**SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY:: PUTTUR**
(AUTONOMOUS)
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**QUESTION BANK**

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

**Course & Branch**: B.Tech CIVIL, MECH &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. $N_2$ , $N_2^+$,
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 slaters 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 0F 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 Free energy.                                                                [5M]
   B) Write a note on solubility product.                                               [5M]

5. A) Write a note on Oxidation and Reduction                                           [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]

## UNIT-III
## WATER TECHNOLOGY

1. a) Write the structure of EDTA. [2M]
   b) Define brakish 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 [10M] treatment

## UNIT-IV
## ORGANIC REACTIONS AND ORGANIC POLYMERS

1. a) Why does benzene does not undergo electrophilic substitution reactions?  [2M]
   b) Why cannot thermosetting plastics 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 with a neat sketch the process of compressing moulding.
   How does it compare 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]

## UNIT-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.

11. Discuss the principle, instrumentation and applications of Transmission

    electron microscopy          [10M

    [10M]