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General Handout for all courses appended to the time table

Course No. : 17CVT71	Dept.: Civil Engineering
Course Title : Geotechnical Engineering – II (IC)	Semester: VII
Course-in-charge : Dr Manohar D R	Academic Year: 2020-21
Lab. Instructor :	

Subject Description


This Course covers the fundamental principles and techniques of soil exploration, which is needed for site selection. This course also gives insight on seepage analysis, which is of prime important for water bound structures. It also deals with stresses in soils, below footing and lateral earth pressures, which will act on earth retained structures. It also covers the stability analysis of slopes, along with types of failures. Other main topic is about bearing capacity and its determination, along with the foundation settlements and types of settlements.

Text Books:

1. Punmia B.C. (2005), “Soil Mechanics and Foundation Engg.”, 16th Edition, Laxmi Publications Co., New Delhi. ISBN: 978-8170087915
2. Gopal Ranjan and Rao A.S.R. (2000), “ Basic and Applied Soil Mechanics”, New Age International (P) Ltd., New Delhi. ISBN : 978-8122412239
3. Venkatramiah C., Geotechnical Engineering, New Age International (P) Ltd., Publishers, New Delhi, 2006, ISBN : 978-8122433517

Reference Books:

1. Bowles J.E. (2012), ‘Foundation Analysis and Design’” 5th Edition, McGrawHill Pub. Co. New York, ISBN : 978-1259061035.
2. Bowles J.E. (1988), “Engineering Properties of Soil and Their Measurements”, McGraw Hill Book Co. New York. ISBN : 978-0070067516.
3. Terzaghi. K. and Peck. R.B. (1996) “Soil mechanics in Engineering practice”, 3rd Edition, John Wiley and Sons, New York, ISBN : 978-0471086581.

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PREREQUISITES

<p>1 Engineering Mechanics</p> <p>2 Basics of Soil Mechanics</p> <p>3 Engineering Mathematics</p> <p>4</p> <p>5</p> <p><i>A good understanding of the above topics is essential</i></p>	<p>Self study/ Online/ Outsourced</p>	<p>Referral Document</p>	<p>Remarks</p>
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LECTURE PLAN


Topic	Topic Details	Number of Lectures	Cumulative lecture hrs.	Unit/ Chapter Reference
Overview	Importance of exploration program,	1	20%	T1:Page No 246-250 T3: Page No 724-756
Unit 1	Methods of exploration, Boring	1		
	Sounding tests	1		
	Types of samples - undisturbed, disturbed and representative samples,	1		
	Samplers, sample disturbance, area ratio, Recovery ratio, clearances,	1		
	stabilization of boreholes	1		
	Typical bore log.	1		
	Number and depth of borings for various civil engineering structures.	1		
Unit 2	Laplace equation (no derivation), assumptions and limitations only.	1	20%	T3: Page No 165-200 R3: Page No 168-173
	Flow nets characteristics and applications.	1		
	Flow nets for sheet piles and below the dam section.	1		
	phreatic line (Casagrande's method - with toe filter).	1		

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	Stresses in Soils: Boussinesq’s and Westergard’s theories assumptions and limitations,	1		
	Equations for concentrated, circular rectangular loads.	1		
	Comparison of Boussinesq’s and Westergard’s.	1		
	Pressure bulb. Newmark’s chart and its application.	1		
Unit 3	Active and Passive earth pressures, Earth pressure at rest, Earth pressure coefficient.	1	20%	T3: Page No 449-530
	Earth pressure theories- Rankine’s theory	1		R3: Page No 494-524
	Coulomb’s theory – assumptions and limitations,	1		
	Lateral earth pressure in cohesive soil	1		
	Lateral earth pressure in cohesion-less soil.	1		
	Graphical solutions for active earth pressure (cohesion-less soil only)	1		T1:Page No 246-250
	Culmann’s graphical method.	1		
	Rebhann’s graphical method.	1		
Unit 4	Types of slopes, causes of failure and type of failure of finite slopes.	1		20%
	Definition of factor of safety, stability of infinite slopes,	1		
	Stability of finite slopes by - Method of slices,	1	R3: Page No 603-621	
	Friction Circle method	1		
	Taylor’s stability number.	1		
	Foundation Settlement: Calculation of settlement - immediate, consolidation and secondary settlements (no derivations)	1	T1: Page No 386-389	

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	Differential settlement, tilt, permissible settlements.	1		
	Tilts as per B.I.S. – Matrices.	1		
Unit 5	Definitions of ultimate, net and safe bearing capacities, Allowable bearing pressure.	1	20%	T3: Page No 541-603 R3: Page No 639-694
	Terzaghi’s bearing capacity equations-assumptions and limitations,	1		
	IS Code’s bearing capacity equations.	1		
	Bearing capacity of footings subjected to eccentric loading	1		
	Effect of ground water table on bearing capacity.	1		
	Field methods of evaluation of bearing capacity – Plate load test,	1		
	Standard penetration test	1		
	Cone penetration test	1		

Evaluation Scheme:

Component	Duration	Weightage	Date (Time)
CIE 1	90 min	10%	28-09-2020
CIE 2	90 min	10%	06-11-2020
AIT 1	2 days	2.5%	20-09-2020
AIT 2	2 days	2.5%	02-11-2020
Make up CIE	90 min	10%	25-11-2020
SEE	180 min	50%	
Make up SEE	180 min	50%	
Total			

Course-in-charge

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