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:
$CaCO_3$ =10.0 mg/L, $MgCO_3$ =8.4 mg/L, $CaCl_2$ =11.1 mg/L, $MgSO_4$ =6.0 mg/L, SiO_2 =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 (3x3=9)
i) Phenol formaldehyde resin
ii) LDPE
iii) Nylon

P.T.O.

OR

Q.5. (a) Draw a labelled phase diagram of water system and discuss (6) various curves, points, and areas present on it. Discuss super cool water in detail.

(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 (7) functions of lime and soda in hot lime-soda process.

(b) What are scales and sludges and why are they formed in (5) boilers. What are their disadvantages and how can their formation be prevented?

(c) Why is Calgon conditioning better than phosphate (3) conditioning?

OR

Q.7. (a) Describe the zeolite process used for the softening of water. (7) What are the advantages and limitations of the process?

(b) Discuss the principle of desalination of water by reverse (5) osmosis.

(c) What is caustic embrittlement and why is it caused? How can it (3) be prevented?

UNIT-IV

Q.8. (a) Discuss the role & nature of oxide formed in the oxidation (5) corrosion. State and explain Pilling- Bedworth ratio.

(b) Define green chemistry and explain 12 principles of green (5) chemistry. https://www.ggsipuonline.com

(c) What is stress corrosion and what factors are responsible for its (5) occurrence? discuss some important types of stress corrosion

OR

Q.9. (a) Explain the mechanism of hydrogen evolution and oxygen (5) absorption in electrochemical corrosion.

(b) Explain surface characterization technique BET and its (5) applications.

(c) What are the various factors which influences corrosion ? (5)

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