JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

Kakinada-533003, Andhra Pradesh, India

M.Tech in SOIL MECHANICS AND FOUNDATION ENGINEERING

Vision of the Department

To produce competent civil engineers with the capacity to handle challenges in the field of civil engineering and also to perform innovative research for societal needs with professional ethics.

Mission of the Department

M1: To produce high-quality learners who are globally competent and professionally skilful in the field of civil.

M2: To offer educational programs that impart inventive knowledge with high levels of ethics and human.

M3: Provide a platform to acquire and implement innovative ideas in research and development.

M4: To build up state-of-the-art laboratories and centres of excellence in different areas of civil engineering.

M5: To train the students and faculty to update their knowledge in emerging technologies to meet industrial requirements.

Program Educational Objectives (PEO)

PEO1: Impart basic technical knowledge and skills for specialized careers in Civil Engineering related fields that cater to global needs.

PEO2: Provide expertise in carrying out project works by using state-of-the-art basic computing and experimental techniques and preparing them to take up Masters and jobs.

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PEO3: Train the student to possess good communication and presentation skills with the ability to work in teams contributing significantly to the technological development of responsible Civil Engineers.

Program Outcomes (PO'S)

PO 1: Able to Solve Mathematical/Numerical Problems

PO 2: Able to Analyze Trusses, Beams, Frames

PO3: Estimation of Forces, Analysis of Multi-Degree of Freedom Systems using Mathematical Approaches Such as Static Quasi-Static and Dynamic methods.

PO 4: Design of Structures to Contribute in The Development of the Society.

PO 5: Application of Experimental Techniques on Structural Evaluation

PO 6: Able to Analyze and design of structure under different type of Loads

PO 7: Optimization of structures and presentation of the project done with Ethics

MSFI-1	**ADVANCED SOIL MECHANICS**

Course Outcomes:

At the end of the course, the student will be able to

CO1	Acquire complete knowledge on stress components and distribution.
CO2	Acquire the complete knowledge on strain and stress strain relationships.
CO3	Tackle problems on seepage through soils

CO4 Understand consolidation phenomenon and apply it to various Geotechnical Engineering problems
CO5 Understand shear strength behavior of soils and its applications in Geotechnical Engineering.

Course Code	**FOUNDATION ENGINEERING-1**
R19 MSFI-1102	

Course outcomes:

At the end of the course, the student will be able to

CO1 Know the process of the soil exploration and sample collection, preservation and transportation of samples to the laboratory.
CO2 Interpret the results of field tests.
CO3 Determine the bearing capacity of soils for shallow foundations
CO4 Make the choice of foundation based on sub soil conditions.
CO5 Determine the settlement of foundations in different soils.

Course Code	**GROUND IMPROVEMENT TECHNIQUES**
R19 MSFI-1103	

Course outcomes:

At the end of the course, the student will be able to

CO1 Understand the principles of various ground improvement techniques.
CO2 Prefer suitable ground improvement techniques based on the Soil conditions and local available materials.
CO3 Understand the principles and suitability of various stabilization techniques.
CO4 Select suitable stabilization techniques based on the Soil conditions and local available materials
CO5 Understand the Principles of dewatering techniques and to apply suitable

dewatering technique in the field depending on the requirement

CO6 Understand the grouting technology and its applications by selecting the suitable grout based on the field conditions.

Course Code	**SOIL FOUNDATION INTERACTIONS**
MSFI-3	

Course outcomes:

At the end of the course, the student will be able to

CO1 Use a stress strain behavior of Soil in modelling to determine the soil response with the applied loads.

CO2 Apply concepts to analyze and to compute the response of the infinite and finite beams, plates on the soil medium.

Course Code	**CRITICAL STATE SOIL MECHANICS**
MSFI-3	

Course outcomes:

At the end of the course, the student will be able to

CO1 Use a critical state framework to determine soil response
CO2 Use a constitutive model to determine soil response
CO3 Analyze the behavior of soil under different boundary conditions.

Course Code	**DESIGNING WITH GEOSYNTHETICS**
R19 MSFI-1104a	

Course outcomes:

At the end of the course, the student will be able to

CO1 Use geosynthetic materials in the field of geotechnical construction works.
CO2 Assess the properties of different materials of Geosynthetics
CO3 Distinguish and describe various manufacturing methods of geotextiles, geogrids, geomembranes and geo-composites
CO4 Understand concepts and design the geosynthetics for the functions of separation, reinforcement, stabilization, filtration, drainage and moisture barriers

CO5 Design reinforced earth retaining walls, gabions, pond liners, covers for reservoirs, canal liners, landfill liners, caps and closures, dams and embankments etc.
CO6 Distinguish survivability requirements of geo-composites and design geo-webs, geo-cells, sheet drains, strip drains and moisture barriers etc.

Course Code	**ROCK MECHANICS**
MSFI-4	

Course outcomes:

At the end of the course, the student will be able to

CO1 Classify rock mass based on field investigation data

CO2 Select the rock strength parameters for design
CO3 Suggest suitable tests on rocks for intended purpose
CO4 Design suitable rock important techniques.

Course Code	**REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM**
R19 PE4102	

Course outcomes:

At the end of the course, the student will be able to

CO1 Familiar with ground, air and satellite-based sensor platforms.
CO2 Select and apply appropriate data manipulation and visualization methods for a number of Earth science applications, including Geographical Information Systems (GIS)
CO3 Operate PC- based visualization software effectively
CO4 To plot, map and interpret, Geo-spatial data and present the results in an organized fashion.

Course Code	**GEOTECHNICAL ENGINEERING LAB-1**
R19 PC3104	

Course outcomes:

At the end of the course, the student will be able to

CO1 Conduct various laboratory tests on soils, analyze and the interpretation of results.

Course Code	**GEOTECHNICAL ENGINEERING LAB-2**

R19 PC3202	

Course outcomes:

At the end of the course, the student will be able to

CO1 Conduct various laboratory tests on soils, analyze and the interpretation of results.

Course Code	**FOUNDATION ENGINEERING-II**
R19 MSFII 1201	

Course outcomes:

At the end of the course, the student will be able to

CO1 Understand classification of piles and determine the load carrying capacity of piles by various methods
CO2 Determine the load carrying capacity of pile groups
CO3 Evaluate the pull-out capacity of piles and down drag forces on piles due to negative skin friction
CO4 Determine the load carrying capacity of laterally loaded piles
CO5 Determine the load carrying capacity of piers and caissons.

Course Code	**EARTH RETAINING STRUCTURES**
R19 MSFII 1202	

Course outcomes:

At the end of the course, the student will be able to

CO1 Quantify the lateral earth pressures associated with different earth systems

CO2 Evaluate the mechanical properties of geosynthetics used for soil reinforcement
CO3 Identify the merits and demerits of different earth retaining systems.
CO4 Select the most technically appropriate type of retaining wall for the application from a thorough knowledge of available systems.
CO5 Design of retaining structures using appropriate design methods, factors of safety, earth pressure diagrams and field verification methods.
CO6 Aware of current guidelines regarding the design of earth retaining structures.
CO7 Design retaining structures considering both external and internal stability aspects.

Course Code	**PAVEMENT ANALYSIS, DESIGN AND EVALUATION**
R19 MSFII-1204b	

Course outcomes:

At the end of the course, the student will be able to

CO1 Understand the design parameters of pavement design
CO2 Design flexible and rigid pavements for different field conditions
CO3 Compute the stress distribution in different pavement layers
CO4 Evaluate the pavements and design overlay systems.

Course Code	**CONSTRUCTION PLANNING AND METHODS**
R19 MSFII-1204b	

Course outcomes:

At the end of the course, the student will be able to

CO1 Understand the construction planning
CO2 Utilize the various earth moving equipment
CO3 To prepare the Project Budget

Course Code	**GEOTECHNICAL EARTH QUAKE ENGINEERING**
MSFII-3	

Course outcomes:

At the end of the course, the student will be able to

CO1 Learn the fundamental definitions of earth quake engineering
CO2 Understand earth quake ground motions
CO3 Gain knowledge on dynamic properties of the soil and its estimation
CO4 Understand liquefaction and lateral spreading of soil.
CO5 Do the seismic design of foundations, slopes and retaining structures.
CO6

Course Code	**EARTH DAMS**
R19 MSFII-1203a	

Course outcomes:

At the end of the course, the student will be able to

CO1 Understand the basic concepts of earth-fill dams and rock-fill dams and identify the site topography and foundations conditions
CO2 Identify basic design requirements and causes of failures of dams, distinguish foundation type and the different fill materials
CO3 Estimate seepage through dam sections, foundations and select core and shell materials

CO4 Understand and design the methods to control seepage through different units of dams
CO5 Able to undertake slope stability analysis of dams
CO6 Distinguish different types of instruments like piezometers, settlement gauges and inclinometers to install for performance studies of dams.

Course Code	**CONSTRUCTION IN EXPANSIVE SOILS**
R19 MSFII-1203b	

Course outcomes:

At the end of the course, the student will be able to

CO1 Understand the behavior of expansive soils
CO2 Assess the foundation practices on expansive soils
CO3 Perform the methods of stabilization expansive soils
CO4 Select additives and the methodology for stabilization
CO5 Apply the gained knowledge for suitable performance.

Course Code	**NUMERICAL METHODS IN GEOTECHNICAL ENGINEERING**
R19 MSFII-1203c	

Course outcomes:

At the end of the course, the student will be able to

CO1 Apply various models to the soil mass to find out the behavior of the soil
CO2 Apply FD solution to homogeneous and layered soils-, one-, two- and three-dimensional Consolidation problems
CO3 Apply the FD and FEM solutions for shallow foundations and Deep foundations

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Course Code	GEOTECHNICAL ENGINEERING LAB-III
R19 MSFPII-1206	

Course outcomes:

At the end of the course, the student will be able to

CO1 Conduct various laboratory tests on soils, analyze and the interpretation of results

Course Code	SOFTWARE DESIGN LAB
R19 MSFPII-1205	

Course outcomes:

At the end of the course, the student will be able to

CO1 Develop Computer s for solution of various geotechnical Problems
CO2 Use different Geotechnical software to solve various geotechnical Problems.

Course Code	GEO ENVIRONMENTAL ENGINEERING
R19 MSFIII-1 2101 a	

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Course outcomes:

At the end of the course, the student will be able to

CO1 Understand various ground contaminations, pollution transport phenomena.
CO2 Collect pollutant data
CO3 Apply principles to get the information about the transport through the unsaturated soil
CO4 Develop various models for contamination transport.

Course Code	**SOIL DYNAMICS & MACHINE FOUNDATIONS**
R19 MSFIII-1 2101b	

Course outcomes:

At the end of the course, the student will be able to

CO1 Use theory of vibrations to find the behavior of soil under dynamic loading
CO2 Design machine foundations under different loads and soil conditions
CO3 Understand the liquefaction phenomena
CO4 Conduct various laboratory and filed tests to determine the dynamic soil prosperities and its Interpretation.
CO5 Design vibration isolators under any vibratory machines.

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Course Code	FINITE ELEMENT METHOD
R19 MSEII-1 1201	

Course outcomes:

At the end of the course, the student will be able to

CO1 Develop finite element formulations of 1 degree of freedom problems and solve them

CO2 Understand any Finite Element software to perform stress, thermal and modal analysis

CO3 Compute the stiffness matrices of different elements and system

CO4 Interpret displacements, strains and stress resultants.