GOVERNMENT POLYTECHNIC, BOLANGIR
DEPARTMENT OF CIVIL ENGINEERING

Discipline: CIVIL ENGG.	**Semester: 3RD**	**Name of the Teaching Faculty: - Smt. Anupama Das [LECT. Stage-I, Civil Engg.]**
Subject: BUILDING MATERIAL & CONCRETE TECHNOLOGY(TH -5)	**No. of days/week class allotted: 03**	**Total contact Hours-45Hrs** **Total Marks-100** **Assessment: Internal Assessment -30, End term-70**
COURSE OUTCOMES	COURSE OUTCOMES CO1: Determine physical and index properties of soil and classify soils as per BIS classification system. CO2: Estimate permeability and seepage characteristics of soil. CO3: Explain various methods of soil compaction, consolidation and stabilization. CO4: Determine shear strength and load bearing capacity of soil. CO5: Apply relevant IS Codes for soil testing, site investigation and foundation engineering.	

LESSON PLAN (45 CLASSES)

Class Day	Main Topic	Sub-Topics	Teaching Aids / Activities	CO
1	Introduction to Geology	Definition, branches and importance of geology	Rock specimens, geological maps	CO1
2	Composition of Earth	Structure and composition of earth	Models, charts	CO1
3	Rocks	Definition and classification of rocks	Rock specimens	CO1
4	Igneous, Sedimentary and Metamorphic Rocks	Characteristics and engineering uses	Rock samples, photographs	CO1
5	Importance of Soil in Civil Engineering	Soil as construction material and foundation bed	Case studies	CO1
6	Applications of Geotechnical Engineering	Foundation, pavement, retaining structures and dams	Project photographs	CO1
7	Soil as Three-Phase System	Soil solids, water and air	Soil phase diagrams	CO1

Class Day	Main Topic	Sub-Topics	Teaching Aids / Activities	CO
8	Water Content of Soil	Oven drying method as per BIS	Laboratory apparatus demonstration	CO1
9	Void Ratio, Porosity and Degree of Saturation	Definitions and relationships	Numerical examples	CO1
10	Air Content and Percentage Air Voids	Concepts and calculations	Tutorial exercises	CO1
11	Unit Weights of Soil	Bulk, dry, saturated and submerged unit weights	Numerical illustrations	CO1
12	Core Cutter Method	Determination of field density	Laboratory equipment demonstration	CO1
13	Sand Replacement Method	Determination of dry density	Field testing demonstration	CO1
14	Specific Gravity of Soil	Pycnometer method	Laboratory apparatus	CO1
15	Consistency of Soil	Introduction to Atterberg Limits	Soil samples	CO1
16	Liquid Limit Test	Procedure and significance	Casagrande apparatus	CO1
17	Plastic Limit and Shrinkage Limit	Procedure and significance	Laboratory demonstration	CO1
18	Plasticity Index	Calculation and interpretation	Numerical examples	CO1
19	Particle Size Distribution	Sieve analysis and hydrometer concept	Sieve set and charts	CO1
20	Grading Curves	Effective size, uniformity coefficient and grading	Graph plotting activity	CO1

Class Day	Main Topic	Sub-Topics	Teaching Aids / Activities	CO
21	BIS Classification of Soil	Soil classification system	Classification charts	CO1
22	Introduction to Permeability	Darcy's law and coefficient of permeability	Flow models	CO2
23	Factors Affecting Permeability	Soil properties and flow conditions	Discussion and examples	CO2
24	Constant Head Permeability Test	Procedure and calculations	Laboratory apparatus	CO2
25	Falling Head Permeability Test	Procedure and calculations	Laboratory demonstration	CO2
26	Numerical Problems on Permeability	Determination of coefficient of permeability	Tutorial session	CO2
27	Seepage Through Soil	Seepage velocity and seepage pressure	Flow diagrams	CO2
28	Phreatic Line and Flow Net	Concepts and applications	Dam section drawings	CO2
29	Effective Stress and Quick Sand	Concepts and field implications	Case studies	CO2
30	Compaction of Soil	Concept and necessity	Compaction equipment photographs	CO3
31	Standard Proctor Test	Procedure and IS code provisions	Laboratory apparatus	CO3
32	Modified Proctor Test	Procedure and applications	Laboratory demonstration	CO3
33	Compaction Curve	OMC, MDD and Zero Air Void Line	Graph plotting activity	CO3
34	Factors Affecting	Moisture content and compactive	Numerical	CO3

Class Day	Main Topic	Sub-Topics	Teaching Aids / Activities	CO
	Compaction	effort	examples	
35	Field Compaction Methods	Rolling, ramming and vibration	Equipment photographs	CO3
36	Consolidation of Soil	Concept and Terzaghi's spring analogy	Consolidation models	CO3
37	Compaction vs Consolidation	Differences and field implications	Comparative charts	CO3
38	Soil Stabilization	Need and methods of stabilization	Stabilized soil samples	CO3
39	California Bearing Ratio Test	Procedure and applications in pavement design	CBR apparatus	CO3
40	Site Investigation and Soil Exploration	Methods and planning of exploration	Bore log samples	CO5
41	Field Identification of Soil	Dry strength, dilatancy and toughness tests	Soil samples	CO5
42	Shear Strength of Soil	Concept and types of shear failure	Failure photographs	CO4
43	Mohr-Coulomb Theory	Cohesion, friction and strength envelope	Graphical illustrations	CO4
44	Shear Tests	Direct shear, triaxial and vane shear tests	Laboratory equipment	CO4
45	Bearing Capacity and Foundations	SBC, UBC, Terzaghi theory, Plate Load Test, SPT, Earth Pressure, Rankine Theory, Types of Foundations, Revision and Assessment	Numerical examples, case studies	CO4, CO5

LEARNING RESOURCES

1. Punmia, B.C., Soil Mechanics and Foundations.
2. Arora, K.R., Soil Mechanics and Foundation Engineering.
3. IS 2720 (Relevant Parts): Methods of Test for Soils.
4. IS 1888: Method of Load Test on Soils.
5. IS 2131: Standard Penetration Test for Soils.
6. Relevant BIS Codes and Geotechnical Engineering Laboratory Manual.

ADay 30/06/26

SIGNATURE OF CONCERNED FACULTY

Dshinde 30/6/26

SIGNATURE OF HOD