B. Tech. Civil Engineering				
Course code: Course Title	**Course Structure**			**Pre-Requisite**
CE 417: Computer Methods in Geotechnical Engineering	**L**	**T**	**P**	**CE206: Soil Mechanics**
	3	**0**	**2**	
Course objective: To understand the role of computer-based methods in geotechnical engineering. Apply numerical methods in solving soil and rock mechanics problems. To use the geotechnical software for modelling and solving real-world problems. To apply AI and Machine learning for geotechnical data analysis and prediction.				

S. No	Course Outcomes (CO)
CO1	Understand Computational Methods
CO2	Apply Numerical Techniques
CO3	Use Geotechnical Software
CO4	Apply AI and Machine Learning
CO5	Solve Real-World Geotechnical Problems

S. No	Contents	Contact Hours
UNIT 1	Introduction to Computational Methods in Geotechnical Engineering: Importance of computational methods in geotechnical engineering. Overview of numerical modelling techniques (FEM, FDM, DEM) Review of fundamental soil mechanics concepts. Introduction to geotechnical problem-solving using computers.	8
UNIT 2	Numerical Methods for Geotechnical Problems. Finite Difference Method (FDM) and its application in geotechnical engineering. Finite Element Method (FEM) concepts and basics of meshing. Introduction to Discrete Element Method (DEM) for granular materials. Application of numerical methods for: Slope stability analysis, Seepage, and groundwater flow Consolidation and settlement.	8
UNIT 3	Geotechnical Engineering Software Applications, Overview and application of PLAXIS (FEM-based geotechnical modelling). GeoStudio (Seepage, stability, and stress analysis). FLAC (Finite difference modelling for soil and rock mechanics). ABAQUS (Advanced finite element analysis for soil-structure interaction). Hands-on practice: Modelling soil behaviour, boundary conditions, and interpretation of results	8