

H

Roll No.

TCH-201

B. TECH. (SECOND SEMESTER)

END SEMESTER

EXAMINATION, June, 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) Why UV-Visible spectroscopy is called as electronic spectroscopy. Discuss the electronic transitions involved and how solvent polarity affect. (CO1)

P. T. O.

- (b) Draw the MOT diagram of O_2 molecule. Arrange the O_2 , O_2^+ , O_2^- and O_2^{2-} in increasing order of bond length. (CO1)
- (c) Write a detailed note on Hydrogen bonding. Also write the conditions for its formation and significance. (CO1)
2. (a) Explain the lime-soda process used for softening the hard water. (CO2)
- (b) Differentiate between temporary and permanent hardness of water. Calculate the temporary and permanent hardness of water whose analysis is as follows :
 $Mg(HCO_3)_2 = 7.3$ ppm, $MgSO_4 = 3.0$ ppm,
 $CaSO_4 = 3.40$ ppm and $CaCl_2 = 27.75$ ppm. (CO2)
- (c) Discuss ion exchange method for water softening with reactions involved. (CO2)
3. (a) Differentiate between addition and condensation polymerization with suitable examples and write the mechanism of addition polymerization. (CO3)

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

(i) Biodegradable polymer

(ii) Conducting polymers.

- (c) Write the preparation, properties and uses of (i) Bakelite (ii) Dacron.

4. (a) What is Biogas ? Explain the working of Biogas plant with a neat and labelled diagram. (CO4)

- (b) What is the basic principle of Bomb Calorimeter ? Explain its construction, working and corrections. (CO4)

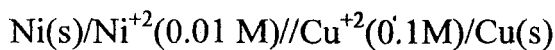
- (c) Define the terms Gross and Net Calorific value of a fuel. Calculate the GCV of the coal in cal/gm, when tested in the laboratory for its calorific value in the bomb calorimeter, the following data were obtained :

Weight of coal burnt = 0.95 gm, weight of water taken = 500 gm, Weight of water equivalent of bomb and calorimeter = 2000 gm, Rise in temperature = 2.48°C , Cooling Correction = 0.02°C , Fuse wire correction = 10 cal, Acid correction = 60 cal, H = 5.5%, C = 82.3% and latent heat of condensation of steam 580 = cal/gm. (CO4)

5. (a) (i) Write a short note on concentration cells.

(ii) Write down the mechanism involved in electrochemical corrosion. (CO5)

(b) Calculate the cell potential of the given cell at 25 degrees centigrade. ($R = 8.31$ J/K/mol; $F = 96500$ C/mol). (CO5)



Given $E^\circ_{\text{Cu}^{+2}/\text{Cu}} = 0.34 \text{ V}$;

$E^\circ_{\text{Ni}^{+2}/\text{Cu}} = -0.25 \text{ V}$

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

(i) Fuel cells

(ii) Electrochemical series.