CY-201/1858 (N)

B. Tech. (Semester-II) Exam. 20

Engineering Chemistry

Time: Three Hours

Maximum Marks: **100**

Note: Attempt questions from all the sections.

Sectiou–A

(Short Answer Type Questions)

Note: Attempt any ten questions. Each question carries 4 marks. **(4x10=40)**

1. Define the terms
(i) Chromophores
(ii) Auxochrome
(iii) Bathochromic shift.

2. Calculate the NMR signals and splitted signals in the following molecules:
(i) CH_3-O-CH_2-CH_3 (ii) CH_3-CH(Br)-COOH

3. How would you determine the calorific value of fuel by Bomb calorimeter?

4. Explain Zeolite method for softening of the hard water

5. Give preparation and use of following:

(i) Bakelite (ii) Nylon 66

(iii) Buna-S (iv) Buna-N

6. On the basis of MOT explain why F_2 is diamagnetic while O_2 is paramagnetic? Calculate their bond orders.

7. At what glancing angle would the first order diffraction from (110) plane of KCl be observed, using X ray of wavelength of 154 pm? The dimension of the unit cell is 315 pm.

8. Describe construction of Galvanic cell.

9. Define phase, component and degree of freedom as applied to phase rule, and also Explain phase rule to one Component system.

10. The specific rate constant for the decomposition of formic acid is 5.5×10^{-4} sec^{-1} at 413K. Calculate the specific Rate constant at 458K if the energy of activation is 2.37×10^{4} $calmol^{-1}$.

11. What do you understand by cathodic protection of iron? Discuss concentration cell.

12. Chromium metal crystallizer with a body centred cubic lattice. The lengthy of the unit cell edge is found to be 287PM. Calculate the atomic radius. What would be the density of Chromium in gm/m? (Mass of Cr=52).

Derive Bragg s equation for diffraction of X-rays by crystals.

Calculate electrode potential of the given cell $Zn/Zn_2+(0.01M)//Cu_2+(0.1M)/$ Cu, if E° cell $Zn/Zn_2+ = -0.254v$ and E° cell $Cu_2+ /Cu = +0.328V$

Draw the construction of fuel cell and explain its application.

Section–B
(Long Answer Type Questions)

Note: Attempt any three questions. Each question carries 20 marks. **(20x3=60)**

(a) What is Metallic Bond? On the basis of bond theory, difference between conductors, semiconductors and insulators.

(b) Calculate density of a BCC crystal. Edge of cube is 4Å and m-60.

(a) The specific rate constant for the decomposition of formic acid is 5.5x10-4 sec-1 at 413K. Calculate the specific rate constant at 458K if the energy of activation is $2.37x10^4$ calmol^{-1}.

(b) By using appropriate example, discuss and illustrate the stereo chemical implication of SN^1 and SN^2 mechanism.

3 Give the mechanism and application of the following

(a) Hoffmann's rearrangement

(b) Aldol condensation

(c) Beckmann's rearrangement

4. (a) Write down the structure of and application of following polymers:

(i)	Nylon66	(ii)	PMMA
(iii)	Teflon	(iv)	Buna-N
(v)	Bakelite	(vi)	Caprolectom

(b) Classify polymers on the basis of molecular forces. Name the type of polymerization and the method by which conducting polymers can be synthesizes with examples.

5. (a) (i) Write a brief note on IR spectroscopy.

(ii) Calculate the minimum weight of a required for complete composition of 1kg of fuel containing C -90%, H-3.5%, O-3%, S-0.5%, H_2O-1%, N-0.5% and ash-rest.

(b) Write short notes on the following:

(i) Bomb calorimeter

(ii) Indicators

(iii) Complexometric

(iv) Titrations

(v) Precipitation Titrations

(vi) Redox Titrations

6. What is the optical activity? Give the stereoisomers of tartaric acid.