



**Sarvodaya Kelavani Samaj managed,
Shri Manibhai Virani and Smt. Navalben Virani Science College
(Autonomous)**

(Affiliated to Saurashtra University, Rajkot)

Re-Accredited at 'A' Level by NAAC

STAR college Scheme & Status by MST-DBT

UGC- College with Potential for Excellence (CPE)

UGC-DDU KAUSHAL Kendra

GAAA –Grade A-1 by KCG, Government of Gujarat

GPCB-Government of Gujarat approved Environment Audit Center

Nodal Center for capacity building by GSBTM

Department of Chemistry

Part-III, SEC- III: Value Added Courses

Offering Department: Department of Chemistry
(From AY 2019-20 onwards)

19UAEVA01	Surface Coating Techniques	40 Hrs.	1 Credits
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Unit.1 Surface coating: (03 Hrs.)

Introduction, objectives & applications of coating (on metal & non-metals), classification of surface coatings (inorganic & organic), preliminary treatment of surfaces.

Unit.2 Organic surface coating: (03 Hrs.)

Chemistry, composition, characteristics, role and applications of oil paints, water paints (emulsion paints), varnishes, lacquers and wax polishes.

Unit.3 Inorganic surface coating - Electroplating: (03Hrs.)

Theory and electroplating techniques of copper, zinc, and chrome.

Unit.4 Inorganic surface coating - Non-electric coatings: (03 Hrs.)

Theory, characteristics, special applications, and working techniques of hot dipping, metal spraying, vacuum metalizing, vitreous coating.

Unit.5 Additive Agents for Surface Coatings: (03 Hrs.)

Introduction, role and classification of additives in surface coating processes.
Additives - brighter, solvents, emulsifiers.

List of Proposed Practical:**(25 Hrs.)**

1. To prepare electrolyte and bath for Copper Electroplating.
2. To prepare electrolyte and bath for Zinc Electroplating.
3. To prepare electrolyte and bath for Chrome Electroplating.
4. To perform electroplating of Copper metal on given standard sample.
5. To perform electroplating of Zinc metal on given standard sample.
6. Demonstrative Practical: To perform electroplating of Chrome metal on given sample.
7. To perform analysis of electrolyte for Copper Electroplating.
8. To perform analysis of electrolyte for Zinc Electroplating.
9. To perform analysis of electrolyte for Chrome Electroplating.

Books Recommended:

1. Coatings materials and surface coatings - Arthur A. Tracton (Editor), CRC Press, Taylor & Francis Group.
2. Engineering chemistry - R. Gopalan, D. Venkappayya, S. Nagarajan.
3. Chemistry in engineering and technology volume -1 & 2 – J.C. Kuriacose & J. Rajaram
4. Engineering chemistry – Jain & Jain
5. Industrial hygiene and chemical safety – M. K. Fulekar.

19UAEVA02	Formulation of Detergents & Toiletries	40 Hrs.	1 Credits
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Unit.1 Surface active agents: (03 Hrs.)

Introduction, classification, and role of surface active agents - emulsifiers, foaming agents, antifoaming agents, concept of HLB - Hydrophile Lipophile Balance.

Unit.2 Additive agents: (03 Hrs.)

Introduction, types of additives, role of additives, selection of additives. Additives: colour, fragrance, preservatives, stabilizers, glycerine.

Unit.3 Soaps: (03 Hrs.)

Introduction, composition, characteristics, role and applications of soaps, formulation process of soaps - both liquid and solid.

Unit.4 Detergents: (03 Hrs.)

Introduction, composition, characteristics, role and applications of soaps, formulation process of detergents - both liquid and solid.

Unit.5 Toiletries: (03 Hrs.)

Introduction, composition, characteristics, role and applications of toiletries like liquid dish-wash and domestic toilet cleaners. Formulation process of liquid dish-wash and domestic toilet cleaners.

List of Proposed Practical:**(25 Hrs.)**

1. Preparation of liquid hand-wash: Gel type - transparent.
2. Preparation of liquid hand-wash: Cream type - opaque.
3. Preparation of liquid dish-wash.
4. Preparation of domestic glass cleaner.
5. Preparation of domestic toilet cleaner.
6. Preparation of liquid detergent.
7. Preparation of tiles cleaner
8. Preparation of rust remover
9. Preparation of drainage cleaner
10. Preparation of shower gel & shampoo.

Books Recommended:

1. Surfactants and interfacial phenomena - Milton J. Rosen
2. Chemical formulation an overview of surfactant – based preparation used in everyday life
– Tony Hargreave, Royal Society of Chemistry, 2003, ISBN: 0854046356
3. Cosmetic and Toiletry Formulations - Vol. 2, Ernest W. Flick, Noyes Publication

19UAEVA03	Soil & Water Analysis	40 Hrs.	1 Credits
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- Unit.1 Water Analysis – Physical examination:** (03 Hrs.)
pH, temperature, total dissolved solid, suspended solid, acidity, alkalinity, colour, taste, smell, turbidity, hardness of water.
- Unit.2 Water Analysis – Nonmetallic inorganic constitues** (03 Hrs.)
chloride, sulphate, sulphide, fluoride, phosphate, sulphur, nitrate, nitrite, carbon dioxide, ammonia, cyanide.
- Unit.3 Water Analysis – Mineral and Toxic Ions** (03 Hrs.)
Mineral ions: calcium, magnesium, iron, sodium, silver, zinc, manganese. Toxic ions: lead, mercury, arsenic, beryllium, cadmium, chromium, copper, selenium.
- Unit.4 Soil Analysis-Physical Test:** (03 Hrs.)
Soil Texture, Water Holding Capacity, Bulk Density, Hydraulic Conductivity
- Unit.5 Soil Analysis- Chemical Test** (03 Hrs.)
pH, Electrical Conductivity (EC), Organic Carbon ,Free Lime, macronutrients N, P, K, micronutrients Cu, Zn, Mg etc.

List of Proposed Practical:**(25 Hrs.)****➤ Soil analysis-Determination of:**

1. Water holding capacity
2. Bulk density
3. Soil Reaction (pH)
4. Electrical Conductivity (EC)
5. Calcium Carbonate (CaCO_3) Free Lime
6. Nitrogen, Phosphorous, Potassium

➤ Soil analysis-Determination of:

1. pH
2. Electrical Conductivity (EC)
3. Carbonates & Bicarbonates
4. Calcium & Magnesium - EDTA Titrimetric Method
5. Chloride
6. Sulphate on Spectrophotometer

Reference Books:

1. Instrumental Analysis, H H Willard, CBS Publishing Co.
2. Handbook of Water Analysis, Third Edition, Leo M.L. Nollet, Leen S. P. De Gelder, CRC Press, ISBN 9781439889640