H Roll No. .....

TCH–201

B. TECH. (SECOND SEMESTER)
MID SEMESTER
EXAMINATION, April, 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 the basis of molecular orbital diagram, explain why NO is paramagnetic in nature. Also report its bond order. (CO1)

OR

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

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2. (a) Differentiate between BMO and ABMO. Draw the molecular orbital diagram of B_2 molecule and write its bond order and magnetic nature. (CO1)

OR

(b) How does an intermolecular hydrogen bonding is different from intramolecular hydrogen bonding ? Explain why alcohols are highly miscible in water ? (CO1)

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

OR

(b) What are nanomaterials and how they are classified ? Write their properties and applications. (CO1)

4. (a) Describe Lime and Soda process in detail with the help of chemical reactions involved in the process. (CO2)

OR

(b) Discuss the Zeolite method of water softening. Also mention its advantages and disadvantages. (CO2)

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

$Mg(HCO_3)_2$ = 14.6 ppm; $CaCl_2$ = 11.1 ppm; $CaSO_4$ = 13.6 ppm; $MgCl_2$ = 19.0 ppm and NaCl = 45 ppm. Calculate the temporary and permanent hardness of water. (CO2)

OR

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

(i) Scale and Sludge Formation in Boilers

(ii) Hardness in terms of $CaCO_3$ equivalents