End Term (Even) Semester Examination May-June 2025

Roll no 2244027

Name of the Program and semester: B.Tech. 2nd Sem
Name of the Course: Engineering chemistry
Course Code: TCH201

Time: 3 hour Maximum Marks: 100

Note:

(i) All the questions are compulsory.
(ii) Answer any two sub questions from a, b and c in each main question.
(iii) Total marks for each question is 20 (twenty).
(iv) Each sub-question carries 10 marks.

Q1	(20 marks)	CO 1
a)	Define Hydrogen bonding their types and any two consequences.	
b)	Explain electronic transitions and Beer's Lamberts law.	
c)	Draw the molecular orbital diagram and find out the bond order and predict the magnetic character for the following: O_2 , N_2^-	
Q2	(20 marks)	CO 2
a)	Define hardness and their types. Describe any chemical method to remove temporary and permanent hardness.	
b)	i. A water sample contains 200mg of $MgSO_4$ per litre. Calculate the hardness in terms of $CaCO_3$ equivalents. ii. Explain Calgon Process .	
c)	Calculate temporary hardness and permanent hardness of a sample of water containing: $Mg(HCO_3)_2$ = 7.3mg/L; $Ca(HCO_3)_2$ = 16.2 mg/L; $MgCl_2$ = 9.5 mg/L; $CaSO_4$ = 13.6 mg/L	
Q3	(20 marks)	CO 3
a)	i. Enumerate the difference between thermoplastic and thermosetting polymers ii. Explain Tacticity and its significance.	
b)	Give the preparation, monomer unit and repeating unit of the following polymers: Nylon 6,6, Bakelite, PVA, PLA	
c)	Describe Conducting Polymer and their applications.	
Q4	(20 marks)	CO4
a)	Give the composition of Biogas? Explain the process for production of biogas and give its applications.	
b)	A sample of coal contains C = 93 %, H = 6% and ash = 1%. The following data were obtained when the above coal was tested in bomb calorimeter: Wt. of coal burnt = 0.92 gm Wt. of water taken = 2200 gm Water equivalent of bomb calorimeter = 550 gm Rise in temperature = 2.42^0C	

	Fuse wire correction = 10.0 cal Acid correction = 50.0 cal Calculate gross & net calorific values of the coal, assuming the latent heat of condensation of steam as 580 cal/gm.	
c)	Write a short note on: i. Gross calorific value and Net calorific value ii. Classification of fuels with example	
Q5	(20 marks)	CO5
a)	What is an electrochemical series? Give its applications with suitable examples.	
b)	Describe the construction of Galvanic cells. Write down the electrode reactions and formula for its EMF.	
c)	Consider a cell $Ni/Ni^{+2}(0.1M)//Cu^{+2}(0.5M)/Cu$. The standard reduction potential of Ni and Cu are -0.25 and 0.34V, respectively. Calculate the EMF of the cell.	