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Roll No.

TCH-101

B. TECH. (FIRST SEMESTER)

MID SEMESTER

EXAMINATION, Nov., 2022

ENGINEERING CHEMISTRY

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any *one* of the sub-questions.

(ii) Each sub-question carries 10 marks.

1. (a) On the basis of MOT, explain why F_2 is diamagnetic in nature. Also draw the molecular orbital diagram of F_2 molecule.

(CO1)

OR

- (b) Differentiate between Inter and Intramolecular hydrogen bonding with their significance.

(CO1)

P. T. O.

2. (a) Explain Conductor, Semiconductor and Insulator on the basis of Band theory.

(CO1)

OR

- (b) Discuss the basic principle and application of Spectroscopy (UV-Visible Spectroscopy).

(CO1)

3. (a) (i) Write a detailed note on Nanoscale material.

- (ii) Explain why p-nitrophenol has higher boiling point than o-nitrophenol.

(CO1)

OR

- (b) Draw the MOT diagram of O_2 molecule. Arrange O_2 , O_2^+ , O_2^- and O_2^{2-} in increasing order of their stability. (CO1)

4. (a) Explain about the Zeolite method for softening of water with its advantages and disadvantages. (CO2)

(3)

OR

- (b) A sample of water on analysis was found to consist the following impurities :
 $\text{Ca}(\text{HCO}_3)_2 = 32.4 \text{ ppm}$; $\text{Mg}(\text{HCO}_3)_2 = 7.3 \text{ ppm}$; $\text{CaSO}_4 = 13.6 \text{ ppm}$; $\text{MgCl}_2 = 38 \text{ ppm}$ and $\text{NaCl} = 11.5 \text{ ppm}$. Calculate the temporary and permanent hardness of water sample. (CO2)

5. (a) What is hardness ? Discuss the types of hardness and explain why hard water does not give lather with soap. (CO2)

OR

- (b) Explain about Lime-Soda method for water softening with the help of appropriate chemical reactions. (CO2)