

Code: 23BS1204

**I B.Tech - II Semester – Regular / Supplementary Examinations
MAY 2025**

**ENGINEERING CHEMISTRY
(Common for CE, ME)**

Duration: 3 hours

Max. Marks: 70

 Note: 1. This question paper contains two Parts A and B.

2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.

3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.

4. All parts of Question paper must be answered in one place.

BL – Blooms Level

CO – Course Outcome

PART – A

		BL	CO
1.a)	Identify various units of hardness and the relationship between them.	L2	CO1
1.b)	Predict which salts are responsible for temporary and permanent hardness of water?	L2	CO1
1.c)	Describe Pilling Bedworth ratio.	L2	CO1
1.d)	List the applications of lithium ion battery.	L1	CO1
1.e)	Define functionality of monomers.	L1	CO1
1.f)	Describe the significance of bio fuel.	L2	CO1
1.g)	Classify composites.	L2	CO1
1.h)	Describe how thermal conductivity of a refractory related to its porosity?	L2	CO1
1.i)	Define the term adsorption.	L1	CO1
1.j)	Identify the advantages of using neem leaf extract for the synthesis of gold nanoparticles.	L2	CO1

PART – B

			BL	CO	Max. Marks
UNIT-I					
2	a)	Illustrate the causes, consequences and preventive methods for caustic Embrittlement in boiler feed water.	L3	CO2	5 M
	b)	Explain the principle involved in Reverse osmosis. Discuss the desalination of Brackish water by Reverse Osmosis method.	L4	CO4	5 M
OR					
3	a)	Analyze and calculate the temporary, permanent and total hardness of water sample containing following impurities: $\text{Mg}(\text{HCO}_3)_2 = 16.8 \text{ mg/L}$, $\text{MgSO}_4 = 24.0 \text{ mg/L}$ and $\text{NaCl} = 58.5 \text{ mg/L}$	L4	CO4	5 M
	b)	Discuss about priming and foaming. Mention their prevention methods.	L3	CO2	5 M
UNIT-II					
4	a)	Define fuel cell. Analyze the working principle of hydrogen – oxygen fuel cell with reactions. Write the advantages of fuel cells.	L4	CO4	5 M
	b)	Discuss the factors affecting rate of corrosion by metal.	L3	CO2	5 M
OR					

5	a)	Analyze the following cell, $\text{Ni}/\text{Ni}^{+2} (0.01\text{M})//\text{Cu}^{+2} (0.5\text{M})/\text{Cu}$ The standard reduction potential of Ni and Cu are -0.25 & 0.34 V respectively. Write the electrode reactions and calculate the EMF of the cell at 298 K. $E^0 \text{Ni}^{+2} / \text{Ni} = -0.25 \text{ V}$, $E^0 \text{Cu}^{+2} / \text{Cu} = 0.34 \text{ V}$	L4	CO4	5 M
	b)	What is galvanic corrosion? Illustrate corrosion control methods.	L3	CO2	5 M
UNIT-III					
6	a)	Define octane number of gasoline. Discuss its significance and how is it measured? Why ethylene dibromide is added when TEL is used as an anti knock reagent?	L3	CO2	5 M
	b)	Explain proximate analysis of coal. How is it carried out?	L4	CO4	5 M
OR					
7	a)	Explain the significance of calorific value in fuel analysis.	L4	CO4	5 M
	b)	Discuss the mechanism of step growth polymerization of Bakelite.	L3	CO2	5 M
UNIT-IV					
8	a)	Distinguish the acidic, basic and neutral refractories with suitable examples.	L4	CO5	5 M

	b)	Discuss the characteristics of good lubricants and give their significance.	L3	CO3	5 M
OR					
9	a)	Explain flash and fire point of a lubricant.	L4	CO5	5 M
	b)	Describe the chemical composition of ordinary Portland cement and its functions.	L3	CO3	5 M
UNIT-V					
10	a)	Discuss the advantages and limitations of the Braggs method for synthesizing colloidal particles.	L3	CO3	5 M
	b)	Explain BET equation. Mention the application of the BET equation in the characterization of nanoporous materials.	L4	CO5	5 M
OR					
11	a)	How does the Freundlich isotherm differ from the Langmuir isotherm in terms of adsorption behavior?	L3	CO3	5 M
	b)	List out the steps involved in synthesis of nanoparticles by using sol-gel method.	L4	CO5	5 M