BT– MRE – I & II (S) – 05.15 – 0570 Reg. No. | | | | | | | | |

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B.Tech. Degree I & II Semester Supplementary Examination in Marine Engineering May 2015

MRE 104 ENGINEERING CHEMISTRY

Time : 3 Hours Maximum Marks : 100

(5 × 20 = 100)

I. (a) Explain older and newer units in which hardness of water is expressed. (4)

(b) What is meant by desalination? Explain electrodialysis method of desalination of sea water. (8)

(c) Explain cold and hot lime soda processes of softening of hard water with equations for the reactions taking place. Compare their advantages and disadvantages. (8)

OR

II. (a) Describe any two internal conditioning methods of boiler feed water. (4)

(b) Show how hardness of water is determined using EDTA method. (8)

(c) Discuss on boiler troubles briefly. (8)

III. (a) State and explain Pilling-Bedworth rules with examples. (4)

(b) Explain theories of electrochemical corrosion of metals taking iron as example. (8)

(c) Describe galvanizing of iron. What is its purpose? Name some articles made of it. (8)

OR

IV. (a) Discuss on any four factors influencing rate of corrosion of a metal. (4)

(b) Describe sacrificial and impressed current cathodic protection of metals. (8)

(c) Name any four ingredients used in the manufacture of varnish and their importance. (8)

V. (a) Derive Nernst equation for potential of an electrode $M_{(s)} \mid M^{n+}$ (4)

(b) Describe construction and working of lead-acid cell. Give equations for discharging and charging reactions. What is its potential? Mention its use in the form of battery. What are its advantages and disadvantages? (8)

(c) Discuss on electrolyte concentration cell with an example. Write anode and cathode reactions and derive expression for cell EMF. Calculate EMF of a silver concentration cell with silver ion concentrations being 0.1 and 0.2 M at left and right electrodes respectively at 25°C. $E^0_{Ag,Ag^+} = 0.8V$. (8)

OR

VI. (a) Determine pH of a solution at left hand electrode (4)

$$Pt\left|H_{2(g,1atm)}\right|H^+\left|\left|H^+_{(1M)}\right|H_{2\ (g,1atm)}\right|Pt$$ at 25°C, if EMF of the cell is 0.59 V.

(b) Explain construction and working of Hydrogen-Oxygen fuel cell. What are its advantages and disadvantages? (8)

(c) Define EMF of a cell. Show how EMF of a cell determined experimentally using a potentiometer. Write circuit diagram and show steps to calculate EMF. (8)

(P.T.O.)

VII.	(a)	Define gross and net calorific values and give their relationship.	(4)
	(b)	Explain how calorific value of a volatile liquid fuel is determined? Give steps for calculation.	(8)
	(c)	What are the fractions obtained during fractional distillation of petroleum? Mention their characteristics and uses.	(8)
		OR	
VIII.	(a)	What is meant by knocking in a petrol engine? What is its disadvantage? How can it be reduced?	(4)
	(b)	Describe proximate analysis of a sample of coal? What is its importance?	(8)
	(c)	Discuss on different types of lubricants with examples.	(8)
IX.	(a)	Give methods of production and uses of PVC and Nylon.	(4)
	(b)	Compare thermo and thermosetting plastics. Give one example for each. Give equation for their preparation.	(8)
	(c)	What is vulcanization of rubber? Explain it with equation. Mention the uses of the product.	(8)
		OR	
X.	(a)	Show with equation how silicon rubber is produced. Mention its important uses.	(4)
	(b)	Compare the characteristic of addition and condensation polymerization reactions. Give equation for formation of any one polymer by each mechanism.	(8)
	(c)	Describe various steps to process natural rubber in sheet form. Give its structure. Compare the properties of natural and vulcanized rubber.	(8)

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