

### 3/4 B.Tech. FIFTH SEMESTER

CE5T2

ENVIRONMENTAL ENGINEERING -1

Credits: 4

Lecture: 4 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

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#### Objectives:

- To gain knowledge on various sources of water with reference to quality and quantity in a locality, their suitability for domestic application and drinking.
- To know the water quality standards and water analysis.
- To design various treatment units as per the quality of water is concern.
- To make pipe line networking with various appurtenances including service reservoirs, various types of valves.

#### Learning outcomes:

After the exposure to the subject, student knows:

- The importance and requirements of protected water supply.
- How to consider a source of water for water supply to a town or city with respect to quality and quantity of water.
- Various types of useful impurities and harmful impurities present in water, the effects of harmful impurities on human health.
- How to treat raw water using various treatment units.

#### UNIT - I

##### INTRODUCTION TO WATER SUPPLY ENGINEERING:

Need for protected water supplies-Objectives of water supply systems -Role of Environmental Engineers- Quantity of water-Estimating requirements- Design period- Per capita consumption- Factors affecting per capita consumption- Fire demand- Fluctuations in demand- Prediction of population.

#### UNIT-II

##### SOURCES & INTAKE WORKS:

Classification of sources of water supply- Choice of source- Suitability with regard to quality and quantity- Lake, river, reservoir and canal intake -Types of conduits- Capacity and design- Materials for pipes- Leakages- Types of pumps- Efficiency and choice of pumps.

#### UNIT-III

##### QUALITY OF WATER:

Impurities in water- Routine water analysis - physical, chemical and bacteriological tests- Standards for drinking water- Methods of purification of water- Sequence of treatment for ground water and surface water sources- Water borne diseases.

#### UNIT-IV

##### PLAIN SEDIMENTATION AND COAGULATION:

Theory of sedimentation; Stoke's law; Sedimentation tanks; Design aspects; Principle of coagulation; Chemicals used for coagulation; Units of coagulation plant; Optimum dose of coagulant.

#### UNIT – V

**FILTRATION OF WATER:**

Theory of filtration; Filter materials; slow sand and rapid sand filters; Construction and operation; Troubles in rapid sand filters; Pressure filters

**UNIT -VI****DISINFECTION OF WATER:**

Different methods of disinfection; Chlorination; Types of chlorination; Testing of chlorine.- miscellaneous treatment methods-Water softening; Methods of removing temporary hardness; Methods of removing permanent hardness; Removal of colour, odour and taste from water; Defluoridation.

**UNIT – VII****DISTRIBUTION SYSTEM:**

General requirements; Classification; Methods of supply; Available pressure in the distribution system; Layouts of distribution networks; Distribution reservoirs; Functions; Types; Capacity of balancing tank; Analysis of distribution system; Methods of analysis; Appurtenances in the distribution system; Sluice valves; Check valve; Air valve; Drain valve; Hydrants; Meters.

**UNIT – VIII****PLUMBING:**

Water supply – pipes and fittings; House drainage - Sanitary fittings, Traps; Plumbing system of drainage – Single stack, One pipe and Two pipe systems; Principles governing design of building drainage.

**Learning resources****Text books:**

1. Elements of Environmental engineering by Duggal, K.N., S. Chand & Company Ltd., New Delhi, 2010.
2. Environmental Engineering Vol. -Water supply engineering by Garg, S.K., Khanna Publishers, Delhi, 2009.

**Reference books:**

1. Water Supply and Sanitary Engineering Vol. 1 by Gurucharan Singh, Standard Publishers Distributors, Delhi, 2005.
2. Water Supply and Sanitary Engineering by Birde, G.S., Dhanpat Rai and sons, Delhi, 2010.
3. Manual on Water Supply & Treatment; CPH and EEO, Ministry of Urban Development, Govt. of India, New Delhi, 2011