H Roll No. .....

TCH-101

B. TECH. (FIRST SEMESTER)

MID SEMESTER

EXAMINATION, Jan., 2023

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 account of molecular orbital theory (MOT), explain why N_2 is diamagnetic in nature. Also draw the molecular orbital diagram of N_2 molecule. (CO1)

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OR

(b) Define Hydrogen bonding. Differentiate between intramolecular and intermolecular hydrogen bonding with suitable example. (CO1)

2. (a) Describe band theory of metallic bond with the help of suitable example. (CO1)

OR

(b) Define the basic principle of UV-Visible spectroscopy. Explain the effect of solvent polarity in UV spectroscopy. (CO1)

3. (a) Write the postulates of MOT. Draw the molecular orbital diagram of CO molecule. (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 stability. (CO1)

4. (a) Explain about the Lime Soda method for softening of water with the help of appropriate reactions of fully labelled diagram. (CO2)

OR

(b) Explain the reason for calculating hardness of water in terms of $CaCO_3$ equivalent. A sample of water on analysis was found to consist the following impurities : (CO2)

$Mg(HCO_3)_2$ = 16.2 ppm; $Ca(HCO_3)_2$ = 7.3 ppm; $MgSO_4$ = 13.6 ppm; $CaCl_2$ = 9.5 ppm. Calculate the temporary and permanent hardness of water.

5. (a) Explain the Ion-Exchange method of water treatment with the help of diagram. Also discuss the regeneration process of Ion Exchange columns. (CO2)

OR

(b) Explain about Zeolite method for water softening with labelled diagram and also discuss the regeneration process. (CO2)