Foundation Engineering-I

First Semester — Class : Fourth Year

Theoretical: 3 Hours / week — Applicatory: 1 Hour / week

Item	Subject	Hrs.
1	INTRODUCTORY CONCEPTS	
	- Definition	
	- Foundation Classification	
	- General Requirements of Foundations	
	- Foundation Selection	4
2	SITE INVESTIGATIONS	
	- Purpose of Sub-soil Exploration	
	- Planning for Site Investigation	
	- Methods of Soil Exploration	4
	- Soil Samples	
	- Causes of Disturbance	2
	- Soil Samplers	
	- Number of Borings	
	- Depth of Borings	4
	- Field Tests	
	- Soil Exploration Report	4
3	SOIL BEARING CAPACITY FOR SHALLOW FOUNDATIONS	
	- Bearing Failure Patterns	
	- Terzaghi's Ultimate Bearing Capacity Equation	4
	- Factor of Safety	
	- Ground Water Table Effect	4
	- Meyerhof's Bearing Capacity Equations	
	- General (Hansen's) Bearing Capacity Equations	
	- Skempton's Method [$\varphi = 0$]	4
	- Foundations Under Eccentric Loads	2
	- Footings on Layered Soils	2
	- Footings Adjacent to a Slope	2
	-Bearing Capacity From Field Tests	4
	- Foundations Subjected to Uplift or Tension Forces	2

Item	Subject	Hrs.
4	FOUNDATION SETTLEMENT - Types of Settlement - Contact Pressure	2
	-Stresses in The Soil Mass	4
	-Immediate Settlement Semi infinite mass Saturated clay underlain by a hard stratum	4
	-Consolidation Settlement Compressibility characteristics Pre-consolidation pressure In-situ (e-log σ') curve	2
	Calculation of one-dimensional consolidation settlement	2
	Rate of consolidation settlement	2
	Correction for construction period -Secondary Settlement -Allowable Settlement	2

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Item	Subject	Hrs.
1	STRUCTURAL DESIGN OF SHALLOW FOUNDATIONS	
	-Spread Footings (Pad and Wall)	2
	-Eccentrically Loaded Spread Footings	2
	-Rectangular Combined Footings	2
	-Trapezoidal Combined Footings	2
	-Strap Footings	2
	-Raft (Mat) Foundations	4
2	PILED FOUNDATIONS	
	-Introduction	
	Definition	
	Uses	
	Types	
	Choice	
	Design criteria	4
	-Ultimate Static Pile Capacity	
	Ultimate point capacity	4
	Skin resistance capacity	4
	-Pile Groups	
	Group efficiency	
	Capacity of a pile group	2
	Settlement of a pile group	2
	Load distribution in a pile group	2
	-Negative Skin Friction	2

Item	Subject	Hrs.
3	SHEET-PILE WALLS	
	-Review of Lateral Earth Pressure	
	Coulomb earth pressure theory	
	Rankine earth pressure theory	
	-Sheet-Pile Walls	
	Types of sheet piling	
	Safety factors	2
	-Cantilever Sheet piling	
	Cantilever sheet piling in granular soil	2
	Cantilever sheet piling in cohesive Soils ($\varphi = 0$)	2
	-Anchored Sheet piling; Free-Earth Support	
	Rowe's moment reduction applied to free-earth support method	4
	Capacity of deadman	
	Location of deadman	2
	-Braced Cuts	
	Pressure envelope for braced-cut design	2
	Design of various components of a braced cut	
	Bottom heaving of a cut in clay	2
4	SLOPE STABILITY	
	-Types of Slips	
	-Stability Analysis	
	-Total Stress Versus Effective Stress Analyses	2
	-Simplified Methods of Stability Analysis	
	Infinite slopes	
	Triangular cross-section	2
	Cylindrical failure ($\varphi = 0$ condition)	
	Cylindrical failure (Taylor's stability charts)	2
	-Slices Methods of Stability Analysis	
	Fellenius method	2
	Simplified Bishop's method	2