

I B. Tech I Semester Regular Examinations, January-2024**CHEMISTRY**

(Common to EEE, CSE)

Time: 3 hours

Max. Marks: 70

*Note: 1. Question paper consists of two parts (Part-A and Part-B)**2. All the questions in Part-A is Compulsory**3. Answer ONE Question from Each Unit in Part-B***PART –A (20 Marks)**

1. a) What is the Significance of Ψ and Ψ^2 ? [2M]
- b) What are the Bonding and Anti-Bonding molecular orbitals? [2M]
- c) Write any two applications of Semiconductors. [2M]
- d) How Super Conductors are classified? [2M]
- e) What is electrochemical cell? Give an example. [2M]
- f) Distinguish between Primary and Secondary batteries. [2M]
- g) What is functionality of monomers? [2M]
- h) Mention two important applications of Conducting Polymers. [2M]
- i) What is Electromagnetic spectrum? [2M]
- j) Define the role of monochromator. [2M]

PART – B (50 MARKS)**UNIT-I**

2. a) Write Schrodinger wave equation and explain its significance in Quantum mechanics [5M]
- b) Draw the molecular orbital diagram of O_2 . Explain the magnetic nature and bond order. [5M]

(OR)

3. a) Discuss particle in one dimensional box with suitable example [5M]
- b) Draw the π -molecular orbitals of butadiene. [5M]

UNIT-II

4. a) Explain basic principle of Semiconducting materials. [5M]
- b) Write an account on Carbon Nano tubes? [5M]

(OR)

5. a) What are Super capacitors? How are they classified? [5M]
- b) Discuss the advancement of nanotechnology in nano medicine. [5M]

UNIT-III

6. a) Derive Nernst equation. What is Calomel electrode? [5M]
- b) Describe the construction and working of Hydrogen-Oxygen fuel cell. [5M]

(OR)

7. a) What are Secondary cells? Describe the construction of lithium ion batteries. [5M]
- b) Discuss principle involved in Conductometric titrations. [5M]

UNIT-IV

8. a) Distinguish between addition and condensation polymerization process. [5M]
- b) Write about mechanism of cationic addition polymerization. [5M]

(OR)

9. a) Describe the preparation, properties and applications of Bakelite. [5M]
- b) Explain about Biodegradable polymers with suitable examples. [5M]



Code No: **R231103**

R23

SET - 1

UNIT-V

10. a) State Beer-Lambert's law. Explain how this law can be used to determine the concentration of coloured solutions. [5M]
b) Explain about High Pressure Liquid Chromatography. [5M]

(OR)

11. a) Write the basic principle involved in IR Spectroscopy. [4M]
b) Write about fundamental modes of vibration in IR spectroscopy. [6M]

2 of 2



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1. a) Define the linear combination of atomic orbitals. [2M]
- b) Define non-bonding orbital. [2M]
- c) What is Semi-Conductor? Give suitable example. [2M]
- d) What are nanoparticles? Give two examples? [2M]
- e) Define electrode potential. [2M]
- f) What is significance of electrochemical series? [2M]
- g) What is addition polymerization? Give suitable example. [2M]
- h) Write two important applications of Biodegradable polymers? [2M]
- i) Write combined form of Lamberts-Beers law. [2M]
- j) What is reference electrode? Give one example. [2M]

PART – B (50 MARKS)**UNIT-I**

2. a) Discuss about significance of Ψ and Ψ^2 . [5M]
- b) Draw the π -molecular orbitals of benzene. [5M]

(OR)

3. a) Explain bonding in homo and heteronuclear diatomic molecules using MO Theory. [5M]
- b) Draw the molecular orbital diagram of CO. Explain the magnetic nature and bond order. [5M]

UNIT-II

4. a) Mention few important applications of Super conductors. [5M]
- b) What are Nano particles? Write applications of Fullerene. [5M]

(OR)

5. a) Explain basic principle of Super capacitor materials. [5M]
- b) Give an account of Graphine nanoparticles. [5M]

UNIT-III

6. a) Describe the working principle and applications of Lithium-ion batteries. [5M]
- b) Explain the advantages of fuel cells over electrochemical cells. [5M]

(OR)

7. a) Write the Nernst equation for electrode potential. Discuss briefly Potentiometric sensors. [6M]
- b) What are the limitations of Conductometric titrations? [4M]



UNIT-IV

8. a) Distinguish between thermoplastics and thermosetting plastics. [5M]
b) Write about Preparation, properties and applications of i) Teflon and ii) Nylon-6,6. [5M]

(OR)

9. a) What are conducting polymers? How are they classified? Write important engineering applications. [5M]
b) Explain coordination polymerization process with suitable examples. [5M]

UNIT-V

10. a) Explain Electronic transition occur in UV-Visible spectroscopy. [4M]
b) Write about important applications of IR spectroscopy. [6M]

(OR)

11. a) Explain the principle and instrumentation of UV-Visible spectroscopy with neat diagram. [5M]
b) Discuss selection rules for IR spectroscopy. [5M]



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3. Answer ONE Question from each Unit in Part-B*

PART –A (20 Marks)

1. a) What are the molecular orbitals? [2M]
- b) Define the bond order. [2M]
- c) What type of magnetism is developed in a superconductor when its temperature is lowered below its critical temperature? [2M]
- d) Write a note on super capacitor. [2M]
- e) What are redox titrations? Give one example. [2M]
- f) What is a fuel cell? Give an example. [2M]
- g) What is monomer? Give any two examples. [2M]
- h) What are the applications of Bakelite? [2M]
- i) What is chromatogram? [2M]
- j) Write two deviations of Lamberts-Beers law. [2M]

PART – B (50 MARKS)**UNIT-I**

2. a) Explain about Liner combination of Atomic Orbitals. [5M]
- b) Discuss about Schrodinger wave equation. [5M]

(OR)

3. a) Discuss Salient features of Molecular Orbital Theory. [5M]
- b) Draw the energy level diagram of Oxygen molecule and calculate the bond order. [5M]

UNIT-II

4. a) What are the important engineering applications of semi conducting materials? [5M]
- b) Write about classifications of Nanoparticles. [5M]

(OR)

5. a) Explain the basic concepts and applications of Super conductors with examples. [5M]
- b) Write properties and applications of carbon Nano tubes. [5M]

UNIT-III

6. a) What is meant by electrochemical sensors? Explain Amperometric sensors. [5M]
- b) What is primary cell? Explain construction and applications of Zinc-Air battery. [5M]

(OR)

7. a) Discuss about Acid- Base titrations using conducto-meter. [5M]
- b) Explain PEMFC fuel cell with neat sketch. [5M]



UNIT-IV

8. a) Write the preparation, properties and applications of Buna-S and Buna-N rubbers. [5M]
b) Write Preparation, properties and applications of PVC. [5M]

(OR)

9. a) Distinguish between chain growth and step growth polymerization process with suitable examples. [5M]
b) Explain preparation, properties and applications of PGA and PLA. [5M]

UNIT-V

10. a) Draw the block diagram of Infrared Spectrometer and explain the functions of various components. [6M]
b) Write about basic principle involved in Chromatography. [4M]

(OR)

11. a) Explain absorption shifts in UV-Visible spectroscopy. [4M]
b) Discuss important applications of UV-Visible Spectroscopy. [6M]



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3. Answer **ONE** Question from each Unit in **Part-B**

PART –A (20 Marks)

1. a) Define the terms Wavelength, Frequency and Velocity. [2M]
- b) Write wave and particle dual nature of an electron. [2M]
- c) What is Super Capacitor? Give suitable example. [2M]
- d) How does Conductivity of a Super Conductor vary with temperature? [2M]
- e) What is primary battery? Give an example. [2M]
- f) What is meant by standard electrode potential? How can it be measured? [2M]
- g) What are conducting polymers? [2M]
- h) Write the preparation of Nylon - 6,6. [2M]
- i) Define the term Retention time. [2M]
- j) How can the fingerprint region be used to identify a compound? [2M]

PART – B (50 MARKS)**UNIT-I**

2. a) Discuss about combinations of Atomic Orbitals. [5M]
- b) Write Schrodinger Wave equation in cartesian coordinate and explain the terms. [5M]

(OR)

3. a) What are the differences between bonding and anti-bonding molecular orbitals? [5M]
- b) Discuss MO energy level diagram of O₂ and CO. [5M]

UNIT-II

4. a) Explain doping in semi-conductors. [5M]
- b) What is the effect of nanotechnology on food science? [5M]

(OR)

5. a) Distinguish between superconductor and perfect conductor and explain. [5M]
- b) Discuss the properties and important applications of nanoparticles. [5M]

UNIT-III

6. a) Explain about potentiometric titrations. [5M]
- b) What is meant by electrochemical sensors? Explain Glucose potentiometric sensors. [5M]

(OR)

7. a) What is meant by conductivity cell? Explain acid base titrations with the help of Conductometer. [5M]
- b) With neat sketch explain about Polymer Electrolyte Membrane Fuel cells. [5M]



UNIT-IV

8. a) Write a note on [5M]
i) Teflon ii) PVC iii) PLA

b) How polyaniline act as conducting polymer? Explain its mechanism of conduction. [5M]

(OR)

9. a) Define polymerization process. Explain mechanism of free radicle addition polymerization. [5M]

b) Write about mechanism of conduction and applications of polyacetylene and polyaniline. [5M]

UNIT-V

10. a) Discuss briefly components of an HPLC instrument. [5M]

b) Write a note on Instrumentation and various spectroscopies used for instrumental methods. [5M]

(OR)

11. a) Explain basic principle of UV-Visible spectroscopy. [5M]

b) Discuss important biological applications of IR spectroscopy. [5M]

