



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

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QUESTION BANK

Subject with Code : Applied Chemistry (20HS0802) Course & Branch: B.Tech (ECE & EEE)

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

Regulation: R20

UNIT-I

ELECTROCHEMISTRY AND APPLICATIONS

1. a) What is Electrochemical cell ? Give an example. [L1] [CO1] [7M]
 b) Calculate the single electrode potential of zinc in 0.05M ZnSO₄ solution at 25⁰C.
 $E^0_{Zn/Zn^{2+}} = 0.763V.$ [L3] [CO1] [5M]
2. Define Electrode Potential. Derive the Nernst equation for a single electrode potential and write its applications. [L1] [CO1] [12M]
3. Write a note on
 - a) Potentiometric Titrations (Redox Titrations) [L2] [CO1] [5M]
 - b) Hydrogen-Oxygen fuel cell . [L2] [CO1] [7M]
4. Define Conductometric titrations. Discuss all types of Acid-Base Conductometric titrations and Explain the nature of the graphs b/n conductance and volume of titrant used. [L2] [CO1] [12M]
5. Discuss the titration curves obtained in conductometric titrations
 - a) Strong acid with weak base [L3] [CO1] [6M]
 - b) Weak acid with strong base [L3] [CO1] [6M]
6. Define Photovoltaic cell. Explain construction, working and applications of photovoltaic cell. [L2] [CO1] [12M]
7. Draw the neat sketch of electrochemical sensor, explain its construction, working principle and applications. [L3] [CO1] [12M]
8. a) What is primary Battery ? Write a brief note on Zinc-Air battery . [L2] [CO1] [7M]
 b) Write a short note on Ni-cd (NICAD) battery. [L2] [CO1] [5M]
9. a) What is secondary Battery ? Explain the Construction and working of Lead acid battery. [L3] [CO1] [7M]
 b) Write a note on Lithium Ion rechargeable cell. [L2] [CO1] [5M]
10. a) What is a Fuel cell ? Describe the Construction and Working of Methanol – Oxygen Fuel cell . [L3] [CO1] [7M]
 b) Write a short note on Photo Galvanic cell. [L2] [CO1] [5M]

UNIT -II
STRUCTURE AND BONDING MODELS

1. a) Explain Planck's Quantum Theory. [L2] [CO2] [6M]
b) Write short note on Wave-Particle duality of an electron [L2] [CO2] [6M]
2. Derive Schrodinger wave equation? Explain the significance of the Ψ and Ψ^2 . [L3] [CO2] [12M]
3. a) Explain pi- molecular orbital's of Butadiene with a neat sketch. [L3] [CO2] [6M]
b) Explain pi- molecular orbital of Benzene with a neat sketch. [L3] [CO2] [6M]
4. a) Write De-Broglie's equation. [L1] [CO2] [6M]
b) Explain Heisenberg Uncertainty principle. [L2] [CO2] [6M]
5. Draw the molecular orbital diagrams of Oxygen molecule (O_2) and Nitrogen molecule (N_2). Explain their magnetic nature and bond order. [L3] [CO2] [12M]
6. Explain the energy level diagrams of CO and NO molecule. Explain their magnetic nature and Bond order. [L3] [CO2] [12M]
7. a) Construct the molecular orbital energy level diagram of H_2 , H_2^+ [L3] [CO2] [7M]
b) Why is it impossible to determine accurately both position and velocity of an electron at any instance [L4] [CO2] [5M]
8. a) Write the postulates of molecular orbital theory. [L1] [CO2] [6M]
b) What are the differences between bonding and antibonding [L4] [CO2] [6M]
9. What is Crystal field theory? Explain the crystal field splitting in octahedral and tetrahedral Complexes. [L3] [CO2] [12M]
10. a) Draw the shapes of various d – orbitals and explain why they are splitted into two groups in an octahedral ligand field [L3] [CO2] [6M]
b) Construct the molecular orbital energy level diagram of O_2^+ , O_2^- [L3] [CO2] [6M]

UNIT III

POLYMER CHEMISTRY

1. a) What is functionality of monomer? [L1] [CO3] [5M]
b) Write a note on nomenclature of polymers. [L1] [CO3] [7M]
2. Explain the following mechanism.
a) Free radical addition polymerization. [L3] [CO3] [6M]
b) Cationic addition polymerization. [L3] [CO3] [6M]
3. Explain the following mechanism .
a) Anionic addition polymerization. [L3] [CO3] [6M]
b) Co-ordination or Ziegler-Natta polymerization. [L3] [CO3] [6M]
4. Explain the following mechanism with examples.
a) Condensation or Step growth polymerization. [L3] [CO3] [6M]
b) Co-polymerization. [L3] [CO3] [6M]
5. Explain the mechanism of Addition polymerization. [L2] [CO3] [12M]
6. a) Distinguish between Thermoplastics and Thermosetting plastics. [L4] [CO3] [6M]
b) Describe the preparation, properties and uses of Bakelite. [L3] [CO3] [6M]
7. a) Describe the preparation, properties and uses of Nylon-6,6. [L3] [CO3] [5M]
b) Describe the preparation, properties and uses of Carbon Fibers [L3] [CO3] [7M]
8. What are conducting polymers? How are they classified? Write the synthesis and Engineering applications of poly acetylene and polyaniline polymers. [L3] [CO3] [12M]
9. Write the preparation, properties and application of Buna-S rubber and Buna-N rubber [L2] [CO3] [12M]
10. a) Write a note on Thermoplastic and Thermosetting resin. [L2] [CO3] [6M]
b) Write the preparation, properties and uses of Phenol-Formaldehyde resin. [L2] [CO3] [6M]

UNIT-IV

INSTRUMENTAL METHODS AND APPLICATIONS

1. a) Write a short note on Beer-Lambert's Law. [L1] [CO4] [5M]
b) Write a note on atomic absorption and molecular absorption. [L1] [CO4] [7M]
2. Explain the principle, working and applications of Thin layer chromatography . [L2] [CO4] [12M]
3. Explain the working principle of Atomic Absorption Spectrometer(AAS) and How will you determine the nickel using by AAS? [L2] [CO4] [12M]
4. Give an account on principle and instrumentation of IR spectroscopy. Explain stretching and bending vibrations. [L2] [CO4] [12M]
5. Explain principle & instrumentation of UV-visible spectroscopy with neat diagram. [L2][CO4][12M]
6. What is meant by Chromatography ? Define the main parts of an High Performance Liquid Chromatography (HPLC). [L2] [CO4] [12M]
7. a) Explain the principle and instrumentation of Gas Chromatography. [L2] [CO4] [8M]
b) Write any four applications of Gas Chromatography [L1] [CO4] [4M]
- 8 a) Explain the main components of gas chromatography [L2] [CO4] [6M]
b) Distinguish between gas chromatography and High Performance Liquid Chromatography [L4] [CO4] [6M]
9. Explain the separating methods of Gaseous Mixtures? [L2] [CO4] [12M]
10. Describe the various methods for separating the Liquid Mixtures? [L3] [CO4] [12M]

UNIT-V
MODERN ENGINEERING MATERIALS

1. Explain in detail about principle and application of semiconductors? [L2] [CO5] [12M]
2. Discuss about Super conductors and their applications? [L3] [CO5] [12M]
- 3.a) What is doping ? Explain the role of doping on band structure. [L2] [CO5] [7M]
b) Write a note on Liquid Insulating Materials. [L1] [CO5] [5M]
- 4.a) Write a note on Liquid Insulating Materials. [L1] [CO5] [5M]
b) Write the Properties of Nanomaterials. [L1] [CO5] [7M]
5. a) Define Dielectrics ? What are the characteristics of Electrical Insulators. [L2] [CO5] [6M]
b) Classification of Insulating material and their applications. [L2] [CO5] [6M]
- 6.a) What is basic lock and key principle ? [L1] [CO5] [6M]
b) Write a short note on Complementarity. [L1] [CO5] [6M]
7. Explain the applications of supramolecules in
- a) Sensors ,Gas storage. [L2] [CO5] [7M]
b) Molecular switches. [L2] [CO5] [5M]
8. a) What is meant by Nanomaterials ? How are Nanomaterials Classified. [L3] [CO5] [4M]
b) How do you apply Catalyst , medical in the application of supramolecules ? [L4] [CO5] [8M]
- 9.a) Write an account on Carbon Nano Tubes. [L1] [CO5] [6M]
b) Write a note on Fullerenes [L1] [CO5] [6M]
10. Write a brief note on Fullerenes and Carbon nano tubes [L1] [CO5] [12M]