H Roll No. .....

TCH–201

B. TECH. (SECOND SEMESTER)

MID SEMESTER

EXAMINATION, 2021-22

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 molecular orbital diagram, explain why O_2 is paramagnetic in nature. Also report its bond order. (CO1)

OR

(b) Draw the MO diagram of F_2 molecule. Discuss the bond order and magnetic nature of F_2 molecule. (CO1)

P. T. O.

2. (a) What do you mean by metallic bonding ? Also discuss the conductor, insulator and semiconductor on the basis of band theory. (CO1)

OR

(b) Explain hydrogen bonding with its types. Explain why *p*-nitrophenol has higher boiling point than *o*-nitrophenol. (CO1)

3. (a) Discuss the basic principle and application of Spectroscopy (UV-Visible Spectroscopy). (CO1)

OR

(b) Write a detailed note on nanoscale materials. Also write its properties and applications. (CO1)

4. (a) Discuss the Ion-Exchange method of water treatment with the help of proper reactions. (CO2)

OR

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

5. (a) A water sample on analysis was found to consist the following impurities :

$Ca(HCO_3)_2$ = 16.2 ppm;

$Mg(HCO_3)_2$ = 14.6 ppm;

$CaCl_2$ = 11.1 ppm;

$CaSO_4$ = 13.6 ppm;

$MgCl_2$ = 19.0 ppm.

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

OR

(b) Calculate the amount of lime and soda required for water softening of 10 lakh litres of hard water, which contains : (CO2)

$Ca(HCO_3)_2$ = 8.1 ppm

$Mg(HCO_3)_2$ = 7.5 ppm

$MgSO_4$ = 12.0 ppm

$CaSO_4$ = 13.6 ppm

$MgCl_2$ = 2.0 ppm and

NaCl = 5.7 ppm.