



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

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**QUESTION BANK**

**Subject with Code :** Chemistry (18HS0801)

**Course & Branch:** B.Tech (AE,CE,ME,EEE)

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

**Regulation :** R18

**UNIT -1 ATOMIC,MOLECULAR STRUCTURE AND PERIODIC PROPERTIES**

1. a) Give any two difference between Bonding and anti bonding molecular orbitals.[2M]  
 b) Define effective nuclear charge. [2M]  
 c) Differentiate Hard, Soft acid and base with example. [2M]  
 d) Write schrodinger wave equation. [2M]  
 e) Define aromaticity and non aromaticity. [2M]
2. Write down the Schrodinger wave equation for the wave mechanical model of an atom.  
 Give the significance of wave function . [10M]
3. Explain pi- molecular orbitals of benzene with neat sketch. [10M]
4. Explain the energy level diagrams of oxygen and fluorine with magnetic behavior. [10M]
5. a) Explain bonding and antibonding orbitals [2M]  
 b) Give these molecules energy level diagram and explain its magnetic behavior. [8M]  
 i. NO, CO,  
 ii. N<sub>2</sub>, N<sub>2</sub><sup>+</sup>,
6. Explain the following  
 a) Pi - molecular orbitals of butadiene [5M]  
 b) Molecular geometries [5M]
7. a) Define aromaticity. Write a note on concept of aromaticity. [2M]  
 b) Justify the following compounds are aromatic or not. [8M]  
 i. Cyclo octatetraene      ii. Thiophene  
 iii.Cyclopropenyl cation      iv.Cyclopentadienyl anion
8. a) Illustrate the postulates of crystal field theory [2M]  
 b) Explain the crystal field splitting of orbital's in octahedral, tetrahedral and square planar fields in complexes [8M]
9. Explain the following

- a) Effective nuclear charge & its calculation using Slater's rule. Give any molecule calculations of EFNC [5M]
- b) Variation of oxidation states in periodic table [5M]
10. Describe the trends of atomic, ionic sizes of s, p, d and f block elements. [10M]
11. Explain HSAB concept and its applications. [10M]

### UNIT-II USES OF FREE ENERGY AND CHEMICAL EQUILIBRIA

1. a) What is meant by corrosion. [2M]  
b) Define internal energy. [2M]  
c) Define entropy. [2M]  
d) What is meant by Anodic inhibitors? [2M]  
e) Define cell potential. [2M]
2. Define cell potential. Derive Nernst equation for the calculation of cell emf. What are its applications? [10M]
3. Define Entropy. Entropy changes in reversible and irreversible process. [10M]
4. A) Define and derive Gibbs Free energy. [5M]  
  
B) Write a note on solubility product. [5M]
5. A) Write a note on Redox titration by potentiometry [5M]  
  
B) Discuss the various factors influencing the rate of corrosion based on nature of metal [5M]
6. A) Write a note on sacrificial anodic protection? [5M]  
B) Discuss about Impressed Current Cathodic protection? [5M]
7. Discuss in detail about electrochemical or wet corrosion? [10M]
8. Explain various factors influencing the rate of corrosion? [10M]
9. Define corrosion? Discuss in detail about chemical or dry corrosion. [10M]
10. A) What is electroplating? [4M]  
B) Explain electroplating of Nickel and copper? [6M]
11. A) What is electroless plating? [4M]  
B) What is meant by cathodic and anodic inhibitors [6M]

**III.WATER TECHNOLOGY**

1. a) Write the structure of EDTA. [2M]  
b) Define brackish water? What type of methods used in purification? [2M]  
c) Which salts caused to temporary and permanent hardness. [2M]  
d) Define hard water and soft water. [2M]  
e) Define sludges and scales. [2M]
2. a) write short notes on Break point Chlorination [5M]  
b) What are the units to express hardness of water? [5M]
3. Describe the estimation of hardness by EDTA method. [10M]
4. a) How water gets hardness. Distinguish between hard water and soft water? [3M]  
b) Explain Boiler corrosion. [7M]
5. a) What is Priming and Foaming? [5M]  
b) Explain sludge and Scale formation in boilers? [5M]
6. Describe briefly boiler troubles and their treatment? [10M]
7. Describe the Zeolite or permutit process for softening of water. what are the advantages and disadvantages of zeolite process. [10M]
8. Describe the Ion exchange process for demineralization of water? what are the advantages and disadvantages of ion exchange process? [10M]
9. Write short notes on  
(a) Electrodialysis (b) Reverse osmosis [10M]
10. Describe the Lime soda process for softening of water? What are the advantages and disadvantages of lime soda process. [10M]
11. Explain with a neat sketch the various steps involved in municipal solid waste water treatment [10M]

**IV.ORGANIC REACTIONS AND ORGANIC POLYMERS**

1. a) Why does benzene undergo electrophilic substitution reactions easily and nucleophilic substitution with difficulty ? [2M]  
b) Why thermosetting plastics cannot be reused and restored? [2M]  
c) Name four substances which are added during moulding of plastics. [2M]  
d) Define conducting polymers. [2M]  
e) Name the reactants used in the preparation of paracetamol and aspirin. [2M]
2. a) Describe a fabrication method used for thermoplastics. [5M]  
b) Write the preparation, properties & uses of Bakelite. [5M]
3. Briefly outline the various methods of moulding process. [10M]
4. a) Describe the process of compressing moulding with a neat sketch.  
How it can be compared with injection moulding. [5M]  
b) Write a note on thermosetting and thermoplastic resins. [5M]
5. a) Give the preparation, properties & uses of Teflon, Nylon 6, 6. [5M]  
b) Distinguish between thermoplastics & thermosetting plastics. [5M]
6. What are conducting polymers? How are they classified? Write the synthesis  
And engineering applications of conducting polymers ? [10M]
7. Explain the synthesis of the following  
a) Paracetamol. [5M]  
b) Aspirin. [5M]
8. Explain the synthesis of the following  
a) Penicillin. [5M]  
b) Sulfa Drug. [5M]
9. a) Define addition and Elimination reactions. [2M]  
b) Explain the addition and elimination reactions with examples. [8M]
10. a) Define Oxidation and Reduction [4M]  
b) Explain oxidation and reduction reactions with examples. [6M]
11. a) What are Substitution reaction. [2M]  
b) Explain different types of substitution reactions with examples. [8M]

**v. SPECTROSCOPIC TECHNIQUES AND APPLICATIONS**

1. a) What are the differences between atomic and molecular spectroscopy [2M]  
b) What are chromophores? What are auxochromes? Give some examples. [2M]  
c) What is finger print region? Mention its importance. [2M]  
d) What is flame photometry? Name few metals which can be easily detected by this method. [2M]  
e) What are the limitations of Beer-Lambert's law ? [2M]
2. Explain principle and instrumentation of UV-visible spectroscopy [10M]
3. Explain the working principle of atomic absorption spectrometer and How will you determine the nickel using by AAS? [10M]
4. Give an account on principle and instrumentation of IR spectroscopy Explain stretching and bending vibrations. [10M]
5. Give applications of  
(a) IR-Spectroscopy (b) UV- visible Spectroscopy [10M]
6. Draw the schematic diagram of a flame photometer and explain how you will determine sodium by using flame photometer. [10M]
7. Give a brief account on  
(a) Derive Beer-Lambert's law (b) Interference and limitation of flame photometry [10M]
8. Explain principle, instrumentation and its applications of Fluorescence spectroscopy [10M]
9. Explain principle, instrumentation and its applications of Scanning Electron microscopy (SEM) [10M]
10. Give a brief account Principle, Instrumentation and its applications of X- ray Crystallography. [10M]
11. Discuss the principle, instrumentation and applications of Transmission electron microscopy [10M]