R20 Regulation *Subject code:* 3B1AG

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech I Semester Regular Examinations, July 2021
Engineering Chemistry
(EEE)

Maximum Marks: 70 Date:16.07.2021 Duration: 3 hours

Note:
1. **This question paper contains two parts A and B.**
2. **Part A is compulsory which carries 20 marks. Answer all questions in Part A.**
3. **Part B consists of 5 Units. Answer any one full question from each unit.**
4. **Each question carries 10 marks and may have a, b, c, d as sub questions.**

Part-A

All the following questions carry equal marks **(10x2M=20 Marks)**

1 Define crystal field stabilization energy
2 What type of bond presents ligands and central metal in complexes
3 Write the Buffer that is used in EDTA titrations and its purpose.
4 What is degree of hardness? Why do we express hardness of water in terms of $CaCO_3$ Equivalents?
5 Differentiate primary and secondary batteries.
6 Glass electrode can't be used for solution pH about 9.0. Why?
7 Temperature increases rate of corrosion increases. Give reason.
8 Presence of impurities in metal enhances the rate of corrosion. Justify.
9 Mention characteristics of a good fuel
10 Give applications of natural gas

Part-B

Answer All the following questions. **(10M X 5=50Marks)**

11 a) Compare high spin and low spin complexes. (5M)
b) Combining atomic orbitals must have same or nearly same energy" Justify. (5M)

OR

12 a) Explain distribution of electrons as stated in LCAO with pictorial representation. (5M)
b) Discuss the crystal field splitting in tetrahedral complex with neat diagram. (5M)

13 a) Explain the following in detail. (5M)
i) Scale ii) Sludge
b) State Ion exchange process for the removal of hardness of water. (5M)

OR

14 a) Write a note on break point of chlorination. (5M)
b) Determine the total hardness of a sample of water in °Fr and °Clarke which showed the following analysis. (5M)
Suspended mater = 100 mg, $Ca(NO_3)$ = 16.4 mg / ltr.; $MgSO_4$ = 24 mg/ ltr; $MgCl_2$ = 19 mg / ltr; NaoH = 0 mg / ltr.; KoH = 56 mg/ltr.
(Atomic masses: Na = 23, mg = 24, k = 39 and Ca = 40)

15 Discuss charging and discharging process of Lead acid cell with chemical reactions. (10M)

OR

16 a) How do you determine the pH of a solution by making use of glass electrode? (5M)
b) Derive Nernst equation and write its applications? (5M)

17 a) Discuss the mechanism of Wet corrosion. (5M)
b) Explain the importance of cathodic protection. (5M)

OR

18 a) Write a short note on galvanic corrosion. (5M)
b) Explain the mechanism of oxidation corrosion. (5M)

19 a) Discuss the Fisher-Tropsch's method of synthesis of petrol. (5M)
b) Outline about ultimate analysis of coal and its significance. (5M)

OR

20 a) How calorific value of fuel is determined by using Junker's gas calorimeter. (5M)
b) Write a note on octane number and thermal cracking. (5M)