

**TEEGALA KRISHNA REDDY ENGINEERING COLLEGE****(UGC – AUTONOMOUS)****B TECH II Semester Examinations, September 2021****(Common to CE, ECE)****CHEMISTRY****Answer any Five questions****All questions carry equal marks****Time : 3 Hours****Max. Marks : 75**

1. a) Illustrate the postulates of Molecular Orbital Theory (MOT)?  
b) Discuss the  $\pi$ -molecular orbital energy level diagram of 1, 3-Butadiene? [7+8]
2. a) Explain the classification of solids based on the band theory? [7+8]  
b) Discuss the crystal field splitting of d-orbitals in Tetrahedral and Octahedral complexes.
3. a) Write a note on Scale and Sludge in boilers?  
b) Explain the purification of hard water by using Ion-Exchange process. [7+8]
4. a) Define desalination? Explain the reverse osmosis process for purification of brackish water?  
b) Calculate the total, permanent and temporary hardness of a water sample containing following dissolved salts.  $\text{CaSO}_4=13.6$  mg/L,  $\text{MgCl}_2=9.5$  mg/L,  $\text{Ca}(\text{HCO}_3)_2=81.0$  mg/L and  $\text{Mg}(\text{NO}_3)_2=14.8$  mg/L. [7+8]
5. a) What is a reference electrode? Write the construction and functioning of Calomel electrode.  
b) Write the chemical reactions taking place in discharging and charging phase of lead acid storage cell with neat diagram? [7+8]
6. a) Explain the formation and mechanism of wet corrosion?  
b) Define cathodic protection? Explain various types of cathodic protection methods? [7+8]
7. a) Discuss the mechanism of  $\text{SN}^1$  and  $\text{SN}^2$  reactions?  
b) Write the synthesis and pharmaceutical applications of Aspirin and Paracetamol? [7+8]
8. a) Discuss the principle and selection rules of electronic spectroscopy?  
b) Explain the various types of molecular vibrations of IR spectroscopy? [7+8]