PVP 20

Code: 20BS1105

I B.Tech - I Semester – Regular / Supplementary Examinations
FEBRUARY - 2023

CHEMISTRY OF MATERIALS
(MECHANICAL ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Determine the temporary, permanent and total hardness in degree Clarke units for a water sample which showed the following analysis. $Ca(HCO_3)_2$= 32.4 mg/lit, $Mg(HCO_3)_2$ =58.4 mg/lit, NaCl = 10 mg/lit, $CaCl_2$ = 22.2 mg/lit, $MgSO_4$ = 36.0 mg/lit, Organic matter = 30 mg/lit. Given: (Atomic weight of Ca=40, H=1, C=12, O=16, Cl=35.5, S=32, Mg=24, Na = 23).	L4	CO4	7 M
	b)	With reactions explain why hard water does not form lather with soap? How can temporary and permanent hardness be removed?	L3	CO2	7 M
OR					

2	a)	Explain the different units to express hardness of water. Establish the relationship between them.	L2	CO1	7 M
	b)	"Zeolites are used as softeners". Give the reason.	L3	CO2	7 M
		UNIT-II			
3	a)	Summarize electrochemical series along with the characteristics of metals present above and below hydrogen. Outline two applications of the series with examples.	L2	CO2	7 M
	b)	Write a note on Hydrogen Electrode with cell reactions and cell notation. Give the advantages of Hydrogen Electrode.	L2	CO2	7 M
		OR			
4	a)	Develop Hydrogen-Oxygen fuel cell with a neat diagram and chemical reactions. List out the applications of fuel cells.	L4	CO4	7 M
	b)	Discuss Li-MnO_2 battery with construction, working and applications.	L4	CO4	7 M
		UNIT-III			
5	a)	State Pilling Bedworth rule. Explain how the volume of metal oxide formed plays a key role in acting as a protective layer?	L4	CO4	7 M
	b)	Summarize the factors affecting the corrosion.	L3	CO2	7 M
		OR			

6	a)	Discuss how metals are protected by Impressed current cathodic protection method?	L3	CO2	7 M
	b)	List out different methods used for controlling the corrosion of metals.	L4	CO4	7 M
		UNIT-IV			
7	a)	Choose any two types of steel and explain them.	L3	CO3	7 M
	b)	List out the properties and uses of Polyphosphazines and briefly explain their preparation.	L4	CO4	7 M
		OR			
8	a)	Make use of a neat diagram to explain the manufacturing process of Portland cement with relevant chemical equation.	L3	CO3	7 M
	b)	Summarize the properties of thermoplastic and thermo setting resins with examples.	L4	CO4	7 M
		UNIT-V			
9	a)	Make use of a neat diagram to explain the characterization of nanomaterials by TEM.	L3	CO3	7 M
	b)	List out the applications of nano materials for waste water treatment.	L4	CO4	7 M
		OR			
10	a)	Summarize the different types of smart materials along with theirs uses.	L4	CO4	7 M
	b)	Discuss chemical synthesis of nanomaterials using sol-gel method.	L4	CO4	7 M