



Anil Neerukonda Institute of Technology & Sciences (Autonomous)

(Permanent Affiliation by Andhra University & Approved by AICTE)
Accredited by NBA (ECE, EEE, CSE, IT, Mech. Civil & Chemical) & NAAC
Sangivalasa-531 162, Bheemunipatnam Mandal, Visakhapatnam District
Phone: 08933-225083/84/87 Fax: 226395
Website: www.anits.edu.in email: principal@anits.edu.in

R23 Material Chemistry Syllabus (For I/IV B.Tech Civil 23-24) WEF 2023-24

Course Code: 23CY1103

Instruction: 3 periods/ 1 Tutorial per week

End exam: 3 hours

Prerequisites: Chemistry at +1 and +2 level

Credits: 3

Sessional marks: 40

End exam marks: 60

Course objectives

1. To make them understand about composition of water resources, determination of water quality parameters, mechanism of corrosion and methods to control corrosion.
2. To provide knowledge on various cement composition, setting & hardening process, composition of soil, instrumental techniques and ceramics materials.

Course Outcomes

CO	Statement
1	Assess and contrast water treatment methods, analyse intricate challenges related to water impurities, hardness, boiler issues, and corrosion, and devise efficient, cost-effective, and environmentally conscious solutions.
2	Analyse various building materials and apply the knowledge in constructional activities
3	Acquire Knowledge on composite materials, their applications and able to know characterisation of Nanomaterial.
4	Assess the effects of corrosion on structures and equipment, exploring corrosion theories, types, and influential factors. Formulate effective corrosion protection strategies based on evaluating the efficiency of various protection methods.
5	Attain knowledge on minerals in soil and their analysis using instrumental techniques

UNIT-I Water Technology.

10 Periods

Impurities of surface & ground water, Types of water – hardness, Types- Determination, problems in hardness – Boiler troubles- Sludge & scale formation- caustic embrittlement. Water softening methods: -Lime soda- Ion exchange processes and their applications. Municipal water treatment- Sedimentation with coagulant-Sterilisation– chlorination, break point chlorination-Desalination Methods-Reverse Osmosis, Electro dialysis.

UNIT-II Cement Chemistry

8 periods

Introduction to building materials, Process of manufacturing of cement, composition of cement, Chemical requirements as per IS: 269:2013.

Computation of amounts of constituent compounds in cement, Setting & Hardening of cement, Chemistry involved in Concrete, Decay of concrete, RCC

UNIT-III Industrial materials

10 periods

Ferrous and Non-Ferrous materials (Iron, steel, Aluminum, copper), classification of steel, Introduction to polymers-Thermoplastics and Thermosetting plastics, Preparation, properties, applications of Vinyl resins (PE, PVC, PS).

Definition of composite- components in composites-classification of composites- Fibre Reinforced Composites-Engineering-Bituminous Materials-Tar, Bitumen & Asphalt

UNIT-IV Corrosion Chemistry

10 Periods

Theories of corrosion-Dry and wet corrosion – Applications-detrimental effects to buildings, machines, devices -Types of corrosion-Galvanic corrosion- Concentration cell corrosion-Illustrations - Factors Influencing corrosion.

Corrosion protection - cathodic protection – sacrificial anodic and impressed current protection methods; advanced protective coatings: electroplating and electroless plating, Corrosion issues in specific industries (Power generation, Chemical Processing, Oil & Gas, Pulp & paper industry).

UNIT-V Soil Chemistry

10 Periods

Thermal analysis of soil minerals, Infrared absorption analysis of soils, Cation exchange capacity determination of soils, soil organic matter separation and characterisation, cation activity measurement for soils-Instrumental techniques in chemical analysis(pH metry, conductometry, potentiometry & spectrophotometry)- Principle &Methods with Illustrations

Prescribed books

1. Engineering chemistry -P.C. Jain and M.Jain-17th edition, 2021, Dhanpath Rai & Sons, New Delhi.

Reference books

1. A text book of Engineering Chemistry-S.S.Dara- 12th edition, 2010,S.Chand & Co.New Delhi.