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CEDX 47 SUSTAINABLE WATER AND L T P C SDG: 6 &11 SANITATION FOR SMART 3 0 0 3 CITIES

COURSE OBJECTIVES:

COB1: To impart knowledge on The concepts of smart water management in cities.

COB2: To provide insight on the tools used in the implementation of smart water management.

COB3:To familiarize the components of smart wastewater management and sustainable treatment techniques.

COB4: To impart knowledge on the policy requirements and faecal sludge management in smart cities.

COB5: To introduce the recent initiatives opted in the smart cities for sustainable water and sanitation.

MODULE I SMART WATER MANAGEMENT(SWM)

Need for Smart Cities – Smart Environment- Institutional and political responsibility - Urban water management challenges- Urban water balance –Climate change effects on urban water resources – Smart water management tools - Economic, Social and Environmental benefits of Smart water management.

MODULE II IMPLEMENTATION OF SWM TOOLS

Smart pipes and Sensors networks-Water Quality monitoring using sensors- Novel Sensing Techniques - Advanced metering infrastructure and Smart metering – Applications of GIS, Cloud computing, SCADA, Web based communication tools in smart water and flood management in cities.

MODULE III SMART WASTEWATER MANAGEMENT

Definition, need and components of Smart wastewater management systems-Smart solutions- Prevention of combined sewage overflow - leak detection, chemical detection in sewage - Application of sensors in wastewater treatment plants and networks - Onsite and offsite challenges in wastewater treatment - Decentralized wastewater treatment systems-Onsite greywater treatment - wetland treatment- Capturing nutrients.

MODULE IV FAECAL SLUDGE MANAGEMENT

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National Policy on Faecal Sludge and Septage Management - Current practice of FSM in Indian cities and challenges-Sanitation service chain-Identification of smart operative solution and treatment options

MODULE V INITIATIVES & CASE STUDIES

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Water saving initiative- Wastewater recycling initiative- Smart agriculture and irrigation initiatives- Cases studies.

L – 45; TOTAL HOURS – 45

TEXT BOOKS:

- 1. Anil Ahuja, "Integration of nature and technologies for smart cities" Third edition, Springer, Switzerland, 2016.
- David A. Lloyd Owen, "Smart Water Technologies and Techniques: Data Capture and Analysis for Sustainable Water Management", Wiley-Blackwell, 2018.
- Pradeep Tomar, Gurjit Kaur, "Green and Smart Technologies for Smart Cities", CRC Press, 2019
- 4. Vinod Kumar, TM. "Smart Environment for Smart Cities", Springer, Singapore, 2019.

REFERENCES:

- 1. Linda Strande, "Faecal Sludge Management: Systems Approach for Implementation and Operation", IWA ,UK, 2014.
- "Smart Cities Mission Statement & Guidelines", Ministry of Urban Development, Government of India, New Delhi, 2015.
- 3. Vinod Kumar, T.M., "E-Democracy for smart cities", Springer, Singapore, 2017.

COURSE OUTCOMES:

At the end of the course the student will be able to

CO1:Describe the concepts of smart water management in cities.

CO2:Illustrate the tools used in the implementation of smart water management.

CO3:Explain the components of smart wastewater management and sustainable treatment techniques.

CO4:Illustrate the concepts of faecal sludge management in smart cities. **CO5:**Describe the various initiatives opted in the smart cities for sustainable water and sanitation.

Board of Studies (BoS) :

Academic Council:

18th BoS of CE held on 05.04.2023

20th Academic council held on 13.4.2023

	РО 1	РО 2	РО 3	PO 4	PO 5	PO 6	РО 7	PO 8	РО 9	P O 10	PO1 1	P O 12	PSO 1	PSO 2	PSO 3
CO1						L	н					М			Н
CO2						L	Н					М			Н
CO3						L	Н					М			Н
CO4						L	н					М			Н
CO5						L	Н					М			Н

Note: L- Low Correlation M - Medium Correlation H -High Correlation

SDG No.6 : Ensure availability and sustainable management of water and sanitation for all.

SDG 11: Make cities and human settlements inclusive, safe, resilient and sustainable Statement : The understanding of Smart techniques for managing water , wastewater and sanitation leads to the development of sustainable smart cities

SPECIALIZATION V: HYDROLOGY AND WATER RESOURCES ENGINEERING

CEDX 51	HYDROLOGY	L	т	Ρ	С
SDG: 13		3	0	0	3

COURSE OBJECTIVES:

The objectives of the course are

COB1:To impart knowledge on hydrological cycle and fundamentals of precipitation

COB2: To enable the students to understand the various losses from precipitation.

COB3: To provide basic analytical concepts of hydrograph

COB4:To familiarize with the computation of runoff.

COB5:To equip knowledge on the hydrological aspects of flood and flood routing.

MODULE I PRECIPITATION 10

Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement of Rainfall – Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, Duration, Frequency relationship – Probable maximum precipitation

MODULE II ABSTRACTION FROM PRECIPITATION 8

Losses from precipitation – Evaporation process – Reservoir evaporation – Infiltration process – Infiltration capacity – Measurement of infiltration – Infiltration indices – Effective rainfall.

MODULE III HYDROGRAPHS 10

Introduction - Factors affecting Hydrograph – Base flow separation – Unit hydrograph – Derivation of unit hydrograph – S curve hydrograph – Unit hydrograph of different durations - Synthetic Unit Hydrograph-Problems.

MODULE IV RUNOFF ESTIMATION 9

Watershed, catchment and basin - Catchment characteristics - factors affecting runoff -Runoff calculation using empirical formulae - SCS curve number method - Rational formulae – Hydrograph methods – Introduction to rainfall runoff modeling - Application of GIS in rainfall runoff analysis - Case studies.