NBS-4103

S.No. 617

No. of Printing Pages : 5

Following Paper ID and Roll No. to be filled in your Answer Book.

Paper ID : 49903 Roll No. 1 2 3 0 4 3 2 6 7 4

B.Tech. Examination-2023-24

(Odd Semester)

ENGINEERING CHEMISTRY

Time : Three Hours] [Maximum Marks : 60

Note :– Attemtp all questions.

SECTION-A

1. Attempt each part in this section. Each part carry equal marks. 8 x 1=8

   (a) Explain the magnetic behaviour of CN molecule.

   (b) Give an example of Pseudo unimolecular reaction.

   (c) Define position isomerism. Give examples.

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(d) Biodiesel production is an example of which of the 12 principles of Green Chemisty.

(e) What are Endocrine disrupting chemcials ?

(f) Write the monomers of Bakelite.

(g) Write the constituents responsible for permanent hardness of water.

(h) What is ISO/IEC 17025 useful for ?

SECTION-B

2. Attempt any two parts in this section. Each part carry equal marks. $2 \times 6 = 12$

(a) Draw the molecular orbital diagram of HF and O_2^-. Also write their bond orders and magnetic behaviour.

(b) What is optical isomerism ? Give the sterio isomers of tortaric acid. How do you account for lack of optical activity in Racenic and Meso forms ?

(c) Define Persistent organic pollutants (POPs). What are their properties and health effects on humans and environment ?

(d) Write the principle of ultraviolet spectroscopy. Discuss various types of electronic transitions in the UV region, giving examples.

SECTION-C

3. Attempt any two parts from each questions. Each part carry equal marks. $5 \times 8 = 40$

(a) Derive Arrhenius equation. The rate of a reaction quadruples when the temperature changes from 293 to 313 K. Calculate the energy of activiation of the reaction. (Given : $R = 8.314$ JK7 mol^{-1})

(b) Derive the rate equation for a second order reaction when both the reactants are same.

(c) Write short notes on the following—

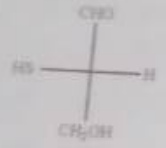
(i) Classification of liquid crystals and uses.

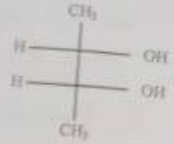
(ii) Structure and uses of graphite.

4. (a) Define stoichiometric defects. Explain various types of this defect with suitable examples and diagrams.

(b) Draw various conformations of n-butane and explain their order of stability using energy profile diagram.

(c) Assign R/S and E/Z nomenclature of the following—

(i) 

(ii) 

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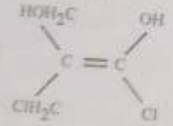
(iv) 

5. (a) Give preparation, properties and uses of dacron and nylon-6, 6.

(b) Explain the following—

(i) Thermoplastic and thermosetting resins.

(ii) Bioplastics and their benefits.

(c) Give the classification of conducting polymers. Write the structure of three conducting polymers. Discuss their properties and uses.

6. (a) Define high performance liquid chromatography (HPLC). What is its principle ? Discuss about its two main modes. How is it operated ?

(b) Write short notes on the following—

(i) Battrochromic shift and hypsochromic shift.

(ii) Zeolite process of softening of water.

(c) Why does hard water consume a lot of soap? Calculate the temprorary, permanent and total hardness of water sample which is analyzed as—

$Ca(HCO_3)_2 = 40.5$ mg/L

$Mg(HCO_3)_2 = 36.5$ mg /L

$CaCl_2 = 27.75$ mg/L

$NaCl = 10.0$ mg/L

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