Weight of coal burnt = 1.28 gm, Weight of water taken = 350 gm, Weight of water equivalent of bomb and calorimeter = 2050 gm, Rise in temperature = 2.2°C, Fuse wire correction = 15 cal, Acid correction = 25 cal, H = 6.6% and Latent heat of condensation of steam = 580 cal/gm.

5. (a) Define and calculate the cell potential of the given cell at 25°C. Also write the half cell reactions of the following cell : (CO5)

$$Cu(s) / Cu^{+2}(0.01M) // Ag^{+}(0.1M) / Ag(s)$$

(Given $E^{\circ}_{Cu^{+2}/Cu} = 0.34\,V$; $E^{\circ}_{Ag^{+}/Ag} = 0.80\,V$; $R = 8.31\ J/K/mol$; $F = 96500\ C/mol$)

(b) What do you understand by Corrosion ? Explain it with the help of electro-chemical theory of corrosion. (CO5)

(c). Write short notes on the following : (CO5)

(i) Concentration Cells

(ii) Fuel Cells

H Roll No. .....

TCH–101

B. TECH. (FIRST SEMESTER) END SEMESTER EXAMINATION, Dec., 2023

ENGINEERING CHEMISTRY

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) One the basis of MOT diagram, explain why N_2 is diamagnetic in nature. Also find its bond order and magnetic nature. (CO1)

(b) What do you mean by H-bonding ? Explain why, ortho-nitrophenol and para-nitrophenol can be able to separate through fractional distillation method. (CO1)

(c) Write short notes on the following : (CO1)

(i) Band theory of metals

(ii) Applications of Spectroscopy

2. (a) Explain the zeolite process for softening of hard water and also discuss its advantages and disadvantages. (CO2)

(b) Define and calculate the temporary and permanent hardness of a water sample which on analysis have the following : (CO2)

$Mg(HCO_3)_2 = 9.2$ ppm

$MgSO_4 = 24.0$ ppm

$CaSO_4 = 3.40$ ppm

$CaCl_2 = 5.55$ ppm

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

(i) Boiler feed water

(ii) Calgon conditioning

3. (a) (i) What do you mean by Functionality of a monomer ? (CO3)

(ii) Differentiate between thermoplastic and thermosetting polymers.

(b) Write short notes on the following : (CO3)

(i) Conducting polymers

(ii) Biodegradable polymers

(c) Write the preparation, properties and uses of the following : (CO3)

(i) Bakelite

(ii) Nylon-6, 6

4. (a) What do you mean by Biogas ? Explain the construction and working of the Biogas plant. (CO4)

(b) Write short notes on the following : (CO4)

(i) Biomass

(ii) CNG and LPG.

(c) Define and calculate the HCV and LCV of a fuel, when tested in the laboratory for its calorific value in the bomb calorimeter, the following data wer obtained : (CO4)