BT MRE-I(R/S)-12-24-3595 Reg. No. | | | | | | | | |

A

B.Tech. Degree I Semester Regular/Supplementary Examination in Marine Engineering December 2024

19-208-0103 ENGINEERING CHEMISTRY

(2019 Scheme)

Time: 3 Hours Maximum Marks: 60

Course Outcome

On successful completion of the course, the students will be able to:

CO1: To understand the treatment of water to remove hardness.
CO2: To get exposure to the important aspects of solid state chemistry and electrochemistry.
CO3: To understand and apply the concepts corrosion science.
CO4: To get exposure on the important types of fuels used in marine applications.
CO5: To gain sound understanding on the requirements and properties of a few important engineering materials.

Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 –Analyze, L5 – Evaluate, L6 – Create

PI – Programme Indicators

(Answer *ALL* questions) (5 × 15 = 75)

			Marks	BL	CO	PI
I.	(a)	Describe the determination of degree of hardness by EDTA method.	10	L2	1	1.2.1
	(b)	A sample of hard water gives the following results on analysis: $Ca(HCO_3)_2$ = 16.2 ppm, $Mg(HCO_3)_2$ = 14.6 ppm, $CaCl_2$ = 11.1 ppm, $MgCl_2$ = 9.5 ppm, $CaSO_4$ = 13.6 ppm, $MgSO_4$ = 12.0 ppm. What is the amount of lime and soda required for the treatment 20000 litres of the water sample?	5	L3	1	1.2.1
		OR				
II.	(a)	Describe the softening of water by resin ion exchange process.	8	L2	1	1.2.1
	(b)	With the help of a neat diagram explain the reverse osmosis process for desalination of sea water.	7	L2	1	1.2.1
III.	(a)	Explain the working of Weston-Cadmium cell with a neat diagram and equations.	10	L2	2	1.2.1
	(b)	Calculate the EMF of the cell at 25° C from the following data: $Ni^{2+}(aq.) + 2e^- \rightarrow Ni(s)$ $E^0 = 0.25v$ $Cr^{3+}(aq.) + 3e^- \rightarrow Cr(s)$ $E^0 = -0.74v$ $[Ni^{2+}] = 1\times10^{-4}M$ and $[Cr^{3+}] = 2\times10^{-3}M$	5	L3	2	1.2.1
		OR				
IV.	(a)	Discuss stoichiometric defects in crystals.	7	L2	2	1.2.1
	(b)	Write notes on (i) Super conductors. (ii) Thermotropic and lyotropic liquid crystals.	8	L1	2	1.2.1

(P.T.O.)

			Marks	BL	CO	PI
V.	(a)	Describe sacrificial anode protection and impressed current cathodic protection for corrosion control.	9	L2	3	1.2.1
	(b)	Discuss any four factors that influence rate of corrosion.	6	L1	3	1.2.1
		OR				
VI.	(a)	Explain rusting of iron by applying electrochemical theory of corrosion.	10	L3	3	1.2.1
	(b)	Rationalize the following: (i) A copper equipment should not possess a small steel bolt. (ii) Iron corrodes faster than aluminium, even though iron is placed below aluminium in the electrochemical series.	5	L3	3	1.2.1
VII.	(a)	Write Dulong formula and explain the terms involved. Calculate NCV and GCV of a coal sample having following composition: C = 72%, H = 8.2%, O = 12%, N = 3.3% and ash = 4.5%	10	L1	4	1.2.1
	(b)	Write notes on (i) Fuel cells. (ii) LPG and LNG.	5	L2	4	1.2.1
		OR				
VIII.	(a)	Describe the Fischer-Tropsch process for the preparation of synthetic petrol.	8	L2	4	1.2.1
	(b)	Describe proximate analysis of coal. What is the significance of this analysis?	7	L2	4	1.2.1
IX.	(a)	Describe the various ingredients used in the compounding of rubber and their functions.	9	L2	5	1.2.1
	(b)	What is vulcanization of rubber? Explain it with equation.	6	L1	5	1.2.1
		OR				
X.	(a)	Describe the preparation, properties and uses of (i) Polystyrene. (ii) PET. (iii) Neoprene . (iv) Buna-S.	10	L2	5	1.2.1
	(b)	Distinguish between (i) addition polymerisation and condensation polymerisation (ii) thermoplastics and thermosetting polymers.	5	L3	5	1.2.1

Blooms's Taxonomy Level
L1 – 20%, L2 – 60%, L3 – 20%.

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