H Roll No. 2394081

TCH–201

B. TECH. (SECOND SEMESTER)
MID SEMESTER
EXAMINATION, March, 2024

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) Discuss the postulates of molecular orbital theory and draw the molecular orbital diagram of N_2 molecule. (CO1)

OR

(b) Differentiate between Intermolecular and Intramolecular hydrogen bonding. Explain why Ice floats on water. (CO1)

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2. (a) Discuss the band theory of metallic bonding in detail with the help of proper examples. (CO1)

OR

(b) Discuss the UV-visible spectroscopy in detail and also explain their applications. (CO1)

3. (a) Write the difference between bonding and antibonding molecular orbital. Draw the molecular orbital diagram of NO molecule. (CO1)

OR

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

4. (a) Explain the lime-soda method for softening of water with the help of appropriate chemical reactions. (CO2)

OR

(b) What is hardness ? A sample of water on analysis was found to consist of the following impurities :

$Ca(HCO_3)_2$ = 32.4 ppm; $Mg(HCO_3)_2$ = 14.6 ppm; $CaSO_4$ = 13.6 ppm; $MgCl_2$ = 38 ppm.

Calculate the temporary and permanent hardness of water. (CO2)

5. (a) Explain the Zeolite method for softening water with the help of appropriate chemical reactions and discuss the advantages and disadvantages of the Zeolite method. (CO2)

OR

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