*Regulation R20* *Subject code:3B2AB*

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

## B.Tech II Semester Supplementary Examinations, January 2024

## Material Chemistry

## (Civil Engineering)

**Maximum Marks: 70** *Date:23.01.2024* Duration: 3 hours

**Note:** **1.This question paper contains two parts A andB.**
**2. Part A is compulsory which carries 20 marks. Answer all questions in PartA.**
**3. Part B consists of 5 Units. Answer any one full question from eachunit.**
**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=20Marks) | | CO | Bloom Tx |
|---|---|---|---|
| 1 | What is the magnetic nature of '$N_2$'molecule? | CO4 | Level 2 |
| 2 | What is meant by Doping in case of Semiconductors? | CO4 | Level 1 |
| 3 | What is calgon conditioning? | CO4 | Level 3 |
| 4 | Write the boiling reactions in the removal of temporary hardness? | CO4 | Level 4 |
| 5 | How do you differentiate a Cell from Battery? | CO3 | Level 2 |
| 6 | Define half wave potential. | CO3 | Level 1 |
| 7 | Write any three advantages of Vulcanized rubber. | CO3 | Level 3 |
| 8 | Define Lubricants. | CO3 | Level 3 |
| 9 | What is selection rule in IR spectroscopy? | CO5 | Level 3 |
| 10 | Write any two applications of UV spectroscopy? | CO5 | Level 4 |

### Part-B

| Answer All thefollowingquestions. (10M X5=50Marks) | | | | |
|---|---|---|---|---|
| 11 | Explain the postulates of Molecular Orbital theory? | 10M | CO4 | Level2 |
| | OR | | | |
| 12 | A. Write the Energy level diagrams of $O_2$ and HF?<br>B. Explain the salient features of Crystal field theory. | 5M<br>5M | CO3<br>CO2 | Level2 |
| 13 | A. Explain the ion exchange process in the softening of water?<br>B. Define carbonate and non-carbonate hardness of water? | 5M<br>5M | CO4 | Level 3 |
| | OR | | | |
| 14 | A. Explain the reasons for scale and sludge formation and write their disadvantages in boilers?<br>B. Write about phosphate conditioning and Calgon conditioning? | 5M<br>5M | CO4<br>CO4 | Level 2 |

| | | | | |
|---|---|---|---|---|
| 15 | A. Explain the construction and working of the calomel electrode?<br>B. What is electro chemical series? Write its significance and applications? | 5M<br>5M | CO3 | Level3<br>Level2 |
| | OR | | | |
| 16 | A. What are Secondary Batteries? Explain their working with Suitable example?<br>B. Explain are fuel cells? Mention their applications? | 5M<br>5M | CO3<br>CO3 | Level3<br>Level2 |
| 17 | Describe the preparation, properties and engineering applications of PVC. polymer. | 10M | CO4 | Level4 |
| | OR | | | |
| 18 | A. What are the applications of Refractory materials.<br>B. What is composition of Portland cement | 5M<br>5M | CO2<br>CO2 | Level2<br>Level3 |
| 19 | A. Explain the molecular vibrations in IR Spectroscopy molecules<br>B. Explain the NMR application of magnetic resonance imaging (MRI). | 5M<br>5M | CO5<br>CO5 | Level4<br>Level3 |
| | OR | | | |
| 20 | A. Explain the principle of NMR spectroscopy<br>B. Write the application UV-visible spectroscopy | 5M<br>5M | CO5<br>CO5 | Level4<br>Level3 |