



**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)

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**QUESTION BANK**

**Subject with Code : Applied Chemistry (19HS0801)**

**Course & Branch: B.Tech (EEE,ECE)**

**Year & Sem: I-B.Tech & I-Sem**

**Regulation: R19**

**UNIT-I**

**ELECTROCHEMISTRY AND APPLICATIONS**

1. a) What is Electrochemical cell ? Give an example. [7M]
  - b) Calculate the single electrode potential of zinc in 0.05M ZnSO<sub>4</sub> solution at 25<sup>0</sup>C. [5M]
- $$E^0_{Zn/Zn^{2+}} = 0.763V.$$
2. Define Electrode Potential. Derive the Nernst equation for a single electrode potential and write its applications. [12M]
  3. Write a note on
    - a) Potentiometric Titrations (Redox Titrations) [5M]
    - b) Hydrogen-Oxygen fuel cell. [7M]
  4. Define Conductometric titrations. Discuss all types of Acid-Base Conductometric titrations. Explain the nature of the graphs between conductance and volume of titrant used. [12M]
  5. Define Photovoltaic cell. Explain construction, working and applications of photovoltaic cell. [12M]
  6. Define electrochemical sensor. Draw the neat sketch of electrochemical sensor and explain its construction, working principle and applications. [12M]
  7. a) Write a brief note on potentiometric sensor. [8M]
  - b) Write a short note on Glucose Potentiometric Sensor. [4M]
  8. a) What is primary Battery ? Write a brief note on Zinc-Air battery. [7M]
  - b) Write a short note on Alkali metal sulphide batteries. [5M]
  9. a) What is secondary Battery ? Explain the Construction and working of Lead acid battery. [7M]
  - b) Write a note on Lithium Ion rechargeable cell. [5M]
  10. a) What is a Fuel cell ? Describe the Construction and Working of Methanol – Oxygen Fuel cell . [7M]
  - b) Write a short note on Photo Galvanic cell [5M]

**UNIT -II**  
**STRUCTURE AND BONDING MODELS**

1. a) Explain Planck's Quantum Theory. [5M]  
b) Write a brief note on particle in one dimensional box. [7M]
2. Derive Schrodinger wave equation? Explain the significance of the  $\Psi$  and  $\Psi^2$  . [12M]
3. a) Explain pi- molecular orbital's of Butadiene with a neat sketch. [6M]  
b) Explain pi- molecular orbital of Benzene with a neat sketch. [6M]
4. a) Write De-Broglie's equation. [6M]  
b) Explain Heisenberg Uncertainty principle. [6M]
5. Draw the molecular orbital diagrams of Oxygen molecule ( $O_2$ ) and Nitrogen molecule ( $N_2$ ). Explain their magnetic nature and bond order. [12M]
6. Explain the energy level diagrams of CO and NO molecule. Explain their magnetic nature and Bond order. [12M]
7. a) Explain the band theory of solids. [5M]  
b) What is doping? Explain the role of doping on band structures. [7M]
8. a) Explain the application of  $\Psi$  and  $\Psi^2$  to hydrogen atom. [6M]  
b) Write the postulates of molecular orbital theory. [6M]
9. What is Crystal field theory? Explain the crystal field splitting in octahedral and tetrahedral complexes. [12M]
10. Draw the band diagrams of Conductors, Semiconductors and Insulators. [12M]

**UNIT III**  
**POLYMER CHEMISTRY**

1. a) What is functionality of monomer? [5M]  
b) Write a note on nomenclature of polymers. [7M]
2. Explain the following mechanism with examples.  
a) Free radical addition polymerization. [6M]  
b) Cationic addition polymerization. [6M]
3. Explain the following mechanism with examples.  
a) Anionic addition polymerization. [6M]  
b) Co-ordination or Ziegler-Natta polymerization. [6M]
4. Explain the following mechanism with examples.  
a) Condensation or Step growth polymerization. [6M]  
b) Co-polymerization. [6M]
5. Explain the mechanism of Addition polymerization. [12M]
6. a) Distinguish between Thermoplastics and thermosetting plastics. [6M]  
b) Describe the preparation, properties and uses of Bakelite. [6M]
7. a) Describe the preparation, properties and uses of Nylon-6,6. [5M]  
b) Describe the preparation, properties and uses of Carbon Fibers [7M]
8. What are conducting polymers? How are they classified? Write the synthesis and Engineering applications of conducting polymers. [12M]
9. Write the preparation, properties and application of Buna-S rubber and Buna-N rubber [12M]
10. a) Write a note on Thermoplastic and Thermosetting resin. [6M]  
b) Write the preparation, properties and uses of Phenol-Formaldehyde resin. [6M]

**UNIT-IV**  
**INSTRUMENTAL METHODS AND APPLICATIONS**

1. a) Write a short note on Beer-Lambert's Law. [5M]  
b) Write a note on atomic absorption and molecular absorption. [7M]
2. Define  $P^H$  ? Write principle and application of  $P^H$  metry. [12M]
3. Explain the working principle of Atomic Absorption Spectrometer (AAS) and How will you determine the nickel using by AAS? [12M]
4. Give an account on principle and instrumentation of IR spectroscopy. Explain Stretching and bending vibrations. [12M]
5. Explain principle and instrumentation of UV-visible spectroscopy with neat diagram. [12M]
6. What is meant by Chromatography? Define the main parts of an High Performance Liquid Chromatography (HPLC). [12M]
7. a) Explain the principle and instrumentation of Gas Chromatography. [8M]  
b) What are the applications of Gas Chromatography [4M]
8. Write a note on  
a) Potentiometry [6M]  
b) Conductometry [6M]
9. Which methods are you using to separate from the Gaseous Mixtures? [12M]
10. What are the methods do you follow to separate from the Liquid Mixtures? [12M]

**UNIT-V**  
**ADVANCED ENGINEERING MATERIALS**

1. a) What is basic lock and key principle ? [6M]  
b) Write a short note on Complementarity. [6M]
2. Write a brief note on Fullerenes and Carbon nano tubes [12M]
3. Explain the applications of supramolecules in  
a) Sensors ,Gas storage. [8M]  
b) Molecular switches. [4M]
4. a) Write a note on Liquid Insulating Materials [5M]  
b) Write the Properties of Nanomaterials. [7M]
5. Explain in detail about principle and application of semiconductors? [12M]
6. Discuss about Super conductors and their applications? [12M]
7. a) Define Dielectrics ? What are the characteristics of Electrical Insulators? [6M]  
b) Classification of Insulating material and their applications. [6M]
8. a) What is meant by Nanomaterials ? How are Nanomaterials Classified. [4M]  
b) How do you apply Catalyst, medical in the application of supramolecules? [8M]
9. a) Write an account on Carbon Nano Tubes. [6M]  
b) Write a note on Fullerenes [6M]
10. a) Write a note on Super Capacitors. [7M]  
b) Write a note on Liquid Insulating Materials. [5M]