



Dempo Charities Trust's
DHEMPE COLLEGE OF ARTS & SCIENCE
Miramar, Panaji-Goa

Post Graduate Certificate Course “ Industrial and Analytical Techniques”
Duration: One year

Course Objectives:

1. To understand methods of sampling, solvent extraction, data handling,
2. To understand Basic Concept of Programming languages, Computer programs, Algorithm, program flow charts and Application of computers in chemistry
3. To understand Pharmaceutical Formulations, Pharmacopoeias, Techniques of analysis used in pharmaceutical dosage form Standardisation and quality control standards for ayurvedic formulations
4. To understand Regulatory Aspects and Good Practices (Salient Features) and packaging materials
5. To understand different spectroscopic and chromatographic methods of analysis
6. To study cosmeticology, and understand methods of analysis of ore, water soil analysis
7. To understand microbiology techniques used in pharma industry

Course Contents:

Paper I

Section I

No.of Lectures

A) Common laboratory techniques	7
Sampling	1
Solvent extraction	2
Potentiometry	2
Conductometry	2

B) Data Handling 8

Evaluation and processing of analytical data, precision and accuracy, types of errors, normal distribution curve, standard deviation, confidence limits, graphical preparation of results, methods of averages, method of linear least squares, significant figures, statistical aids to hypothesis testing t test, f test, X^2 test. (More emphasis on problem solving)

Section II

Basic Concept of Operating System & Network	5
Programming languages, Computer programs, Stored program concept, Operating systems, Algorithm, program flow charts	
Application of computers in chemistry:	6
Introduction to various numerical methods in applicable in chemistry such as least square fit, solution to simultaneous equations, interpolation, extrapolation, data smoothing, numerical differentiation and integrations etc.	
Use of software packages in chemistry:	4
Spread sheet application, least square fit, data plotting, simulations of potentiometric titration and end point locations etc.	

Paper II

Section I

Pharmaceutical Analysis

Introduction to Drugs	2
Drug products, definition, examples of drugs, prodrugs and drug products/dosage forms.	
Formulations	3
Classification of dosage forms and their descriptions, components of formulations, their types with typical examples.	
Pharmacopoeias	3
Introduction, development, study of monographs,(IP,BP,USP,EU, Formularies and Codax),extra pharmacopoeia	
Techniques of analysis used in pharmaceutical dosage form	3
Typical examples from pharmacopoeia and study of monographs, general quality control tests in respect to various catagories of pharmaceutical dosage forms.	
Standardisation and quality control standards for ayurvedic formulations.	6

Raw materials and their constituents

Identification and evaluation of raw materials

Dosage forms for Ayurvedic medicines

Section II

A) Regulatory Aspects and Good Practices (Salient Features)

7

Drugs and Cosmetics Act, 1940

Brief introduction, rules under acts and schedules with emphasis of Schedule M and Schedule U

Certification ISO 9002

Legal considerations in packaging

B) Packaging Material

6

Types of packaging materials and effect on stability and compatibility Studies

Testing materials for packaging

Pharmaceutical containers & closures

Requirements of labelling, art works, approval and control

Paper III

Section I

15

UV-Visible spectroscopy

IR, FTIR, Near IR Spectroscopy

Flame emission Spectrometry

Atomic Absorption Spectrometry

Thermal techniques

PXRD

Section II

Analytical techniques	15
GC	
HPLC	
Ion Chromatography	
Capillary electrophoresis and capillary electrochromatography	
 Paper IV	
Section I	
Preparations of solutions	2
 Cosmeticology	4
Definition of cosmetics, classification and description and general techniques for analysis	
Analysis	6
Water	
Soil	
Ore	
Pesticides	3
 Section II	
Microbiology	
1. Scope of Microbiology	2
- Historical perspective	
- Role of microbiology in food, industry, agriculture and environment.	
- Structure of bacteria cell	
- Parts of the cell – cell wall, plasma membrane, nucleoid, inclusion bodies Flagella, spores, capsule.	
 2. Staining of bacteria – Gram staining, negative staining, spore staining,	2

use of microscope – parts of microscope.

3. Concept of Intellectual property Rights 2
 - Definition, Function if IPR,
 - Forms of Protection – Patents, copyrights, trademarks, design
 - Biopiracy
4. Culturing bacteria 2
 - types of culture media – selective, enrichment, minimal, transport,
 - Methods of streaking,
 - Role of environmental factors – pH, temperature, oxygen, in bacteria growth.
 - Culture preservation in Industries.
5. Medical microbiology 2

Bacteria	Fungi	Virus
- Thyroid	Aspergillus	Influenza
- Bacterial dysentery	Candidiasis	
- Staphylococcal wound Infections		Protozoa
Tetanus		Malaria
6. Safety in clinical labs 1
 - Biosafety levels 1-4,
 - Good microbiological techniques
 - Quality Assurance in clinical laboratories
7. Water pollution and analysis 2
 - Causes of water pollution
 - Indicator organisms
 - Methods of detection – Routine tests – presumptive, confirmed, completed
 - MPN - technique
 - Membrane filters technique
 - Treatment of Industrial &Municipal waters

Primary, secondary & tertiary of effluent

- | | | |
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| 8. | Sterilization and disinfection | 2 |
| | Physical agents | - Heat Radiations |
| | Chemical agents | - Alcohols, Halogens, Aldehydes, phenols |
| | Phenol coefficient | |
| | Gaseous agents | |
| | Disinfectants | |
| 9. | Aseptic technique | 1 |
| | - Microbiological instrument for monitoring and testing of sterility | |
| | - Laminar air flow, Bunsen burners | |

Reference Books

1. Microbiology – Pelczar, Reid, Chan
2. General Microbiology – Stainier
3. Textbook of Microbiology – Dubey & Maheshwari
4. Textbook of Microbiology – Ananthanarayan

Learning Outcomes: The students will be able to understand all analytical methods, microbiology, computer methods used in pharma industry, mining laboratory. Students should also develop presentation skill and should know good laboratory practices and good manufacturing practices. They should be employable in industries.