**17CE32E3 – INTEGRATED WATERSHED MANAGEMENT**

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| **Course Category**  | Core Elective | **Credits**  | 3 |
| **Course Type**  | Theory | **Lecture - Tutorial - Practical**  | 3 - 0 - 0 |
| **Prerequisite**  | Water Resources Engineering | **Sessional Evaluation**  | 40 |
| **Semester End Exam Evaluation**  | 60 |
| **Total Marks**  | 100 |

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| **Course Objectives** | 1. To understand different watershed behaviour
2. To discuss different aspects of water resource development and management on watershed basis.
3. To understand land use classification.
4. To study the impact of land use changes on hydrological cycle parameters.
5. To know the relation between soil erosion and soil water relationship.
6. To provide inputs for various modeling methods for integrated watershed management.
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| **Course Outcomes** | CO1 | Understand the basic concepts of watersheds. |
| CO2 | Apply the principles of watershed management in planning of a watershed. |
| CO3 | Identify the importance of participatory rural appraisal in watershed management. |
| CO4 | Explain the causes of soil erosion and imply the remedial measures. |
| CO5 | Distinguish various methods of natural drain management in a watershed. |
| CO6 | Apply the basics of the watershed modeling in watershed development |
| **Course****Content** | **UNIT - I****CONCEPTS OF WATERSHED MANAGEMENT:** Introduction – Concept of watershed management – History of watershed management and its relevance to India – Watershed characteristics – Causes of watershed deterioration – Effect of watershed on the community – Water resources region of india.**UNIT II****PRINCIPLES OF WATERSHED MANAGEMENT:** Introduction – Integrated watershed management approach (IWMA) – Objectives of IWMA – Envisaged results – Success criteria – Selection of watershed village – Equity issues – Benchmark survey – RS in watershed management – Land capability classification.**UNIT III****PRATICIPATORY RURAL APPRAISAL IN WATERSHED PROGRAMME:**Introduction – Participatory rural appraisal – Basic principles – Assumptions and basics of PRA – Tips for PRA practitioners – Myths of PRA techniques – Benefits of participatory rural appraisal – Different tools of PRA.**UNIT IV****SOIL EROSION AND SOIL WATER RELATIONSHIP:** Introduction – Soil erosion – factors affecting soil erosion –Different types and causes of erosion – Cost of soil erosion – Estimation of loss of soil from erosion – Control of soil erosion – Soil salinity – Soil water relationship and different types of soil – Water requirement of crop – Methods of water application to crop or plants. **UNIT V****MANAGEMENT OF NATURAL DRAINAGE IN WATERSHED:** Introduction –Check dams –Structures for gully stabilization and storage of water –Rivers or stream Bank management measures –River training works –Methods of river training works –Channel improvement –River training for navigation –Sediment control –Retards – revetments –Gabion retaining wall –Reservoir system in watershed.**UNIT VI****WASTELAND, LANDUSE AND LAND DRAINGAE MANAGEMENT:** Introduction – Causes of wasteland – Remedial measures – Landslides – Land drainage management – Types of tile drain layouts – Urban storm water management.**WATERSHED MODELLING:** Introduction – Data of watershed for modeling –History and evolution – Application – Comparison – Model calibration and validation – Emerging trends in watershed models. |
| **Textbooks****and****References** | **TEXTBOOKS:*** 1. Watershed Management by Madan Mohan Das, Mimi Das Saikia, PHI publications.
	2. Watershed Management by JVS MURTHY, New Age International Publishers.

**REFERENCES:**1. Hydrology and the Management of Watersheds by Kenneth N. Brooks, Peter F. Folliott, Joseph A. Magner NCE, Wiley-Blackwell publications.
2. GIS for Water Resource and Watershed Management edited by John G. Lyon, CRS.
3. Integrated watershed management – Principles and Practice by Isobel W. Heathcote, Published by John Willey & Sons.
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