechanism of S_{N_1} and S_{N_2} reaction.

(b) What is the difference between a monomer and polymer ? Write the chemical reaction involved during Nylon 6, 6 polymer syntheses.

(c) What is meant by calorific value of fuel ? What is the difference between Gross calorific value and Net calorific value ?

6. Attempt any *two* parts of choice from (a), (b) and (c). (10×2=20 Marks)

(a) Define the following :

(i) Hydrogen bonding and its application.

(ii) Differentiate between mole cularity and order of reaction.

(iii) Principle involved in L-H process with equations.

(iv) Fission of a covalent bond.

(v) Reverse osmosis.

(b) What is the energy of Activation ? How is the rate constant of a reaction related to its activation energy ?

(c) A simple of water on analysis was found to contain the following impurities :

Impurity	Quantity	Mol. wt.
$Ca(HCO_3)_2$	4	162
$Mg(HCO_3)_2$	6	146
$CaSO_4$	8	136
$MgSO_4$	10	120

Calculate the temporary, permanent and total hardness of water in ppm.