


Final Assessment Test – November 2025
Course: **BACHY104 - Engineering Chemistry**Class NBR(s): **6416 / 6422**Time: **Three Hours**Slot: **C1+TC1**Max. Marks: **100**

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

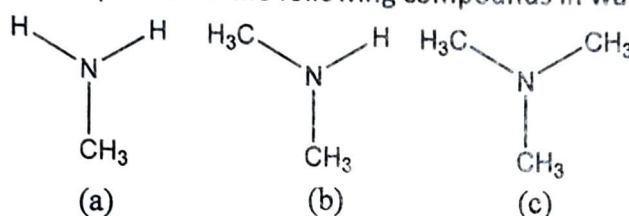
COs	CO Statements
CO1	Explain the electronic effects and reactions of aromatic compounds with mechanisms.
CO2	Describe the preparation of semiconductor materials and surface protection methods.
CO3	Apply analytical techniques for materials characterization.
CO4	Examine the methods of water analysis and treatment techniques.

BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Answer ALL Questions

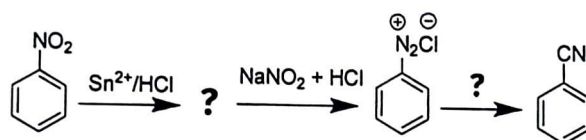
(10 X 10 = 100 Marks)

1. a) Explain the basicity order of the following compounds in water: [5+5] CO1 BL2



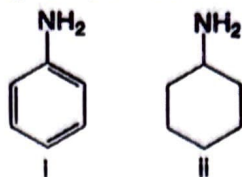
- b) Why is the bond dissociation energy of fluorine lower than that of chlorine?

2. a) Draw and explain the full mechanism for the nitration of benzene. Label the rate determining step. [5+5] CO1 BL2
- b)



3. Classify corrosion inhibitors and discuss their mechanisms of action. [10] CO2 BL2
4. a) Explain the mechanism of action of cation exchange resin and anion exchange resin and why water must be passed first through a cation-exchange resin before an anion-exchange resin? [5+5] CO4 BL3
- b) What is caustic embrittlement? Explain its mechanism.
5. Explain why gold nanoparticle appear darker in TEM but brighter in SEM by comparing their working principle? [10] CO3 BL3
6. a) Why is regeneration necessary in the Zeolite and Ion-Exchange processes? Explain the chemical steps involved in regeneration for both methods. [5+5] CO4 BL3
- b) Explain how phosphate and calgon conditioning prevent scale formation?
7. a) Write down the mechanism of alkylation and acylation reaction in benzene. CO1 BL2
- b) Why does benzene undergo polyalkylation easily, whereas polyacylation is not feasible?

8. a) Explain why o-hydroxy benzoic acid is more acidic than p-hydroxy benzoic acid?
 b) Explain which of the following compounds is more basic.



- 9.a) (i) Differentiate between intrinsic and extrinsic semiconductors with diagrams. How does doping change their electrical conductivity?
 (ii) Discuss the effect of temperature on the electrical conductivity of semiconductors and compare it with that of metals.

[OR]

- 9.b) Why does the Float Zone (FZ) method produces higher-purity crystals than the Czochralski (CZ) method? What compromises one needs to make before choosing the FZ method?

- 10.a) Explain the working principle and applications of UV – visible spectroscopy with suitable examples.

[OR]

- 10.b) Explain the principle of IR spectroscopy with the applications.

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