Total number of printed pages–8

53 (CY 201) ENCH

2021

ENGINEERING CHEMISTRY

Paper : CY 201

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer Question No. ***1*** *and* ***any four*** *from the rest.*

1. *(a)* Choose the correct answers : 1×5=5

   (i) The minimum energy necessary to permit a reaction is :

   (A) Internal eneregy

   (B) Free energy

   (C) Threshold energy

   (D) Activation energy

Contd.

(ii) The cell reaction is spontaneous, if the cell potential is —

(A) Zero

(B) Positive

(C) Negative

(D) Infinite

(iii) Standard hydrogen electrode has been assigned a potential of :

(A) 100 volts

(B) 1 volt

(C) 0 volt

(D) *–ve* voltage

(iv) Which of the following is an weak electrolyle ?

(A) $NaCl$

(B) HCl

(C) KOH

(D) NH_4OH

(v) Corrosion of metals take place because of —

(A) Reduction

(B) Oxidation

(C) Both (A) and (B)

(D) None of the above

(b) Fill in the blanks : 1×5=5

(i) The stability of 3° amine is _____ than 2° amine.

(ii) The monomer units of Nylon–6.6 are _____ and _____ .

(iii) Bakelite is known as _____ resins.

(iv) The other name of Buna-Srubber is _____.

(c) Find out *true / false* from the following : 1×5=5

(i) The reaction pathway followed for Saytzeff rule is E_2.

(ii) Singlet carbene is sp^2 hybridised.

(iii) α-hydrogen requires for Aldol reaction.

(iv) Mesomeric effect can be transmitted along any number of carbon atoms in a conjugated system.

(v) The inductive effect is a permanent state of polarization.

(d) Match the following : 1×5=5

Group A	Group B
(a) H_2, O_2, N_2, etc have	(i) electronic transition
(b) HCl, H_2O, NH_3 etc have	(ii) $NaCl$
(c) Ionic bond is found in	(iii) NH_4^+ ion
(d) Dative bond is found in	(iv) Non-polar bonds
(e) UV-visible spectroscopy	(v) Polar bonds

2. (a) Write down the application of Nernst equation. 3

(b) Explain the difference between electrode potential and standard electrode potential. 2

(c) Write the cell reaction and e.m.f. equation for the following cell :

$$Fe\,/Fe^{+2}\ //\ Sn^{+2}/Sn$$ 5

(d) Write the differences between dry and wet corrosion. 3

(e) Deduce the expression of work done for isothermal reversible process for one mole of an ideal gas. 5

(f) Mention the main features of Transition State Theory. 2

3. (a) Explain the terms Chromophore and Auxochrome giving examples. 4

(b) What are stretching and bending modes of molecular vibrations associated with IR-spectroscopy ? 6

(c) Describe the instrumentation of Mass Spectroscopy. 5

(d) Mention the properties of an ideal fuel. 5

4. (a) Distinguish between addition and condensation polymers giving examples. 4

(b) In a polymer, there are 100 molecules of molecular weight 100, 200 molecules of molecular weight 1,000 and 300 molecules of molecular weight 10,000. Find M_n, M_w and PDI. 6

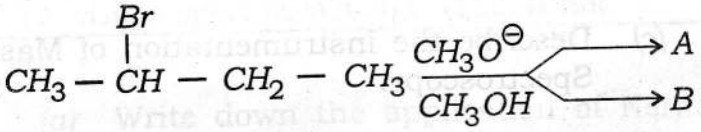
(c) Write short notes on : 3+3+4=10

(a) Natural rubber

(b) Teflon

(c) Pseudounimolecular reaction

5. (a) Write down the reaction product of the following with proper reaction mechanism pathway : 2+3=5



(b) What is Markovnikov and anti-Markovnikov rules ? Give examples with reactions. 2½+2½=5

(c) What is carbene intermediate species ? What are decomposition products of ketene and diazomethane ? 1+1+1=3

(d) Give the mechanism of acid or base catalysed aldol reaction. 5

(e) Define S_N1 and $E1$ reactions. 2

6. (a) Explain the hybridisation involved in CH_4, C_2H_4 and C_2H_2 molecules. 6

(b) What are n-type and p-type semiconductors ? Give examples. 4

(c) Explain what do you understand by Gross and Net calorific values. 4

(d) Write short notes on : 3+3=6

(i) Octane number

(ii) Cracking of hydrocarbons.

7. (a) Give the differences between order and molecularity of a reaction. 4

(b) Give structure and examples of linear, branched and cross-linked polymers. 6

(c) How do you define nucleophilic and electrophilic reagents ? Give examples of positively and negatively charged species. 2+2=4

(d) Explain inductive and mesomeric effects mentioning their applications. 3+3=6