Code: 23BS1204

I B.Tech - II Semester – Supplementary Examinations
DECEMBER 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.

PART – A

1.a)	What are the permanent hardness causing substances?
b)	What is caustic embrittlement? Write the preventive method for it.
c)	Write Nernst equation and explain the terms in it.
d)	Mention the working principle of Zn-air battery.
e)	What is octane and cetane number?
f)	What is functionality of a monomer? What is its significance in polymer chemistry?
g)	Define Refractoriness.
h)	How are carbon fibers obtained?
i)	Mention the characteristics of colloidal solutions.
j)	Describe the role of stabilizing agent in the synthesis of nanomaterials.

PART – B

			Max. Marks
		UNIT-I	
2	a)	Discuss the ion-exchange process of softening of hard water. How the exhausted resins are regenerated.	5 M
	b)	Calculate the temporary and permanent hardness of the water sample containing $MgCl_2$ = 9.5 mg/L; $Mg(HCO_3)_2$ = 7.3 mg/L; $Ca(HCO_3)_2$ = 16.2 mg/L; $CaSO_4$ = 13.6 mg/L and $NaCl$ = 58.5 mg/L.	5 M
		OR	
3	a)	Explain the principle involved in complex metric method in estimation of hardness of water.	5 M
	b)	Differentiate between scales and sludge's.	5 M
		UNIT-II	
4	a)	What are primary and secondary cells? Give examples. Give the construction and working of lithium ion battery.	5 M
	b)	Write the mechanism of electrochemical corrosion by taking the example rusting of iron.	5 M
		OR	
5	a)	Describe the construction and functioning of Ni-Cd battery with relevant chemical reactions involved in the charging and discharging.	5 M
	b)	Explain the factors affecting the rate of corrosion.	5 M
		UNIT-III	
6	a)	What are bio-fuels and explain about bio-fuels with an example.	5 M
	b)	Explain Ultimate analysis of coal.	5 M

		OR	
7	a)	Explain refining of petroleum.	5 M
	b)	Discuss the mechanism of chain growth polymerization of Vinyl chloride.	5 M

UNIT-IV

8	a)	What are lubricants? Discuss mechanism of thin film Lubrication.	5 M
	b)	What is Portland Cement? Write the chemical reactions involved in setting and hardening of Cement.	5 M
		OR	
9	a)	Write a note on composites. What are the advantages and applications of composites?	5 M
	b)	Describe the different types of refractory materials, provide examples of industries that use each type of refractory material.	5 M

UNIT-V

10	a)	List out the applications of nanomaterials in various fields.	5 M
	b)	Describe the principle of Bragg's method for synthesizing colloids. Explain how this method is used to produce metal colloids.	5 M
		OR	
11	a)	Compare the chemical and biological methods for preparation of nanomaterials. What are the advantages and disadvantages of each method?	5 M
	b)	Discuss about the BET equation. Mention its applications of colloids.	5 M