SRI SARADA COLLEGE FOR WOMEN (AUTONOMOUS)

Reaccredited with B++ Grade by NAAC

(Affiliated to Periyar University)

Salem – 636 016.

PG & RESEARCH DEPARTMENT OF CHEMISTRY

ADVANCED DIPLOMA COURSE

IN

APPLIED CHEMISTRY

Syllabi

I Year	**Certificate Course**	**Polymer Chemistry**
II Year	**Diploma Course**	**Water Chemistry and Dye Chemistry**
III Year	**Advanced Diploma Course**	**Medicinal Chemistry**

ADVANCED DIPLOMA COURSE IN APPLIED CHEMISTRY
CERTIFICATE COURSE : POLYMER CHEMISTRY

Total Hours: 100

Syllabus

Objectives:

Students will be able to

- Understand the fundamental principles of Polymer Chemistry focusing on synthesis, structure and properties of polymers.
- Know about the polymerization techniques, polymer processing and biopolymers.
- Have an overview on industrial applications with reference to material properties.

UNIT I: **Hours: 20**

Introduction

Monomers, Polymers, Polymerisation, Classification of polymers – Natural polymer, Synthetic polymer, Thermosetting polymer, Thermoplastic polymer, Homopolymer, Heteropolymer, Elastomer, Resins, Fibres, Types of polymerisation – Addition and Condensation polymerisation, Mechanism of Addition polymerisation –Free radical, cationic, and anionic, Coordination polymerisation – Ziegler Natta catalyst mechanism, Copolymerisation- Styrene copolymer, Conducting polymers, Molecular weight – number-average and weight average molecular weights – Significance.

UNIT-II: **Hours: 20**

Individual polymers

Natural and Synthetic polymer – Natural polymers – Rubber, Cellulose, Starch - Synthetic polymers – Preparation, properties and application of Neoprene rubber, Buna-S, Polyethylene, Polystyrene, Polyurethane, Polyvinylchloride, Polyester - Polyethyleneterephthalate, Terylene, Polyamide – Nylon 6,6, Polytetrafluoroethylene.

UNIT - III: **Hours: 20**

Polymerisation Techniques and Structure

Polymerisation Techniques – Bulk polymerisation, Solution polymerisation, Suspension polymerisation, Emulsion polymerization - Structure of polymers – Linear, Branched and Network polymer - Properties of polymers – Glass transition temperature - Degradation of polymers – Thermal degradation, Mechanical degradation, Oxidative degradation, Degradation by ultrasonic waves - Environmental Hazards.

UNIT IV: **Hours: 20**

Polymer processing

Polymer Processing- Injection moulding, Compression moulding, Blow moulding, Thermoforming, Fibre spinning – dry spinning, wet spinning and melt spinning.

UNIT V: **Hours: 20**

Biopolymers and Application of polymers

Biopolymers – Biocompatible and Biodegradable polymers, Applications of polymers – Polymers as adhesives, Fillers, Reinforcements, Pins, Implant materials, Artificial organs, Surgical sutures, Use of polymers in drug delivery, Synthetic textiles.

Books for study and reference

1. V. R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar, *Polymer Science*, Wiley Eastern Ltd, 1986.
2. Jayashree Ghosh, *Fundamental Concepts of Applied Chemistry*, 1st Ed, S Chand & Company Ltd, 2006.
3. V. K. Ahluwalia and Anuradha Mishra, *Polymer Science* – A Text Book, 1st Ed, Ane Books Pvt. Ltd, 2008.
4. K. Bagavathi Sundari, *Applied Chemistry*, MJP Publishers, 2006.

DIPLOMA COURSE : WATER CHEMISTRY AND DYE CHEMISTRY

Total Hours: 100

Syllabus

Objectives:

Students will be able to

- Highlight the different sources of water, potable water, standards and waste water treatment.
- Understand the classification of dyes with reference to textile and non-textile.
- Know about the principles of water analysis and measurement of pH, BOD and COD.

UNIT I: **Hours: 20**

Introduction and Potable water

1.1 Sources and unique properties of water – Classification of water pollutant –Organic, Inorganic, Sediments, Pesticides, Insecticides, Radioactive and Thermal pollutants - constituents and characteristics of waste water.

1.2 Potable water standards - WHO and other standards - bacteriological standards/disinfectants methods - oxidation method - bleaching powder, chlorine, ozone and UV - Quality characteristics of water.

1.3 Desalination – Demineralization - Reverse osmosis, dialysis and nanofilteration.

UNIT-II: **Hours: 20**

Waste water treatment

2.1 Waste water treatment- pre-treatment - screening, grit removal and pre-chlorination.

2.2 Primary treatment - settling and sedimentation. Secondary treatment - trickling filter process, activated sludge process, Aeration. Tertiary treatment.

2.3 Waste water treatment - Domestic, Aerobic, Anareobic, Industrial -Electrodialysis.

2.4 Water pollution control and Management.

UNIT - III: **Hours:20**

3.1 Fluorination and defluorination of water – Removal of Iron and Manganese from water – Purification of water from radioactive substances – Protection of surface waters from pollution with industrial sewage – Treatment of effluents with organic and inorganic impurities.

3.2 Municipal waste water – Purpose of sewage treatment – Methods of sewage disposal - Recycling of sewage.

UNIT IV: **Hours:20**

Dyes – Fundamental concepts

4.1 Introduction, Definition – Dye, Colour, chromophores, auxochromes, bathochromic shift, hypsochromic shift.

4.2 Classification of dyes with examples – Acid, base, vat, azo and reactive dyes.

Reaction of dyes with fibre and water, Fluorescent brightening agents.

4.3 Applications of dyes in other areas:

Medicine – Antioxidants

Chemical Analysis – Fluorescein, Eosin, Phenolphthalein

Food and Beverages – Certified colours (Natural and synthetic dyes as colouring agent), Spurious colours, Labelling, safety and quality standards – FDA, FSSAI.

UNIT V: **Hours: 20**

5.1 Water Analysis - Measurement of pH, acidity, alkalinity, dissolved oxygen, BOD, COD, TDS, conductance and bacterial measurements.

5.2 Determination of simple ions such as chloride, carbonate, sulphate and Lead.

5.3 Estimation of total hardness of water.

5.4 Preparation of simple dyes – Scarlet red dye, Fluorescein.

Books for study and reference

1. A.K. De , *Environmental Chemistry*, Wiley Eastern .
2. B.K. Sharma, *Industrial Chemistry*, Goel Publishing House, Meerut.
3. R.Gopalan, Amritha Anand and R.Wilfred Sugumar, *A laboratory manual for Environmental Chemistry*, I.K. International.
4. M.K. Jain, S.C. Sharma, *Organic Chemistry*, Fourth Edition, Vishal Publications, 2016.

ADVANCED DIPLOMA COURSE: MEDICINAL CHEMISTRY

Total Hours: 100

Syllabus

Objectives:

Students will be able to

- Understand the key concepts relating to drugs and medicinal flora.
- Explain the importance of intellectual property rights in drugs and herbal medicines.
- Comprehend the types of drugs and their utility.
- Have an overview on phytochemicals, various diseases, their causes and treatment.

UNIT I: **Hours: 20**

1.1 Introduction

1.1.1 Important Terminologies used in Medicinal Chemistry – Pharmacology, Drug, Pharmacognosy, Pharmacy, Therapeutics, Toxicology, Chemotherapy, Pharmacopoeia, Viruses, Bacteria, Vaccines, Therapeutic Index, Encapsulation.

1.2 Medicinal Flora in India

1.2.1 Some Indian Healers and their significance – Neem, Adathoda Vasica, Amla, Turmeric, Thulasi, Thoothuvalai, Kizhanelli, Shoe Flower.

1.2.2 Cancer curing plants-periwinkle, Allium sativum (Garlic), Aloe vera, Thuthuvalai.

1.2.3 Medicinal plants in the kitchen garden.

1.2.4 Spices as medicine.

1.3. Herbal Medicines and Intellectual Property Rights

1.3.1. Types of IPs- Patent, Copyrights, Industrial design, trade mark, trade secret, geographical indication.

1.3.2. Traditional Knowledge (TK) of Medicines and IPR- Biopiracy, new IPR solutions for Traditional Medicines.

UNIT-II: **Hours: 20**

2.1. Phytochemicals and their Biological role- Definition and their general role as Antioxidant, Antimicrobial Agents, detoxifying agents etc.,

2.2. Classification and biological functions of Phytochemicals - Phenolics, Terpenoids and Steroids, Alkaloids and others.

2.2.1. Phenolic Acids and its biological activities

2.2.2. Flavanoids and its biological activities

2.2.3. Tannins and its biological activities

2.2.4. Alkaloids and its biological activities

2.2.5. Terpenes and Saponins and its biological activities

2.3. Antioxidant polyphenols counteracting aging

UNIT - III: **Hours:20**

3.1 Common diseases and Drugs

3.1.1 Common air borne diseases – Common cold, Influenza, Measles, Mumps, Diphtheria, Whooping cough, Tuberculosis.

3.1.2 Common water borne diseases – Dysentery, Cholera, Typhoid, Jaundice.

3.1.3 Common insect-borne diseases – Malaria, Elephantiasis.

3.1.4 Some other common diseases – Asthma, Epilepsy.

3.1.5 Life-style diseases and treatment- Obesity, Diabetes, Cardiovascular diseases including blood pressure, Cancer, Aids. [Reason, drugs (Structure not needed), prevention].

UNIT IV: **Hours:20**

Classification of Drugs

4.1 Sulpha drugs, Antibiotics, Analgesics, Antiseptics and Disinfectants, Anaesthetics, Psychopharmacology.

4.1.1 Analgesics: Definition-classification, action of analgesics-narcotic analgesics (morphine and its derivatives with reference to SAR) Synthetic analgesics- uses of pethidines and methadones. Antipyretic analgesics - salicylic acid derivatives, indole derivatives & *p*-amino phenol derivatives.

4.1.2 Antiseptics and disinfectants- definition and distinction, Use of phenols, dyes, chloramines, dequalinium chloride, formaldehyde and cationic surface active agents.

UNIT V: **Hours: 20**

Miscellaneous topics

5.1 Blood groups, Rh factor, Composition of blood, Types of anaemia and drugs.

5.2 Accidents and First aids.

5.3 Poisons and antidotes.

5.4 Vitamins and hormones.

5.5 Analysis of blood and urine.

Books for study and reference

1. *Pharmacognosy and Phytochemistry: A Comprehensive Approach*, Dr. S. Doere, Dr. S. S. Khadabadi, Dr. B. A. Baviskar, Pharma Med Press, Hyderabad, 2014.
2. *Phytochemical methods: A guide to Modern techniques of plant analysis*, J.B. Harborne, 2nd Ed, Chapman and Hall Ltd, 1984.
3. *Pharmaceutical Chemistry*, Dr. S. Lakshmi, Sultan Chand & Sons, 3rd Ed, 2004.
4. *Fundamental Concepts of Applied Chemistry*, Jayashree Ghosh, 1st Ed, S. Chand, 2006.