

MASTER OF TECHNOLOGY (GEOTECHNICAL ENGINEERING)

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
CEXXXXX	Soil Dynamics and Geotechnical Earthquake Engineering	3	1	0	4
CEXXXXX	Advanced Foundation Engineering	3	1	0	4
CEXXXXX	Experimental Geotechnics	1	1	2	3
CEXXXXX	Elective - III	3	0	0	3
CEXXXXX	Elective - IV	3	0	0	3
	Total	15	3	2	19

Civil Engineering Department

Semester : II

I	Course Code	HS5001			
II	Course Title	Research Methodology			
III	Credit Structure	L	T	P	C
		2	0	0	2
IV	Prerequisite(If any for the student)				
V	Course Content	<ul style="list-style-type: none"> • 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. 			
VI	Text/References	<ol style="list-style-type: none"> 1. Blessing, L.T.M., Chakrabarti, A., DRM, a Design Research Methodology, Springer, 2009, ISBN: 978-1-84882-586-4. 2. Chandra, S., Sharma, M.K., Research Methodology, Narosa Publishing House, 2013, ISBN: 978-81-8487-246-0. 3. Cohen, L., Manion, L., Morrison, K., Research Methods in Education, Routledge (Taylor and Francis Group), 2011, ISBN: 978-0-415-58336-7. 4. Goddard, W., Melville, S., Research Methodology an Introduction, Juta and Company Ltd., 2004, ISBN: 978-0-702-15660-1. 5. Kothari, C.R., Garg, G., Research Methodology Methods and Techniques, New Age International, 2014, ISBN: 978-81-224-3623-5. 6. Kumar, R., Research Methodology a Step-by-Step Guide for Beginners, SAGE, 2011, ISBN: 978-1-84920-300-5. 7. Pandey, P., Pandey, M.M., Research Methodology Tools and 			

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

I	Course Code	CEXXXXX			
II	Course Title	Soil Dynamics and Geotechnical Earthquake Engineering			
III	Credit Structure	L	T	P	C
		3	1	0	4
IV	Prerequisite(If any for the student)	Soil Mechanics/Geotechnical Engineering			
V	Course Content	<ul style="list-style-type: none"> • Introduction – Scope and objectives, nature and types of dynamic loading and importance • Vibration theory and Wave Propagation – Vibration of elementary systems, degrees of freedom, undamped and damped free and forced vibrations, types of forced vibrations, multi degrees of freedom systems, response spectra, elastic response of continuum • Dynamic Soil Properties – Stiffness, damping and plasticity parameters of soil and their determination (laboratory testing, intrusive and non-intrusive in-situ testing), Correlations of different soil parameters, Liquefaction (basics, evaluation and effects) • Engineering Seismology – Basics, causes of earthquake, elastic rebound theory, plate tectonics, earthquake prediction, theory of continental drift, earthquake hazards • Strong Ground Motion and wave propagation – Magnitude and intensity of earthquake, seismic energy correlations, attenuation relationships, Methods to locate earthquake’s epicenter • Seismic Hazard and Site Response Analysis – deterministic seismic hazard analysis (DSHA), probabilistic seismic hazard analysis (PSHA), earthquake source characterization • Seismic Analysis and Design of Various Geotechnical Structures – Pseudo-static method, Pseudo dynamic method, seismic analysis of various geotechnical structures, codal provisions/guidelines for seismic design of geotechnical structures 			
VI	Text/References	<ol style="list-style-type: none"> 1. Shamsheer Prakash, "Soil Dynamics", McGraw-Hill Book Company. 2. Braja M. Das, "Principles of Soil Dynamics", PWS-KENT Publishing Company. 3. Steven L. Kramer, "Geotechnical Earthquake Engineering", Prentice Hall Inc. 4. D. D. Barkan, "Dynamics of Bases and Foundations", McGraw-Hill Book Company. 5. E. E. Richart et al. "Vibrations of Soils and Foundations", Prentice Hall Inc. 6. Robert W. Day, “Geotechnical Earthquake Engineering Handbook”, 			

		<p>McGraw Hill, New York.</p> <ol style="list-style-type: none">7. Ikuo Towhata, "Geotechnical Earthquake Engineering", Springer-Verlag Heidelberg.8. Kenji Ishihara, "Soil Behaviour in Earthquake Geotechnics", Oxford University Press, USA.9. IS 1893, Indian Standard Criteria for earthquake resistant Design of Structures.10. Recent relevant literature
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Civil Engineering Department

Semester : II

I	Course Code	CE XXXXX			
II	Course Title	Advanced Foundation Engineering			
III	Credit Structure	L	T	P	C
		3	1	0	4
IV	Prerequisite(If any for the student)	Soil Mechanics/Geotechnical Engineering			
V	Course Content	<ul style="list-style-type: none"> • Stress distribution in soils Pressure bulb, Boussinesq's and Westergaard theories, contact pressure distribution, arching in soils • Combined and Raft Foundations Proportioning of foundation for equal settlement, modulus of subgrade reaction, rectangular combined foundation, trapezoidal combined foundation, strap foundation, design of rigid raft foundation, design of flexible raft foundation, construction aspects for combined and raft foundations • Pile Foundations Types, function, selection of piles; end-bearing and friction piles, vertical and lateral load carrying capacity of single pile, group action of piles, negative skin friction, settlement of pile groups, pile load tests, construction aspects for pile foundation, concept of piled-raft foundation • Machine Foundations Types, design criteria, spring mass analogy, dynamic soil-spring constants, free and damped vibrations, degrees of freedom of block foundation, cyclic plate load test, down hole test, cross hole test, codal provisions for machine foundations, vibration isolation • Special Foundations Foundations for tank, chimney and silo; caissons and well foundations, underwater construction aspects, recent advancements in foundation design and construction 			
VI	Text/References	<ol style="list-style-type: none"> 1. Bowles, J. E., Foundation Analysis and Design, McGraw Hill International Ed. 2. Das, B.M., Principles of Foundation Engineering, Cengage Learning 3. Tomlinson M and Woodward J, Pile Design and Construction Practice, Taylor and Francis 4. Das, B. M. and Ramana, G. V, Principles of Soil Dynamics, Cengage Learning 5. Prakash S and Puri V. K, Foundations for Machines: Analysis and Design, John Wiley and Sons 6. Gopal Ranjan & A.S.R. Rao, Basic and Applied Soil Mechanics, New Age Publishers 7. Murthy, V.N.S., Soil Mechanics and Foundation Engineering, CRC Press 8. Relevant Standards / Codes 			
VII	Any other Remarks				

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Semester : II

I	Course Code	CE XXXXXXXX			
II	Course Title	Experimental Geotechnics			
III	Credit Structure	L	T	P	C
		1	1	2	3
IV	Prerequisite(If any forthe student)	Soil Mechanics/Geotechnical Engineering			
V	Course Content	•			
VI	Text/References	1.			
VII	Any other Remarks				