

## Department of Geography

### Open Elective/Generic Elective (OE/GE) Course

#### Semester-I

Year	Semester	Course Type	Course Code	Course Title	Theory/ Practical	Credit	No. of Lectures/ Practical to be conducted
1	I	OE/GE	GE-OE-101T	Rainwater Harvesting	Theory	4	60

#### Semester-II

Year	Semester	Course Type	Course Code	Course Title	Theory/ Practical	Credit	No. of Lectures/ Practical to be conducted
1	II	OE/GE	GE-OE-102T	Water Pollution and Management	Theory	4	60

## Open Elective/Generic Elective (OE/GE) Course

### Rainwater Harvesting

Course Code & Title	Credits	Credit distribution of the course	
		Theory	Practical
<b>GE-OE-101T: Rainwater Harvesting</b>	<b>4</b>	<b>4</b>	<b>--</b>

- **Course Objectives:**

1. To introduce the students to nature, scope, need, and importance of rainwater harvesting.
2. To make the students aware of hydrological characteristics.
3. To understand the methods of water conservation and management techniques.
4. To describe the components and types of rainwater harvesting.
5. To make students aware of the realizing ground water table by using rainwater harvesting methods.

- **Course Outcomes:**

**After completion of this course, students will able to;**

- CO-1: Familiarize with the rainwater harvesting methods and techniques.
- CO-2: The student develops water conservation and management skills.
- CO-3: To acquire advanced knowledge about surface and rooftop rainwater harvesting.

- **Course Contents**

**Unit-1: Introduction to Rain Water Harvesting**

**(10 Clock Hours)**

- 1.1 Meaning and Definition.
- 1.2 Nature and Scope
- 1.3 Climate Change and Water Security
- 1.4 Need and Importance

**Unit-II: Introduction to Hydrology**

**(20 Clock Hours)**

- 2.1 Hydrological Cycle,
- 2.2 Measurements of Precipitation,  
Losses- Infiltration, Interception, Evaporation and Transpiration
- 2.3 Water Quality Parameters
- 2.5 Global Distribution of Water

2.6 Utilization of Water: Domestic, Agricultural and Industrial

**UNIT III: Types and Components of Rainwater Harvesting (15 Clock Hours)**

4.1 Types of Rainwater Harvesting

4.2 Components of Rainwater Harvesting

4.3 Surface Runoff Harvesting

4.4 Rooftop Rainwater Harvesting

**Unit-IV: Water Conservation and Management (15 Clock Hours)**

3.1 Concept of Water Conservation and Management

3.2 Need for Water Conservation and Management

3.3 Methods of Water Conservation

3.4 Techniques of Water Management

3.5 Groundwater Recharge

● **Reading Books:**

- Kale, V. S. and Gupta, A. (2001): Introduction to Geomorphology, Orient Longman, Calcutta.
- Savindra Singh (2002): Geomorphology, PrayagPustakBhawan, Allahabad.
- Spark B. W (1972): Geomorphology, Longman. New York
- Steers, A. (1958): The Unstable Earth, Methuen, London
- Ollier, C. D. (1981): Tectonics and Landforms, Longman, London.
- Strahler A. H and Strahler, A. N. (1992) :Modern Physical Geography, John Wiley, New York
- D. S. Lal (2003): Climatology. Sharda Pustak Bhawan. 11. University road Allahabad.
- H.J. Critchfield (1993): General Climatology. Prentice Hall, New Delhi.
- Pacey, A. and A. Cullis (1989): Rainwater Harvesting: The Collection of Rainfall and Runoff in Rural Areas, WBC Print Ltd., London.

## Open Elective/Generic Elective (OE/GE) Course

### Water Pollution and Management

Course Code & Title	Credits	Credit distribution of the course	
		Theory	Practical
<b>GE-OE-102T: Water Pollution and Management</b>	<b>2</b>	<b>2</b>	<b>--</b>

- **Course Objectives:**

1. To introduce the students to the basic concept of Water Pollution.
2. To make the students aware of the causes of water Pollution.
3. To know about the management of water Pollution and the role of society.

- **Course Outcomes:**

**After completion of this course, students will able to;**

- CO-1: List the main water pollutants and their effects on human health and the environment.  
 CO-2: Discuss several types of water pollution problems and the chemistry and physics affecting them.  
 CO-3: Interpret the results of laboratory analysis for water characterization.  
 CO-4: Develop a broad overview understanding of the strategies, regulations, and policies to manage water pollution in the European context.  
 CO-5: Describe unit operations used for wastewater treatment.

- **Course Content:**

**Unit-I: Introduction to Water Pollution (10 Clock Hours)**

- 1.1 Water Pollution Definition
- 1.2 General Properties of Water
- 1.3 Types of Water Pollution -Physical , Chemical, Biological and Thermal Pollution

**Unit-II: Water Pollution Causes and Effects (15 Clock Hours)**

- 2.1 Sources of Water Pollution
- 2.2 Causes of Water Pollution
- 2.2 Effects of Water Pollution -Human Health, Agriculture, and Environment

**Unit-III: Water Quality (10 Clock Hours)**

- 3.1 Standards of Drinking Water and Maintenance of Purity of Water
- 3.2 Ground Water Pollution, Factors Affecting Ground Water Pollution

3.3 Harmful Effects of Ground Water Pollution- Water Borne diseases

**Unit-IV: Surface Water Pollution****(15 Clock Hours)**

4.1 Sources of Surface Water pollution

4.2 Factors Affecting Surface Water Pollution

4.3 Monitoring and Control of Pollution in Lakes, Rivers and Estuaries

**Unit-V Pollution Management and Control****(10 Clock Hours)**

5.1 Treatment and Techniques

(i) by Recycling (ii) by Reusing

(iii) Waste Minimization (iv) by Mitigating

(v) by Preventing (vi) by Compost.

**• Reading Books:**

- Nathanson J.A. (2009): Basic Environmental Technology: Water Supply, Waste Management and Pollution Control, 4th ed., PHI Learning, New Delhi.
- Gilbert M. Masters and Wendell P. Ela (2017): Introduction to Environment Engineering and Science, 3rd ed. Pearson, Pearson.
- प्रा.टी.एन.घोलप (२०००): पर्यावरणशास्त्र, निशिकांत प्रकाशन, पुणे.
- डॉ. विठ्ठल धारपुरे (२००७) : पर्यावरणशास्त्र, पिंपळपुरे & कंपनी पब्लिशर्स, नागपूर