Devi Ahilya Vishwavidhyalaya, Indore, India Institute of Engineering & Technology					III Year B.Tech. (Civil Engineering)	
Course Code & Name	**Instructions Hours per Semester and Credits**					
6RVPE1 **Geotechnical Engineering -II**	**Classroom Instruction (CI)**		**Lab Instruction (LI)**	**Term Work (TW) and Self Learning (SL)**	**Total no. of Hours Per semester**	**Total Credits (Total Hours/30)**
	L	**T**	**P**	**TW+SL**	**120**	**4**
	20	**10**	**20**	**70**		

Course Learning Objectives:

1. Familiarize students with the essential steps in geotechnical site investigation.
2. Introduce the principal types of foundations.
3. Learn factors governing the choice of suitable foundation type for a given solution.
4. Understand procedures used for bearing capacity estimation.
5. Determine earth pressure and study concepts of slope stability.

Prerequisite(s): Geotechnical Engineering – I

COURSE CONTENTS

Unit-I

Shallow Foundations: Type of foundations shallow and deep. Bearing capacity of foundation on cohesion less and cohesive soils. General and local shear failures. Factors affecting B. C. Theories of bearing capacity-Prandle, Terzaghi, Balla, Skempton, Meyerh of and Hansan. I. S. code on B. c. Determination of bearing capacity. Limits of total and differential settlements. Plate load test.

Unit-II

Deep Foundation: Pile foundation, Types of piles, estimation of individual and group capacity of piles in less cohesion and cohesive soils. Static and dynamic formulae. Pile load test, Settlement of pile group, Negative skin friction, under-reamed piles and their design. Piles under tension, inclined and lateral load Caissons. Well foundation. Equilibrium of wells. Analysis for stability tilts and shifts, remedial measures.

Unit-III

Soil Improvement Techniques: Compaction. Field and laboratory methods, Proctor compaction tests, Factors affecting compaction. Soil properties are affected by compaction. Various equipment for field compaction and their suitability. Field compaction control. Lift thickness.

Soil stabilization: Mechanical, Lime, Cement, Bitumen, Chemical, Thermal, Electrical stabilization and stabilization by grouting. Geo-synthetics, types, functions, materials and uses.

Unit-IV

Soil Exploration and Foundations on Expansive and Collapsible soils: Methods of soil exploration. Planning of exploration programme for buildings, highways and earth dams. Disturbed and undisturbed samples and samplers for collecting them. Characteristics of expansive and collapsible soils, their treatment, Construction techniques on expansive and collapsible soils. CNS layer.

Unit-V

Sheet piles/Bulk heads\ and Machine foundation: Classification of sheet piles/bulk heads. Cantilever and anchored sheet piles, Cofferdams, materials, types and applications. Modes of vibration. Mass-spring analogy, Natural frequency. Effect of vibration on soils. Vibration isolation. Criteria for design. Design of block foundation for impact type of machine.

Course Outcome:

CO.No.	CO	
CO1	Analyze earth pressures on foundations and retaining structures.	PO-2
CO2	Analyze shallow and deep foundations.	PO-2
CO3	Calculate bearing capacity of soils and foundation settlements.	PO-4
CO4	Understand soil exploration methods.	PO-1
CO5	Understand behavior of machine foundations under vibrations.	PO-1, PO-3

Books recommended:

1. Punmia, B.C. – *Soil Mechanics and Foundations Engineering*, Laxmi Publications, New Delhi, 2005
2. Murthy, V.N.S. – *Soil Mechanics and Foundation Engineering*, CBS Publications, Delhi, 2007
3. Das, B.M. – *Principles of Foundation Engineering* (5th Ed.), Thomson Books, 2010
4. Gopal Ranjan & Rao A.S.R. – *Basic and Applied Soil Mechanics*, New Age Publications, Delhi, 2000
5. Iqbal H. Khan – *Geotechnical Engineering*, Prentice Hall, Delhi, 2007
6. Arora, K.R. – *Soil Mechanics and Foundation Engineering*, Standard Publishers, New Delhi, 2011
7. Bowles, J.E. – *Foundation Analysis and Design*, McGraw Hill, 2001

CO-PO Relationship

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
6RVPE1.CO1		3										
6RVPE1.CO2		3										
6RVPE1.CO3				3								
6RVPE1.CO4	3											
6RVPE1.CO5	2		3									