

END SEMESTER EXAMINATION : JUNE - JULY : 2021**ENGINEERING CHEMISTRY**

Time :3 Hrs

Maximum Marks :60

Note: Attempt questions from all sections as directed. Use of scientific calculator is permitted**Section - A: Attempt any Four questions out of Five . Each question carries 06 marks. [24 Marks]**

Q1. Explain boiler scales and boiler corrosion. Why should the presence of silica and dissolved gases such as CO_2 in boiler water be avoided?

Q2. Explain intergranular and galvanic corrosion. Also give ways of minimizing them.

Q3. What is knocking? How is it related to chemical constituents of the fuel? Differentiate between octane and certain number.

Q4. What do you mean by spin active nuclei? What is meant by shielding and deshielding of protons in H-NMR?

Q5. What are the three steps involved in free radical mechanism? Give one example each of (a) addition polymer and (b) condensation polymer.

Section – B: Attempt any two questions out of three. Each question carries 10marks. [20 Marks]

Q6. (a) Why alkalinity of water cannot be due to the simultaneous presence of OH^- , CO_3^{2-} and HCO_3^- ? Give reaction. (2)

(b) What are zeolites? How are they helpful in softening of water? (4)

(c) A sample of water is alkaline to both phenolphthalein and methyl orange. 200 ml of water sample required 30 ml of N/25 H_2SO_4 for phenolphthalein end point and another 20 ml of complete neutralization. Calculate the type of alkalinity present. (4)

Q7. (a) Define gross calorific value and net calorific value. Why gross calorific value is higher than net calorific value? (4)

(b) In a bomb calorimeter experiment, the following data is obtained: wt. of coal = 1 g, wt. of water taken in the calorimeter = 1500 g; water equivalent of the calorimeter = 270 g; Observed rise in temperature = 1.36°C ; acid correction = 60.0 cal; cooling correction = 0.02°C ; fuse wire correction = 8.00 cal. Calculate the gross and net calorific value of coal, if 10% H is present in coal sample. (6)

Q8. (a) Discuss the method of preparation pf phenol-formaldehyde resin and mention their uses. (5)

(b) State the principle of IR spectroscopy. Why are some molecules IR active and some inactive? Name four IR active molecules. (5)

Section - C: Compulsory question**[16 Marks]**

Q9. (a) Define viscosity and viscosity index. How the viscosity of a lubricating oil improved? (4)

(b) Explain how rate of corrosion is influenced by the following factors:

(i) Nature of corrosion product (b) Relative anodic to cathodic area (4)

(c) A water sample on analysis gave the following results: $MgCO_3 = 42 \text{ mg/l}$, $CaCO_3 = 80 \text{ mg/l}$, $CaCl_2 = 101 \text{ mg/l}$, $Mg(NO_3)_2 = 74 \text{ mg/l}$, $KCl = 20 \text{ mg/l}$,. Calculate the amount of lime (86% pure) and soda (83% pure) needed for the treatment of 10,000 liters of water. (4)

(d) Define rubber. What are the advantages of vulcanized rubber? Give the structure of Buna-S. (4)
