ENGINEERING CHEMISTRY

BRANCH:- ALL

SEMESTER – FIRST

These important questions have been prepared using your previous exam papers (PYQs), verified concepts, and additional reference from trusted online academic sources.
For deeper understanding, please refer to your class notes as well.

1️⃣ *HIGH & LONG IMPORTANT QUESTIONS*

(Unit-wise long descriptive questions covering major syllabus weightage and frequently repeated concepts)

Unit 1: Atomic Structure & Chemical Bonding

1. Discuss the postulates of **Bohr's theory** and mention its major **limitations**[33]. Separately, define and explain the significance of the **four Quantum Numbers** (Principal, Azimuthal, Magnetic, and Spin).
2. Define **Orbitals** and explain the **Aufbau Principle**[5555]. State and illustrate **Hund's Rule** for filling up the orbitals (e.g., up to Atomic No. 30)[6].
3. **Chemical Bonds:** Define and explain the formation of **Electrovalent (Ionic)** and **Covalent** bonds with suitable examples NaCl, $CaCl_2$, CO_2. Differentiate between electrovalent and covalent compounds[8].

Unit 2: Electrochemistry

1. Explain **Arrhenius Theory of Ionization**.
2. Define **Degree of Ionization** and discuss the **factors affecting** the degree of ionization in detail.
3. Define **Corrosion** and discuss the **different types of corrosion** with a focus on the mechanism[1111]. Describe various **protective coating methods** used to prevent corrosion, such as Galvanization and Tinning.

Unit 3: Metals & Alloys

1. Define an **Alloy**. Describe the **purpose of making alloys** and their classification (Ferrous and Non-Ferrous)[131313]. Give the composition, properties, and applications of **Gun Metal** and **Duralumin**[141414].
2. Describe the **four main stages of extraction of metals** from their ores in detail: Crushing, Concentration, Reduction, and Refining .

Unit 4: Non Metallic Materials (Polymers & Rubber)

1. Define **Polymers**. Explain the two main types of polymerisation reactions: **Addition Polymerisation** (with example Polyethylene and **Condensation Polymerisation** (with example Bakelite.
2. Compare **natural and synthetic rubber** with suitable examples .
3. Explain the **process of Vulcanisation of Rubber**, including the chemical reaction and mention its applications .

Unit 5: Environmental Effects

1. **Air Pollution:** Define **Air Pollution**. Describe the **sources and effects** of major air pollutants.
2. Explain the **causes and remedial measures/control methods** for air pollution·
3. **Water Pollution & Waste:** Define **Water Pollution** and detail its causes and methods of prevention·
4. Describe **E-waste**: its origin, effects, and control measures·

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2 *IMPORTANT & SHORT QUESTIONS*

(Conceptual, short, and repeated questions focusing on definitions, differences, and examples)

Unit	Question	Relevant Topics
1. Atomic Structure	1. Differentiate between **Orbits and Orbitals**[22].	Distinction, Orbital Shapes
	2. Define **Isotopes and Isobars** with one suitable example for each[23].	Definitions, Examples
	3. Explain **Electrovalency** and **Covalency** with a suitable example[24].	Valency Types
2. Electrochemistry	4. Explain the significance of the **Electrochemical Series** for Cations and Anions[25][25][25].	Electrochemical Series
	5. State **Faraday's First and Second Laws of Electrolysis**. (Numerical problems may be asked) [26].	Laws of Electrolysis
	6. Write a short note on **Electrolysis**[27][27].	General Process
3. Metals & Alloys	7. Define **Metallurgy** and define the terms: **Ore, Gangue, Flux, and Slag**[28].	Metallurgy Terms
	8. Write the physical properties and engineering applications of **Copper and Aluminium**.	Properties, Applications

Unit	Question	Relevant Topics
	9. Write the composition and applications of **Dutch Metal** and **German Silver**[30].	Alloy Composition
4. Non Metallic Materials	10. Differentiate between **Thermosoftening and Thermosetting Plastics** with examples[31].	Distinction of Plastics
	11. Write about the **Engineering Applications of Plastic** based on their properties[3232].	Plastic Applications
	12. Write a short note on **Thermal Insulators** and mention the properties of **Glasswool**[333333].	Thermal Insulators
5. Environmental Effects	13. Write a short note on the **causes and control measures of Ozone Layer Depletion**[3434].	Ozone Depletion
	14. Explain the concept and significance of **BOD (Biological Oxygen Demand)** and **COD (Chemical Oxygen Demand)**	Water Pollution Indices
	15. What is the role of the ingredients of a **Paint**? (E.g., Pigment, Vehicle, Solvent) [3636].	Protective Coating Ingredients

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3 *"AA BHI SAKTA HAI" QUESTIONS (Low probability but smart picks)*

(New syllabus additions or rarely asked, high-value questions indirectly linked with trending patterns)

Unit 1 & 2 (Atomic Structure & Electrochemistry)

1. Explain the concept of **Hydrogen Bonding**[3737].
2. Draw a neat labelled diagram and explain the construction and working of a **Lead–Acid Storage Cell**[38].
3. Explain the mechanism of **Electrolysis** with the primary and secondary reactions at the Cathode and Anode[39].

Unit 3 & 4 (Metals & Non-Metallic)

4. List and explain four important **Mechanical Properties of metals** like Hardness, Ductility, and Malleability[40].
5. What is **Compounding of Plastics**? Briefly explain the role of **Resins, Fillers, and Plasticizers**[41].

6. Write a short note on the properties and applications of **Asbestos** and **Cork**.

Unit 5 (Environmental Effects)

7. Discuss the causes, effects, and control measures of the **Green House Effect**[43].
8. Briefly explain the objectives and activities of **Preventive Environmental Management (PEM)**.
9. Explain the environmental effects and control measures of pollution caused by **Internal Combustion Engines**.

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