SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Bachelor of Technology
Civil Engineering

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B. Tech. III Semester V

Subject Name : Water Resource Management **Subject Code:** BTCL14505

Type of course : PEC - I

Prerequisite : -

Rationale : Students will be able to start developing master and strategic water resources planning to deal with water Supply/Demand issues including water demand management, reservoir storage and other structural and non-structural methods and also able to know how to implement Water Resource Management in different regions including irrigation water management.

Teaching and Examination Scheme:

Teaching Scheme				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	150
3	0	2	4	60	25	15	30	20	

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests **CA2:** Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems **TEE:** Term End Examination **TEP:** Term End Practical Exam (Performance and viva on practical skills learned in course) **CA3:** Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	**Urban Water Resources Management:** Urban hydrologic cycle, major problems, storm water management objectives and limitations; Urban water resources management models; urban storm water management practices; Rain water harvesting.	08	15%
2	**Context for Water Resource Management:** Functions of Water Resources Management, Water Scarcity and its impacts, Water Shortages vs. Water Resources Management, Water Resources Management methods. Water management policy during droughts. Integrated Water Resources Management (IWRM), Definition of IWRM, IWRM Principles	09	20%
3	**Water Resources Planning:** Concepts of systems analysis, water resources planning, Modelling techniques, objectives and constraints, overview of optimization techniques, Overview of multi objective optimization, multi criteria decision making, Simulation, Overview of applications of optimization and simulation techniques in hydrologic and water resources systems – irrigation management, water quality management, groundwater management, water conveyance and distribution systems.	10	25%
4	**Agriculture in the Concept of Water Resource Management:**	08	15%

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	Water for Food Production: "Blue" Versus "Green" Water Debate – Virtual Water Trade for Achieving Global Water Security – Irrigation Efficiencies, Irrigation Methods And Current Water Pricing.		
5	**Water Economics:** Economic view of water issues: economic characteristics of water good and services – Non-market monetary valuation methods – Water economic instruments, policy options for water conservation and sustainable use – Case studies. Pricing: distinction between values and charges – Private sector involvement in water resources management: PPP objectives, PPP options, PPP processes, PPP experiences through case studies – Links between PPP and IWRM.	10	25%

Suggested Specification table with Marks (Theory/Practical):

% Distribution of Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	10	25	20	20	15

Legends: R: Remembrance, **U:** Understanding; **A:** Application, **N:** Analyze, **E:** Evaluate **C:** Create and above Levels **(Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Text Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Water Resources Systems Planning and Management – An introduction to methods, models and applications	Loucks, D.P. and Eelco van Beek	UNESCO Publishing, Springer, ISBN 978-3-319-44232-7, DOI 10.1007/978-3-319-44234-1	2005	1st
2.	Water Resources Systems Modeling Techniques and Analysis	Vedula, S. and P PMujumdar	Tata McGraw Hill Pub. Co., New Delhi, ISBN 0070590893 9780070590892	2005	1st
3.	Role of Water in Urban Ecology	Hengeveld, H. and C. De Voch.t.	Elsevier Scientific Publ. Co. Amsterdam, ISBN-10 : 0444420789, ISBN-13 : 978-0444420787	1982	1st
4.	Storm Water Management	Martin, P. Wanelista and Yousef, A. Yousef	. John Wiley and sons, ISBN: 978-0-471-57135-3	1992	1st
5.	Urban Water	Neil S. Grigg	John Wiley and sons,	1986	1st

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	Infrastructure Planning, Management and Operations		ISBN-10 : 0471829145 ISBN-13 : 978-0471829140		
6.	Applied Hydrology	V. T. Chow, David Maidment, and Larry Mays	McGraw Hill Publications, New York, ISBN: 0-07-100174-3	1995	1st

Course Outcome:

Sr. No.	CO Statement After learning this subject, students will be able to	Marks % weightage
CO-1	Identify urban water problems and resolve storm water management. *(R,U ...- Cognitive Level)*	10
CO-2	Develop concepts of systems analysis for planning of water resources systems. *(R,U,A...- Cognitive Level)*	20
CO-3	Planning of the complexities of dealing with water resources problems.*(U,C,N ...- Cognitive Level)*	25
CO-4	Formulate and solve deterministic concept in the field of agriculture water management. *(N,A,C ... - Cognitive Level)*	25
CO-5	Associate with economic aspects of water.*(A, N ...- Cognitive Level)*	20

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	1	2	1	3	3	2	2	1	3	1	1	3	1	3	2
CO-2	2	3	2	3	1	1	1	1	1	1	1	1	2	2	1
CO-3	1	1	1	1	1	3	3	3	2	2	1	2	3	1	1
CO-4	2	2	3	3	3	1	1	1	1	1	1	1	1	3	1
CO-5	1	1	1	1	1	2	1	2	1	2	3	3	2	1	3
Rationale *	**7**	**9**	**8**	**11**	**9**	**9**	**8**	**8**	**8**	**7**	**7**	**10**	**9**	**10**	**8**

Rationale*: All the COs are satisfying the well-defined POs & PSOs up to the certain extent. Students are able to develop master and strategic water resources planning and able to know how to implement Water Resource Management in different regions including irrigation water management.

List of Practical:

1. Develop Better Characterization and Estimation of Precipitation Partitioning in Rainfall Runoff Models.
2. Examining the key elements of Water Resources Management process in your region.
3. Prepare project on Rainwater Harvesting system.

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4. Design storm water conveyance system.
5. Formulate and solve deterministic optimization models for design and operation of water resources systems.
6. Case study on Economic evaluation on storm water resource management.

List of Open Source/learning website:

- https://www.gwp.org
  - Detail of coverage as Urban Water-GWP
- https://www.iwapublishing.com
  - Detail of coverage as integrated water management: Basic Concept
- https://cedb.asce.org
  - Detail of coverage as water resource planning: analysis, modelling and optimization techniques
- http://www.worldwatercouncil.org
  - Detail of coverage as water security, water and climate change, financing water infrastructure
- https://onlinecourses.nptel.ac.in
  - Detail of coverage as Water Economics and Governance

List of Open Source Software:

- QGIS
- HEC-RAS
- SWAT
- MODFLOW
- Python
- R