

GUJARAT TECHNOLOGICAL UNIVERSITY
DIPLOMA IN METALLURGY ENGINEERING
Semester: 4

Subject Name METALLURGICAL ANALYSIS

Sr. No.	Course content
1.	INTRODUCTION 1.1 Importance of chemical analysis of raw materials and finished products. 1.2 Types of chemical analysis.
2.	SAMPLING 2.1 Definition of sampling and its importance. 2.2 Sampling methods and equipment. 2.3 Sampling of different materials like solid and liquid metals, ores, castings etc. 2.4 Advantages and limitations of different sampling methods.
3.	THEORETICAL PRINCIPLES OF CHEMICAL ANALYSIS 3.1 Theory and electrolytic dissociation and ionization. 3.2 Law of mass action. 3.3 PH for Hydrogen ion exponent. 3.4 Solubility product. 3.5 Acid, base and salts. 3.6 Hydrolysis of salts. 3.7 Theory of indicators. 3.8 Types and use of indicators. 3.9 Titration curves. 3.10 Buffer solution.
4.	CONVENTIONAL CHEMICAL ANALYSIS METHOD 4.1 Types of conventional analysis like qualitative and quantitative (Gravimetric , volumetric). 4.2 Principles of chemical analysis by group reagent. 4.3 Separation of positive radicals by qualitative analysis. 4.4 Principles of quantitative analysis. 4.5 Equipment and materials used in quantitative analysis like balance, filter paper, glass ware etc. 4.6 Care and precautions during quantitative analysis. 4.7 Determination of various elements from Alloys by quantitative analysis.

5.	MODERN CHEMICAL ANALYSIS METHOD 5.1 List of modern chemical analysis methods polarography, potentiometry like calorimetry, electrometry, spectroscopy. 5.2 Principles of calorimetry, electrometry, spectroscopy. 5.3 Description of instruments for modern analysis. 5.4 Procedure steps in modern analysis. 5.5 Introduction about SEM/TEM.
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LABORATORY EXPERIENCES:

1. Weigh given samples by analytical balance.
2. Perform quantitative analysis of given ferrous and non ferrous sample by standard kit of chemicals.
3. Determination of C and S by Rolla's apparatus in given steel sample.
4. Determination of Si in cast iron by gravimetric method.
5. Determination of phosphorous in bronze by volumetric method.
6. Determination of Mn in steel by volumetric method.
7. Determination of antimony in bearing metals by gravimetric method.
8. Determination of alloying elements in steel by spectroscopy.
9. Determination of alloying elements by potentiometry
10. Study determination of elements by colorimetry
11. Study determination of elements by electrolysis

Reference Books:

Sr. No.	Name of Books	Author
1.	Metallurgical analysis	Agrawal and Jain
2.	Quantitative chemical analysis	Vogel
3.	Qualitative analysis	Cowen
4.	Fundamentals of physical chemistry	Crockford and Kright