SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road, Puttur – 517583
QUESTION BANK (DESCRIPTIVE)

Subject with Code : Applied Chemistry (20HS0802) **Course & Branch**: B.Tech-**CSE,CSIT, CSE(AI&ML) & CSE(IOT&CS Including BCT)**

Regulation: R20 **Year & Sem:** I-B.Tech & II-Sem

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 $ZnSO_4$ solution at 25^0C.
   $E^0_{Zn/Zn^{2+}} = 0.763V$. [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]