M.TECH GEOTECHNICAL ENGINEERING

SEMESTER 1

07CE6203 ADVANCED SOIL MECHANICS	
CO1	describe soil structures and clay mineralogy and their identifications.
CO2	explain elastic theories and constitutive relationships for soils and apply the same in solving various engineering problems.
CO3	assess the shear strength of soil based on Mohr -Coulomb theory and critical state concept and conduct different tests to find out shear strength of soil and interpret the results for different conditions.
CO4	describe three dimensional consolidation and rheological models for soil and effectively use them to solve related engineering problems.

07CE6205 FINITE ELEMENT ANALYSIS	
CO1	describe basics of finite element method and its applications.
CO2	evaluate energy principles, shape functions and coordinate systems.
CO3	formulate stiffness matrix and use isoparametric elements to solve problems.
CO4	assess the use of plate bending elements and shell elements to model and solve engineering problems and conduct contact modelling for practical applications.

07CE6207 ADVANCED FOUNDATION ENGINEERING	
CO1	describe and compute bearing capacity of foundations using different methods.
CO2	compute elastic ,consolidation and differential settlement of foundations using various methods.
CO3	describe pile foundations, caissons and well foundations and design caissons and well foundations.
CO4	describe soil structure interaction and apply soil structure interaction models for different field conditions.

07CE6209 SOIL EXPLORATION AND FIELD TESTING	
CO1	Identify the procedure, applicability and limitations of various geotechnical investigation method and field tests.
CO2	plan geotechnical investigation programme, prepare and interpret borelog and soil investigation report.
CO3	evaluate different sampling methods used in geotechnical investigation.
CO4	explain offshore exploration techniques and instrumentation used in soil engineering

07CE6229 PAVEMENT ANALYSIS AND DESIGN	
CO1	explain the types, components and performance of pavement system.
CO2	describe and apply reliability concept for pavement analysis and design
CO3	compute stress and strain developed in pavements in different conditions.
CO4	design flexible and rigid pavements.

7GN6001 RESEARCH METHODOLOGY	
CO1	To Discuss research methodology concepts, research problems, research designs, thesis preparations, publications and research methods
CO2	To Analyse and evaluate research works and to formulate a research problem to pursue research
CO3	To Prepare a thesis or a technical paperand a present or publish them
CO4	To Apply the various research methods followed in engineering research for formulation and design of own research problems and to utilize them in their research project.

07CE6219 GROUND IMPROVEMENT	
CO1	Explain the need and objectives of ground improvement techniques
CO2	Differentiate ground improvement techniques based on mechanical modifications and hydraulic modifications
CO3	Compare ground improvement methods based on inclusion, chemical and thermal methods
CO4	Choose and recommend effective ground improvement techniques based on field conditions

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SEMESTER II

07CE6202 PILE FOUNDATIONS- ANALYSIS AND DESIGN	
CO1	describe behaviour of pile foundation, piling methods and their effects.
CO2	compute bearing capacity and settlement of pile under axial load.
CO3	determine bearing capacity and settlement of pile under lateral load.
CO4	evaluate bearing capacity and settlement of pile under dynamic loads and assess the behaviour of pile during uplift and liquefaction.
07CE6204 STRUCTURAL DESIGN OF FOUNDATIONS AND RETAINING STRUCTURES	
CO1	recognize the limit sate design philosophy for foundations and their structural behavior.
CO2	structural design of different shallow foundations.
CO3	structural design of raft foundations.
CO4	structural design of pile, pile cap, well foundations and retaining walls.
07CE6206 SOIL DYNAMICS AND MACHINE FOUNDATION	
CO1	Explain fundamental concepts of soil dynamics and theory of vibration.
CO2	Evaluate dynamic soil properties and dynamic bearing capacity.
CO3	Describe vibration isolation and apply principles of vibration isolation for machine foundations.
CO4	Describe soil liquefaction and laboratory tests to evaluate liquefaction potential of soil.
07CE6228 APPLIED SOIL MECHANICS	
CO1	explain arching soils and apply theory of arching to find out soil pressure on tunnels and conduits.
CO2	describe earth pressure theories and types of retaining structures.
CO3	analyse different retaining structures for stability.
CO4	explain earth pressure and failure in open cuts and design bracings for cuts in soil.
CO5	describe non conventional retaining systems and analyse cofferdams.
07CE6238 ROCK MECHANICS	
CO1	explain the formation and classification of rocks, tests conducted to determine rock properties.
CO2	describe failure theories for rock and apply them for predicting behaviour of rocks. □
CO3	explain methods and instrumentation for rock tunneling. □
CO4	assess rock reinforcement and rock blasting methods and mechanisms.
07CE6248 GROUND WATER HYDROLOGY	
CO1	explain hydrological cycle, distribution of ground water and aspects affecting groundwater.
CO2	apply mathematical formulations to develop flow net.
CO3	apply well hydraulics and pumping tests to estimate ground water parameters.
CO4	evaluate ground water development problems.
CO5	model ground water flow using different methods.
07CE6212 ENVIRONMENTAL GEOTECHNICAL ENGINEERING	
CO1	explain basics of Environmental Geotechnics and its relevance.
CO2	characterize fly ash and apply land fill engineering to solve waste disposal.
CO3	evaluate contaminant transport phenomenon and bearing capacity of compacted fills.
CO4	describe long term behaviour of landfills and contaminate ground remediation.
07CE6222 REINFORCED EARTH AND GEOTEXTILES	
CO1	To introduce the concepts of Geosynthetcics and its functions
CO2	To understand the properties' and manufacturing process of various types of Geosynthetcics
CO3	To understand the design and construction of Geotextiles as a reinforcement element
CO4	To introduce the application of Geosynthetcics in pavements and railways
CO5	To understand the design and application of geotextiles in environmental control
07CE6232 STABILITY ANALYSIS OF SLOPES AND EMBANKMENTS	
CO1	describe landslide phenomenon and its mechanism. □ analyse slope stability using different methods. □ evaluate the effect of seepage in stability of slopes and importance of drainage in retaining structures. □
CO2	analyse slope stability using different methods.
CO3	evaluate the effect of seepage in stability of slopes and importance of drainage in retaining structures.
CO4	explain site investigation of slopes and assess reasons for slope failure.
07CE6214 SEMINAR	
CO1	Undertake a critical review of literature on a chosen topic.
CO2	Present topics of relevance to a group of professionals.
CO3	Prepare a technical report.
07CE6216 MINI PROJECT	
CO1	to improve technical skills of students in field of geotechnical engineering
CO2	to conduct survey of available literature in the field of geotechnical engineering
CO3	to develop practical knowledge in Geotechnical Engineeringfor solving real life problems
CO4	to prepare a report and present the findings of study conducted
07CE6218 SOFTWARE LABORATORY	
CO1	Work with finite element software
CO2	Analyse shallow and deep foundations, retaining walls, under different loading conditions using FEM packages
CO3	Carry out slope stability analysis usingsoftware packages

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SEMESTER III

07CE7201 FORENSIC GEOTECHNICAL ENGINEERING	
CO1	To understand:the foundation failure ,to explain the scope and application of forensic engineering in geotechnical engineering
CO2	to analyze the field data and perform laboratory tests, destructive and non-destructive tests to evaluate the soil/ground behavior
CO3	To study the settlement of structures, expansive soil and dessicated clay
CO4	To understand about lateral movements and other geotechnical problems
CO5	To apply back analysis and develop most probable failure hypothesis.
CO6	To perform reliability checks and identify legal issue related to geotechnical engineering
07CE7211 MODERN TECHNIQUES IN GEOTECHNICAL ENGINEERING	
CO1	explain and analyse foundations used for special structures.
CO2	describe the importance of instrumentations used in geotechnical engineering and choose suitable instrument based on field conditions.
CO3	apply techniques to find resistivity of soil, non destructive pile testing and modern tests to analyse soil structure.
07CE7221 MODELLING, SIMULATION AND COMPUTER APPLICATIONS	
CO1	explain fundamentals of systems and models and their applications.
CO2	effectively use spatial distribution and model building for solving problems.
CO3	apply validation simulation techniques for analysis.
CO4	apply probability distributions to solve engineering problems
07CE7203 EARTHQUAKE GEOTECHNICAL ENGINEERING	
CO1	describe earth quake seismology and ground motion due to earth quakes.
CO2	apply ground response analysis for structures under earthquake loading .
CO3	describe liquefaction and evaluate liquefaction potential of soils.
CO4	seismic design of foundations.
CO5	conduct seismic slope stability analysis and sesimic design of retaining walls.
07CE7213 SHELL FOUNDATIONS	
CO1	explain geometrical aspects, classification and uses of shell foundations.
CO2	geotechnical design of shell foundations.
CO3	conduct membrane analysis, bending analysis and ultimate strength analysis of shell foundations. □
CO4	structural design of shell foundation and describe construction of shell foundations.
07CE7223 GEOINFORMATICS	
CO1	explain the basics of remote sensing and geographic information system.
CO2	describe remote sensors and their applications.
CO3	apply the principles of remote sensing and geographic information system in engineering problems .
CO4	analyse and model GIS data using different methods.
07CE7205 SEMINAR	
CO1	Undertake a critical review of literature on a chosen topic.
CO2	Present topics of relevance to a group of professionals.
CO3	Prepare a technical report.

07CE7207 PROJECT PHASE – 1 & SEMESTER IV 07CE7202 PROJECT PHASE – 2

CO1	to develop work practice in students by applying therotical and practical tools/technique to solve field problems related to geotechnical engineering
CO2	to identify problems and also to develop methods for solving such problems which needs the specialisd knowledge of theoritical and practical aspects from various
CO3	to develop analytical/experimental/numerical models for solving/analyzing specific Geotechnical Engineeeirng problems such as Earth pressure,slope stability,bearing
CO4	to improve professional competancy and research aptitude in various areas of Geotechnical Engineering
07CE7202 PROJECT PHASE – 2	
CO1	to develop work practice in students by applying therotical and practical tools/technique to solve field problems related to geotechnical engineering
CO2	to identify problems and also to develop methods for solving such problems which needs the specialisd knowledge of theoritical and practical aspects from various
CO3	to develop analytical/experimental/numerical models for solving/analyzing specific Geotechnical Engineeeirng problems such as Earth pressure,slope stability,bearing
CO4	to improve professional competancy and research aptitude in various areas of Geotechnical Engineering

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