

COURSE OBJECTIVE:

- To impart knowledge and skills relevant to water conservation and management towards achieving the sustainability in water resources and relate the engineering principles and practices in estimation of runoff, storage, recharge into the ground and maintain the system through the best management practices followed around the world.

UNIT I BASICS OF RWH**8**

Water and its sources-Need for water conservation– Types of water demand-Conservation Methods -Global and Indian perspectives-National mission and goals towards rainwater harvesting–National water policy - Legislation on rainwater harvesting in India and Tamil Nadu.

UNIT II HYDROLOGY AND GROUNDWATER**10**

Hydrological cycle – Precipitation - Rainfall measurement - Rain-gauges – Hyetograph - Infiltration – Runoff estimation–Roof top runoff estimation. Groundwater- Aquifer Properties–Darcy law and well hydraulics - Steady flow.

UNIT III METHODS OF RAIN WATER HARVESTING**7**

Rainwater harvesting potential of an area - Traditional harvesting practices – Rooftop harvesting - Methods of RWH structures – Site selection for rainwater harvesting - Surface runoff Harvesting - Ground water recharge - Artificial recharge.

UNIT IV DESIGN OF RAIN WATER HARVESTING STRUCTURES**10**

Design Considerations - Components of Rainwater harvesting system - Simple roof water collection system - Design of Storage structure - Design of Recharge structures – Recharge pit - Recharge trench- Recharge well-Gully plug-Contour bund-Percolation tank-Check dam-Recharge shaft-Efficiency of RWH system

UNIT V MANAGEMENT OF RWH AND CASE STUDIES**10**

Difficulties in RWH - At catchment level - At household level - Evaluation of RWH systems – Maintenance of RWH structures - Modernization of RWH system - Case studies on best practice of RWH in urban - Success stories of Contemporary practices of RWH in India.

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

- On completion of the course, the student is expected to be able to

CO1 Understand the need and importance of water conservation through global and Indian practices of rainwater harvesting

CO2 Understand and apply the concepts of hydrology and groundwater in the estimation of runoff and recharge potentials

CO3 Understand the various types of rain water harvesting methods and apply it on the field

CO4 Design the various RWH structures to harvest the rainwater in surface and subsurface

CO5 Explain the difficulties of RWH, evaluation methods and maintenance through various case studies.

TEXTBOOKS

1. H.M.Raghunath "Ground Water" 3rd Edition, New Age International 2007.
2. Jayarami Reddy, P, (2005) "A Textbook of Hydrology" Firewall Media Publication.
3. Ramakrishnan S, (2010), "Ground Water", Scitech Publications (India) Pvt Ltd

REFERENCES:

1. Proceedings of UNHABITAT Blue water series "Rainwater harvesting and utilization", Book 2 beneficiaries and capacity builders.
2. Rainwater Harvesting Techniques to Augment Ground Water: Ministry of Water Resources Central Ground Water Board Faridabad, 2003.
3. Rainwater Harvesting: Indian Railway Institute of Civil Engineering Pune, October 2015.
4. A Manual on "Rainwater Harvesting and Conservation": Government of India, Consultancy Service Organization Central Public Works Department, New Delhi.
5. "A Water Harvesting Manual for Urban Areas" issued by Centre for Science and Environment.
6. Traditional Water Harvesting Systems of India "C.P.R. Environmental Education Centre, Chennai, India (2004).
7. Empowering Village Communities for a Sustainable Water Future - A Resource Book for Jaldots, 2019, Prepared by Central Ground Water Board, Dept. of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti, Govt. of India and MARVI – Managing Aquifer Recharge and Sustaining Ground water Use through Village-level Intervention.
8. Handbook on rainwater harvesting storage options, Ministry of Water & Environment, Uganda

COs-PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	2	3	2	3	2	2
PO2	Problem analysis	1	3	2	3	2	2
PO3	Design/development of solutions		2	2	3	2	2
PO4	Investigation		2	2	3	2	2
PO5	Modern Tool Usage	1	3	2	3	2	2
PO6	Engineer and Society	2	2	2	3	2	2
PO7	Environment and Sustainability	2	1	2	2	2	2
PO8	Ethics	2	1	1	2	2	2
PO9	Individual and Teamwork	1	1	1	2	2	1
PO10	Communication	1	1	1	1	1	1
PO11	Project Management and Finance	1	2	1	3	2	2
PO12	Life Long Learning	2	2	2	2	2	2
PSO1	Knowledge of Civil Engineering	2	2	2	3	3	2
PSO2	Critical analysis of Civil Engineering problems and innovation	2	2	2	3	3	2
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	1	2	2	3	3	2