05/12/17

Roll No. | | | | | | | |

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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 *five* questions with alternative choice.

(ii) All questions are compulsory.

(iii) Instructions on how to attempt a question are mentioned against it.

(iv) Total marks assigned to each question are **twenty.**

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

   (a) Differentiate between bonding and anti-bonding molecular orbitals. Draw the MOT diagram of HF molecule. Also report about its magnetic nature and bond order.

(b) (i) Explain why, orthonitrophenol and paranitrophenol can be able to separate through fractional distillation method,

(ii) Explain metallic bond on the basis of Electron Sea Theory.

(c) On the basis of VSEPR theory, discuss the shape of XeF_2 and BF_3. Write the drawbacks of VSEPR theory.

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

(a) (i) Explain why, chloroacetic acid is strong acid than acetic acid.

(ii) Hyperconjugation

(b) Differentiate between SN^1 & SN^2 reactions, with suitable examples and mechanism.

(c) Write short notes on the following :

(i) Stability of Carbocations

(ii) Electromeric Effect

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

(a) Write the preparation, properties and uses on the following :

(i) Polystyrene

(ii) Bakelite

(iii) Plexi Glass

(b) (i) Define Conducting Polymers.

(ii) Differentiate between the Thermoplastic and Thermosets polymers.

(c) (i) Write the preparation, properties and uses on Kevlar and Teflon.

(ii) Define about the tacticity in polymers. Also give suitable examples.

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

(a) (i) Write about electrochemical theory of corrosion.

(ii) Discuss about concentration cells.

(b) Determine the potential of a Daniel cell, initially containing 100 L each of 1.00 M Cu^{+2} ion and 1.00 M Zn^{+2} ion, after the passage of 0.1×10^6 coulombs of charge.

(c) Prove that for second order reaction, the half life period is inversely proportional to initial concentration of one of reactant (when the reactants are same).

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

(a) Write short notes on the following :

(i) Bio-Gas

(ii) Lime Soda process for softening of water

(b) Define the term GCV and NCV of a fuel. Calculate the GCV and NCV of the coal in Cal/gm for a coal sample, tested in the laboratory for its calorific value in the bomb calorimeter, the following data were obtained :

Weight of coal burnt = 0.92 gm, weight of water taken = 650 gm, weight of water equivalent of bomb and calorimeter = 1650 gm, Rise in temperature = 2.25°C, Fuse wire correction = 10 cal, Acid correction = 60 cal, Hydrogen = 9% and latent heat of Condensation of steam = 587 cal/gm.

(c) (i) Write the principle of UV-Visible spectroscopy.

(ii) Explain why, hardness is expressed in terms of $CaCO_3$ equivalents.