## SKILL ENHANCEMENT COURSE

**CHSEC236(T+P) - Water Analysis**

**Credit – (1T+1P), Theory Hours – 15, Practical Hours – 30**

**Course outcomes:**

After the completion of this course, student will be able to-

CO-1. Gain the basic and conceptual knowledge of water contamination, Water sampling methods and water purification methods.

CO-2. Understand the basic concepts of different types of water parameters like total, permanent and temporary hardness of water sample, TDS of water.

CO-3. Gain the skill to establish water analysis laboratory.

CO-4. Analyse and find the quality of the water which they use.

CO-5. Evaluate and criticize the principles associated to measure different parameters of the water.

CO-6. Create, modify and synthesise the quality of water, water sampling methods and water purification methods.

CO-PO mapping (connecting COs with POs)

| CO | PSO-1 | PSO-2 | PSO-3 | PSO-4 | PSO-5 | PSO-6 |
|---|---|---|---|---|---|---|
| CO-1 | 3 | 3 | 2 | 3 | 2 | 3 |
| CO-2 | 3 | 3 | 2 | 3 | 2 | 3 |
| CO-3 | 2 | 3 | 3 | 2 | 3 | 2 |
| CO-4 | 3 | 2 | 3 | 2 | 2 | 3 |
| CO-5 | 3 | 2 | 3 | 2 | 3 | 3 |
| CO-6 | 3 | 2 | 3 | 2 | 3 | 3 |

**UNIT – I:**

**Analysis of water** **[25 Marks]**

**[15 Hours]**

Introduction, Concept of pure water, Water Contamination, Sources of water contamination, Categories of water contaminants, Water sampling methods, Water purification method, Boiling, Filtration, Distillation, Chlorination, Reverse osmosis.

**UNIT–II:**

**PRACTICAL: Laboratory tests for water quality parameters**

**[25 Marks]**

**[30 Hours]**

(1) Determination of total, permanent and temporary hardness of water sample (EDTA method).
(2) Determination of Acidity of water sample.
(3) Determination of Alkalinity of water sample.
(4) Determination of total dissolved solids of water sample.
(5) Determination of carbonates and bicarbonate of water sample.
(6) Determination of Chloride of water sample.
(7) Determination of pH of water sample.
(8) Determination of conductance of water sample.

## REFERENCE BOOKS


1. Gauging the Ganga: Guidelines for sampling and monitoring water quality, 2017 by Chandra Bhusan and D D Basu, Centre for Science and Environment, New Delhi.
2. Standards method for the examination of water and waste water, American Public health association.
3. Guidelines on standard analytical procedures for water analysis, Technical Assistance, Hydrology project, Government of India and Netherlands.