

END TERM EXAMINATION

SECOND SEMESTER [B.TECH] JULY 2023

Paper Code: BS-104

Subject: Applied Chemistry

[Batch 2021 Onwards]

Time: 3 Hours

Maximum Marks: 75

Note: Attempt five questions in all including Q.No.1 which is compulsory. Select one question from each unit.

- Q.1. **Attempt any three.** (3×5=15)
- (a) On burning 0.83 g of a solid fuel in a bomb calorimeter, the temperature of 3500 g of water increased from 26.5°C to 29.2°C. Water equivalent of calorimeter and latent heat of steam are 385.0 g and 587.0 cal/g respectively. If the fuel contains 0.7% hydrogen, calculate its gross and net calorific value.
 - (b) State Gibb's Phase rule. With the help of suitable example explained the terms:
i) Components ii) Degree of freedom iii) Phase
 - (c) What are conducting polymers? Illustrate with an example.
 - (d) Calculate the quantity of lime and soda required to soften 20,000 liters of water containing the following salts:
CaCO₃ = 10.0 mg/L, MgCO₃ = 8.4 mg/L, CaCl₂ = 11.1 mg/L, MgSO₄ = 6.0 mg/L, SiO₂ = 1.2 mg/L
Assuming the purity of lime as 90% and soda as 95%.
 - (e) Discuss sacrificial anodic protection. What is the condition for a metal to act as a sacrificial anode to iron?

UNIT-I

- Q.2. (a) Define carbonization of coal. Explain Otto-Hoffman oven method of carbonization and recovery of by-products with diagram. What are its advantages over earlier methods? (10)
- (b) What do you understand by the term knocking in IC engine? Explain its significance with chemical constituents of fuels. (5)

OR

- Q.3. (a) What are advantages of catalytic cracking of petroleum? Explain fixed bed catalytic method of cracking. Give its mechanism. (10)
- (b) Discuss the relative merits and demerits of solid, liquid and gaseous fuels. (5)

UNIT-II

- Q.4. (a) What do you mean by congruent melting point? Discuss the phase diagram of a two-component system with the formation of a compound having congruent melting point. (6)
- (b) Give the preparation properties and uses of the following (3×3=9)
- i) Phenol formaldehyde resin
 - ii) LDPE
 - iii) Nylon

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OR

- Q.5. (a) Draw a labelled phase diagram of water system and discuss various curves, points, and areas present on it. Discuss super cool water in detail. (6)
- (b) Write short notes on the following: (3x3=9)
- i) Liquid crystalline polymers
 - ii) Electroluminescent polymers
 - iii) Biodegradable polymers

UNIT-III

- Q.6. (a) What do you understand by softening of water? Elaborate the functions of lime and soda in hot lime-soda process. (7)
- (b) What are scales and sludges and why are they formed in boilers. What are their disadvantages and how can their formation be prevented? (5)
- (c) Why is Calgon conditioning better than phosphate conditioning? (3)

OR

- Q.7. (a) Describe the zeolite process used for the softening of water. What are the advantages and limitations of the process? (7)
- (b) Discuss the principle of desalination of water by reverse osmosis. (5)
- (c) What is caustic embrittlement and why is it caused? How can it be prevented? (3)

UNIT-IV

- Q.8. (a) Discuss the role of nature of oxide formed in the oxidation corrosion. State and explain Pilling- Bedworth ratio. (5)
- (b) Define green Chemistry and explain 12 principles of green chemistry. <https://www.ggsipuonline.com> (5)
- (c) What is stress corrosion and what factors are responsible for its occurrence? discuss some important types of stress corrosion (5)

OR

- Q.9. (a) Explain the mechanism of hydrogen evolution and oxygen absorption in electrochemical corrosion. (5)
- (b) Explain surface characterization technique BET and its applications. (5)
- (c) What are the various factors which influences corrosion ? (5)
