Marks	Grade Point	Letter Grade	*Marks*	Grade Point	Letter Grade
80>	4.00	A+	55-59	2.75	B-
75-79	3.75	A	50-54	2.50	C+
70-74	3.50	A-	45-49	2.25	C
65-69	3.25	B+	40-44	2.00	D
60-64	3.00	B	0-39	0.00	F

Daffodil Polytechnic Institute, Institute Code: 50238

Lesson Plan – Academic session: (September-23 toFebruary-2024)

Subject Teacher : Md. Zahidul Islam, Jr. Instructor
Subject Name : Geotechnical Engineering
Subject Code :26445
Technology : Civil
Semester : 4th
BTEB Text Book Name : Geotechnical Engineering (Publisher: Hauqe Prokashani)

Class Timing Distribution	
Particulars	**Time**
Greeting with students	10 Minutes
Previous Class Review	20 Minutes
Present Class Topic Discussion and Lecture Delivery	50 Minutes
Present Class Topics Review	10 Minutes

Reference Book Name : Foundation Engineering - Ralph B Peck, Walter, E Hanson

Mark Distribution (for 150 Marks)			
Theory Marks		**Practical Marks**	
Midterm	20	PC	25
Class test	10	PF	25
Quiz test	10	-	-
Final	60	-	-
Total	**100**	**Total**	**50**

Subject Aims:

At the end of the course the student will be able:

- **Our students will able to know about the soil.**
- **They will learn how to determine various soil.**
- **They also can know about various property of soil.**
- **They can know about the compaction system of the soil.**
- **They will know about the bearing capacity of soil**

Subject Outcome:

Introduction to geotechnical engineering; Preliminary definition and simple tests; Particle size of soil; Plasticity characteristic of soil; Hydraulic properties of soil; Consolidation characteristics of soil; Subsurface investigation; Lateral earth pressure; Bearing capacity of soil.

Date	Lecture	Chapter/ Exam / Industrial Visit	Learning Area	Learning Outcome	Class/Lab Supporting Equipment's
	01	Chapter 01 - **Understand the basic concept of geotechnical**	1.1 Define rock, soil and soil engineering. 1.2 Describe origin and formation of soil	After the Class, Students will be able to: ● Observe , Understand and perform about rock, soil and soil engineering. ● Observe , Understand and perform origin and formation of soil	1) Basic Class Materials 2) Projector Lecture Slide: **https://www.youtube.com/watch?v=ZuofAC9rq58**
	02	Chapter 01 - **Understand the basic concept of geotechnical.**	1.3 Describe historical origin and formation of soil of Bangladesh. 1.4 Explain limitation of soil engineering. 1.5 Mention the soil classification system. 1.6 State textural, AASHO and unified ASTM system.	After the Class, Students will be able to: ● Observe, Understand and perform about Limitation of soil Mention ● Observe , Understand and perform about The soil classification system	● Basic Class Materials ● Projector
	03	Chapter 01	Problem solving Class	After the Class, Students will be able to: ● **Understand the basic concept of geotechnical**	● Basic Class Materials
	04	Class Test-1	Examination Topic: Chapter 01 Examination mark: 20 Passing Mark: 08		1) Basic Class Materials 2) Answer Script

	05	Chapter 02 - **Understand preliminary definitions and simple test soil.**	2.1 Define the following terms: void ratio, porosity, degree of saturation, percentage of air voids, air content, water content, bulk unit wt, dry unit wt, saturated unit wt, submerged unit wt, unit wt. of solids, specific gravity of solids, density index. 2.2 Explain three-phase diagram in terms of void ratio. 2.3 Explain three-phase diagram in terms of porosity.	After the Class, Students will be able to: ● Observe , Understand and perform about void ratio, porosity, degree of saturation, percentage of air voids, air content, water content, bulk unit wt, dry unit wt, saturated unit wt, submerged unit wt, unit wt. of solids, specific gravity of solids, density index.	● Basic Class Materials ● Projector Lecture Slide: https://www.youtube.com/watch?v=8lC7g1A90HI
	06	Chapter 02 - **Understand preliminary definitions and simple test soil.**	2.4 Solve problems on soil properties. 2.5 Explain oven drying method of water content determination. 2.6 Explain specific gravity determination by pycnometer method.	After the Class, Students will be able to: Observe , Understand and perform Solve problems on soil properties	● Basic Class Materials ● Projector
	07	Chapter 03 - Understand the	3.1 Define index properties of soil. 3.2	After the Class, Students will be able to:	● Basic Class Materials ● Projector

		particle size of soil.	State mechanical analysis of soil. 3.3 Describe sieve analysis.	● Observe , Understand and perform about index properties of soil.	Lecture Slide: https://www.youtube.com/watch?v=QqxfwpUtEoQ
	08	Chapter 03 - Understand the particle size of soil.	3.4 Mention and interpret stokes law. 3.5 Describe particles size analysis by hydrometer.	After the Class, Students will be able to: ● Observe , Understand and perform about stokes law.	● Basic Class Materials ● Projector
	9	**PRACTICAL:1**	Determine the water content of soil by oven drying method.	After the Class, Students will be able to: ● Observe , Understand and perform about water content of soil	● Three moisture cans ● Oven ● Balance ● Container ● Desiccator ● Container holding tools ● Knives
	10	Quiz test-1	Examination Topic: Chapter 02,03 Examination mark: 10 Passing Mark: 4		1) Basic Class Materials 2) Answer Script
	11	Chapter 04 - Understand the plasticity characteristics of soil.	4.1 Define: plasticity of soil, Atterberg limit, liquid limit, plastic limit, shrinkage limit, 4.2 Explain plasticity index, liquidity index, consistency index, flow index and toughness index. 4.3 State the method of measurement of consistency.	After the Class, Students will be able to: ● Observe , Understand and perform about plasticity of soil, Atterberg limit, liquid limit, plastic limit, shrinkage limit,	● Basic Class Materials ● Projector Lecture Slide: https://www.youtube.com/watch?v=eQtCS8KK0ak

			4.4 Define the terms: sensitivity and thixotropy. 4.5 List the uses of consistency (Atterberg) limits.		
	12	**PRACTICAL:2**	Determine the specific gravity of soil by pycnometer method.	After the Class, Students will be able to: ● Observe , Understand and perform about shear force & bending moment at different sections.	● **Volumatic flask pycnometer** ● **Vacuum pump** ● **Mortar and pestle** ● **Balance** ● **Thermometer**
	13	Chapter 05 - Understand the hydraulic properties of soil.	5.1 Define the following: Permeability of soil, hydraulic head, piezometric head, position head. 5.2 State & Explain Darcy's law. 5.3 State the constant head and variable head permeability test for determination of co-efficient of permeability. 5.4 Describe the pumping out tests for determination of coefficient of permeability.	After the Class, Students will be able to: ● Observe , Understand and perform about Permeability of soil, hydraulic head, piezometric head, position head.	● Basic Class Materials ● Projector Lecture Slide: https://www.youtube.com/watch?v=o3raQVXb4jM
	14	Class Test-2	Examination Topic: Chapter 04 Examination mark: 20 Passing Mark: 08		1) Basic Class Materials 2) Answer Script

	15	Chapter 05 - Understand the hydraulic properties of soil.	5.5 Compute effective pressure and pore water pressure. 5.6 List the factors affecting permeability of soil. 5.7 Define seepage pressure, seepage velocity, equipotential line and flow net.	After the Class, Students will be able to: ● Observe , Understand and perform about effective pressure and pore water pressure	● Basic Class Materials ● Projector
	16	Quiz test-2	Examination Topic: Chapter 5 Examination mark: 10 Passing Mark: 4		1) Basic Class Materials 2) Answer Script
	17	**PRACTICAL:3**	Determine the plastic limit of soil.	After the Class, Students will be able to: ● Observe , Understand and perform about the plastic limit of soil.	● glass plate ● balance ● 425 micron IS sieve ● Aluminum container ● 3mm dia brass
	18	Chapter 06 - Understand the consolidation characteristics of soil.	6.1 Define consolidation 6.2 Classify & explain consolidation. 6.3 State behavior of saturated soil under pressure. 6.4 Identify triaxial compression test apparatus.	After the Class, Students will be able to: ● Observe , Understand and perform about Classify & explain consolidation.	● Basic Class Materials ● Projector Lecture Slide: **https://www.youtube.com/watch?v=o3raQVXb4jM**
	19	Chapter 06 - Understand the significance of welded connections.	6.5 Differentiate between consolidation and compaction of soil. 6.6 State standard proctor test of compaction. 6.7 Explain optimum moisture content & percent compaction. 6.8 State unconfined test.	After the Class, Students will be able to: ● Observe , Understand and perform about consolidation and compaction	● Basic Class Materials ● Projector

			6.9 State confined compression test.		
	20	**PRACTICAL:4**	Determine the amount of compaction and the water content by standard proctor test.	After the Class, Students will be able to: ● Observe , Understand and perform about compaction and the water content by standard proctor test.	● **Compaction molds** ● **Trowel** ● **Rammer** ● **Straight edge** ● **A tray for soil mixing** ● **Oven** ● **Sieve no 4** ● **Moisture cans** ● **Balance**
	21	Chapter 07 - Understand the purpose of subsurface investigation.	7.1 State subsurface investigation of soil. 7.2 Mention the stages in subsurface explorations. 7.3 Mention the purposes of subsurface investigation of soil. 7.4 Compute the depth and lateral extent of explorations.	After the Class, Students will be able to: ● Observe , Understand and perform about subsurface investigation of soil.	● Basic Class Materials ● Projector Lecture Slide: **https://www.youtube.com/watch?v=o3raQVXb4jM**
	22	Chapter 07 - Understand the purpose of subsurface investigation.	7.5 Describe the open excavation (Test Pit) methods of explorations. 7.6 Describe auger boring, wash boring, and rotary drilling.7.7 Identify various types of soil samples.	After the Class, Students will be able to: ● Observe , Understand and perform about types of soil samples.	● Basic Class Materials ● Projector
	23	Chapter 07 - Understand the purpose of	7.8 Identify split barrel sampler, spring core catches, scraper bucket	After the Class, Students will be able to:	● Basic Class Materials ● Projector

		subsurface investigation.	and piston sampler for collecting samples. 7.9 Describe the method of standard penetration test (SPT). 7.10 State the procedure of writing subsoil investigation report.	• Observe , Understand and perform about split barrel sampler, spring core catches, scraper bucket and piston sampler for collecting samples.	Lecture Slide: https://www.youtube.com/watch?v=xrU3l1RvyiE
	24	Class Test-3	Examination Topic: Chapter Chapter 07 Examination mark: 20 Passing Mark: 08		1) Basic Class Materials 2) Answer Script
	25	Chapter 08- Understand the aspect of lateral earth pressure	8.1 State the meaning of at-rest pressure, active earth pressure and. 8.2 explain active and passive earth pressure of Rankine's theory with non-surcharge. 8.3 State the formula of active earth pressure of Rankine's theory with surcharge.	After the Class, Students will be able to: • Observe , Understand and perform about at-rest pressure, active earth pressure and passive earth pressure.	• Basic Class Materials • Projector • Lecture Slide: **https://www.youtube.com/watch?v=o3raQVXb4jM**
	26	Chapter 08- Understand the aspect of lateral earth pressure	8.4 State the fundamental assumptions of Coulomb's wedge theory. 8.5 State the formula of active earth pressure of Coulomb's theory with surcharge.	After the Class, Students will be able to: • Observe , Understand and perform about Coulomb's wedge theory.	• Basic Class Materials • Projector
	27	Quiz test-3	Examination Topic: Chapter 08 Examination mark: 10 Passing Mark: 04		1) Basic Class Materials 2) Answer Script

	28	**PRACTICAL:5**	Determine the bearing capacity of soil from Standard Penetration Test (SPT).	After the Class, Students will be able to: ● Observe , Understand and perform about Standard Penetration Test (SPT).	● Basic Class Materials ● Projector Lecture Slide: https://www.youtube.com/watch?v=aAdCh6Hv6EM
	29	Chapter 09 - Understand the bearing capacity of soil.	9.1 Define bearing capacity of soil. 9.2 Correlate between penetration resistance and unconfined compressive strength for. 9.3 Correlate between penetration resistance and angle of shearing resistance for cohesion less soil	After the Class, Students will be able to: ● Observe , Understand and perform about bearing capacity of soil.	● Basic Class Materials ● Projector Lecture Slide: https://www.youtube.com/watch?v=o3raQVXb4jM
	30	Chapter 09 - Understand the bearing capacity of soil.	9.4 Explain the bearing capacity from Standard Penetration Test (SPT). 9.5 List the causes of foundation settlement.	After the Class, Students will be able to: ● Observe , Understand and perform about bearing capacity from Standard Penetration Test (SPT).	● Basic Class Materials ● Projector
	31	Class Test-4	Examination Topic: Chapter Chapter 09 Examination mark: 20 Passing Mark: 08		1) Basic Class Materials 2) Answer Script
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