**WATER SUPPLY SYSTEMS**
**(Open Elective – II)**

**Course Code: 20CE11P4**

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**Pre-requisites:** Chemistry, Environmental Science

**Course Outcomes:**
At the end of the course, students will be able to:
**CO1:** Outline of the various facets of water usage in daily life
**CO2:** Explain the origin of Natural waters and also to synthesize it for regular use
**CO3:** Discuss the utilization of non-potable water
**CO4:** Describe water supply system from a reservoir
**CO5:** Explain the characteristics of wastewater

**UNIT-I** **(10 Lectures)**

**WATER AND LIFE:**

Necessity of water – Domestic demand – Public demand – Irrigation – Transportation – Sanitation – Dilution of waste waters – Dust palliative – Recreation – Fire protection.

***Learning outcomes:***
1. Explain about the necessity of water(L2)
2. Describe various types of demand(L2)
3. Discuss about water demand for fire protection(L2)

**UNIT-II** **(10 Lectures)**

**SOURCES OF WATER:**

Surface sources – Ground sources – Water from atmosphere – Desalination – Recycling ofwaste water – Recharging of aquifers.

***Learning outcomes:***
1. Discuss various types of water sources(L2)
2. Explain methods of effective use of water(L2)
3. Describe the process of recharging of aquifers(L2)

**UNIT-III** **(10 Lectures)**

**DUAL SUPPLY OF WATER:**

Potable and non-potable water – Protected water – Grey water – Black water – Water bornediseases – water related diseases – Sewage Irrigation.

***Learning outcomes:***
1. Discuss the types of water based on quality(L2)
2. Explain various types of water diseases(L2)
3. Describe the water quality and treatment requirement for irrigation(L2)

**UNIT-IV** **(10 Lectures)**

**DISTRIBUTION OF WATER:**

Based on topography – Gravity distribution – Direct pumping – Combined pumping and gravityflow. Service Reservoirs – Continuous supply – Intermittent supply – Networks of distribution
– Emergency water supply as in case of fire accidents – Valves, hydrants and meters.

***Learning outcomes:***

1. Explain the various methods of water supply(L2)
2. Discuss the various types of networks of distribution(L2)
3. Summarize the various appurtenances in distribution system(L2)

**UNIT-V** **(10 Lectures)**

**INDUSTRIAL WATER:**

Location of Industry with reference to surface sources of water – Quality of water required for industrial operations – characteristics of waste water produced – Standards for letting industrial effluents into sources of water.

***Learning outcomes:***

1. Explain the location of industry(L2)
2. Describe the quality and characteristics of industrial wastewater(L2)
3. Discuss the standards for letting industrial effluents(L2)

**TEXT BOOKS:**

1. K.N. Duggal, "Elements of Environmental Engineering", 7th Edition, S. Chand Publishers, 2010.
2. Hammer and Hammer "Water and wastewater Technology", 4th Edition, Prentice hall of India, 2003.
3. Howard S. Peavy, Donand P. Rowe, George Technobanoglous, "Environmental Engineering", 1st Edition Mc Graw –Hill Publications, Civil Engineering Series, 1985.

**REFERENCES:**

1. B.C.Punmia, "Water Supply Engineering", Vol. 1, "Waste water Engineering Vol. II", 2nd Edition, Ashok Jain &Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi, 2008.
2. Fair, Geyer and Okun, "Water and Waste Water Engineering", 3rd Edition, Wiley, 2010.
3. Metcalf and Eddy, "Waste Water Engineering", 3rd Edition, Tata Mc Graw Hill, 2008.