| O.P.Code: 23HS0801 | R23 | H.T.No. | | | | | | | | | |
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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**
(AUTONOMOUS)
**B.Tech. I Year I Semester Regular & Supplementary Examinations December/January-2025/2026**
**CHEMISTRY**
(Common to CSM, CIC, CAD, CCC, CIA & CAI)

**Time: 3 Hours** **Max. Marks: 70**

**PART-A**
(Answer all the Questions **10 x 2 = 20** Marks)

| | | | | | |
|---|---|---|---|---|---|
| 1 | a | What is meant by bond order in molecular orbital theory? | CO1 | L1 | 2M |
| | b | State any two limitations of Bohr's atomic model. | CO1 | L1 | 2M |
| | c | Distinguish between intrinsic and extrinsic semiconductors. | CO2 | L1 | 2M |
| | d | Write any two applications of supercapacitors. | CO2 | L1 | 2M |
| | e | Define electrochemical sensor. | CO3 | L1 | 2M |
| | f | Mention any two advantages of fuel cells over conventional batteries. | CO4 | L1 | 2M |
| | g | What is the functionality of a monomer? | CO5 | L1 | 2M |
| | h | Give one example each for thermoplastic and thermosetting polymer. | CO5 | L1 | 2M |
| | i | Define chromatography. | CO6 | L1 | 2M |
| | j | What type of electronic transition is most intense in UV–Visible spectroscopy? | CO6 | L1 | 2M |

**PART-B**
(Answer all Five Units **5 x 10 = 50** Marks)

**UNIT-I**

| | | | | | |
|---|---|---|---|---|---|
| 2 | | Calculate the bond order of F2 & NO molecule and explain the magnetic properties based on MOT theory. | CO1 | L3 | 10M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 3 | a | Sketch the molecular orbital diagram for Oxygen (O2). Explain its bond order and magnetic property based on MOT theory. | CO1 | L3 | 5M |
| | b | Differentiate bonding and anti-bonding molecular orbitals. | CO1 | L3 | 5M |

**UNIT-II**

| | | | | | |
|---|---|---|---|---|---|
| 4 | a | Explain the principle and classification of supercapacitors. | CO2 | L2 | 5M |
| | b | Outline the engineering applications of nanomaterials. | CO2 | L2 | 5M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 5 | | Discuss about the principle, classification and applications of Superconductors. | CO2 | L3 | 10M |

**UNIT-III**

| | | | | | |
|---|---|---|---|---|---|
| 6 | a | Explain the construction and working of Daniel cell. | CO3 | L2 | 5M |
| | b | Calculate the EMF of Fe–Cu cell. Given: $E^0(Cu^{2+}/Cu) = +0.34$ V, $E^0(Fe^{2+}/Fe) = -0.44$ V. | CO3 | L2 | 5M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 7 | a | Describe the working of PEM fuel cell with reactions. | CO4 | L2 | 6M |
| | b | Differentiate between primary and secondary batteries. | CO4 | L2 | 4M |

**UNIT-IV**

| | | | | | |
|---|---|---|---|---|---|
| 8 | | Explain the following<br>i) Polymer ii) Monomer iii) Polymerization iv) Conducting polymers<br>v) Biodegradable polymer | CO5 | L2 | 10M |

**OR**



| | | | | | |
|---|---|---|---|---|---|
| 9 | | Explain different types of polymerizations with examples in detail. | CO5 | L2 | 10M |

**UNIT-V**

| | | | | | |
|---|---|---|---|---|---|
| 10 | a | What is the use of detector in chromatographic technique and what are the different types of detectors used in HPLC technique. | CO6 | L2 | 5M |
| | b | Explain in detail about Stretching and bending vibrations. | CO6 | L2 | 5M |

**OR**

| | | | | | |
|---|---|---|---|---|---|
| 11 | | Explain the various possible electronic transitions occurs in a molecule by absorbing the UV-Visible radiation. | CO6 | L2 | 10M |

***** END *****