Academic Regulations-M.Tech. 2009-10

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
Academic Regulations For The Award Of Full Time M.Tech. P.G. Degree
(WITH EFFECT FROM THE ACADEMIC YEAR 2009-10)

The Jawaharlal Nehru Technological University Anantapur shall confer M.Tech. Post Graduate degree to candidates who are admitted to the Master of Technology Programs and fulfill all the requirements for the award of the degree.

1.0 ELIGIBILITY FOR ADMISSIONS:

Admission to the above programme shall be made subject to the eligibility, qualifications and specialization prescribed by the University for each programme, from time to time.

Admissions shall be made either on the basis of merit rank obtained by the qualified candidates at an Entrance Test conducted by the University or on the basis of GATE / PGECET score, subject to reservations prescribed by the University or Government policies from time to time.

2.0 COURSE WORK:

2.1 A Candidate after securing admission must pursue the M.Tech. course of study for Four semesters duration.

2.2 Each semester shall be of 20 weeks duration including all examinations.

2.3 A candidate admitted to a programme should complete it within a period equal to twice the prescribed duration of the programme from the date of admission.

3.0 ATTENDANCE:

3.1 A candidate shall be deemed to have eligibility to write end semester examinations if he has put in at least 75% of attendance on cumulative basis of all subjects/courses in the semester.

3.2 Condonation of shortage of attendance up to 10% i.e., from 65% and above and less than 75% may be given by the college on the recommendation of the Principal.

3.3 Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representation by the candidate with supporting evidence.

3.4 If the candidate does not satisfy the attendance requirement he is detained for want of attendance and shall reregister for that semester. He / she shall not be promoted to the next semester.

4.0. EVALUATION:

The performance of the candidate in each semester shall be evaluated subject wise, with a maximum of 100 marks for Theory and 100 marks for practicals, on the basis of Internal Evaluation and End Semester Examination.

4.1 For the theory subjects 60% of the marks will be for the External End Examination. While 40% of the marks will be for Internal Evaluation, based on the better of the marks secured in the two Mid Term-Examinations held, one in the middle of the Semester (I-IV units) and another immediately after the completion of instruction (V-VIII) units with Three questions to be answered out of four in 2hours, evaluated* for 40 marks.

*****Note: All the Questions shall be of equal weightage of 10 marks and the marks obtained for 3questions shall be extrapolated to 40 marks, any fraction rounded off to the next higher mark

4.2 For practical subjects, 60 marks shall be for the End Semester Examinations and 40 marks will be for internal evaluation based on the day to day performance.

4.3 For Seminar there will be an internal evaluation of 50 marks. A candidate has to secure a minimum of 50% to be declared successful. The assessment will be made by a board consisting of HOD and two internal experts at the end of IV semester instruction.

4.4 A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

4.5 In case the candidate does not secure the minimum academic requirement in any of the subjects (as specified in 4.4.) he has to reappear for the Semester Examination either supplementary or regular in that subject, or repeat the course when next offered or do any other specified subject as may be required.

5.0 RE-REGISTRATION FOR IMPROVEMENT OF INTERNAL EVALUATION MARKS:

Following are the conditions to avail the benefit of improvement of internal evaluation marks.

5.1 The candidate should have completed the course work and obtained examinations results for I & II semesters.

5.2 He should have passed all the subjects for which the Internal evaluation marks secured are more than 50%.

5.3 Out of the subjects the candidate has failed in the examination due to Internal evaluation marks secured being less than 50%, the candidate shall be given one chance for each Theory subject and for a maximum of **three** Theory subjects for Improvement of Internal evaluation marks.

5.4 The candidate has to re-register for the chosen subjects and fulfill the academic requirements.

5.5 For each subject, the candidate has to pay a fee equivalent to one third of the semester tuition fee and the amount is to be remitted in the form of D.D. in favour of the Registrar, JNTUA payable at Anantapur along with the requisition through the Principal of the respective college.

5.6 In the event of availing the Improvement of Internal evaluation marks, the internal evaluation marks as well as the End Examinations marks secured in the previous attempt(s) for the reregistered subjects stand cancelled.

6.0 EVALUATION OF PROJECT WORK:

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the college/ institute.

6.1 Registration of Project work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the courses (theory and practical courses of I & II Sem)

6.2 An Internal Departmental Committee (I.D.C) consisting of HOD, Supervisor and one internal senior expert shall monitor the progress of the project work.

6.3 The work on the project shall be initiated in the penultimate semester and continued in the final semester. The duration of the project is for two semesters. The candidate can submit Project thesis with the approval of I.D.C. after 36 weeks from the date of registration at the earliest and one calendar year from the date of registration for the project work. Extension of time within the total permissible limit for completing the programme is to be obtained from the Head of the Institution.

6.4 The student must submit status report at least in three different phases during the project work period. These reports must be approved by the I.D.C before submission of the Project Report.

6.5 A candidate shall be allowed to submit the thesis / dissertation only after passing in all the prescribed subjects (both theory and practical) and then take viva voce examination of the project. The viva-voce examination may be conducted once in two months for all the candidates submitted during that period.

6.6 Three copies of the Thesis / Dissertation certified in the prescribed from by the supervisor & HOD shall be presented to the H.OD. One copy is to be forwarded to the University and one copy to be sent to the examiner.

6.7 The college shall submit a panel of three experts for a maximum of 5 students at a time. However, the thesis / dissertation will be adjudicated by one examiner nominated by the University.

6.8 If the report of the examiner is favorable viva-voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the thesis / dissertation. The board shall jointly report candidates work as:

1.	Very Good	Grade A
2.	Good	Grade B
3.	Satisfactory	Grade C
4.	Not satisfactory	Grade D

If the report of the viva-voce is not satisfactory (Grade D) the candidate will retake the viva-voce examination after three months. If he fails to get a satisfactory report at the second viva-voce examination he will not be eligible for the award of the degree unless the candidate is permitted to revise and resubmit the thesis.

7.0 AWARD OF DEGREE AND CLASS:

A candidate shall be eligible for the award of respective degree if he satisfies the minimum academic requirements in every subject and secures 'satisfactory' or higher grade report on his thesis/dissertation and viva-voce. Based on overall percentage of marks obtained, the following class is awarded.

First class with Distinction:	70% or more
First class	below 70% but not less than 60%

Second class below 60% but not less than 50%

8.0 WITH – HOLDING OF RESULTS:

If the candidate has not paid dues to the university or if any case of in-discipline is pending against him, the result of the candidate shall be withheld and he will not be allowed/ promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

9.0 TRANSITORY REGULATIONS:

Candidates who have discontinued or have been detained for want of attendance or who have failed after having undergone the course in earlier regulations and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to 4.5 and 2.3 sections. Whereas they continue to be in the academic regulations they were first admitted.

10.0 GENERAL:

i. The academic regulations should be read as a whole for purpose of any interpretation.

ii. Disciplinary action for Malpractice / improper conduct in examinations is appended.

iii. There shall be no places transfer within the constituent colleges and affiliated colleges of Jawaharlal Nehru Technological University Anantapur.

iv. Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

v. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.

vi. The University may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the University**.**

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RULES FOR DISCIPLINARY ACTION FOR MALPRACTICE / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	If the candidate	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.

3.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

6.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
7.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the impostor is an outsider, he will be handed over to the police and a case is registered against him.

8.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

MALPRACTICES IDENTIFIED BY SQUAD OR SPECIAL INVIGILATORS

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices)
   (i) A show cause notice shall be issued to the college.
   (ii) Impose a suitable fine on the college.
   (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

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Curriculum and Syllabus for M. Tech (Geotechnical Engineering)
(Four Semester Course)
(To be Effective from 2010-11)

Curriculum and Scheme of Instruction

First Semester

Code	Subject	No. of Periods/ Week	Credits
9D12101	Advanced Soil Mechanics	4	4
9D12102	Theoretical Soil Mechanics	4	4
9D12103	Numerical Methods	4	4
9D12104	Shallow Foundations	4	4
9D12105a 9D12105b	**Elective – 1** 1. Geo-Technical Earth Quake Engineering 2. GIS (Geographical Information Systems)	4	4
9D12106a 9D12106b	**Elective – 2** 1. Geo-Environmental Engineering 2. Soil Dynamics and Machine Foundations	4	4
9D12107	Advanced Geo-Technical Engineering Laboratory	3	2

Second Semester

Code	Subject	No. of Periods/ Week	Credits
9D12201	Deep foundations and Earth Retaining Structures	4	4
9D12202	Ground Improvement Techniques	4	4
9D12203	Design with Geo-Synthetics	4	4
9D12204	Finite Element Method for Geo-Technical Applications	4	4
9D12205a 9D12205b	**Elective – 3** 1. Earth and Rock fill Dams and Slope Stability 2. Soil Stabilization and flexible pavement Design	4	4
9D12206a 9D12206b	**Elective – 4** 1. Experimental Geo-Mechanics 2. Structural Analysis and Foundation Design	4	4
9D12207	Computer Lab	3	2

II Year

Code	Subject	No. of Periods/ Week	Credits
9D12401	Industrial Seminar	-	2
9D12402	Project Work	-	16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (GE) **Credits 4; Periods/Week 4**

(9D12101) - ADVANCED SOIL MECHANICS

UNIT I

Clay Mineralogy and Soil Structures I :

Clay Mineralogy, Basic structural units, Isomorphic substitution, base exchange capacity, inter automatic and inter molecular bonds, different clay minerals

UNIT II

Clay Mineralogy and Soil Structures II :

Engineering properties of clay minerals,permeability, swelling & shrinkage and stress – strain characteristics of soil and consolidation theory.

UNIT III

Soil Water Hydraulics:

Seepage Mathematical Analysis – finite difference formulae of study state and transient floe water soils – construction of flow nets in homogeneous soils by graphical methods – computation of seepage for ground water – embankments earth uplift pressures critical hydraulics – safety factors.

UNIT IV

Shear Strength of Soils I :

review of conventional shear stress factors affecting shear strength of soils – pore pressure in soils – pore pressure measurements in triaxial test and field measurements – total and effective shear stress parameters

UNIT V

Shear Strength of Soils I :

stress path, total stress path and effective stress path – Horslave shear parameters – shear strength , thixotropy and liquefaction of soils.

UNIT VI

Compressibility of Soils: Concept of Stress, Principal Stress and Strain, Stress – Strain relations, plane Stress, Plane Strain, Mohr's diagram.

UNIT VII

Settlement and consolidations: ultimate Settlements (Consolidation Test), Time rate of Consolidation, Effect of Layers and changes in parameters on the rate of consolidations.

UNIT VIII

Soil Strength: General considerations, Yield criterion, Theories of failures – Mohr – column failure conditions – testing of soils – strength, strength of soils.

REFERENCE BOOKS:

1. Foundations of Theoretical Soil Mechancis — ME Harr
2. Soil Behaviors — JR Mitchell
3. Soil mechanics — Lambe.T.W and Whitman
4. Soil mechanics — R.F.Craig
5. Advanced soil mechanics — B.M.Das

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (GE) **Credits 4; Periods/Week 4**

(9D12102) - THEORETICAL SOIL MECHANICS

UNIT I

Theory of Elasticity I : Basic concepts, definitions and notations of stress – strain components – Hooke's law, Generalized equilibrium and compatible conditions in Cartesian, Polar coordinates

UNIT II

Theory of Elasticity I :

principle stress strain – octahedral stress – stress invariants.

UNIT III

Stress and Strain Tensors: Stress in soil mass due to surface loads – Boussinesq's equations – elasticity problems in soil mechanics.

UNIT IV

Theory of Plasticity: Ideal plastic substance strain hardening – yield criteria – Tresca & Moses theory

UNIT V

Mohr's & Coulombs yield surfaces – applications to soil mechanic problems.

UNIT VI

Rheological Equations: Visco – Elasticity – Ideal viscus substances, Rheological models consisting more than two elements, Principle of super-positions.

UNIT VII

Fundamental Applications of Theory of Elasticity and Plasticity in Soil Mechanics: Limit analysis

UNIT VIII

Upper bounds / Lower bounds – Limit equations.

REFERENCE BOOKS

1.	Elastic Solutions for Soil and Rock mechanics	John Wiley and Sons
2.	Rheological Aspects of Soil Mechanics	John Wiley and Sons
3.	Applications of Theory of Plasticity in Soil Mechancis	John Wiley and Sons
4.	Stress Strain Behavior of Soil Mechanics	GT Foulis & Co.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (GE) **Credits 4; Periods/Week 4**

(9D12103) - NUMERICAL METHODS

UNIT I

The calculus of the Finite Difference : Differences, Differences Formulae, Difference table, Operator E, Properties of the operator E and Δ, Leibnitz rule – Interpolation with equal intervals, unequal intervals, Central difference interpretation formulae.

UNIT II

Numerical Differentiation and Integration and Inverse Interpolation.

UNIT III

Numerical solution of ordinary difference equations of the first and second order.

UNIT IV

Simultaneous linear algebraic equations – methods of solution using the inverse of the matrix, method of successive elimination.

UNIT V

Iterative method – gauss Siedel method, Relaxation methods.

UNIT VI

Introduction to Finite Element Analysis various steps in solving a problem by finite Element Method (displacement approach). Two dimensional method elements.

UNIT VII

Formulation of the finite element method using (i) Principle of virtual work (ii) Minimization of total potential energy of a system, Discrete Element Method.

UNIT VIII

Applications – mats – Conventional analysis and finite difference solution, Design of the sheet pile walls by matrix methods.

REFERENCE BOOKS

1.	Calculus of finite Difference Method & Numerical Analysis	Gupta Malik
2.	Analytical & Computer Methods in Finite Difference Methods	Bonles
3.	Elastic Analysis of Soil Foundation Interactions	Selva Durai

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (GE) **Credits 4; Periods/Week 4**

(9D12104) - SHALLOW FOUNDATIONS

UNIT I Soil Investigations: Factors affecting site investigation, Planning sub soil exploration programme, Methods of soil exploration, Spacing and depth of borings, Location of borrow areas, bore log,

UNIT II Types of samples and samplers, Cleaning of bore holes, types of samplers, design consideration of open drive samplers, Preservation of soil samples, Labelling and shipment of samples.

UNIT III Types of Shallow Foundations: Strip pad, Combined, Raft Foundations.

UNIT IV Bearing Capacity: Terzaghi's factors, Accuracy of Terzaghi's factors, Effect of footing shape, Net bearing capacity, General formulae, Soil layers of finite depths, Non uniform soils, Strength increasing with depth, Footings on slopes, Layered soils.

UNIT V Settlement: Limits of settlement, Settlement computation, theory of elasticity, 1-D Conditions, 3-D problems,

UNIT VI Rate of settlement, Settlement of footings on sand, determination of BC based on settlement and bearing criteria.

UNIT VII Raft Foundations: Strip raft, Circular raft, rectangular raft, foundation – soil materialization – Beams & Plates on EI Found.

UNIT VIII Foundation – Soil Structure Interaction: Idealized soil behavior – Foundation behavior, Interface behavior, Analytical techniques, Slope of soil – Foundation interaction analysis.

REFERENCE BOOKS:

1.	Elastic Analysis of Soil Foundation Interactions	Selva Durai
2.	Soil Mechanics & foundation Engineering	Arora
3.	Analysis & Design of Foundations	Swamisaran
4.	Principles of foundation Engg	B.M.Das

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (GE) **Credits 4; Periods/Week 4**

(9D12201) - DEEP FOUNDATIONS AND RETAINING STRUCTURES

UNIT I
Beams on Elastic Foundations: Winkler and Modified Winkler Models.

UNIT II
Theory of sub grade reaction, Applications of solution of beams on elastic foundations for footings and rafts, Finite Difference Method.

UNIT III
Pile Foundations: Criteria for Design, types of Piles, Pile Load Capacity, Group Effects

UNIT IV
Settlements and deformation prediction, Design charts and equations for single pile, pile group settlement, pile load testing, Butter Piles, Negative Skin friction, Lock – Socketed Piles.

UNIT V
Well Foundations: Shapes of wells and component parts, Depth of well foundation and bearing capacity, Forces acting on a well foundation, Analysis of well foundation, well curb, cutting edge, staining and bottom plug, Well sinking.

UNIT VI
Earth Pressure Theories and Retaining Walls: conventional retaining wall, Gravity and Cantilever walls, shut pile walls (Cantilever & Anchored).

UNIT VII
Strutted Excavations: Stability of slopes to open excavations, Support of excavations, Structural Design of Supports to excavation, Over all stability, inward yielding and settlement of ground surrounding excavation.

UNIT VIII
Reinforced Earth Walls: Concepts – Designs.

REFERENCE BOOKS

1.	Elastic Analysis of Soil Foundation Interaction	Selva Durai
2.	Analysis of Beams on Elastic Foundations	Glyn jones
3.	Foundation Design and Construction	Tomlinson
4.	Foundation Design	john N Cemical
5.	Principles of Foundation Engineering	Das C
6.	Foundation analysis and Design	JE Bowles
7.	Pile Foundation Analysis and Design	Poulos & Davis
8.	Pile Foundations	Dinesh Mohall
9.	Foundation Engineering Hand Book	Winterkorn & Fang
10.	IS 2911 (Part I to IV)	

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (GE) **Credits 4; Periods/Week 4**

(9D12202) - GROUND IMPROVEMENT TECHNIQUES

UNIT I
Introduction to Engineering Ground Modification: Need and Objectives, Soil Stabilization Techniques – Mechanical, Electrical, Thermal and Chemical methods and applications.

UNIT II
Mechanical modification: Principles of soil densification – properties of compacted soil, Compaction control tests.

UNIT III
Specification of compaction requirements, Discussion on Blasting Vibro-flotation, Dynamic tamping and Compaction Piles.

UNIT IV
Hydraulic Modification: Objectives and techniques, traditional dewatering methods and their choice, Design of dewatering system, Electro-osmosis, Filtration, Drainage and seepage control with Geo-synthetics, Preloading and use of vertical drains, Electro kinetic dewatering.

UNIT V
Physical and Chemical Modification: Modification by admixtures, Shotcreting and Guniting technology.

UNIT VI
Modification at depth by grouting, Crack Grouting and compaction grouting, Field techniques of grouting, Thermal Modification including ground freezing.

UNIT VII
Modification by Inclusions and Confinement: Soil Confinement by formwork, Evolution of soil reinforcement, Mechanical Models of soil reinforcement, constructed Strip, Bar, Mesh and Grid reinforced Soil, flexible geo-synthetic sheet reinforcement, In-situ ground reinforcement, ground Anchorage, rock bolting and soil nailing.

UNIT VIII

Construction Techniques: Stone Columns, Lime Columns, Sand drains, Sand Wicks, rope Drains, compaction Piles.

REFERENCE BOOKS

1. Engineering Principles of Ground Modifications — MR Hausmann
2. Grouting Technology in Tunneling and Dam Construction — Shreff AV & Shah DL
3. Design with Geo-Synthetics — Koerner RM
4. Earth Reinforcement and Soil Structures — Butter Worths
5. Ground Control and Improvement — Xianthakos& AbreimsonS
6. Ground Improvement — Moseley
7. Ground Improvement Techniques — Purushotham Raju

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (GE) **Credits 7; Periods/Week 4**

(9D12203) - DESIGNING WITH GEO-SYNTHETICS

UNIT I

An Overview of Geosynthetics: Geotextiles, geogrids, geonets, geo membranes, geopipes and geocomposites.

UNIT II

Introduction: Basic description of geosynthetics – manufacture and current uses.

UNIT III

Geotextiles: Mechanical, endurance, hydraulic and degradation properties – functions and mechanisms in reinforcement, filtration, drainage, liquid barrier, multiple functions.

UNIT IV

Designing with Geotextiles:

1. Soil reinforcement : In embankments, Foundation soils, retaining walls and slope stabilization.
2. Filtration: Behind retaining walls, around under drains, beneath erosion control structures.
3. Drainage: Gravity drainage, pressure drainage and capillary migration breaks.
4. Roadway Reinforcement.

UNIT V

Geogrids & Geonets:
Geogrids: Mechanical, Endurance and Degradation properties

UNIT VI

Designing of Geogrid reinforcement in embankments, retaining walls, slopes and foundation soils.
Geonets: Mechanical, Hydraulic and Endurance of geonets properties, designing of geonet drainage.

UNIT VII

Geoembranes and Geocomposites: Mechanical properties and degradation properties; application to landfills and ponds, roads/highways.

UNIT VIII

Geocomposites: application to erosion control, reinforcement, drainage, filtration and liquid/vapour barriers.

REFERENCE BOOKS

1. Designing with Geo-synthetics: Robert M. Koerner.
2. Engineering with Geo-synthetics: G. Venkatappa Rao & G.V.S. Suryanarayana Raju.
3. Geo-synthetics: S.K. Shukla – Telford.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (GE) **Credits 4; Periods/Week 4**

(9D12204) – FINITE ELEMENT METHOD FOR GEOTECHNICAL APPLICATIONS

UNIT I

Introduction: Concepts of FEM, Steps involved in Finite Element Analysis procedure, Merits and Demerits.

UNIT II

Principles of Elasticity: Stress equations, Strain – Displacement relationships in matrix form, plane stress, Plane strain and axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT III

Element properties: concept of an element, various element shapes, Displacement models, generalized coordinates, shape functions, convergent and compatibility requirements.

UNIT IV

Geometric invariance, natural coordinate system – area and volume coordinates – Generation of element stiffness and nodal load matrices.

UNIT V

Isoparametric formulation: Concepts, Different isoparametric elements for 2D analysis.

UNIT VI

formulation of 4-noded and 8-noded isoparametric quadrilateral elements, Lagrangian elements, Serendipity elements.

UNIT VII

Assemblage of Elements: Discretization of a structure, Numbering system, Aspect ratio its effects, Assemblage, Direct Stiffness Method.

UNIT VIII

Geotechnical Applications: Sequential construction, Excavations and embankments, Bearing capacity and settlement analysis.

REFERENCE BOOKS

1.	Introduction to FEM	C Desai & Abel
2.	Finite element Methods	OC Zienkiewicz
3.	Finite Element Analysis – Theory & Programming	CSK Murthy
4.	INTRODUCTION TO FEM	TIRUPATHI CHANDRAPATLA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (GE) **Credits 2; Periods/Week 3**

(9D12107) - ADVANCED GEOTECHNICAL ENGINEERING LABORATORY

List of Experiments/Projects

1. Identification of Soils
2. Index Properties
3. Hydraulic properties
4. Shear Strength Properties
5. Settlement Characteristics
6. Parametric Studies
7. Demonstration of SPT and Pressuremeter
8. Performance Tests on Geo-Synthetic Materials

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (GE) **Credits 2; Periods/Week 3**

(9D12207) - COMPUTER LABORATORY

List of Experiments/Projects

1. Evaluations of allowable bearing pressure for different conditions
2. Slope stability analysis by different methods
3. Analysis and design of single pile and pile group
4. Analysis and Design of retaining walls
5. Using commercial FEM packages for GTE applications

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (GE) **Credits 4; Periods/Week 4**

ELECTIVE –1

(9D12105A) - GEOTECHNICAL EARTH QUAKE ENGINEERING

UNIT I

Introduction : Earth quake occurrence; wave type; magnitude; earth quake source zones; Maximum magnitude(M) and Estimation of M; wave propagation; strains in the ground.

UNIT II

Earthquake Ground motions: Effects of soil conditions on ground motions; nonlinear soil behaviour;

UNIT III

site classification – based amplification factor, NEHRP provisions; effects of topography.

UNIT IV

Seismic soil - structure interaction: Kinematics and inertial soil structure interaction; Tan method for assessing interaction effects;

UNIT V

Liquefaction: SPT(N) Liquefaction assessment chart; cone penetration test; seismic settlement; residual strength and post liquefaction deformations.

UNIT VI

Seismic Design of Foundations: Elements of seismic design of foundations; seismic design requirements of foundations; design pressure based on bearing capacity; design loads.

UNIT VII

Seismic design of Retaining Structures: Dynamic active & passive earth pressures; Saturated back fill; anchored bulk heads;

UNIT VIII

reinforced soil walls; seismic wall displacements; seismic design for tolerable wall displacements; unyielding walls(rigid).

REFERENCE BOOK

1. Geotechnical and Geo – Environmental Engineering Hand Book – R. Kerry Rowe
2. Basic Geotechnical Earth Quake Engineering by Kamalesh kumar
3. Fundamentals Of Soil Dynamics And Earth Quake Engineering by Bharat Bhushan Prasad

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M.Tech. I SEMESTER (GE) **Credits 4; Periods/Week 4**

ELECTIVE – 1
(9D12105B) - GEOGRAPHICAL INFORMATION SYSTEMS

UNIT I

Introduction: Electromagnetic spectrum, Energy sources and Radiation Principle, Energy interactions in the atmosphere, energy interactions with earth surface features – vegeatation, soil and water.

UNIT II

Data Acquisition: platforms – sensors used for the remote sensing data acquisition.

UNIT III

Data Processing – Radiometric, Geometric corrections.

UNIT IV

Digital Image Processing: Image enhancement – linear, nonlinear spatial filterings; edge enhancement. Classification – Supervised, unsupervised classification.

UNIT V

Geographical Information System (GIS): Definition data input and output; Toplogy, Digital Elevation Data.

UNIT VI

Data Management – relational data model, spatial data models – raster and Vector data Models. GIS analysis – Classification, Overlay operation.

UNIT VII

Land use/Land cover Analysis: Classification principles and Systems; Applications of soil, water resources, environmental, earthquakes, landslides.

UNIT VIII

Software scenario – watershed modeling, watershed management, environmental modeling.

Reference Books

1. F.F. Sabins Jr. –"Remote Sensing Principles and interpretation" – W.H. Freeman & Co.
2. Lillesand & Kiefer –"Remote Sensing Principles and interpretation" – John Wiley & Sons. America, 2000.
3. Paul J. Gibson & Clare H. Power –"Introductory Remote Sensing" – British Library, London. 1st Published, 2000.
4. Stan Arnoff – "Geographic Information Systems" – A management perspective, Canada,1995.

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M.Tech. I SEMESTER (GE) **Credits 4; Periods/Week 4**

ELECTIVE – 2
(9D12106A) - GEO-ENVIRONMENTAL ENGINEERING

UNIT I

Sources and types of Contaminations – Underground storage tanks; Landfills; Surface impoundments; waste disposal; injection wells; septic systems; agricultural wastes; radio active contaminations; other sources of contaminations.

UNIT II

Site Characterization – Need for characterization; planning and design of characterization study; investigation methods.

UNIT III

Solid and Hazardous Waste Management - Characteristics of solid waste, Consideration in solid waste management,

UNIT IV

processing of municipal solid waste(MSW), land filling, Nuclear wastes, Bio-medical wastes, chemical wastes, Identifying a hazardous waste.

UNIT V

Contaminant Transport – Advection, diffusion, dispersion, sorption, biodegradation & chemical reactions.

UNIT VI

Mass – Transport equations; tests for dispersivity and estimation of sorption.

UNIT VII

Remediation Techniques – Introduction to remediation methods, remedial alternatives, source control, bioremediation, sol vapour extraction systems, remediation NAPL sites, emerging remediation technologies.

UNIT VIII

Low Permeability Liners – compacted clay liners; soil Bentonite liners; Geosynthetic clay liners.

Reference Books

1. Geotechnical Geo – Environmental Engineering hand Book – Kerry Row
2. Ground Water Contamination: Bedient, Refai & Newell.
3. Geoenvironmental Engineering by Sharma H.D & Reddy K.R
4. Geoenvironmental Engineering by Reddi L.N & Inyang.H.I
5. Geo Technical Practice For Waste Disposal by Daniel .D.E

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M.Tech. I SEMESTER (GE) **Credits 4; Periods/Week 4**

ELECTIVE – 2
(9D12106B) - SOIL DYNAMICS AND MACHINE FOUNDATIONS

UNIT I

Introduction: Types of Machine Foundations – General requirements, Design criteria for machine foundations – Dynamic loads – Permissible amplitudes and bearing pressures – Stress – Strain characteristics of soil under dynamic loads.

UNIT II

Theory of Vibrations: Free and Forced vibration of single degree of freedom system with and without damping two degree of freedom with and without damping, Natural frequency and resource and its effects.

UNIT III

Dynamic Soil Properties: In-Situ measurements by plate load tests, cyclic plate load test, dynamic tests – laboratory tests – IS Code method, Wave Propagation in Soils, Evaluation of soil Properties.

UNIT IV

Design Approaches: Mass-Spring Dashpot model, Elastic half space model and Analogues, Analysis by Hsieh.

UNIT V

Analog parameters of Lysmer & richart Et.al, Gazetus parameters, Wovak's Parameters for pile foundations.

UNIT VI

Damping in Soils: Radiation and Internal damping, Methods of Evaluation, Dynamic elastic constants and their evaluation in the field.

UNIT VII

Design of Machine Foundations: Data for analysis and design – Principles of design of foundation for rotary, reciprocating and Impact type of machines – as per IS Code.

UNIT VIII

Vibration Isolation and Control: Type and methods of Isolation – Isolation materials and their properties, Vibration control of existing machine foundation – Foundation Isolation by Barriers.

REFERENCE BOOKS

1. Foundation Analysis and Design — JE Bowles
2. Soil Dynamics and machine Foundation — Swamisaran
3. Hand Book of Machine Foundation — Srinivasulu & Vidyanathan
4. Soil Dynamics — Prakash S
5. Vibration Analysis and Foundation Dynamics — Kameswara Rao
6. Vibration in Soils and Foundations — Richert RE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech.II SEMESTER (GE) **Credits 4; Periods/Week 4**

ELECTIVE –3

(9D12205A) - EARTH AND ROCK FILL DAMS AND SLOPE STABILITY

UNIT I

Earth Dam and Rock fill Dams: General features, selection site, merits and demerits of the earth and rock fill dams.

UNIT II

Classification of earth dams; materials of construction and requirements;cause of failure and criteria and safe design.

UNIT III

Failures and Damages of Earth Dams: Nature and importance of failure; piping through embankment and foundations; methods of seepage control through embankments and foundations; design criteria for filters; treatment of upstream and downstream of slopes;

UNIT IV

Instrumentation in earth dams – pore pressure measurements, settlement gauges, inclinometers, stress measurements, seismic measurements.

UNIT V

Slope Stability: Aims of the slope stability analysis; engineered slopes; factors contributing to slope failure; Basic concepts applied to slope stability; typical input data for slope stability analysis.

UNIT VI

Stability Analysis of Earth Dams: Basic concepts; conditions for stability analysis; Shear parameters and factors of safety for different conditions; Swedish slip circle and Bishop's Methods of analysis.

UNIT VII

Simplified Jamb's methods, Morgan Stan price method;Case histories of failures of earth dams.

UNIT VIII

Rock Filled Dams: Requirements of compacted rock fill; shear strength of rock fill materials; rock fill soil mixtures, rock fill embankments; earth core rock fill dams.

REFERENCE BOOKS

1. Earth Manual – Oxford IBH Publishing Company.
2. Soil Mechanics in Engineering Practices – Terzaghi.K and Peck and Peck. R. B
3. Relevant I.S. Codes.
4. Earth and Earth Rock dams – Sherard et.al
5. Earth & Rock fill dams – Sowers G.F and Salley H.I
6. Earth & Rock fill dams – Bharat Singh and R.D Sharma.
7. Embankment Dams – H.D. Sharma.
8. Slope Stability and Stabilization methods – Lee W. Abramson, Thomas S lee, Sunil Sharma, John Wiley & Sons.
9. Land slides – 7thInternational conferences.

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M.Tech. II SEMESTER (GE) **Credits 4; Periods/Week 4**

ELECTIVE –3

(9D12205B) - SOIL STABILIZATION AND FLEXIBLE PAVEMENT DESIGN

UNIT I

Mechanical Stabilization: Introduction – applications – factors affecting proportioning the materials .

UNIT II

Rothfutchs method – Triangular chart – Soft aggregate stabilization.

UNIT III

Lime Stabilization: Introduction – scope – lime – soil interaction – factors affecting design of lime – soil stabilized pavements – construction techniques – additives.

UNIT IV

Cement Stabilization: Introduction – applications – factors affecting – laboratory testing – design of soil – cement mixtures.

UNIT V

Bitumen stabilization: introduction – applications – factors affecting – design principles – additives .

UNIT VI

Stabilization of expansive soil.

UNIT VII

Pavement Design: Rigid and Flexible, Highway and Airport, components of pavement design criteria .

UNIT VIII

Design of flexible highway pavements – C.B.R Metyhod, Triaxial test method, Burmisters - Group Index.

Reference Books

1. E.J. Yoder – Principles of Pavement design – John Wiley and Sons, New York.
2. Khanna S.K and Justo C.E.G – Highway Engineering, Neemchand Bros. Roorkee.
3. G.A. Lconards – Foundation Engineers.
4. Soil Mechanics for Road Engineers – I.H.M.S.D. London

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (GE) **Credits 4; Periods/Week 4**

ELECTIVE-4
(9D12206A) - EXPERIMENTAL GEO-MECHANICS

UNIT I
GENERAL: Purpose of Soil Exploration – Planning a sub surface exploration – Stages in sub surface exploration .

UNIT II
Depth of Exploration – Lateral Extent of Exploration.

UNIT III
OPEN EXCAVATION AND BORINGS OF EXPLORATION: Pits and Trenches – Drifts and Shafts – Auger Borings – Wash Borings – Rotary Drilling – Percussion Drilling – Core Drilling.

UNIT IV
SOIL SAMPLES AND SAMPLERS: Types of soil samples – Disturbed samples – Undisturbed samples – Design Features affecting the sample disturbance .

UNIT V
Split spoon samplers – Scraper Bucket Samplers – Shellby Tubes and Thin walled Samplers – Piston Samplers – Denis Samplers – Hand Curved Samplers.

UNIT VI
IN-SITU TESTING: Standard Penetration Tests – Cone Penetration Tests – In-situ Vane Shear Test .

UNIT VII
Plate Load Test – Field Permeability Tests – In-situ Tests using Pressure meter – Observation of Ground Water Table.

UNIT VIII
GEOPHYSICAL METHODS: Seismic Methods – Electrical Resistivity Methods – Electrical Profiling Method – Electrical Sounding Method – Common Soil Tests – Sub-soil Investigation Report

REFERENCE BOOKS

1. Sub surface exploration and Sampling of soils for Civil Engineering Purpose by Hvorslev, M.J. Waterways Station, Vicksburg, Missispi, 1949.
2. Foundation Engineering by S.P. Brahma, Tata McGraw Hill Publishing Company Limited, New Delhi, 1985.
3. Analysis and Design of Foundations and Retainig Structures by Shamsher Prakash, Gopal Ranjan and Swami Saran, Sarita Prakasham, Meerut.1979.
4. Soil Mechanics & Foundation Engineering, Vol. 2 by V.N.S. Murthy, Sai Kripa Technical Consultants, Bangalore.
5. Geotechnical Engineering by C. Venkataramaiah, Wiley Eastern Ltd., New Delhi.

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M.Tech. II SEMESTER (GE) **Credits 4; Periods/Week 4**

ELETIVE-4
(9D12206B) - STRUCTURAL ANALYSIS AND FOUNDATION DESIGN

Structural Analysis and Design of the following types of footings and foundations:

UNIT IV
Eccentrically loaded footings and footings subjected to moments.

UNIT IV
Combined footings.

UNIT IV
Strap Footings.

UNIT IV
Rafts – Modulus of subgrade reaction approach.

UNIT IV
Finite difference approach (Design Examples excluded).

UNIT IV
Precast concrete piles and pile cap.

UNIT IV
Design Of Cantilever And Basement Retaining Walls

UNIT IV
Design Of Shell Foundations

(NOTE: Limit State Method of Design only is included).

REFERENCES BOOKS

1. Bowles: Foundation Analysis and Design..
2. Teng: Foundation Design.
3. Vazirani and Ratwani: Analysis and Design of Structures – vol. II(Concrete Structures).
4. Analysis and Design of Substructures by Swamy Saran, OXFORD & IBH Publishing Company Pvt. Ltd. Delhi.
5. Design of reinforced concrete foundations by P.C.Varghese

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