MASTER OF TECHNOLOGY (URBAN INFRASTRUCTURE)

Civil Engineering Department

Semester - II

Course Scheme

Course Code	Course Name	Lecture hours	Tutorial hours	Practical hours	Credit
HS 5001	Research Methodology	2	0	0	2
CE 225001	Urban Water Infrastructure Planning	3	0	2	4
CE 225002	Planning for Public Infrastructure	3	0	2	4
CEXXXXX	Elective – III	3	0	0	3
CEXXXXX	Elective – IV	3	0	0	3
	Total	**14**	**0**	**4**	**16**

Civil Engineering Department

Semester : II

<table>
<tr><td>I</td><td>Course Code</td><td colspan="4">HS5001</td></tr>
<tr><td>II</td><td>Course Title</td><td colspan="4">Research Methodology</td></tr>
<tr><td rowspan="2">III</td><td rowspan="2">Credit Structure</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>2</td><td>0</td><td>0</td><td>2</td></tr>
<tr><td>IV</td><td>Prerequisite(If any for the student)</td><td colspan="4"></td></tr>
<tr><td>V</td><td>Course Content</td><td colspan="4">

Introduction to engineering research: Definition, characteristics and types, basic research terminology, qualities of a researcher, research methods vs methodology, overview of engineering research methods, role of Information and Communication Technology (ICT) in research, research ethics, intellectual property rights and scholarly publishing.
Research formulation: Defining and formulating the research problem, selecting the problem, necessity of defining the problem, literature survey significance in defining a problem, various sources, critical review, identifying gap areas from literature review and research databases, development of working hypothesis.
Research design and data analysis: Research design basic principles, need of research design, features of good design, important concepts relating to research design, observation and facts, laws and theories, method validation, observation and collection of data, methods of data collection, sampling methods, data processing and analysis, hypothesis testing, generalization and interpretation.
Technical writing: Types (thesis, report, journal papers etc.), qualities, structure and components of good technical document, use of software tools (Word processing, latex, etc.), illustrations and tables, bibliography, referencing and footnotes. Oral presentation planning, software tools, creating and making effective presentation, use of visual aids, importance of effective communication.

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<tr><td>VI</td><td>Text/References</td><td colspan="4">

Blessing, L.T.M., Chakrabarti, A., DRM, a Design Research Methodology, Springer, 2009, ISBN: 978-1-84882-586-4.
Chandra, S., Sharma, M.K., Research Methodology, Narosa Publishing House, 2013, ISBN: 978-81-8487-246-0.
Cohen, L., Manion, L., Morrison, K., Research Methods in Education, Routledge (Taylor and Francis Group), 2011, ISBN: 978-0-415-58336-7.
Goddard, W., Melville, S., Research Methodology an Introduction, Juta and Company Ltd., 2004, ISBN: 978-0-702-15660-1.
Kothari, C.R., Garg, G., Research Methodology Methods and Techniques, New Age International, 2014, ISBN: 978-81-224-3623-5.
Kumar, R., Research Methodology a Step-by-Step Guide for Beginners, SAGE, 2011, ISBN: 978-1-84920-300-5.
Pandey, P., Pandey, M.M., Research Methodology Tools and

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		Techniques, Bridge Centre, 2015, ISBN: 978-606-93502-7-0. 8. Panneerselvam, R., Research Methodology, PHI Learning Pvt. Ltd., 2014, ISBN: 978-81-203-4946-9. 9. Rugg, G., Petre, M., A Gentle Guide to Research Methods, Open University Press, 2007, ISBN: 978-0-335-21927-8. 10. Singh, Y.K., Fundamentals of Research Methodology and Statistics, New Age International, 2006, ISBN: 978-81-224-2418-8. 11. Walliman, N., Research Methods the Basics, Routledge (Taylor and Francis Group), 2011, ISBN: 978-0-415-48994-2

Civil Engineering Department

Semester : II

I	Course Code	**CE 225001**			
II	Course Title	**Urban Water Infrastructure Planning**			
III	Credit Structure	**L**	**L**	**L**	**L**
		3	3	3	3
IV	Prerequisite(If any for the student)				
V	Course Content	• **Introduction:** Need and availability of water, technology for meeting water need. • **Urban water demand:** Various types of urban water demand, variation in demands and their effects, Per capita demand and factors affecting them, design periods, methods to forecast the future population and thus the total urban water requirement. • **Water Distribution System Design:** Requirements of good distribution system, Appurtenances in the distribution network, Layout of distribution networks and methods of distributions, Systems of Supply, Pressure in the distribution network, Distribution Reservoirs, Estimation of storage capacity of distribution Reservoirs, Design of distribution networks for simple and complex pipe networks (Hardy-Cross Method, Equivalent Pipe Method, Newton-Raphson method. • **Transporting water through conduits:** Various types of conduits, Hydraulics of Flow, Flow in pipe system, Factors acting on pressure conduits, Types of pipes and pipe appurtenances. • **Storm Water Drainage Network Design:** Status of urban drainage in India, Causes of urban flooding, Need for storm drainage, Mass curve of Rainfall, Hyetograph, Rainfall Analysis: development of IDF curves, Return period, Extreme value distributions, Translation of IDF into Hyetograph; Runoff Estimation by using Rational Method, Storm Sewer design philosophy, Storm Sewer design practice constraints and assumptions, Street gutters design, Street inlets design, Manholes, storm sewers conduit appurtenant structures, Hydraulic design of storm sewers. • Urban flood protection planning including the river training work adopted in urban areas. • Application of Remote Sensing in water infrastructure planning			
VI	Text/References	1. Water Resources System Planning and Management, S.K. Jain and V.P. Singh, Elsevier. 2. Water Supply Engineering, Environmental Engineering Vol. I, S.K. Garg, Khanna Publishers. 3. Design of Water Supply Pipe Networks, P.K.Swamee and A.K.Sharma, Wiley. 4. River Behaviour Management and Training, Vol. I. Central Board			

		of Irrigation and Power, New Delhi. 5. Urban drainage, David Butler and John Davies, Taylor and Francis
VII	Any other Remarks	This course includes projects on design and analysis of water distribution network and sewerage/storm water drainage network of a locality using WATERGEMS and SEWERGEMS software respectively.

Civil Engineering Department

Semester : II

I	Course Code	**CE 225002**			
II	Course Title	**Planning For Public Infrastructure**			
III	Credit Structure	**L**	**T**	**P**	**C**
		3	0	2	4
IV	Prerequisite(If any for the student)				
V	Course Content	• Definitions and concept of planning, planning categories (social, economic and physical), Identification of problems and setting of goals, Demographic analysis, Population projection and demand forecasting, Objectives and priorities, planning for social infrastructure (health, education, public services and facilities), urban planning norms and standards, Sustainability in the context of urban infrastructure Planning for urban utilities • **Water Distribution System:** Source identification and assessment of water demand, planning for distribution system including storage systems, pumping stations, water distribution network, filtration and treatment plants, efficiency of distribution systems • **Drainage System:** Analyzing existing storm water and sewerage systems, layout for sewage collection system, adequacy of sewage disposal and treatment facilities, • **Solid Waste:** Analyzing framework for collection and transport of solid waste in test areas, considerations for location of landfill sites, Recycling of solid waste issues and challenges • **Transport Infrastructure:** Importance of public transport system, models of public transportation, identifying and prioritizing the needs to different transport modes			
VI	Text/References	1. Kruckerberg and Silvers (1974), Urban Planning Analysis: Methods and Models, John Wiley & Sons, New York. 2. Chapin F.S. (1972), Urban Land Use Planning, University of Illinois Press, Chicago. 3. Faia Arthur B Gallion, The Urban Pattern City Planning And Design, CB			
VII	Any other Remarks				