H Roll No. .....

TCH–101

B. TECH. (FIRST SEMESTER)

MID SEMESTER

EXAMINATION, Oct., 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) 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)

OR

(b) Write the significances of hydrogen bonding. Differentiate between

P. T. O.

intramolecular and intermolecular hydrogen bonding. Explain, why H_2O is a liquid while H_2S is a gas. (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 and its applications. (CO1)

3. (a) Differentiate between BMO and ABMO. Draw the molecular orbital diagram of Li_2 molecule. (CO1)

OR

(b) Draw the MOT diagram of HF molecule. Also report its bond order and magnetic nature. (CO1)

4. (a) Explain the Ion-Exchange method of water treatment with the help of diagram. Also discuss the regeneration process and advantages of this method. (CO2)

OR

(b) Explain, why hardness of water is expressed in terms of $CaCO_3$ equivalents. A water sample on analysis was found to consist the following impurities : $Mg(HCO_3)_2$ = 32.4 ppm; $Ca(HCO_3)_2$ = 14.6 ppm; $MgSO_4$ = 6.8 ppm; $CaCl_2$ = 9.5 ppm; NaCl = 23.4 ppm. Calculate the temporary and permanent hardness of water. (CO2)

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

OR

(b) Write short notes on the following : (CO2)

(i) Reverse Osmosis

(ii) Scale and Sludge formation