*R20 Regulation* *Subject code: 3B1AG*

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

## B.Tech I Semester Regular Examinations, April 2022

### ENGINEERING CHEMISTRY

*(EEE)*

***Maximum Marks: 70*** Date:05.05.2022 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 What are the differences between atomic and molecular orbitals?
2 What is the bond order for $N_2$and $O_2$?
3 What are the various units of hardness giving the relationship between them?
4 What is Calgon? Write the reaction involved in Calgon conditioning?
5 Write the Nernst equation and mention its importance?
6 Define standard electrode potentials?
7 Write the Principle involved in pitting corrosion?
8 Why coating of Zn on (iron) Fe is called sacrificial anode, explain. Define corrosion?
9 Give composition of LPG and CNG.
10 What is calorific value? Write Dulong's formula.

Part-B

Answer All the following questions. (5X10M=50Marks)

11 A. Discuss the salient features of crystal field theory and explain the crystal field splitting of transition metal ion d-orbitals in square planar geometries. 7M
B. Write a note on molecular orbital theory? 3M

OR

12 A. Draw the molecular orbital diagram $N_2$ molecule and predict the magnetic behavior of it? 5M
B. What do you understand by HOMO and LUMO? Draw HOMO of 1,3 butadiene. 5M

13 A. Discuss the Ion exchange process of softening hard water. 6M
B. Explain the various methods of Internal treatment methods boiler water. 4M

OR

14 A. What are the specifications of potable water? Write the steps involved in the treatment of potable water. 5M
B. What are the chemical methods required to remove dissolved oxygen? 5M

15 A. What is a fuel cell and mention its applications? Describe construction and working principle of Hydrogen-Oxygen fuel cell. 6M

B. What is a battery? Explain the functioning of Li ion battery. 4M

OR

16 A. Explain how the Glass electrode is used to determine the $P^H$ of a given solution. What are the limitations of Glass electrode? 5M

B. With neat diagram explain the principle, construction and applications of quinhydrone electrode. 5M

17 A. Explain electrochemical theory of corrosion by taking rusting of iron as an example. 5M

B. What is cathodic protection? Explain sacrificial anodic method. 5M

OR

18 A. Define corrosion? Explain different types of corrosion. 4M

B. Explain the briefly mechanism of Dry corrosion. 6M

19 A. Explain the Ultimate analysis of coal and discuss their significance. 5M

B. Discuss Fischer –Tropsch process for synthetic petrol with neat sketch. 5M

OR

20 A. Define HCV &LCV give one Example each. 4M

B. Discuss knocking, cetane Number and Octane Number. 6M