R20 Regulation *Subject code:3B2AB*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Semester Supplementary Examinations, July 2025

MATERIAL CHEMISTRY

(CE)

Maximum Marks: 70 Date: 11.07.2025 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)		Marks	CO	BTL
1	What is the magnetic nature of 'N_2'molecule?	2M	1	L1
2	Write the differences between bonding and anti-bonding molecular orbitals?	2M	1	L1
3	What is calgon conditioning?	2M	2	L1
4	Write the boiling reactions in the removal of temporary hardness?	2M	2	L1
5	How do you differentiate a Cell from Battery?	2M	3	L1
6	Define Cell potential (EMF)?	2M	3	L1
7	Write any three application of Conducting polymers.	2M	4	L1
8	Discuss briefly Characteristics of a good lubricant	2M	4	L1
9	What is selection rule in IR spectroscopy?	2M	5	L1
10	Define auxochrome and chromophore?	2M	5	L1
	Part-B			
Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	a) Explain the postulates of Molecular Orbital theory. b) Write the Energy level diagrams of O_2?	5M 5M	1	L2
	OR			
12	a) Explain the salient features of Crystal field theory. b) Write a note on factors affecting the magnitude of crystal field splitting?	5M 5M	1	L2
13	a) How can we estimate the amount of hardness by complexo metric method? b) Calculate the temporary and permanent hardness of given Water containing following impurities per liter. $MgCl_2$ = 9.5mgs, $MgSO_4$=60mgs, $CaSO_4$= 11.1mgs, $Ca(HCO_3)_2$=16.2mgs, $Mg(HCO_3)_2$=7.3mgs.	5M 5M	2	L2
	OR			
14	a) Explain the reasons for scale and sludge formation and write their disadvantages in boilers. b) Write about phosphate conditioning and calgon conditioning?	5M 5M	2	L2

15	a) Explain the construction and working of the calomel electrode. b) What is electro chemical series? Write its significance and applications?	5M 5M	3	L2
	OR			
16	a) Explain the construction and working of lithium ion batteries. b) Explain about H_2-O_2 fuel cells.	5M 5M	3	L2
17	Describe the preparation, properties and engineering applications of PVC.polymer and Teflon polymer.	10M	4	L2
	OR			
18	a) Explain the setting and hardening of cement with relevant chemical reactions involved. b) Discuss briefly about the hydrodynamic lubrication.	5M 5M	4	L2
19	a) Explain the molecular vibrations in IR Spectroscopy molecules. b) Explain the NMR application of magnetic resonance imaging (MRI).	5M 5M	5	L2
	OR			
20	a) Write a note on chemical shift? b) Write the basic principle of NMR?	5M 5M	5	L2