

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 cetane number.
- Q4.** What do you mean by spin active nuclei? What is meant by shielding and deshielding of protons in ^1H -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 $\text{N}/25 \text{ H}_2\text{SO}_4$ 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 of 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: $\text{MgCO}_3 = 42 \text{ mg/l}$, $\text{CaCO}_3 = 80 \text{ mg/l}$, $\text{CaCl}_2 = 101 \text{ mg/l}$, $\text{Mg(NO}_3)_2 = 74 \text{ mg/l}$, $\text{KCl} = 20 \text{ mg/l}$,. 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? Gove the structure of Buna-S. (4)
