H Roll No. .....

TCH–101

B. TECH. (FIRST SEMESTER)
MID SEMESTER
EXAMINATION, 2021-22

(All Branches)

ENGINEERING CHEMISTRY

Time : 1 : 30 Hours

Maximum Marks : 50

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

(ii) Each question carries 10 marks.

1. (a) On the basis of MOT, explain why O_2 is paramagnetic in nature. Also draw the molecular orbital diagram of O_2 molecule.

(CO1)

OR

(b) What do you mean by H-bonding ? Also explain its classification and significances.

(CO1)

P. T. O.

2. (a) Explain band theory of metallic bond with proper example. (CO1)

OR

(b) Discuss the main postulates of VSEPR theory with the help of structure of H_2O and NH_3 molecule. (CO1)

3. (a) Write the difference between bonding and anti-bonding molecular orbital. Draw the molecular orbital diagram of HF molecule. (CO1)

OR

(b) Draw the MOT diagram of N_2 molecule. Arrange N_2, N_2^+, N_2^- and N_2^{--} in increasing order of stability. (CO1)

4. (a) Explain about the Zeolite method for softening of water with its advantages and disadvantages. (CO5)

OR

(b) Why is hardness of water calculated in terms of $CaCO_3$ equivalent ? A sample of

water on analysis was found to consist the following impurities :

$Ca(HCO_3)_2 = 16.2$ ppm;

$Mg(HCO_3)_2 = 7.3$ ppm;

$CaSO_4 = 13.6$ ppm;

$MgCl_2 = 9.5$ ppm.

Calculate the temporary and permanent hardness of water. (CO5)

5. (a) Discuss the Ion-Exchange method of water treatment with the help of a diagram. Also discuss the regeneration process of Ion-Exchange columns. (CO5)

OR

(b) Explain about Lime-Soda method for water softening with the help of appropriate chemical reactions. (CO5)