TCH–101

B. TECH. (FIRST SEMESTER)

MID SEMESTER EXAMINATION, Nov., 2022

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-questions carries 10 marks.

1. (a) On the basis of hydrogen bonding, explain the following :

    (i) Ice floats on water.   (CO1)

    (ii) Orthonitro phenol can be steam distilled while paranitrophenol cannot.

OR

(b) What is meant by bond order ? Calculate the bond order of He_2^+ and O_2 and also explain the magnetic nature.

2. (a) Explain the following terms :   (CO1)

    (i) Spectroscopy and its advantages

(ii) Electromagnetic spectrum

(iii) Beer's Lambert law of absorption of light

(iv) Range of IR Spectroscopy

OR

(b) Why Infra-red Spectroscopy is known as vibrational spectroscopy ? Explain different types of vibrations involved in IR Spectroscopy.

3. (a) Describe the principle of Lime Soda Process with the help of chemical reactions and also differentiate between cold lime soda process and hot lime soda process.   (CO2)

OR

(b) Calculate the amount of lime (92% pure) and soda (98% pure) required for treatment of 30,000 litres of water containing : $Mg(HCO_3)_2 = 36.5$, $CaCl_2 = 27.75$, $Ca(HCO_3)_2 = 40.5$, $CaSO_4 = 34.0$, $MgSO_4 = 30.0$ and $NaCl = 50$.

4. (a) Distinguish between :   (CO2)

(i) Boiler scales and sludges

(ii) Temporary hardness and Permanent hardness

OR

(b) A completely exhausted zeolite softner requires 120 litres of NaCl solution having 100 g/l of NaCl. How many litres of water having hardness 500 ppm can be softened by the zeolite softner.

5. (a) Describe the construction of Bomb Calorimeter. How is the calorific value determined with the help of Bomb calorimeter ? (CO4)

OR

(b) When 0.994 g of coal was burnt completely in Bomb calorimeter, the increase in temp. of 2592 grams of water was 2.732°C, if the water equivalent of calorimeter is 3940 g. Calculate GCV and NCV of the fuel. Given : %H in fuel = 8.0, Latent heat of condensation of steam = 587 cal/g.