LESSON PLAN

Subject : GEOTECHNICAL ENGINEERING – II		
Year : IV B-Tech	Semester : I	Branch : CIVIL
Faculty : **G MAHITHA**	Reg : R16	Academic Year : **2020-21**

COURSE OBJECTIVES:

To impart to the student knowledge of types of shallow foundations and theories required for the determination of their bearing capacity.

• To enable the student to compute immediate and consolidation settlements of shallow foundations.

• To impart the principles of important field tests such as SPT and Plate bearing test.

• To enable the student to imbibe the concepts of pile foundations and determine their load carrying capacity.

COURSE OUTCOMES:

1	**Factual**	CO1: The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics.
2	**Conceptual**	CO2: The student must be able to compute the magnitude of foundation settlement to decide the size of the foundation
3	**Procedural**	CO3: The student must be able to use the field test data and arrive at the bearing capacity
4	**Applied**	CO4: The student must be able to design Piles based on the principles of bearing capacity

TEXT BOOKS:

1. Principles of Foundation Engineering, Das, B.M., (2011), 6th edition Cengage learning

2. Basic and Applied Soil Mechanics, Gopal Ranjan & A.S.R. Rao, New Age International Pvt. Ltd, (2004).

REFERENCE BOOKS:

1. Foundation Analysis and Design, Bowles, J.E., (1988), 4th Edition, McGraw-Hill Publishing Company, Newyork.

2. Analysis and Design of Substructures by Swami Saran, Sarita Prakashan, Meerut.

UNIT – 1: Stability of Slopes **[Total Classes: 13]**

Activity:

1	**Factual**	Reading Prerequisite concepts of Geotechnical Engineering – II
2	**Conceptual**	Video Lectures related to of Geotechnical Engineering – II NPTEL Videos
3	**Procedural**	Refer to text book content and class notes
4	**Applied**	Solving Exercises Implementing Programs Assignments Quiz etc…

Activity / Schedule of UNIT-1 :

Pre-Class : Videos, E-books, Web links, Case Studies etc…
In-Class : Explanation on concept, discussion, Poll, doubts clarification, PPT, Demo etc..
Post-Class : Discussion Forum, Review on topic, Assessment, Quiz, Notes etc….

CLASS SL NO	CONCEPT	OBJECTIVES	PRE-CLASS	IN-CLASS	POST-CLASS
1.	Introduction	To understand about Stability of Slopes	Student must know about Stability of Slopes	Discussion on pre-requisites (10 Min) PPT presentation (30 Min) Discussion or **Poll activity** (5 min) Summery (5min) Doubts clari-fication (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
2.	Basic concepts of Stability of Slopes	To Understand the Basic concepts of Stability of Slopes	Student must know about remote sensing	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (40 min) Doubts clarification (10 min)	. Discussion Forum on the topic in the group Review on the topic Share material on the topic
3.	Infinite and finite earth slopes in sand and clay.	To Understand the concepts of Infinite and finite earth slopes in sand and clay.	Student must know about Infinite and finite earth slopes in sand and clay	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (20 min) Example (15 min)	. Discussion Forum on the topic in the group Review on the topic Share material on the topic

				Doubts clarification (10 min)	
4.	Infinite and finite earth slopes in sand and clay	To Understand the concept of Infinite and finite earth slopes in sand and clay	Student must know about Infinite and finite earth slopes in sand and clay	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (20 min) Example (15 min) Doubts clarification (10 min)	. Discussion Forum on the topic in the group Review on the topic Share material on the topic
5.	types of failures	To Understand the concept of types of failures	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (20 min) Example (15 min) Doubts clarification (10 min)	. Discussion Forum on the topic in the group Review on the topic Share material on the topic
6.	factor of safety of infinite slopes	To Understand the concept of factor of safety of infinite slopes	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (20 min) Example (15 min) Doubts clarification	. Discussion Forum on the topic in the group Review on the topic Share material on the topic

				(10 min)	
7.	stability analysis by Swedish arc method	To Understand the concept of stability analysis by Swedish arc method	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (20 min) Example (15 min) Doubts clarification (10 min)	. Discussion Forum on the topic in the group Review on the topic Share material on the topic Exercises to solve
8.	standard method of slices	To Understand the concept of standard method of slices	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (20 min) Example (15 min) Doubts clarification (10 min)	. Discussion Forum on the topic in the group Review on the topic Share material on the topic Exercises to solve
9.	Taylor's Stability Number	To Understand the concept of Taylor's Stability Number	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (20 min) Example (15 min) Doubts clarification	. Discussion Forum on the topic in the group Review on the topic Share material on the topic

				(10 min)	Quiz
10.	Taylor's Stability Number	To Understand the concept of Taylor's Stability Number	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (20 min) Example (15 min) Doubts clarification (10 min)	. Discussion Forum on the topic in the group Review on the topic Share material on the topic
11.	Stability of slopes of dams and embankments - different conditions	To Understand the concept of Stability of slopes of dams and embankments - different conditions	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (20 min) Example (15 min) Doubts clarification (10 min)	. Discussion Forum on the topic in the group Review on the topic Share material on the topic Quiz .

12.	Stability of slopes of dams and embankments - different conditions	To Understand the concept of Stability of slopes of dams and embankments - different conditions	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (20 min) Example (15 min) Doubts clarification (10 min)	. Discussion Forum on the topic in the group Review on the topic Share material on the topic Quiz .
13.	Stability of slopes of dams and embankments - different conditions	To Understand the concept of Stability of slopes of dams and embankments - different conditions	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (20 min) Example (15 min) Doubts clarification (10 min)	. Discussion Forum on the topic in the group Review on the topic Share material on the topic Quiz .

UNIT – 2: Earth Retaining Structures **[Total Classes: 09]**

Activity:

1	**Factual**	Reading Prerequisite concepts Geotechnical Engineering – II
2	**Conceptual**	Video Lectures related to Geotechnical Engineering – II NPTEL Videos
3	**Procedural**	Refer to text book content and class notes
4	**Applied**	Installation demo / Video demo Implementing Programs, Configuration of files etc Assignments Quiz etc…

Activity / Schedule of UNIT-2 : Earth Retaining Structures

Pre-Class : Videos, E-books, Web links, Case Studies etc…
In-Class : Explanation on concept, discussion, Poll, doubts clarification, PPT, Demo etc..
Post-Class : Discussion Forum, Review on topic, Assessment, Quiz, Notes etc….

CLASS SL NO	CONCEPT	OBJECTIVES	PRE-CLASS	IN-CLASS	POST-CLASS
1.	Rankine's & Coulomb's theory of earth pressure	To introduce The concept of Rankine's & Coulomb's theory of earth pressure	Students must revise previous class topics	Discussion on pre-requisites (10 Min) PPT presentation (30 Min) Discussion or **Poll activity** (5 min) Summery (5min) Doubts clari-fication (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
2.	Rankine's & Coulomb's theory of earth pressure	To introduce The concept of Rankine's & Coulomb's theory of earth pressure	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
3.	Rankine's & Coulomb's theory of earth pressure	understanding The concept of Rankine's & Coulomb's theory of earth pressure	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic

				Doubts clarification (10 min)	
4.	Culmann's graphical method	understanding The concept of Culmann's graphical method	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
5.	Culmann's graphical method	understanding The concept of Culmann's graphical method	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
6.	earth pressures in layered soils.	understanding The concept of earth pressures in layered soils.	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic

7.	earth pressures in layered soils.	understanding The concept of earth pressures in layered soils.	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
8.	earth pressures in layered soils.	understanding The concept of earth pressures in layered soils.	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
9.	earth pressures in layered soils.	understanding The concept earth pressures in layered soils.	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic

UNIT – 3: Shallow Foundations **[Total Classes: 16]**

Activity:

1	**Factual**	Reading Prerequisite concepts- Geotechnical Engineering – II
2	**Conceptual**	Video Lectures related to Geotechnical Engineering – II NPTEL Videos
3	**Procedural**	Refer to text book content and class notes
4	**Applied**	Installation demo / Video demo Implementing Programs, Configuration of files etc Assignments Quiz etc…

Activity / Schedule of UNIT-3: Shallow Foundations

Pre-Class : Videos, E-books, Web links, Case Studies etc…
In-Class : Explanation on concept, discussion, Poll, doubts clarification, PPT, Demo etc..
Post-Class : Discussion Forum, Review on topic, Assessment, Quiz, Notes etc….

CLASS SL NO	CONCEPT	OBJECTIVES	PRE-CLASS	IN-CLASS	POST-CLASS

1.	Bearing Capacity Criteria: Types of foundations	To introduce The concept of Bearing Capacity Criteria: Types of foundations	Students must revise previous class topics	Discussion on pre-requisites (10 Min) PPT presentation (30 Min) Discussion or **Poll activity** (5 min) Summery (5min) Doubts clari-fication (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
2.	Bearing Capacity Criteria: Types of foundations	Bearing Capacity Criteria: Types of foundations	Students must revise previous class topics	Discussion on pre-requisites (10 Min) PPT presentation (30 Min) Discussion or **Poll activity** (5 min) Summery (5min) Doubts clari-fication (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
3.	factors to be considered in their location	factors to be considered in their location	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
4.					

	Bearing capacity – criteria for determination of bearing capacity	understanding The concept Bearing capacity – criteria for determination of bearing capacity	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
5.	Bearing capacity – criteria for determination of bearing capacity	understanding The concept of Bearing capacity – criteria for determination of bearing capacity	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
6.	factors influencing bearing capacity	understanding The concept factors influencing bearing capacity	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
7.	analytical methods to determine	understanding The		Revise previous class – (5 mins) Asking Questions on previous class	Discussion Forum on the

	bearing capacity	concept of analytical methods to determine bearing capacity	Students must revise previous class topics	randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	topic in the group Review on the topic Share material on the topic
8.	Terzaghi's theory - IS Methods	Understanding The concept of Terzaghi's theory - IS Methods	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
9.	Settlement Criteria: Safe bearing pressure based on N- value –	Understanding The Settlement Criteria: Safe bearing pressure based on N-value –	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
10	allowable bearing pressure	allowable bearing pressure	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic

				Doubts clarification (10 min)	
11	allowable bearing pressure	allowable bearing pressure	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
12	Types of foundation settlements and their determination	Types of foundation settlements and their determination	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
13	Types of foundation settlements and their determination	Types of foundation settlements and their determination	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic

14	allowable settlements of structures.	allowable settlements of structures.	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
15	allowable settlements of structures.	allowable settlements of structures.	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic
16	allowable settlements of structures.	allowable settlements of structures.	Students must revise previous class topics	Revise previous class – (5 mins) Asking Questions on previous class randomely (5 Mins) PPT presentation (30 min) Doubts clarification (10 min)	Discussion Forum on the topic in the group Review on the topic Share material on the topic

Note: similarly we have to prepare for 4, 5, 6 units.