

**5<sup>th</sup> SEMESTER**  
**DISCIPLINE SPECIFIC ELECTIVE (DSE)**

**OPTION-I**

**WM520DA: WATER MANAGEMENT: WATER RESOURCE MANAGEMENT**

**CREDITS - THEORY-4, PRACTICAL-2**  
**MAXIMUM MARKS: 60 MINIMUM MARKS: 24**

*Objectives/Expected Learning Outcomes: The student is expected to learn different tools, techniques and policies for management of water resources which are crucial for the sustenance of life on earth.*

**UNIT-I: INTEGRATED WATER RESOURCE MANAGEMENT** **15 HOURS**

1. History of water management
2. Integrated water resource management: concepts and theoretical perspectives
3. Principles and tools for practicing IWRM
4. Issues and challenges in IWRM.
5. Corporate social responsibility in water resource management

**UNIT-II: WATER HARVESTING AND WATERSHED MANAGEMENT** **15 HOURS**

1. Concept and framework of watershed approach
2. Soil and water conservation-conservation technology
3. Water harvesting-importance and techniques
4. Integrated watershed development
5. A case study of water harvesting

**UNIT-III: FRESHWATER ECOSYSTEM MANAGEMENT** **15 HOURS**

1. Artificial recharges of ground water
2. River basin management
3. Management of lakes and wetlands
4. Flood control and management
5. Case study: Dal Lake, Ganga Action Plan

**UNIT-IV: WATER LEGISLATIONS** **15 HOURS**

1. Evolution of water law and policy in India
2. National water policy (2012)
3. J&K water resources (Regulation and Management) Act, 2010
4. Water (Prevention and control of pollution) Act 1974
5. Water Cess Act 1977

**PRACTICAL (2 CREDITS - 60 HOURS) MAXIMUM MARKS: 30 MINIMUM MARKS: 12**

1. Study of vegetation in a watershed area
2. Study of plant diversity in a watershed area
3. Study of the soil profile in a watershed area
4. Measurement of lake area and lake volume
5. Case studies on techniques of rainwater harvesting
6. Estimation of runoff from a given area

**5<sup>th</sup> SEMESTER**  
**DISCIPLINE SPECIFIC ELECTIVE (DSE)**  
**OPTION-II**

**WM520DB: WATER MANAGEMENT: WATER AND WASTEWATER ENGINEERING**

**CREDITS - THEORY-4, PRACTICAL-2**  
**MAXIMUM MARKS: 60 MINIMUM MARKS: 24**

*Objectives/Expected Learning Outcomes: The objective of the course is to understand different types of engineering processes and techniques for treatment of water and wastewater for management and conservation of water resources.*

**UNIT-I: WASTEWATER QUALITY AND MONITORING** **15 HOURS**

1. Sources of wastewater
2. Characteristics of wastewater
3. Wastewater flows
4. Monitoring of waste water quality
5. Bio-monitoring of waste water

**UNIT-II: DRINKING WATER TREATMENT** **15 HOURS**

1. Conventional water treatment processes: coagulation, flocculation,
2. Sedimentation and filtration
3. Disinfection: chlorination
4. Reverse osmosis
5. Specific water treatment processes: defluoridation and nitrate

**UNIT-III: WASTEWATER TREATMENT** **15 HOURS**

1. Preliminary / primary treatments
2. Secondary treatment
3. Tertiary treatment
4. Design and working of Sewage Treatment Plants (Activated Sludge)
5. Design and working of Sewage Treatment Plants (Trickling filter)

**UNIT-IV: TREATMENT OF SLUDGE AND EFFLUENTS** **15 HOURS**

1. Characteristics of sludge
2. Treatment of sludge: dewatering, conditioning
3. Sludge digestion: aerobic and anaerobic
4. Wastewater disposal and re-use
5. Design and maintenance of landfills

**PRACTICAL (2 CREDITS - 60 HOURS) MAXIMUM MARKS: 30 MINIMUM MARKS: 12**

1. Determination of coliform bacteria from drinking water samples
2. Determination of pH and conductivity of sludge
3. Determination of OC and OM content of sludge
4. Visit to a drinking water supply scheme and report preparation
5. Visit to STP and report preparation.
6. Identification of bio-indicator species from a water body