

Code No: 132AG

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD**B. Tech I Year II Semester Examinations, February - 2025****ENGINEERING CHEMISTRY****(Common to CE, ME)****Time: 3 Hours****Max. Marks: 75****Note:** i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART - A**(25 Marks)**

- 1.a) What are the causes of the hardness of water? [2]
- b) A hard water sample of 50 mL volume required 18.0 mL of 0.03 M EDTA in the titration. Determine the hardness of water in ppm units. [3]
- c) Examine the important criteria that make primary batteries not rechargeable. [2]
- d) For a cell constructed with $\text{Ni}^{2+}|\text{Ni} (1 \text{ M})$ and $\text{Ag}^+|\text{Ag} (1 \text{ M})$, the standard cell potential is 0.8 V, where $\text{Ni}^{2+}|\text{Ni}$ acts anode. As the reaction proceeds, determine the cell potential when the concentration of Ag^+ is reduced to 0.2 M. [3]
- e) Describe the preparation, properties, and applications of PVC. [2]
- f) Define fiber-reinforced plastics and their applications. [3]
- g) Describe the cetane rating of fuels. [2]
- h) Give the composition and uses of LPG, CNG and natural gas. [3]
- i) Describe the composition and characteristics of white cement. [2]
- j) Describe the classification and characteristics of good refractories. [3]

PART - B**(50 Marks)**

- 2.a) Discuss the Nalgonda technique for defluoridation of water and its advantages.
 - b) Describe the Calgon conditioning. [5+5]
- OR**
- 3.a) Discuss the causes, characteristics, and control of caustic embrittlement.
 - b) Describe the reverse osmosis process. [5+5]

- 4.a) Describe the construction and functioning of a dry cell with half-cell and full-cell reactions.
- b) Critically analyze whether a Daniel cell could be recharged slowly. Examine the theoretical possibilities of the recharging of a Daniel cell. [5+5]

OR

- 5.a) Analyze the necessity of a membrane between cathode and anode compartments in a Lithium-ion cell. Explain in brief the construction, working principle, and chemical reactions (during discharging) of a Lithium-ion cell with an emphasis on the membrane used between anode and cathode compartments.
- b) Critically comment on the validity of the following sentence with justification: "While a membrane is used between cathode and anode in Lithium-ion cell, there is no membrane between cathode and anode in Lead-acid cell" [5+5]

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- 6.a) Explain the vulcanization and compounding of rubber.
b) Compare the characteristics of addition and condensation polymerizations. [5+5]

OR

- 7.a) Explain the preparation, properties, and applications of Dacron.
b) Compare the characteristics of thermoplastics and thermoset polymers. [5+5]

- 8.a) Discuss in detail the process involved in the conversion of syngas to hydrocarbons.
b) Explain the Proximate analysis of coal. [5+5]

OR

- 9.a) Describe in detail the moving bed catalytic cracking process of liquid fuels.
b) Explain the process of fractional distillation of crude oil and mention various fractions in order of their boiling range. [5+5]

- 10.a) Analyze any interconnectivity/relativity between flash, fire, and cloud points of a lubricant, along with a brief note on any two properties of a lubricant.
b) Discuss the characteristics of a good lubricant. [5+5]

OR

- 11.a) Explain the setting and hardening of Portland cement.
b) Explain the mechanism of lubrication. [5+5]

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