

|| Jai Sri Gurudev||  
**Sri Adichunchanagiri Shikshana Trust (R)**  
**ADICHUNCHANAGIRI UNIVERSITY**  
**BGS Institute of Technology**

**B. E. CIVIL ENGINEERING**  
**Choice Based Credit System (CBCS) and Outcome Based Education (OBE)**

18CV653	Course Code	<b>WATER RESOURCES MANAGEMENT</b>	Course Title	VI	Semester
2	Credits	2-0-0-2	L - T - P - TL*	40 Hours	Teaching Period
100 Marks	Total	60 Marks	SEE*	40 Marks	CIE*
*NOTE: L – Lecture; T – Tutorial; P – Practical; TL – Total; CIE – Continuous Internal Evaluation; SEE – Semester End Examination					

<p><b>Course Learning Objectives:</b>  This course will enable students to</p> <ol style="list-style-type: none"> <li>1. Judge surface and ground water resources.</li> <li>2. Address the issues of water resources management.</li> <li>3. Learn the principles of integrated water resources management.</li> <li>4. Understand the legal framework of water policy.</li> <li>5. Know the different methods of water harvesting.</li> </ol>	<b>Teaching Hours</b>
<p><b>Module-1</b>  Surface and Ground water Resources: Hydrologic Cycle, Global water resources and Indian Water resources, Surface Water Resources, Water Balance, Available Renewable Water Resources, Water Scarcity, The Water Balance as a Result of Human Interference, Groundwater Resources, Types of Aquifers, Groundwater as a Storage Medium</p>	<b>8Hours</b>
<p><b>Module-2</b>  Water Resources Planning and Management: Necessity, System components, planning scales, Approaches, planning and management aspects, Analysis, Models for impact prediction and evaluation, Adaptive Integrated Policies, Post Planning and management Issues.</p>	<b>8Hours</b>
<p><b>Module-3</b>  Integrated Water Resources Management: Definition of IWRM, Principles, Implementation of IWRM, Legislative and Organizational Framework, Types and Forms of Private Sector Involvement</p>	<b>8Hours</b>
<p><b>Module-4</b>  Water Governance and Water Policy: Legal Framework of Water – Substance of National Water Laws – Other key issues – Changing incentives through Regulation - National Water Policy – National-Level Commissions – Irrigation Management Transfer Policies and Activities – Legal Registration of WUAs – Legal Changes in Water Allocation, – Role of Local Institutions – Community Based Organizations – Water Policy Reforms: India..</p>	<b>8Hours</b>

<p><b>Module-5</b> Water Harvesting and Conservation: Water Harvesting Techniques – Micro-catchments - Design of Small Water Harvesting Structures – Farm Ponds – Percolation Tanks – Yield from a Catchment, Rain water Harvesting-various techniques related to Rural and Urban area</p>	<p><b>8Hours</b></p>
<p><b>Course outcome</b></p> <p>After studying this course, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Assess the potential of groundwater and surface water resources.</li> <li>2. Address the issues related to planning and management of water resources.</li> <li>3. Know how to implement IWRM in different regions.</li> <li>4. Understand the legal issues of water policy.</li> <li>5. Select the method for water harvesting based on the area</li> </ol>	
<p><b>Question paper pattern:</b></p> <ul style="list-style-type: none"> <li>• The question paper will have ten full questions carrying equal marks.</li> <li>• Each full question will be for 20 marks.</li> <li>• There will be two full questions (with a maximum of four sub- questions) from each module.</li> <li>• Each full question will have sub- question covering all the topics under a module.</li> <li>• The students will have to answer five full questions, selecting one full question from each module</li> </ul>	
<p><b>Textbooks:</b></p> <ol style="list-style-type: none"> <li>1. K. Subramanya, “Engineering Hydrology”, Tata McGraw Hill Publishers, New Delhi.</li> <li>2. H.M. Raghunath, “Ground Water”, Wiley Eastern Publication, New Delhi.</li> <li>3. Daniel P. Loucks and Eelco van Beek, “Water Resources Systems. Planning and Management”, UNESCO Publication.</li> <li>4. Mollinga, P. et al, “Integrated Water Resources Management”, Water in South Asia Volume I, Sage Publications, 2006.</li> <li>5. Singh, Chhatrapati “Water Rights in India,” Ed: Chhatrapati Singh. Water Law in India: The Indian Law Institute, New Delhi,1992.</li> <li>6. Dhruva Narayana, G. Sastry, V. S. Patnaik, “Watershed Management”, CSWCTRI, Dehradun, ICAR Publications, 1997</li> </ol> <p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Lal, Ruttan. “ Integrated Watershed Management in the Global Ecosystem”. CRC Press, New York.</li> <li>2.Heathcote, I. W. Integrated Watershed Management: Principles and Practice. 1988. John Wiley and Sons, Inc., New York.</li> </ol>	