



*R20 Regulation* *Subject code:3B2AB*  
**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**  
(Autonomous, Accredited by NAAC with 'A+' Grade)

**B. Tech II Semester Supplementary Examinations, January 2026**

**MATERIAL CHEMISTRY**  
**(CE)**

**Maximum Marks: 70**

**Date: 20.01.2026**

**Duration: 3 hours**

- Note:**
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 10 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                                                              | Calculate the Magnetic momentum for Ni (CO) <sub>4</sub>                   | 2M    | 1  | L1  |
| 2                                                              | Write the differences between bonding and anti-bonding molecular orbitals? | 2M    | 1  | L1  |
| 3                                                              | What is Calg on 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                                                              | What are the monomers of Teflon and PVC?                                   | 2M    | 4  | L1  |
| 8                                                              | Write a short not on Biodegradable polymers.                               | 2M    | 4  | L1  |
| 9                                                              | What is the finger print region in IR?                                     | 2M    | 5  | L1  |
| 10                                                             | Write any two applications of UV spectroscopy.                             | 2M    | 5  | L1  |

**Part-B**

| Answer All the following questions. (5X10M=50Marks) |                                                                                                               | Marks    | CO | BTL |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------|----------|----|-----|
| 11                                                  | Explain molecular orbital diagram for 1, 3-butadiene and F <sub>2</sub> molecule.                             | 10M      | 1  | L2  |
| OR                                                  |                                                                                                               |          |    |     |
| 12                                                  | a) Explain band theory of solids.<br>b) Explain the crystal field splitting in tetrahedral metal complexes.   | 5M<br>5M | 1  | L2  |
| 13                                                  | What is the principle of EDTA titration? How the permanent hardness of water is determined using EDTA method. | 10M      | 2  | L2  |
| OR                                                  |                                                                                                               |          |    |     |
| 14                                                  | Explain the treatment of potable water.                                                                       | 10M      | 2  | L2  |
| 15                                                  | a) Derive the Nernst equation for the potential of a single electrode                                         | 5M       | 3  | L2  |

|    |                                                                                                                      |          |   |    |
|----|----------------------------------------------------------------------------------------------------------------------|----------|---|----|
|    | b) Explain glass membrane electrode.                                                                                 | 5M       |   |    |
|    | OR                                                                                                                   |          |   |    |
| 16 | Explain the construction and working Of Pb-acid storage battery and write its applications.                          | 10M      | 3 | L2 |
| 17 | Describe the preparation, properties and engineering applications of PVC and Bakelite polymer.                       | 10M      | 4 | L2 |
|    | OR                                                                                                                   |          |   |    |
| 18 | a) Write a short of properties of Refractories.<br>b) Write the chemical reactions of setting & hardening of cement. | 5M<br>5M | 4 | L2 |
| 19 | a) Write a note on chemical shift.<br>b) Explain the basic principle of NMR.                                         | 5M<br>5M | 5 | L2 |
|    | OR                                                                                                                   |          |   |    |
| 20 | a) Explain the principle of rotational spectra of diatomic molecules.<br>b) Write the application IR spectroscopy.   | 5M<br>5M | 5 | L2 |