Discipline:**CIVIL**	Semester: **3RD**	Name of Teaching Faculty:-**Shri Tapas Kumar Mallick**
Subject:- **Geotechnical Engineering**	No of Days/Week Class alloted:- **03**	Semester from date:**14.07.2025 to 15.11.2025** No of Weeks: **15**
Week	**Claas Day**	**Theory Topics**
1st	1st	**1.Overview of Geology and Geotechnical Engineering:-** Introduction of Geology, Branches of Geology, Importance of Geology for civil engineering structure and composition of earth.
	2nd	Definition of a rock: Classification based on their genesis (mode of origin), formation. Classification and engineering uses of igneous, sedimentary and metamorphic rocks. (Concepts only)
	3rd	Importance of soil as construction material in Civil engineering structures and as foundation bed for structures. (Concepts only
2nd	1st	Field application of geotechnical engineering for foundation design, pavement design
	2nd	design of earth retaining structures, design of earthen dam. (Concepts only)
	3rd	**2.Physical and Index Properties of Soil :-**Soil as a three phase system, water content
3rd	1st	determination of water content by oven drying method as per BIS code, void ratio, porosity and degree of saturation, density index.,air Content,Percentage of air voids,Relation between the parameters.
	2nd	Unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight
	3rd	Determination of bulk unit weight and dry unit weight by core cutter and sand replacement method, Determination of specific gravity by pycnometer.
4th	1st	Consistency of soil, Atterberg limits of consistency
	2nd	Liquid limit, plastic limit and shrinkage limit. Plasticity index
	3rd	Particle size distribution test and plotting of curve
5th	1st	Determination of effective diameter of soil, well graded and uniformly graded soils, BIS classification of soil
	2nd	**3.Permeability and Seepage:-**Definition of permeability, Darcy's law of permeability,

	3rd	coefficient of permeability, factors affecting permeability,
6th	1st	determination of coefficient of permeability by constant head and falling head tests
	2nd	simple problems to determine coefficient of permeability
	3rd	Seepage through earthen structures, seepage velocity
7th	1st	seepage pressure, phreatic line
	2nd	flow lines, application of flow net, (Concepts only
	3rd	Effective stress,quick Sand
8th	1st	**4.Compaction,Consolidation and stabilization of soil:-**Concept of compaction, Standard and Modified proctor test as per IS code
	2nd	Plotting of Compaction curve for determining: Optimum moisture content (OMC), maximum dry density (MDD)
	3rd	Zero air voids line. Factors affecting compaction, field methods of compaction – rolling, ramming and vibration.
9th	1st	Consoildation,Difference between compaction and consolidation.
	2nd	Terzaghi's Model analogy of compression/springs showing the process of consolidation,Field implications
	3rd	Concept of soil stabilization, necessity of soil stabilization, different methods of soil stabiliza tion. California bearing ratio (CBR) test - Meaning and Utilization in Pavement Construction
10th	1st	Necessity of site investigation and soil exploration: Types of exploration, criteria for decidingthe location and number of test pits and bores. Field identification of soil – dry
	2nd	strength test, dilatancy test and toughness test
	3rd	**5.Shear Strength of Soil:-Shear failure of soil**-General,local and punching shear, concept of shear strength of soil
11th	1st	Components of shearing resistance of soil
	2nd	cohesion, internal friction. Mohr-Coulomb failure theory,
	3rd	Strength envelope, strength equation for purely cohesive
12th	1st	strength equation for cohesion less soils
	2nd	Direct shear test

	3rd	triaxial shear test
13th	1st	vane shear test laboratory methods.
	2nd	**6.Bearing Capacity of Soil and Foundation:-** Bearing capacity and theory of earth pressure
	3rd	Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure
14th	1st	Introduction to Terzaghi's analysis and assumptions
	2nd	effect of water table on bearing capacity.
	3rd	Field methods for determination of bearing capacity – Plate load and Standard Penetration Test. Test procedures as per IS:1888 & IS:2131.
15th	1st	Definition of earth pressure, Active and Passive earth pressure for no surcharge condition,
	2nd	coefficient of earth pressure, Rankine's theory and assumptions made for non- cohesive Soils
	3rd	Type of foundations-shallow,deep foundation

11/7/25