

R15

Code No: 121AE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech I Year Examinations, January/February - 2025

ENGINEERING CHEMISTRY

(Common to CE, EEE, ME, ECE, CSE, IT, MIE, PTM)

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 is the effect of dilution on specific and molar conductance? [2]
- b) What is differential aeration corrosion? Explain with suitable example. [3]
- c) Write the preparation and uses of Nylon – 6, 6. [2]
- d) Describe the characteristics of a good refractory material. [3]
- e) What is Calgon conditioning? [2]
- f) Differentiate sludge and scale formation in boilers. [3]
- g) Define knocking and octane number. [2]
- h) Describe the steps involved in refining of petroleum [3]
- i) What is condensed phase rule and describe the terms involved in it. [2]
- j) What happens when a beam of light is passed through a colloidal solution? Explain. [3]

PART - B

(50 Marks)

- 2.a) What is concentration cell? Explain with example. Derive the equation for emf of concentration cell without transference.
 - b) Describe the construction of lead-acid battery with the reactions occurring during discharge. [5+5]
- OR**
- 3.a) What is cathodic protection? Explain the sacrificial anodic method with suitable example.
 - b) Explain pitting corrosion, metal cladding and electroplating. [5+5]
- 4.a) What is the need for vulcanization of natural rubber? Describe the process of vulcanization.
 - b) Write the reactions involved in setting and hardening of cement. [5+5]
- OR**
- 5.a) Write the preparation and applications of Butyl rubber and Thiokol rubber.
 - b) Differentiate between thermoplastic and thermosetting resins with examples. [5+5]
- 6.a) Discuss the Ion exchange process of softening of hard water along with the chemical reactions involved.
 - b) Describe the process of reverse osmosis in desalination of brackish water. [5+5]

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OR

- 7.a) Explain the disinfection of water by chlorination and ozonisation.
b) Calculate the temporary, permanent and total hardness of a water sample which contains the following salts per litre: $\text{Ca}(\text{HCO}_3)_2=16.2\text{mg}$, $\text{Mg}(\text{HCO}_3)_2=7.3\text{mg}$, $\text{CaSO}_4=6.8\text{mg}$, $\text{CaCl}_2=22.2\text{mg}$, $\text{MgCl}_2=0.5\text{mg}$. Express it in degree French. [5+5]

- 8.a) Explain the cracking of petroleum by fixed bed catalytic cracking process.
b) A sample of coal was found to contain the following constituents: C=76%, O=12.8%, S=1.2%, H=5.2%, N=2.7%, remaining being ash. Calculate the minimum amount of air required for the complete combustion of 1kg of coal. [5+5]

OR

- 9.a) Explain the synthesis of petrol by Fisher-Tropsch's process with a neat diagram.
b) Explain the proximate analysis of coal along with significance. [5+5]

- 10.a) Discuss the applications phase rule to Pb-Ag system.
b) Define the terms phase, components and degrees of freedom with examples. [5+5]

OR

- 11.a) Describe the characteristics of colloidal solutions and explain electrophoresis.
b) Explain various factors influencing the adsorption of gas on solid surface and applications of adsorption. [5+5]

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