

CY8101

CHEMISTRY FOR MARINE ENGINEERING

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3 0 0 3**OBJECTIVES:**

On Completion of the course the Students are expected to

- Have a thorough knowledge of Boiler Chemistry and Feed Water Treatment methods.
- Have a knowledge of various Water Hardness analysis procedures
- Have a basic concept on Nanochemistry.

UNIT I WATER TECHNOLOGY**9**

Water and its impurities - Significance and estimation - turbidity, colour, pH, acidity, solids, chlorides, residual chlorine, sulphates, fluorides, phosphates, iron and manganese, DO, BOD, COD, nitrogen, grease, volatile acids.

UNIT II WATER TREATMENT PROCESSES**9**

Lime and Soda treatment, zeolites process and ion exchange (demineralization) - pH treatment, salinometer, use of litmus paper, test for partial, total alkalinity, chloride, sulphite, phosphate test, caustic soda treatment, condensate lime treatment. Desalination of water, reverse osmosis and electro dialysis, and control, effects of salts and gases in feed water.

UNIT III BOILER CHEMISTRY**9**

Purpose of water treatment in boilers, scale and sludge formation and prevention, priming and foaming- Boiler corrosion – fretting, pitting corrosion, corrosion fatigue, atoms and ions, electro chemical corrosion, hydrogen and hydroxyl ions, types and causes of corrosion and its control ; chemical and mechanical deaeration, methods of chemical deaeration, dezincification, stress corrosion.

UNIT IV WATER HARDNESS ANALYSIS**9**

Hardness, units of hardness, estimation of hardness by EDTA method, treatment for hardness, total dissolved solids, dissolved oxygen test, use of coagulants, typical test valves for smoke and water tube boilers.

UNIT V ENERGY SOURCES AND NANOCHEMISTRY**9**

Introduction - Properties (Electrical, Mechanical and vibration) – carbon nano tubes -Applications in fuel cells, catalysis and use of gold nanoparticles - batteries –secondary batteries - alkaline batteries – lead acid, Ni – Cd and Li batteries, principles and applications of solar cells, fuel cells – Hydrogen and methanol.

TOTAL: 45 PERIODS**OUTCOME:**

The knowledge gained on various aspects of water chemistry, energy sources and nanochemistry will provide a strong platform to understand concepts on these subjects for further learning.

TEXT BOOKS:

1. Jain. P.C. and Monika Jain, "Engineering Chemistry", 4th Edition, Dhanpat Rai & Sons, New Delhi, 2002.
2. Milton and Leech, "Marine Boilers", Butter Worth Publishers, UK.
3. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, Delhi, 2015.

REFERENCES:

1. L. Jackson and T.D. Morton, "Reed's General Engineering Knowledge for Marine Engineers", Vol. 8, 2013.
2. Vairam S., Murugavel S.C. and Chelladurai C, "Engineering Chemistry-I & II", Gems Publishers, 2016.