DISCIPLINE SPECIFIC ELECTIVE COURSE – GEOGRAPHY OF WATER RESOURCE MANAGEMENT (DSE 12)

Course title & Code	Credits	Duration (per week)			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical/ Practice		
Geography of Water Resource Management (DSE 12)	**4**	**3**	**1**	**0**	**Class 12th**	**NIL**

Course Objectives: The course addresses SDG 6 (Clean water and sanitation) and SDG 10 (Reduced inequalities)

- To understand the basics of hydrological regime
- To understand the spatial issues and problems related to water resources in India
- To explain the integrated concept of water resource management

Learning Outcomes: After studying this course, students will be able to:

- Understand the basic components of hydrological cycle and learn best practices of integrated watershed management,
- Explain various components of water balance and management of river basins,
- Highlight the geographical aspects of water related issues, problems and strategies for their solution.

Course Outline:

Unit 1: Hydrological Cycle (15 hours): Components of hydrological cycle: precipitation, interception, evaporation, evapo-transpiration, infiltration, percolation, groundwater, run-off and over land flow; Human impact on hydrological cycle

Unit 2: Surface Water Resources (15 hours): Sources of stream flow; Inter-relationships between components of water balance: water balance equation, soil moisture storage, water deficit and water surplus, Characteristics of river basins: basin parameters, river network, water flow with the help of case study

Unit 3: Ground Water Resources (10 hours): Ground water-table, base-flow, flow of water in aquifers; Status of groundwater levels in India

Unit 4: **Water Resource Issues and Management (20 hours)**: water disputes: nature of dispute, water sharing principles, river linkages, Water pollution- Water quality parameters, water quality standards and major pollutants; Integrated water resource management-conjunctive use of surface and ground-water, watershed management strategies with case study; Rain water harvesting, artificial recharge of ground-water; National Water Policy

Tutorial Exercises:

Tutorial exercises will include discussion of unit specific readings, presentations on case studies of river water disputes and sharing (Cauvery Water Dispute, Narmada Water Dispute), watershed management (case study of Rajsamadhiyala watershed, Uttaranchal Decentralized Watershed Development Project)

Reading List:

- AISLUS. (1990). *Watershed Atlas of India, All India Soil and Land Use Survey*, Dept. of Agriculture and Cooperation, Ministry of Agriculture. Government of India.
- Andrew. D. Ward and Stanley, Trimble (2004). *Environmental Hydrology*, 2nd edition, Lewis Publishers, CRC Press.
- Fetter, C.W. (2005). *Applied Hydrogeology*. New Delhi, India. CBS Publishers & Distributors.
- Jain, S. K., Agarwal, P. K., & Singh, V. P. (2007). Runoff and Streamflow. In *Hydrology and Water Resources of India. Water Science and Technology Library*, *57*, 193–234. Springer. https://doi.org/10.1007/1-4020-5180-8_5
- Karanth,K. R. (1988). *Ground Water: Exploration, Assessment and Development*. McGraw-Hill. New Delhi.
- Lyon, J. G. (2003). *GIS For Water Resource and Watershed Management*. Taylor & Francis.
- N.S. Grigg. (2016). *Integrated Water Resource Management.*Palgrave Macmillan London.
- Rao, K. L. (1982). *India's Water Wealth* (2nd ed). Orient Longman.
- Reddy, K. Ramamohan, Venkateswara Rao,B, Sarala, C. (2014). *Hydrology and Watershed Management*. Allied Publishers.
- Singh, V. P. (1995). *Environmental Hydrology*. Kluwar Academic Publications.
- SLUSI. (2012). *Watershed Atlas of India*, All India Soil and Land Use Survey, Dept. Of Agriculture and Cooperation, Ministry of Agriculture. Government of India.
- Sustainable Surface Water Management (2016). A Handbook for SuDS. In S. M. Charlesworth (ed.), *Colin A. Booth.* John Wiley & Sons, Ltd.
- Tideman, E.M. (1999). *Watershed Management - Guidelines for Indian Conditions*. Delhi, India. Omega Scientific Publishers.
- Todd, D.K. (1959). *Ground Water Hydrology*. New Delhi, India. Wiley India Edition.

Digital reading list:

- http://slusi.dacnet.nic.in/index_English.html
- *https://jalshakti-dowr.gov.in/sites/default/files/nwp20025617515534_1.pdf*