

16/12/16

Roll No.

--	--	--	--	--	--	--

H

TCH-101

**B. Tech. (First Semester)
End Semester EXAMINATION, 2016**

(All Branches)

ENGINEERING CHEMISTRY

Time : Three Hours]

[Maximum Marks : 100

Note : (i) This question paper contains five questions.

(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. Find the bond order of F_2 and NO molecule and also report about their magnetic nature.

[2]

TCH-101

- (b) Write a note on hydrogen bonding with conditions for its formation. Classify H-bonding with their significances.
- (c) Write the main postulates of VSEPR theory. On the basis of it, discuss the geometry of CH_4 and NH_3 molecule.
2. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)
- (a) Discuss about SN^1 and SN^2 reactions. With suitable examples and stereochemistry.
- (b) Define Electrophilic Substitution ($\text{S}_{\text{E}}\text{Ar}$) reaction with the mechanism of Nitration.
- (c) Write a short note on, with the suitable examples of the following :
- Stability of carbonations
 - Resonance 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 :
- Kevlar
 - Bakelite
 - PMMA
- (b) Define addition and condensation polymerization, with suitable examples.

D-48

[3]

TCH-101

- (c) Write short notes on the following with the suitable examples:
- Conducting Polymers
 - Thermoplastic resins and thermosets.
4. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)
- (a) 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).
- (b) Calculate the potential of the cell :
- $$\text{Cr}/\text{Cr}^{+3} (0.1\text{M})/\text{Fe}^{+2} (0.01\text{M})/\text{Fe}$$
- Given :
- $$E^0_{\text{Cr}^{3+}/\text{Cr}} = -0.74 \text{ V and } E^0_{\text{Fe}^{+2}/\text{Fe}} = -0.44 \text{ V}$$
- (c) Write short notes on the following :
- Concentration cells with its classification and applications in industry.
 - Differentiate between molecularity and order.
5. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)
- (a) Write short notes on the following :
- Bio-gas
 - UV-Visible spectroscopy

D-48

P. T. O.

- (b) Calculate the permanent and temporary hardness of hard water whose analysis is as follows :

$$\text{Ca(HCO}_3)_2 = 16.2 \text{ ppm, } \quad \text{NaCl} = 11.1 \text{ ppm,}$$

$$\text{MgSO}_4 = 60.0 \text{ ppm, } \text{Mg(HCO}_3)_2 = 7.3 \text{ ppm}$$

$$\text{and CaCl}_2 = 11.1 \text{ ppm.}$$

- (c) 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 :

$$\text{Weight of coal burnt} = 0.90 \text{ gm}$$

$$\text{Weight of water taken} = 550 \text{ gm}$$

$$\text{Weight of water equivalent of bomb and calorimeter} = 1750 \text{ gm}$$

$$\text{Rise of temperature} = 2.5^\circ\text{C}$$

$$\text{Fuse wire correction} = 10 \text{ cal}$$

$$\text{Acid correction} = 60 \text{ cal}$$

$$\text{Hydrogen} = 15\%$$

$$\text{Latent heat of condensation of steam} = 587 \text{ cal/gm.}$$