

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

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**QUESTIONBANK (DESCRIPTIVE)**

Subject with Code: APPLIED CHEMISTRY (20HS0804) Course &amp; Branch: B.Tech: ECE, CSE &amp; EEE

Year &amp; Sem : I YEAR&amp;I SEM

Regulation: R20

**UNIT-I**  
**ELECTROCHEMISTRY AND APPLICATIONS**

1	a) Define Electrochemical cell? Explain the construction, working Principle and mechanism of an Electrochemical cell.	[L1] [CO1]	[8M]
	b) What is single electrode potential? Calculate the single electrode potential of zinc in 0.05M ZnSO <sub>4</sub> solution at 298.15 K. { $E^0_{Zn/Zn^{2+}} = -0.763V$ }	[L3] [CO1]	[4M]
2	a) Define Electrode Potential.	[L1] [CO1]	[2M]
	b) Derive the Nernst equation for a single electrode potential and explain the terms in equation and write its applications.	[L2] [CO1]	[10M]
3	a) Define Photovoltaic cell.	[L1] [CO1]	[2M]
	b) Explain construction, working and applications of photovoltaic cell With neat diagram.	[L2] [CO1]	[10M]
4	Discuss the titration curves obtained in the following Acid – Base conductometric titrations		
	a) Strong acid with Weak base	[L3] [CO1]	[6M]
	b) Weak acid with Strong base	[L3] [CO1]	[6M]
5	a) What is primary Battery? Write a brief note on Zinc-Air battery	[L1] [CO1]	[6M]
	b) Write a short note on Ni-cd (NICAD) battery.	[L2] [CO1]	[6M]
6	a) Define electrochemical sensor.	[L1] [CO1]	[2M]
	b) Explain Electrochemical sensor construction, Working principle and applications.	[L2] [CO1]	[10M]
7	Discuss the titration curves obtained in the following Acid – Base conductometric titrations		
	a) Weak acid with Weak base	[L3] [CO1]	[6M]
	b) Strong acid with Strong base	[L3] [CO1]	[6M]
8	a) What is secondary Battery? Explain the Construction and working of Lead acid battery.	[L1] [CO1]	[6M]
	b) Write a note on Lithium-Ion rechargeable cell.	[L2] [CO1]	[6M]
9	a) Define Fuel cell? Describe the Construction and Working principle and uses of Methanol – Oxygen Fuel cell.	[L1] [CO1]	[6M]
	b) Write short note on Hydrogen-Oxygen fuel cell.	[L2] [CO1]	[6M]
10	a) Write a short note on Photo Galvanic cell	[L2][CO1]	[6M]
	b) Explain about Potentiometric redox titrations	[L2] [CO1]	[6M]

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

1	a) Explain Planck's Quantum Theory.	[L2] [CO2]	[6 M]
	b) Write short notes on Wave-Particle duality of matter	[L2] [CO2]	[6 M]
2	a) Write the postulates of molecular orbital theory.	[L2] [CO2]	[6M]
	b) Explain the crystal field splitting in Tetrahedral complexes.	[L3] [CO2]	[6M]
3	a) Derive Schrodinger wave equation?	[L3] [CO2]	[10M]
	b) Explain the significance of the $\Psi$ and $\Psi^2$	[L2] [CO2]	[2M]
4	a) Explain de Broglie's dual nature hypothesis	[L2] [CO2]	[6M]
	b) What is Heisenberg's uncertainty principle?	[L1] [CO2]	[6 M]
5	a) Sketch the Molecular Orbital Energy Diagram for Oxygen ( $O_2$ ). Explain its Bond order and magnetic property based on MOT theory.	[L3] [CO2]	[6M]
	b) Explain $\pi$ - molecular orbital of 1,3- Butadiene with a neat sketch.	[L3] [CO2]	[6M]
6	a) Discuss the Molecular Orbital Energy Diagram for $F_2$ molecule and calculate its bond order and explain its magnetic property.	[L2] [CO2]	[8M]
	b) Explain the Molecular Orbital Energy Diagram for CO molecule and calculate its bond order and explain its magnetic property.	[L2] [CO2]	[4M]
7	a) Explain $\pi$ - molecular orbital of Benzene with a neat sketch.	[L2] [CO2]	[8M]
	b) Differentiate bonding and anti-bonding molecular orbitals.	[L3] [CO2]	[4M]
8	a) Explain the salient features of Crystal Field Theory.	[L2] [CO2]	[6M]
	b) Draw the shapes of various d – orbitals and explain why they are splitted into two groups in an octahedral ligand field.	[L3] [CO2]	[6M]
9	a) Sketch the Molecular Orbital Energy Diagram for Nitrogen ( $N_2$ ). Explain its Bond order and magnetic property based on MOT theory.	[L3] [CO2]	[6M]
	b) Explain the Molecular Orbital Energy Diagram for NO molecule and Calculate its bond order and explain its magnetic property.	[L2] [CO2]	[6M]
10	a) Explain colour properties of transition metal complexes	[L2] [CO2]	[6M]
	b) Discuss about magnetic properties of metal complexes.	[L2] [CO2]	[6M]

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

1	a) What is functionality of monomer? b) Write a note on nomenclature of polymers.	[L1] [CO3] [L1] [CO3]	[5M] [7M]
2	a) Define polymerization? Write the types of polymerizations with examples. b) Write the mechanism of Cationic addition polymerization.	[L2] [CO3] [L2] [CO3]	[8M] [4M]
3	Explain the following mechanism. a) Free radical addition polymerization. b) Anionic addition polymerization.	[L2] [CO3] [L2] [CO3]	[6M] [6M]
4	a) Distinguish between Chain growth and step growth polymerization with examples. b) Write about Co-ordination or Ziegler-Natta polymerization.	[L3] [CO3] [L2] [CO3]	[5M] [7M]
5	Define the following terms (a) Polymer (b) Monomer (c) Degree of polymerization (d) Polymerization (e) Write a short notes on Co – Polymerization with examples.	[L2] [CO3] [L2] [CO3]	[4M] [8M]
6	a) Write the synthesis and engineering applications of Poly aniline conducting polymer. b) Write the mechanism of Anionic addition polymerization.	[L2] [CO3] [L2] [CO3]	[6M] [6M]
7	a) Distinguish between Thermoplastics and Thermosetting plastics. b) Describe the preparation, properties and uses of Bakelite.	[L4] [CO3] [L3] [CO3]	[6M] [6M]
8	Describe the preparation, properties and uses of the following a) Nylon-6, 6. b) Carbon Fibers	[L2] [CO3] [L2] [CO3]	[6M] [6M]
9	a) What are conducting polymers? How are they classified? b) Write the synthesis and engineering applications of Poly acetylene Conducting polymer.	[L1] [CO3] [L2] [CO3]	[4M] [8M]
10	a) Write the preparation, properties and application of Buna-S rubber and Buna-N rubber. b) Write the applications of conducting polymers.	[L2] [CO3] [L2] [CO3]	[8M] [4M]

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

1	a) Explain the different regions of electromagnetic spectrum. b) Write a short note on Beer-Lambert's Law.	[L2] [CO4] [L2] [CO4]	[6M] [6M]
2	a) Explain principle & instrumentation of UV-visible spectroscopy with neat diagram. b) Write about Applications of UV-Visible spectroscopy.	[L2] [CO4] [L2] [CO4]	[9M] [3M]
3	Explain the working principle and instrumentation of Atomic Absorption Spectrometer (AAS)	[L2] [CO4]	[12M ]
4	a) Give an account on principle and instrumentation of IR spectroscopy. b) Write the applications of IR spectroscopy.	[L2] [CO4] [L2] [CO4]	[8M] [4M]
5	a) Explain the principle, working and applications of Thin Layer Chromatography (TLC). b) Write the applications of TLC.	[L2] [CO4] [L2] [CO4]	[8M] [4M]
6	a) What is meant by Chromatography? Write about main parts of HPLC. With neat diagram. b) Write about the important applications of HPLC Chromatography.	[L2] [CO4] [L2] [CO4]	[8M] [4M]
7	a) Explain the principle and instrumentation of Gas Chromatography b) Write any four applications of Gas Chromatography.	[L2] [CO4] [L2] [CO4]	[8M] [4M]
8	a) Explain the main components of gas chromatography. b) Explain stretching and bending vibrations.	[L2] [CO4] [L2] [CO4]	[6M] [6M]
9	a) Explain the separating methods of Gaseous Mixtures? b) Explain the distillation and fractional distillation.	[L2] [CO4] [L2] [CO4]	[6M] [6M]
10	a) Describe the various methods for separating the Liquid Mixtures? b) Describe the methods of separation Gaseous mixture.	[L2] [CO4] [L2] [CO4]	[6M] [6M]

**UNIT-V**  
**MODERN ENGINEERING MATERIALS**

1	a) Define semiconductor? b) Explain in detail about principle and application of semiconductors? c) How the semiconductor can classify and give examples.	[L1] [CO5] [L2] [CO5] [L2] [CO5]	[2M] [6M] [4M]
2	a) Define Super conductors. b) Discuss about the principle and application of Super conductors and their applications?	[L1] [CO5] [L1] [CO5]	[2M] [10M]
3	a) Draw the band diagrams for conductors, semi-conductors and Insulators. b) Define Dielectric materials. Write the good characteristics of dielectrics.	[L2] [CO5] [L1] [CO5]	[6M] [6M]
4	a) Write the classification of electrical insulators. b) Write the characteristics and applications of electrical insulators.	[L2] [CO5] [L2] [CO5]	[5M] [7M]
5	a) Write the Properties of Nano materials. b) What are the different types of CNTs?	[L2] [CO5] [L1] [CO5]	[6M] [6M]
6	a) What is basic lock and key principle? b) Write a short note on Complementarity.	[L1] [CO5] [L2] [CO5]	[6M] [6M]
7	Explain the applications of supramolecules in a) Sensors, Gas storage. b) Molecular switches.	[L2] [CO5] [L2] [CO5]	[7M] [5M]
8	a) What is meant by Nano materials? How the Nano materials Classified. b) How do you apply in Catalysis and medical fields in the application of supra molecules?	[L1] [CO5] [L2] [CO5]	[4M] [8M]
9	a) Write a short notes on Carbon Nano Tubes. b) Write a note on Fullerenes.	[L1] [CO5] [L1] [CO5]	[6M] [6M]
10	a) Draw the band digrams for conductors, semi –conductors and insulators. b) Write short notes on Internsic and Externsic Semiconductors.	[L3] [CO5] [L2] [CO5]	[6M] [6M]

**PREPARED BY: CHEMISTRY DEPARTMENT**