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ANANTHAPURAMU – 515 002 (A.P) INDIA

M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

SEMESTER – I

S. No.	Course codes	Course Name	Category	Hours per			Credits
				L	T	P	
1.	21D12101	Design of Shallow Foundations	PC	3	0	0	3
2.	21D12102	Advanced Soil Mechanics	PC	3	0	0	3
3.	21D12103a 21D12103b 21D12103c	**Program Elective Course – I** Theoretical Soil Mechanics Geo-Technical Earth Quake Engineering Unsaturated Soil Mechanics	PE	3	0	0	3
4.	21DBS104 21D12104a 21D12104b	**Program Elective Course – II** Numerical Methods Geo- Environmental Engineering Soil Structure Interaction	PE	3	0	0	3
5.	21D12105	Advanced Geotechnical Engineering Lab-1	PC	0	0	4	2
6.	21D12106	Computational Geotechnical Engineering Laboratory	PC	0	0	4	2
7.	21DRM101	Research Methodology and IPR	MC	2	0	0	2
8.	21DAC101a 21DAC101b 21DAC101c	**Audit Course – I** English for Research paper writing Disaster Management Sanskrit for Technical Knowledge	AC	2	0	0	0
Total							**18**

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SEMESTER – II

S.No.	Course codes	Course Name	Category	Hours per week			Credits
				L	T	P	
1.	21D12201	Design of Deep Foundations	PC	3	0	0	3
2.	21D12202	Ground Improvement Techniques	PC	3	0	0	3
3.	21D12203a 21D12203b 21D12203c	**Program Elective Course – III** Design with Geo- Synthetics and applications in Geo Technical Engineering Earth and Earth Retaining Structures Soil Dynamics and Machine Foundations	PE	3	0	0	3
4.	21D12204a 21D12204b 21D12204c	**Program Elective Course – IV** Finite Element Methods for Geo-Technical Applications Experimental Geo-Mechanics Rock Mechanics	PE	3	0	0	3
5.	21D12205	Advanced Geotechnical Engineering Lab-II	PC	0	0	4	2
6.	21D12206	Computational Geotechnical Engineering Laboratory - II	PC	0	0	4	2
7.	21D12207	Technical seminar	PR	0	0	4	2
8.	21DAC101a 21DAC101b 21DAC101c	**Audit Course – II** Pedagogy Studies Stress Management for Yoga Personality Development through Life Enlightenment Skills	AC	2	0	0	0
		Total					**18**

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SEMSTER - III

S.No.	Course codes	Course Name	Category	Hours per			Credits
				L	T	P	
1.	21D12301a 21D12301b 21D12301c	**Program Elective Course – V** Foundation Engineering for Problematic Soils Remote Sensing and its Application in Geotechnical Engineering Off shore Geotechnical Engineering	PE	3	0	0	3
2.	21DOE101a 21DOE101b 21DOE101c	**Open Elective** Cost Management of Engineering Project Industrial Safety Business Analytics	OE	3	0	0	3
3.	21D12302	Dissertation Phase – I	PR	0	0	20	10
4.	21D12303	Co-curricular Activities					2
	Total						**18**

SEMESTER - IV

S.No.	Course codes	Course Name	Category	Hours per			Credits
				L	T	P	
1.	21D12401	Dissertation Phase – II	PR	0	0	32	16
		Total					**16**

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	DESIGN OFSHALLOW FOUNDATIONS	L	T	P	C
21D12101		3	0	0	3
	Semester	I			

Course Objectives: This Course Will Enable Students:

- Understanding the capacity of the soil under different field conditions
- Design of shallow foundations under different loading condition and different environment
- Design of footings for uniform settlement of all shallow foundations

Course Outcomes (CO): Student will be trained

- Analyze The Bearing Capacity Of The Soil For Shallow Foundations
- Design Aspects Of Raft Foundations For Achieving Uniform Settlement For Special Structures Like Water Tanks
- Structural Design Of Shallow Foundations In All Conditions Like Land-Fills, Pavements Etc In Varying Conditions Including Seismic Areas
- Proper Communication With Structural And Other Engineers

UNIT - I	Lecture Hrs:

Developments - Need Of Foundation Engineering – Consideration for depth of foundations – Classification of foundations and their applicability - General Requirements – Selection of Type of Foundation– Structural Safety and Economy, Foundation Drainage Control.

UNIT - II	Lecture Hrs:

Bearing Capacity of Shallow Foundations - Homogeneous –Layered Soils - Soft and Hard Rocks, Effect of Ground Water Table and Eccentricity of Foundations. Evaluation of Bearing Capacity from In-Situ Tests: Plate Load test, Standard penetration test - Codal - Recommendations.

UNIT - III	Lecture Hrs:

Foundations on Sanitary Landfill Site, Residual Soils, Permafrost and Adjoining To the River Bed. Contact Pressure under Footings: Flexible and Rigid. Principles of Footing Design

UNIT - IV	Lecture Hrs:

Proportionating of Shallow Footings, Introduction to Special Foundations - Design of Foundation for Seismic Forces - Introduction to Theory of Vibration - Design of Block Foundation - Codal Recommendations.

UNIT - V	Lecture Hrs:

Settlement Analysis-Immediate-Consolidation Settlement-Layered Soils. Construction Period Correction-Evaluation from In-Situ Tests – Codal Recommendations.

Textbooks:

1. Basic Soil Mechanics by Gopal Ranjan and ASR Rao
2. Foundation Engineering, Varghese P C. (2011)– Phi, India
3. Foundation Engineering, Bajra M Das.(2012), Cengage Learning India

Reference Books:

1. "Principles of Foundation Engineering", Das B.M., 8 th edition, cengage learning, PVT. LTD., 2015
2. Foundation Analysis and Design, J E Bowles (2012), McGraw Hill, Inc.
3. Foundation Engineering, Peck Hanson&Thornburg (1974). John Wiley &Sons,

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Course Code	ADVANCED SOIL MECHANICS	L	T	P	C
21D12102		3	0	0	3
	Semester	**I**			

Course Objectives: This Course Will Enable Students:

- To Explore The Scientific Principles Used To Describe The Major Engineering Properties Of Soil, And The Engineering Testing Methods Used To Quantify These Properties
- To Explain Role Of Water In Soil Behavior With Change In Soil Stresses, Permeability And Quantity Of Seepage Including Flow Net Are Estimated
- To Determine Shear Parameters And Stress Changes In Soil Due To Foundation Loads
- To Estimate The Magnitude And Time-Rate Of Settlement Due To Consolidation

Course Outcomes (CO): Student will be trained

- Analyze The Soil Stresses, Permeability And Seepage For The Existing Field Conditions
- To Understand The Compressibility Behavior of Soil And Consolidation Settlement Along With Time Rate Of Settlement
- To Develop Suitable Method For Analyzing The Slope Stability.
- To understand the stability considerations of retaining walls.

UNIT - I Lecture Hrs:

GEOSTATIC STRESSES &STRESS PATHS:
Stresses Within A Soil Mass: Concept of Stress for a Particulate System, Effective Stress Principle, Geostatic Stresses, Soil Water Hydraulics: Principal Stresses and Mohr's Circle of Stress, Stress Paths; at Rest Earth Pressure, Stress Paths for Different Practical Situations

UNIT - II Lecture Hrs:

COMPRESSIBILITY ANDCONSOLIDATION:
One Dimensional Consolidation, Odometer Test, Coefficient of Volume Change, Constrained Modulus, Compression Index, Swell for Loading and Unloading, Pre Consolidation Stress, Over-Consolidation Ratio, Primary and Secondary Compression, Consolidation One Dimensional Problems, Consolidation of Partially Saturated Soils, Creep/Secondary Consolidation

UNIT - III Lecture Hrs:

STRESS-STRAIN BEHAVIOROFSOILS:
Shear Strength of Soils;Failure Criteria :Coulomb's Failure Criterion, Taylor's Failure Criterion,Mohr–Coulomb Failure Criterion, Tresca Failure Criterion, Practical Implications ofFailure Criteria, Drained and Un-drained Shear Strength of Soils. Significance of Pore Pressure Parameters; Determination of Shear Strength; Drained, Consolidated Un-drained and Un-drained Tests; Interpretation of Triaxial Test Results.

UNIT - IV Lecture Hrs:

STABILITY ANALYSIS OF SLOPES:
Effective and Total Stress Approach, Shape of Slip Surface, Methods of Slices, Graphical Methods, and Location of Critical Slip Circle, Friction Circle Method, and Stability During Critical Conditions.

UNIT - V Lecture Hrs:

EARTH PRESSURE THEORIES
Rankin's earth pressure – Coulomb`s wedge theory – Cullman`s graphical method – Rebhan`s Graphical Method – Stability of Retaining walls: Gravity and Cantilever – Terzaghi`s simplified method for stability analysis.

Textbooks:

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1. Geotechnical Engineering- Donold P Coduto Phi Learning Private Limited, New Delhi
2. Principles of Geotechnical Engineering-Das, B. M. & Sobhan K, - Cengage Learning, Edition (2015).
3. Soil Mechanics And Foundation Engg.- Muni Budhu(2010), 3rd Edition, John Wiely & Sons

Reference Books:

1. Fundamentals of soil behavior- Mitchell J.K. - John Wiley and Sons, Inc., New York. (Third edition) 2005
2. Soil Mechanics- J A Knappett and R F Craig Eighth Edition (2012), Spon PressTaylor &Francis.
3. Analysis and Design Foundations by Joseph Bowles, McGraw Hill Publications.

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COURSE STRUCTURE & SYLLABI

Course Code	THEORETICAL SOIL MECHANICS	L	T	P	C
21D12103a	(PE-I)	3	0	0	3
	Semester	**I**			

Course Objectives: This Course Will Enable Students:

- To Impart The Knowledge For Computation Of Settlements And Stress In Semi-infinite Elastic Soil Medium
- Settlements And Stress In Anisotropic Medium And Layered Deposits Due To Foundation Loads
- Concept on Plastic Collapse.

Course Outcomes (CO): Student will be trained

- To Evaluate The Theoretical Aspects Like Stresses, Limiting Stresses Etc
- To Understand The Stability Aspects Collapse Mechanisms, Centrifuge Modeling, Estimate The Stresses In Soils, Flow Net And Related Problems

UNIT - I Lecture Hrs:

Introduction– Elasticity and Stability Problems, Concept of Stress and Strain – Plane Stress, Plane Strain and Axi-symmetric Problems– Equation of Equilibrium and Compatibility – Stress Functions.

UNIT - II Lecture Hrs:

Stresses In Elastic Half-Space Medium By External Loads –Fundamental Solutions –Boussinesq's and Mindlin Solution– Anisotropic and Non-Homogeneous Linear Continuum – Influence Charts – Elastic Displacement-Layered Soil-Burmister Method

UNIT - III Lecture Hrs:

Limit Equilibrium Analysis – Stress –Strain Relationship – Elasto Plastic Response, – Perfectly Plastic Material, Filed applications – Slip-Line Solutions for Undrained and Drained Loading.

UNIT - IV Lecture Hrs:

Limit Analysis – Principles of Virtual Work – Theorems of Plastic Collapse – Mechanism for Plane Plastic Collapse – Simple Solutions for Drained and Un-drained Loading –Stability of Slopes, Cuts and Retaining Structures. Introduction to Centrifuge Modeling.

UNIT - V Lecture Hrs:

Flow Through Porous Media – Darcy's Law – General Equation of Flow– Steady State Condition – Solution by Flow Net – Fully Saturated Conditions.

Textbooks:

1. Foundations of Theoretical Soil Mechanics, Harr, M.E (1966) McGraw-Hill.
2. Foundation Engineering Handbook, Winterkorn, H.F., AndFang, H.Y(2000) Galgotia, Book source, 2000
3. Theoretical Soil Mechanics- Karl Terzaghi (1943), John Wiley &Sons.

Reference Books:

1. Soil Mechanics and Foundations, MuniramBudhu (2007), John Wiley &Sons, Inc.
2. Soil Mechanics, T.W. Lambe and R.V. Whitman (1969). John Wiley &Sons
3. Foundations And Slopes- Attikinson(1981), McGraw-Hill, New Delhi
4. Seepage, Drainage And Flow nets– Cedergren H R(1997).-, John Wiely&Sons

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COURSE STRUCTURE & SYLLABI

Course Code	GEO-TECHNICAL EARTH QUAKE ENGINEERING	L	T	P	C
21D12103b	(PE-I)	3	0	0	3
	Semester	I			

Course Objectives: This Course Will Enable Students:

- To Understand the dynamics of earth and its response, effect on earth structure and measures to mitigate the effects
- To develop the design ground motion for a site by suitable response analysis
- To analyze and design geotechnical structures.

Course Outcomes (CO): Student will be trained

- To know the causes and quantification of earthquake.
- To know the exposure to the effect of earthquake and the design criterions to be followed for the design different geotechnical structures

UNIT - I	Lecture Hrs:

ELEMENTS OF EARTHQUAKE SEISMOLOGY AND DYNAMICS:
Theory Of Vibration - Basic Definition - Governing Equation For Single Degree Freedom System - Forced Vibrations - Rotating Mass Type Excitation - Base Excitation - Isolation Vibration Measuring Instruments. Mechanism Of Earthquakes - Causes Of Earthquake - Earthquake Fault Sources.

UNIT - II	Lecture Hrs:

GROUND MOTION CHARACTERISTICS:
Elastic Rebound Theory - Seismic Wave in Earthquake Shaking - Definition of Earthquake Terms - Locating an Earthquake - Quantification of Earthquakes. Strong Motion Records -Characteristics of Ground Motion - Factors Influencing Ground Motion - Estimation of Frequency Content Parameters.

UNIT - III	Lecture Hrs:

GROUND RESPONSE ANALYSIS - LOCAL SITE EFFECTS AND DESIGN GROUND MOTION
Wave Propagation Analysis - Site Amplification - Need For Ground Response Analysis - Method Of Analysis - One Dimensional Analysis - Equipment for Linear Analysis for Site Effects.

UNIT - IV	Lecture Hrs:

SEISMIC STABILITY ANALYSIS
Earthquake Response Of Slopes - Evaluation Of Slope Stability - Pseudo static Analysis - Newmark's Study Of Block Analysis - Dynamic Analysis - Earth Pressure Due To Ground Shaking Evaluation. Liquefaction-Susceptibility.

NIT - V	Lecture Hrs:

EARTHQUAKE HAZARD MITIGATION
Seismic Risk Vulnerability And Hazard - Percept Of Risk - Risk Mapping - Hazard Assessment - Maintenance And Modifications To Improve Hazard Resistance - Different Type Of Foundation And Its Impact On Safety.

Textbooks:

1. Kameswararao, N.S.V., Dynamics Soil Tests and Applications, Wheeler Publishing - New Delhi, 2000.
2. Krammers.L. Geotechnical Earthquake Engineering, Prentice Hall, International Series, Pearson Education (Singapore) Pvt. Ltd., 2004.
3. "Geotechnical Earth Quake Engineering" by SL Kramer, Pearson Education.

Reference Books:

1. Kameswararao, Vibration Analysis and Foundation Dynamics, Wheeler Publishing, New Delhi, 1998.
2. Kamalesh Kumar, Basic Geotechnical Earthquake Engineering, New age, 2008
3. Earth Quake" W.H. Freeman, New York

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	UNSATURATED SOIL MECHANICS (PE-I)	L	T	P	C
21D12103c		3	0	0	3
	Semester	I			

Course Objectives: This Course Will Enable Students:

- Understand concept of shear stress and its importance
- Know the behavior hydraulic conductivity of the soil
- Know the importance of soil-water interaction in applied soil engineering

Course Outcomes (CO): Student will be trained

- To understand the concept of unsaturated soils and change in the behavior of the soil properties.
- To understand the contractual skin mechanism of partially saturate sols in the design of foundations by knowing the soil water interaction i.e., soil as a four phase system. Comparative study of basic properties in case of three and four phase system in soils.
- To design the effective methods for foundations and structures

UNIT - I Lecture Hrs:

INTRODUCTION TO UNSATURATED SOIL MECHANICS:
Types of Problems, Typical Profiles of Unsaturated, Tropical and Residual Soil, Expansive and Collapsing Type of Soils. Origin and Formation, Identification and Classification of Expansive and Collapsing Soils.
Collapse and Heave: Collapse Potential and Swell Potential, their importance and Determination by Different Laboratory Methods. Heave Prediction Based On Odometer Tests, Suction Tests and Empirical Procedures, Heave, Collapse and Settlement

UNIT - II Lecture Hrs:

SOIL SUCTION:
Matric And Osmotic Suction, Total Suction, Theory Of Soil Suction, Measurement By Direct And Indirect Methods –Tensiometers, Axis Translation Technique, Pressure Plate Apparatus, Filter Paper Method, Psychrometers, Squeezing Technique Of Measuring Osmotic Suction
Flow Through Unsaturated Soils – Flow Laws, Darcy's Law for Unsaturated Soils, Coefficient of Permeability With respect To Water Phase and Air Phase, Air Diffusion, Measurement of Permeability and Air Coefficient of Permeability.

UNIT - III Lecture Hrs:

PHASE PROPERTIES AND RELATIONS FOR UNSATURATED SOILS: Properties Of Individual Phases, Interaction Of Air And Water, Volume-Mass Relations, Changes In Volume-Mass Properties, Densities Of Mixtures Subjected To Compression Of The Air Phase, Piston Porous Stone Analogy, Effective Stress Concepts And Stress State Variables For Unsaturated Soils, Equilibrium Analysis For Unsaturated Soils: Total Or Overall Equilibrium, Independent Phase Equilibrium – Water Phase, Air Phase, Contractile Skin(Meniscus).

UNIT - IV Lecture Hrs:

DESIGN ALTERNATIVES FOR STRUCTURES ON EXPANSIVE SOILS: Structural Foundation Alternatives, Treatment Of Expansive Soils – General Considerations And Guidelines, Surcharge Loading, Prewetting, Use Of Admixtures, Electrochemical Soil Treatment, Moisture Control And Soil Stabilization, Treatment Alternatives For Highways And Airfield Pavements.

UNIT - V Lecture Hrs:

SHEAR STRENGTH:
History Of Shear Strength, Failure Envelope For Unsaturated Soils, Use Of Effective Stress Parameters To Define Shear Strength, Mohr-Coulomb And Stress Points Envelopes, Triaxial Tests On Unsaturated Soils, Cd Tests, Constant Water Content Tests, CuTests With Pore Pressure Measurements, Undrained Tests, Multistage Testing, Measurement Of Shear Strength Parameters

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Textbooks:

1. Soil Mechanics For Unsaturated Soils – Dg Fredlund And H Rahardjo, Wiley Interscience Publication, John Wiley & Sons, NY
2. Unsaturated Soil Mechanics – Ning Lu And William J Likos, John Wiley & Sons, Inc
3. Mechanics of Unsaturated Geomaterials, by: Lyesse Laloui, First Edition, Publisher: John iley and Sons Inc., 2010

Reference Books:

1. Ng Charles, W.W., Menzies Bruce, Advanced unsaturated Soil Mechanism and Engineering, Taylor & Francis Group, 2007.
2. Mechanics Of Residual Soils – G E Blight, A ABalkema Publishers, USA
3. Expansive Soils – Problems & Practice In Foundations And Pavement Engineering – John D NelsonAnd Debora J Miller, John Wiley & Sons, Ny

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COURSE STRUCTURE & SYLLABI

Course Code	NUMERICAL METHODS	L	T	P	C
21DBS104	(PEC-II)	3	0	0	3
	Semester	**I**			

Course Objectives: This Course Will Enable Students:

- To familiarize with numerical methods of solving the non-linear equations, interpolation, differentiation, integration, and ordinary differential equations.
- To impart knowledge in basic concepts of finite element methods.

Course Outcomes (CO): Student will be able to

- Analyse interpolation for equal and unequal intervals.
- Solve simultaneous linear equations numerically.
- Numerically differentiate and integrate continuous and discrete functions.
- Numerically solve ordinary differential equations with initial value problems.
- Formulate the finite element method.

UNIT - I	**Interpolation**	Lecture Hrs: 8

Calculus of the Finite Differences: Differences formulae, Difference table, Properties of the operators E and Δ, Leibnitz rule- Interpolation with equal intervals, Unequal intervals, Central difference interpolation formulae – Inverse interpolation.

UNIT - II	**Numerical Differentiation and Integration**	Lecture Hrs: 8

Numerical Differentiation and Integration: First order and second order derivatives – Maximum and Minimum values of a tabulated function- Newton Cote's quadrature formula - Trapezoidal rule, Simpson's rules, Romberg's Method – Gaussian quadrature formulae.

UNIT - III	**Simultaneous Linear Algebraic Equations**	Lecture Hrs: 6

Simultaneous Linear Algebraic Equations: Methods of Solution using the Inverse of the matrix, Method of Successive elimination- Iterative Methods – Gauss - Siedel Method, Jacobi method and Relaxation Method.

UNIT - IV	**Numerical Solution of Ordinary Differential Equations**	Lecture Hrs: 8

Numerical Solution of Ordinary Differential Equations: Picard's method of successive approximations –Euler's modified method -Runge Kutta method of fourth order – Predictor – Corrector methods - Milne's method and Adam's Moulton method.

UNIT - V	**Introduction to Finite Element Analysis**	Lecture Hrs:8

Introduction to Finite Element Analysis: Various steps in solving a problem by Finite element method (Displacement Approach) - Two dimensional method elements - Formulation of the finite element method using (I) Principle of virtual work (II) Minimization of total potential energy of a system - Discrete element method.

Textbooks:

1. Introductory Methods Of Numerical Analysis by S.S.Sastry, PHI
2. Numerical Methods For Engineers & Scientists by Chapra, Tata McGraw Hill

Reference Books:

1. Calculus Of Finite Difference Method & Numerical Analysis by Gupta Malik
2. Analytical & Computer Methods In Finite Difference Methods by Bonles
3. Applied Numerical Analysis By Curtis F. Gerald, Partick.O.Wheatly, Addison – Wesley, 1989

Online Learning Resources:

After completion of this course the student should be able to :

- Understand the concept and steps of Numerical methods
- Apply the numerical differentiation and integration concepts.
- Find the solution and implementation of non linear equations.

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- Solve the initial value problems numerically.
- Implement the finite element method.

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Course Code	GEO-ENVIRONMENTAL ENGINEERING	L	T	P	C
21D12104a	(PE– II)	3	0	0	3
	Semester	I			

Course Objectives: This Course Will Enable Students:

To learn concepts of geoenvironmental engineering, and planning and design of waste in landfills, ash ponds and tailing ponds.

Course Outcomes (CO): Student will be trained

- Analyse the soil contamination concentration and type
- Monitor and analyse quality of ground water
- Suggest the steps to remdiatation of soil and groundwater
- Design the landfill site

UNIT - I Lecture Hrs:

SOIL – POLLUTANT INTERACTION

Introduction To Geo Environmental Engineering – Environmental Cycle – Sources, Production And Classification Of Waste – Causes Of Soil Pollution – Factors Governing Soil-Pollutant Interaction – Failures Of Foundations Due To Pollutants – Case Studies.

UNIT - II Lecture Hrs:

SITE SELECTIONAND SAFE DISPOSAL OF WASTE

Safe Disposal of Waste – Site Selection for Land Fills – Characterization of Land Fill Sites – Waste Characterization – Stability of Land Fills – Current Practice of Waste Disposal – Passive Containment System – Application of Geo Synthetics in Solid Waste Management – Rigid or Flexible Liners

UNIT - III Lecture Hrs:

TRANSPORT OF CONTAMINANTS

Contaminant Transport In Sub Surface – Advection – Diffusion – Dispersion – Governing Equations – Contaminant Transformation – Sorption – Biodegradation – Ion Exchange – Precipitation – Hydrological Consideration In Land Fill Design – Ground Water Pollution . Pollution of Aquifers by Mixing Of Liquid Waste – Protecting Aquifers.

UNIT - IV Lecture Hrs:

WASTE STABILIZATIONAND DISPOSAL

Hazardous Waste Control And Storage System – Stabilization/ Solidification Of Wastes – Micro And Macro Encapsulation – Absorption, Adsorption, Advection, Precipitation- Detoxification – Mechanism Of Stabilization – Organic And Inorganic Stabilization – Utilization Of Solid Waste For Soil Improvement.

UNIT - V Lecture Hrs:

REMEDIATIONOF CONTAMINATED SOILS

Rational Approach To Evaluate And Remediate Contaminated Sites – Monitored Natural Attenuation – Ex-situ And In-situ Remediation – Solidification, Bio – Remediation, Incineration, Soil Washing, Electro Kinetics, Soil Heating.

Textbooks:

1. Hazardous Waste Management, Wentz, C.A., McGraw Hill, Singapore, 1989.
2. Geotechnical Practice for Waste Disposal, Daniel, B.E., Chapman and Hall, London, 1993.
3. Environmental Geotechnics, Sarsby, R., Thomas Telford, 2000.

Reference Books:

1. Proceedings of the International Symposium of Environmental Geotechnology (Vol.I and Ii), Environmental Publishing Company, 1986 And 1989.
2. Ott, W.R., Environmental Indices, Theory and Practice, Ann. Arbor, 1978.

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3. Fried, J.J., Ground Water Pollution, Elsevier, 1975.
4. ASTM Special Technical Publication 874, Hydraulic Barrier in Soil and Rock, 1985.
5. Westlake, K., (1995), Landfill Waste Pollution and Control, Albion Publishing Ltd., England, 1995.
6. Lagrega, M.D., Buckingham, P.L., and Evans, J.C., Hazardous Waste Management, McGraw Hill, Inc. Singapore, 1994.

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Course Code	SOIL STRUCTURE INTERACTION	L	T	P	C
21D12104b	(PE – II)	3	0	0	3
	Semester	**I**			

Course Objectives: This Course Will Enable Students:

- Make students understand soil structure
- Understand stress-strain characteristics of soils, the mechanism of failure, the factors that affects the shear strength structural behavior with soils

Course Outcomes (CO): Student will be trained to

- Analyze the behavior of the soil under elastic and plastic condition
- Predict the behavior of the pile under static and dynamic loads.
- Understand analysis and design of Rafts & Piles.
- Analyze the laterally load pile and prediction of its behavior

UNIT - I	Lecture Hrs:

SOIL-FOUNDATION INTERACTION:
Introduction To Soil-Foundation Interaction Problems, Soil Behavior, Foundation Behavior, InterfaceBehavior, Scope Of Soil Foundation Interaction Analysis, SoilResponse Models, Winkler, Elastic Continuum, Two ParameterElastic Models, Elastic Plastic Behavior.

UNIT - II	Lecture Hrs:

BEAM ON ELASTIC FOUNDATION- SOIL MODELS:
Infinite Beam, TwoParameters, Isotropic Elastic Half Space, Analysis Of Beams Of FiniteLength, ClassificationOf Finite Beams In Relation To Their Stiffness.Plate on Elastic Medium: Thin and Thick Plates, Analysis of FinitePlates, Numerical Analysis of Finite Plates, Simple Solutions.

UNIT - III	Lecture Hrs:

PLATES ON ELASTIC CONTINUUM:
Thin and Thick Rafts, Analysis of FinitePlates, Numerical Analysis of Finite Plates.

UNIT - IV	Lecture Hrs:

ELASTIC ANALYSIS OF PILE:
Elastic Analysis ofa Single Pile, TheoreticalSolutions for Settlement and Load Distributions, Analysis Of PileGroup, Interaction Analysis, Load Distribution In Groups With RigidCap.

UNIT - V	Lecture Hrs:

LATERALLY LOADED PILE:
Load Deflection Prediction for Laterally LoadedPiles, Sub-grade Reactionand Elastic Analysis, Interaction Analysis,Pile-Raft System, Solutions through Influence Charts. AnIntroduction to Soil-Foundation Interaction under Dynamic Loads.

Textbooks:

1. Foundation Analysis And Design - J E Bowles, McGraw Hill, Ny
2. Soil Mechanics In Engineering Practice – Karl Terzaghi And R B Peck (1967),John Wiley And Sons, Ny
3. Design of Foundation Sytems : Principles & Practices, N.P. Kurien, Narosa, New Delhi 1992,

Reference Books:

1. Analysis And Design Of Foundations And Retaining Structures –S.Prakash(1979), Sarita Prakashana, Meerut
2. Soil Mechanics And Foundation Engineering – S K Garg, Khanna Publications
3. Geotechnical Engineering – C Venkataramaiah, New Age International Publishers

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	ADVANCED GEOTECHNICAL ENGINEERING LAB-1	L	T	P	C
21D12105		0	0	4	2
	Semester	I			

Course Objectives:

To obtain index and engineering properties of locally available soils, tounderstand the behavior of these soils under various loads and subsoil conditions.

Course Outcomes (CO):

Possible to classify and evaluate the behavior of the soil subjected to various loads and subsoil conditions.

List of Experiments:

1. Classification of a given Soil
2. Determining the void ratio of a deposit
3. Effect of compactive effort on compaction properties of a given soil
4. In-Situ Unit Weight (Core Cutter & Sand Replacement)
5. Permeability of Clay Soils.
6. Free Swell, Swell Potential, Swell Pressure Test
7. Odometer Test (For DeterminationOfCC&CV)
8. Direct Shear Test
9. Triaxial Tests- UU
10. Triaxial Tests- CU
11. CBR Test

References:

1. Head, K.H. – Manual Of Soil Laboratory Testing, Volumes I – Soil ClassificationAnd Compaction Tests, 3rd Edition, Crc Press, Taylor And Francis Group, 2006.
2. Head, K.H. – Manual Of Soil Laboratory Testing, Volumes Ii – Permeability, Shear Strength And Compressibility Tests, 3rd Revised Edition, Ingram International Inc, 2011.
3. Head, K.H. And Epps, R.J. – Manual Of Soil Laboratory Testing, Volumes III – Effective Stress Tests, 3rd Edition, Whittle Publishing, 2014.

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	COMPUTATIONAL GEOTECHNICAL ENGINEERING LABORATORY - I	L	T	P	C
21D12106		0	0	4	2
	Semester	I			

Course Objectives: Using software student should be able

- To determine bearing capacity of substrata and vertical stress distribution
- To Analyze settlements of shallow foundations
- To determine Load carrying capacity of piles
- To check the stability of reinforced soil walls

Course Outcomes (CO):

- Students can determine design/ check the stability of Geotechnical structures using software
- Student will get hands on experience in modelling shallow foundation, piles, slopes, and retaining walls.

List of Experiments:

1. Presentation of field test data and borelog preparation
2. Bearing capacity of shallow foundations using different theories for different soils
3. Determination of Vertical Stress distribution under different loading conditions and planes
4. Settlement analysis of shallow foundations for different soils
5. Determination of Pile load carrying capacity under compression
6. Determination of lateral pile load capacity
7. Design of underreamed pile foundation
8. Design of Reinforced soil walls

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	RESEARCH METHODOLOGY AND IPR	L	T	P	C
21DRM101		2	0	0	2
	Semester	I			

Course Objectives:

- Identify an appropriate research problem in their interesting domain.
- Understand ethical issues understand the Preparation of a research project thesis report.
- Understand the Preparation of a research project thesis report
- Understand the law of patent and copyrights.
- Understand the Adequate knowledge on IPR

Course Outcomes (CO): Student will be able to

- Analyze research related information
- Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT - I		Lecture Hrs:

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, scope, and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT - II		Lecture Hrs:

Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

UNIT - III		Lecture Hrs:

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT - IV		Lecture Hrs:

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT - V		

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Textbooks:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"

Reference Books:

1. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
2. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
3. Mayall, "Industrial Design", McGraw Hill, 1992.
4. Niebel, "Product Design", McGraw Hill, 1974.
5. Asimov, "Introduction to Design", Prentice Hall, 1962.
6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age", 2016.

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	DESIGN OF DEEP FOUNDATIONS	L	T	P	C
21D12201		3	0	0	3
	Semester	**II**			

Course Objectives: This Course Will Enable Students:

- Know the design of deep foundation
- Type of deep foundations will be provided for different structures
- Understand the special foundations.

Course Outcomes (CO): Student will be trained

- To analyze and adopt design skills of vertical and batter piles for various types of loading and soil conditions
- To design the sheet piles and under reamed piles in expansive soils.
- To design the well foundations (caissons)
- To design the deep foundations in expansive soils.

UNIT - I — Lecture Hrs:

SINGLE PILE:
Vertically Loaded Piles, Static Capacity, Dynamic Formulae; Wave Equation Analyses; PointBearing Resistance With SPTandCPT Results; Bearing Resistance of Piles on Rock; Pile Load Test; Uplift Resistance;Laterally Loaded Piles -Ultimate Lateral Resistance; Negative SkinFriction;

UNIT - II — Lecture Hrs:

BUCKLING OF FULLY AND PARTIALLY EMBEDDED PILES:
Ultimate Capacity of Pile Groups in Compression, Pullout & LateralLoad; Efficiency; Settlements of Pile Groups; Interactionof Axially &Laterally Loaded Pile Groups.

UNIT - III — Lecture Hrs:

PILE RAFT FOUNDATION:
Design Criteria-Design of Sheet Pile Foundations: Analysis of Anchored Sheet Piles and Cantilever Sheet Piles Lateral Supports In Open Cuts Numerical Problems

UNIT - IV — Lecture Hrs:

WELL FOUNDATION:
Design And Construction of well foundations. Bearing Capacity, Settlement and Lateral Resistance. Tilts and Shifts. Drilled Shaft: Construction Procedures, Design Considerations, Load Carrying Capacity And Settlement Analysis.

UNIT - V — Lecture Hrs:

DEEP FOUNDATIONS IN EXPANSIVE SOILS:
Origin And Occurrence, Identification, Sampling And Testing, Preventive And Remedial Measures. Foundations on Expansive Soils: The Nature, Origin and Occurrence, Identifying, Testing and Evaluating Expansive Soils, Typical Structural Distress Patterns and Preventive Design & Construction Measures.

Textbooks:

1. Analysis And Design Of Substructures (2009), Swami Saran, Oxford &Ibh Publications Pvt. Ltd.
2. Foundation Design in Practices (2010) - Kaurna Moy Ghosh. Phi
3. Foundation Engineering (2012)- J E Bowles, McGraw Hill

Reference Books:

1. Pile Foundation Analysis And Design H.G. Poulos, And E.H.Davis, John Wiley And Sons, New York.
2. Design Of Foundation Systems (1992)N.P. Kurien: Principles & Practices, Narosa, New Delhi
3. Foundation Engineering Hand Book (1990), H. F. Winterkorn And H Y Fang Galgotia Book source

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	GROUND IMPROVEMENT TECHNIQUES	L	T	P	C
21D12202		3	0	0	3
	Semester	**II**			

Course Objectives: This Course Will Enable Students:

- Identify the soil type of soil from a job site or in a professional setting, determine that soil's properties based on type and evaluate design decisions from your understanding of that soil's properties.
- To explore the scientific principles used to describe the major engineering properties of soil, and the engineering testing methods used to quantify these properties
- To explore the site improvement techniques

Course Outcomes (CO): Student will be trained

- To explore and understanding the behavior of soils using index, compaction and engineering properties for the design of foundations.
- To adopt suitable ground improvement techniques
- To alter the geotechnical properties to suit any type of foundations based on the load coming from the super structure on to the foundation and soil
- To understand the dewatering mechanics mechanism.

UNIT - I	Lecture Hrs:

SITE INVESTIGATION:
Planning Of Exploration And Experimental Programmed, Investigations, Exploration For Preliminary Design, Exploration For Detailed Designee-Physical Explorations (Soundings, Probing, Boring, Boring Methods), Excavation Methods For Explorations, Ground Water Investigations, Rock Boring, Miscellaneous Exploratory Techniques

UNIT - II	Lecture Hrs:

SAMPLING AND IN-SITU FIELD TESTS:
Types Of Samples, Samplers, Preservation, Shipment And Storage Of Samples, Bore Log, Pore Pressure Measurements, Core Recovery, Rock Strength, Rock Quality Designation In-Situ Field Testing And Laboratory Investigation Of Soils And Rock(Including Advanced Equipment), Instrumentation, Data Acquisition And Measurement Techniques: SPT, SCPT, DCPT, Pressure Meter.

UNIT - III	Lecture Hrs:

DATA INTERPRETATION:
Data Interpretation for Determination of Engineering Properties of Soils and Their Application to Geotechnical Design, Preparation of Site Investigation Reports

UNIT - IV	Lecture Hrs:

SITE IMPROVEMENT:
General Methods Of Stabilization – Shallow And Deep, Factors Governing Suitable Method, Compaction, Drainage: Soil And Filter Permeability, Filter Criteria, Drainage Layout And Pumping System, Pre-Compression And Consolidation: Principles, Sand Drains, Pore Pressure Distribution, Electro-Osmotic And Chemical Osmotic Consolidation.

UNIT - V	Lecture Hrs:

STABILIZATION:
Mechanical Stabilization, Lime, Cement, Bitumen, and Chemical Etc. Grouting: Injection Principles, Grouting Pressure Criteria, Grouting Equipment, Injection of Chemicals, Thermal Methods: Heating and Cooling Effects on Soils.

Textbooks:

1. Engineering Principles of Ground Modifications – Haussmann, McGraw Hill.
2. Foundation Analysis and Design – J E Bowles, Tata McGraw Hill.

3. Engineering Treatment of Soils- F. G., Bell, E& FN Spon, New York, 2006.

Reference Books:

1. Subsurface Explorationand Sampling of Soils for Civil Engg. Purposes – Hvorslev M J,
2. Geotechnical Engineering- Donold P Coduto Phi Learning Private Limited, New Delhi
4. Geotechnical Engineering- Shashi K. Gulathi&Manoj Datta. (2009), "Tata Mc Graw Hill.
3. Soil Mechanics And Foundation Engg.- Muni Budhu (2010), 3rd Edition, John Wiley& Sons
4. Soil Mechanics For Road Engineers –Hmso

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	DESIGN WITH GEO-SYNTHETICS AND APPLICATIONS IN GEO TECHNICAL ENGINEERING (PE-III)	L	T	P	C
21D12203a		3	0	0	3
	Semester	**II**			

Course Objectives: This Course Will Enable Students:

- To understand the emerging trends of Geosynthetic in Geotechnical Engineering
- To evaluate the different properties of including different tests
- To analyze the functions of geosynthetic and its suitability
- To design different structures using geosynthetics according to various applications

Course Outcomes (CO): Student will be trained

- Identify the type of geosynthetics and their relevance in geotechnical field
- Understand the mechanism of formation of different geosynthetics
- Analyse and compute different properties of geosynthetics
- Apply the knowledge for designing the structures using Geosynthetic materials

UNIT - I Lecture Hrs:

INTRODUCTION:
Historical Development – Types Of Geo-synthetics – Geotextiles – Geogrids- Geonets – Geomembranes – Geocomposites – Functions – Reinforcement – Separation – Filtration – Drainage – Barrier Functions.

UNIT - II Lecture Hrs:

RAW MATERIALS AND MANUFACTURING METHODS:
Methods – Polyamide – Polyster – Polyethylene – Polypropylene – Poly Vinyl Chloride – Woven – Monofilament – Multifilament – Slit Filament – Non-Woven – Mechanically Bonded- Chemically Bonded – Thermally Bonded.

UNIT - III Lecture Hrs:

PHYSICAL AND HYDRAULIC PROPERTIES:
Physical Properties: Mass Per Unit Area – Thickness – Specific Gravity; Hydraulic Properties: Apparent Open Size – Permittivity – Transmissivity.

UNIT - IV Lecture Hrs:

MECHANICALLY PROPERTIES AND DURABILITY:
Mechanical Properties: Uniaxial Tensile Strength – Burst And Puncture Strength – Soil Geosynthetic Friction Tests; Durability: Abrasion Resistance – Ultraviolet Resistance.

UNIT - V Lecture Hrs:

APPLICATIONS OF GEOSYNTHETICS:
Use Of Geosynthetics For Filtration And Drainage – Use Of Geosynthetics In Roads – Use Of Reinforced Soil In Retaining Walls – Improvement Of Bearing Capacity – Geosynthetics In Land Fills.

Textbooks:

1. Engineering With Geosynthetics by G.Venkatapparao and G.V.Ssuryanarayanaraju – Tata McGraw Hill, New Delhi, 1990.
2. Construction and Geotechnical Methods in Foundation Engineering By Robert M. Koerner – McGraw Hill, New York, 1985.
3. Fundamentals of Geosynthetics Engineering- Sanjay Kumar Shukla and Jian-Hua Yin- CRC Press, 2017, Hyderabad.

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Reference Books:
1. Designing With Geosynthetics by Robert M. Koerner, Prentice Hall, New Jersey, UAS, 1989.
2. Engineering with Geosynthetics (1990), G.V.Rao and G.V.S.S,Raju (Eds), Tata McGraw Hill, New Delhi
3. G.Venkatappa Rao (2007).Geosynthetics – An Introduction, SAGES, Hyderabad

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	EARTH AND EARTH RETAINING SRUCTURES	L	T	P	C
21D12203b	(PE– III)	3	0	0	3
	Semester	**II**			

Course Objectives: This Course Will Enable Students:

- To study the geostatic stresses, shear strength of soils.
- To study the static earth pressure for retaining walls, slope stabilities

Course Outcomes (CO): Student will be trained

- Calculate earth pressure on various earth retaining structures such as gravity retaining walls, sheet pile, bulkheads, bracing/struts and coffer dams
- Selection of suitable retaining structure for a given site condition
- Design the relevant earth retaining structure for a given soil condition
- Analyze earth pressures on shafts, conduits and tun

UNIT - I Lecture Hrs:

GEOSTATIC STRESSES: Total, Neutral and Effective Stress inHomogeneous Soils, Stress Diagrams, Stresses Affected By Capillary Water and Directionof Flow of Water. **Shear Strength Of Soils:** Introduction, Concept of Stresses, Principal Stresses, Principal Planes, Mohr's Construction, Locationof Pole, Basic Concept of Shearing Resistance, Coulomb's Theory, and Mohr-Coulomb's Theory. Numerical Problems

UNIT - II Lecture Hrs:

Determination Of Shear Strength Parameters, Stress Controlled And Strain Controlled Tests, Classification Of Shear Tests Based On Drainage Conditions, Stress-Strain Relationship Of Clays And Sands, Concept Of Critical Void Ratio. Pore pressure parameters and their relevance.

UNIT - III Lecture Hrs:

EARTH PRESSURE:
Introduction, Active And Passive Earth Pressures, Earth Pressure At Rest, Rankin's Theory For Determination Of Active And Passive Earth Pressure, Coefficient Of Earth Pressure At Rest, Earth Pressure Distribution, Total Earth Pressure And Its Point Of Application, Determination Of Tension Cracks And Critical Height For Unsupported Excavation, Effect Of Water Table On Earth Pressure, Coulomb's Theory Of Active And Passive Earth Pressure, Cullman's And Ruthann's Graphical Methods For Determination Of Active And Passive Earth Pressures.

UNIT - IV Lecture Hrs:

STABILITY OF SLOPES:
Introduction, Factor Of Safety, Slope Failure, Toe And Base Failure Of Finite Slopes, Analysis Of Stability By Method Of Slices, Taylor's Stability Number, Effect Of Water Table On Slopes, Tension Cracks

UNIT - V Lecture Hrs:

SEEPAGE ANALYSIS:
Laplace's Equation For Two Dimensional Flow Of Water Through Soils, Flow nets, Properties And Uses Of Flownets,Phreatic Line, Graphical And Analytical Procedures For Determination Of Quantity Of Seepage, Prevailing Hydraulic Head And Exit Gradient In Homogeneous Earth Dam, Uplift Pressure, Sketching Of Flow netsFor Typical Hydraulic Structures – Weirs, Dams, Sheet Pile Walls

Textbooks:

1. Foundation Analysis And Design - J E Bowles, McGraw Hill, NY
2. Soil Mechanics In Engineering Practice – Karl Terzaghi And R B Peck (1967), John Wiley and Sons, NY
3. Geotechnical engineering, Gulhati, K.Shashi and M.Datta, Mc.GrawHillbookcompany,2005

Reference Books:
1. Analysis And Design Of Foundations And Retaining Structures –Prakash(1979), Sarita Prakashana, Meerut 2. Soil Mechanics And Foundation Engineering – S K Garg, Khanna Publications 3. Geotechnical Engineering – C Venkataramaiah, New Age International Publishers

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	SOIL DYNAMICS AND MACHINE FOUNDATIONS (PE-IV)	L	T	P	C
21D12203c		3	0	0	3
	Semester	II			

Course Objectives: This Course Will Enable Students:

- To understand the basics of dynamics, like damping, wave propagation, resonance and effect of modes of vibrations.
- To determine the dynamic soil properties by field and laboratory tests.
- To study the effect of liquefaction and anti liquefaction measures.
- To study vibration isolation, machine foundation design.

Course Outcomes (CO): Student will be trained

- Understands theory of vibration and wave propagation through the ground.
- Determination dynamic soil properties required for design.
- Evaluate liquefaction potential of any site and remediation.
- To design machine foundations for reciprocating and impact loads.

UNIT - I — Lecture Hrs:

Fundamentals of Vibration: Definitions, Simple harmonic motion, Response of SDOF systems of Free and Forced vibrations with and without viscous damping, Frequency dependent excitation, Logarithmic decrement, Determination of viscous damping, Systems with Two and Multiple degrees of freedom, Vibration measuring instruments.

UNIT - II — Lecture Hrs:

Wave Propagation and Dynamic Soil Properties: Propagation of seismic waves in soil deposits - Attenuation of stress waves, Stress-strain behavior of cyclically loaded soils, Dynamic soil properties - Laboratory and field-testing techniques, Elastic constants of soils, Correlations for shear modulus and damping ratio in sands and clays.

UNIT - III — Lecture Hrs:

Foundation Vibration Analyses: Types, General Requirements, Permissible amplitude, Allowable soil pressure, Modes of vibration of a rigid foundation block, Vertical vibration of circular foundations resting on Elastic Half Space- Lambs, Reissner, Quinlan & Sungs analogies.

UNIT - IV — Lecture Hrs:

Design of Machine Foundations: Analysis and design of block foundations for reciprocating engines, IS code of practice design procedure for foundations of reciprocating and impact type machines. Vibration isolation and absorption techniques.

UNIT - V — Lecture Hrs:

Machine Foundations on Piles: Introduction, Analysis of piles under vertical vibrations, Analysis of piles under translation and rocking, Design procedure for a pile supported machine foundation

Textbooks:

1. Soil Dynamics and Machine Foundation- Swami Saran - Galgotia Publications Pvt. Ltd. (2010)
2. Soil Dynamics- Prakash, S. -, McGraw Hill Book Company (1981)
3. Dynamics of Structures and Foundation- I. Chowdhary and S P Dasgupta -, 2009.

Reference Books:

1. Vibration Analysis and Foundation Dynamics- Kameswara Rao, N. S. V. - Wheeler Publication Ltd., 1998.
2. Vibrations of Soils and Foundations- Richart, F. E. Hall J. R and Woods R. D. - Prentice Hall Inc., 1970.
3. Principles of Soil Dynamics- Das, B. M. - PWS KENT publishing Company, Boston.2002
4. Advanced Soil Dynamics and Earthquake Engineering- Bharat Bhushan Prasad –, PHI Learning Pvt. Limited, New Delhi, 2011.

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	FINITE ELEMENT METHOD FOR GEO-TECHNICAL APPLICATIONS (PE-IV)	L	T	P	C
21D12204a		3	0	0	3
	Semester	**II**			

Course Objectives: This Course Will Enable Students:

- Understand in general how finite elements obtain approximate solutions to differential equations.
- Appreciate the structure of a typical finite element program.
- Gain experience of finite element analysis applied to classical geotechnical problems (e.g. settlement, seepage, consolidation, slope stability)
- Gain insight into the soil properties needed for finite element Analysis

Course Outcomes (CO): Student will be trained

- To understand the basic concepts of finite element analysis in general and the transition from structural engineering aspects to geotechnical engineering aspects.
- To understand the finite element techniques for seepage analysis and joint rock masses
- In Finite element applications in design and Analysis of bearing capacity of the soil for shallow foundations
- To understand elastic model, hyperbolic model and stress- strain response.

UNIT - I Lecture Hrs:

INTRODUCTION:
Concepts of FEM, Steps Involved In Finite Element Analysis Procedure, Merits and Demerits. Principles of Elasticity: Stress Equations, Strain-Displacement Relationships in Matrix Form, Plane Stress, Plane Strain and Axi-Symmetric Bodies of Revolution withAxi-Symmetric Loading.

UNIT - II Lecture Hrs:

ELEMENT PROPERTIES:
Concept Of An Element, Various Element Shapes, Displacement Models, Generalized Coordinates, Shape Functions, Convergent And Compatibility Requirements, Geometric Invariance, Natural Coordinate System - Area And Volume Coordinates GenerationOf Element Stiffness And Nodal Load Matrices, Isoparametric Formulation: Concept, Different IsoparametricElements For 2d Analysis.

UNIT - III Lecture Hrs:

DiscretizationOf A Structure, Numbering Systems, Aspect Ratio ItsEffects, Assemblage, Direct Stiffness Method Strain Laws: Introduction, Bilinear Elastic Model, Hyperbolic Model, Comparison of Models.

UNIT - IV Lecture Hrs:

GEOTECHNICAL APPLICATIONS:
Geotechnical Applications Sequential Construction, Excavations and Embankments, Bearing Capacity and Settlement Analysis.

UNIT - V Lecture Hrs:

SEEPAGE ANALYSIS:
Finite Element Discretizationof Seepage Equation, Computationof Velocities and Flows, Treatment of Free SurfaceBoundary,Analysis of Jointed Rock Mass: Characters and Discontinuity of Rock.

Textbooks:

1. Introduction to the Finite Element Method (1972), Desai, C. S. And J.F. , Abel.Van Nostrand Reinhold Company
2. Finite Element Analysis In Geotechnical Engineering Vol 1&2, (1999) - D M Potts& L Zdravkovic, Thomas Telford Publishing, London
3. Finite Element Analysis In Geotechnical Engineering, D J Naylor & G N Pande(2012)

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Reference Books:

1. Introduction To The Finite Element Method(1993) J. N. Reddy - McGraw-Hill Publishers,
2. Finite Element Analysis - Theory And Programming(1994) Krishna Murthy, C. S -Tata McGraw-Hill,
3. Finite Element Methods(1971) Zienkiewicz, O. C. -, McGraw-Hill Publishers,

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	EXPERIMENTAL GEO-MECHANICS	L	T	P	C
21D12204b	(PE – IV)	3	0	0	3
	Semester	II			

Course Objectives: This Course Will Enable Students:

- Understanding various soil exploration techniques.
- Appreciate the various sampling techniques.
- Gain experience of in situ testing
- Gain insight into geophysical testing.

Course Outcomes (CO): Student will be trained

- To understand the basic concepts of soil exploration techniques.
- To understand the various sampling techniques to carry out soil investigation
- To understand Instrumentation in Soil Engineering
- To monitor the performance of geotechnical structures.

UNIT - I Lecture Hrs:

introduction:
Scopes And Objectives Of Explorations – Planning A Subsurface Exploration – Stages In Sub Surface Exploration – Explorations For Preliminary And Detailed Design – Spacing And Depth Of Exploration.

UNIT - II Lecture Hrs:

Open ExcavationAnd Borings Of Exploration
Pits And Trenches – Drifts And Shafts – Methods Of Boring – Auger Borings – Wash Borings – Rotary Drilling –Percussion Drilling – Core Drilling.

UNIT - III Lecture Hrs:

OPEN EXCAVATIONAND BORINGS OF EXPLORATION
Pits And Trenches – Drifts And Shafts – Methods Of Boring – Auger Borings – Wash Borings – Rotary Drilling –Percussion Drilling – Core Drilling.

UNIT - IV Lecture Hrs:

IN-SITU TESTING:
Field Tests – Standard Penetration Tests – Cone Penetration Tests – In-Situ Vane Shear Test–Plate Load Test – Monotonic And Cyclic –Field Permeability Tests – In-Situ Tests Using Pressure Meter – Observation Of Ground Water Table. - Instrumentation in Soil Engineering, Strain Gauges, Resistance and Inductance Type

UNIT - V Lecture Hrs:

GEOPHYSICAL METHODS:
Geophysical Methods-Types-Seismic Methods – Electrical Resistivity Methods – Electrical Profiling Method –Electrical Sounding Method – Seismic Refraction Method – Sub-Soil Investigation Report.

Textbooks:

1. Sub Surface Explorationand Sampling of Soils for Civil Engineering Purpose by Hvorslev, M.J. Waterways Station, Vicksburg, Mississippi, 1949.
2. Foundation Engineering By S.P. Brahma, Tata McGraw Hill Publishing Company Limited, New Delhi, 1985.

Reference Books:

1. Analysis And Design of Foundations and Retaining Structures by Shamsherprakash, Gopalranjan and Swami Saran, Saritaprakasham, Meerut.1979.
2. Soil Mechanics & Foundation Engineering, Vol. 2 by V.N.S. Murthy, Saikripa Technical Consultants, Bangalore.
3. Geotechnical Engineering by C. Venkataramaiah, Wiley Eastern Ltd., New Delhi.

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ANANTHAPURAMU – 515 002 (A.P) INDIA

M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	ROCK MECHANICS	L	T	P	C
21D12204c	(PE – IV)	3	0	0	3
	Semester	**II**			

Course Objectives: This Course Will Enable Students:

- Identify the type of the rock
- Analyze the rock quality designation and also evaluate its strength
- Determine the methods of tunneling and mining

Course Outcomes (CO): Student will be trained

- Identify the type of rock and to evaluate the bearing capacity of the rock,
- Design and analyze the foundations and improvement techniques for the
- foundations on in-situ rocks
- Design methodologies for mining and tunneling where rock is encountered
- To understand the principles of gravity.

UNIT - I — Lecture Hrs:

INTRODUCTION:
Classificationof Rocks, Geological Petro Graphic and Engineering. Index Properties of Rocks-Porosity, Density, Permeability, Durability and Slake. Core Recovery, Rqd And Its Importance In Engineering Stress-Strain Behavior, Factors Influencing The Strength Of Rock, Temperature, Confining Pressure, Strain Rates, Modes Of Failures Of Rocks.

UNIT - II — Lecture Hrs:

FAILURE THEORIES OF ROCKS:
Mohr's Hypothesis, Griffith's Criteria, Muller's Extension of Griffith's Theory, Elementary Theory Of Crack Propagation, Failure Of Rock By Crack Propagation, Effects Of Cracks Of Elastic Properties. Testing Of Rocks: Laboratory and Field Test, Assessment of In-Situ Strength

UNIT - III — Lecture Hrs:

ROCK FOUNDATION:
Shallow and Deep Investigation for Foundation Design and Construction Aspect, Slope Stability Analysis, Mode of Failures in Rock. Design of Slopes, Excavation in Rock and Stabilization Concepts

UNIT - IV — Lecture Hrs:

STRENGTHENING OF ROCKS:
Foundation Treatment for Dams and Heavy Structures by Grouting and Rock Reinforcement. Methods and Principles of Grouting, Principles of Design of Rock Bolts

UNIT - V — Lecture Hrs:

TUNNELS:
Basic Terminology And Application, Site Investigations, Methods Of ExcavationOf Tunnels Supports And Stabilization, Construction Control And Maintenance, Tunnel Ventilation, Control Of Ground Water And Gas Underground Mining; Mining Methods.

Textbooks:

1. Introduction To Rock Mechanics – Goodman (1976), John Wiley And Sons, Ny
2. Fundamentals Of Rock Mechanics – J C Jeager And N G W Cook (1976), Chapman and Hall, London
3. Rock Mechanics For Engineers: Varma, B.P, Khanna Publishers

Reference Books:

1. Principles Of Engineering Geology And Geotechniques – Krynine And Judd
2. Rock Engineering – John A Franklin And Maurice B Dusseault, McGraw Hill
3. Rock Mechanics & Design Of Structures: Obert, L & Duvall, W.I., John Wiley &Sons

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	ADVANCED GEOTECHNICAL ENGINEERING LAB-II	L	T	P	C
21D12205		0	0	4	2
	Semester	II			

Course Objectives: This course will enable students to

- The objective of this course is to make students to learn principles and design of experiments.
- To investigate the performance of various Soils

Course Outcomes (CO): During this course, students will be trained:

- Achieve Knowledge of Design and development of experimental skills.
- Understand the principles of design of experiments.

List of Experiments:

1. Determination Of Shear Strength Parameters By Vane Shear Test
2. Determination Of Shear Strength Parameters By CD And CU Test
3. To Evaluate The Bearing Capacity And Settlement Of Soils From
    a. By Plate Load Test
    b. By Cone Penetration Test (Static And Dynamic)
    c. Standard Penetration Test
4. To Determine The Ground Water Table
    a. Using Electrical Resistivity Method
    b. Seismic Refraction Method
5. Determination Of Shear Modulus, Damping Ratio And Liquefaction Of Soils By Resonant Column Method
6. Determination of Ph and Organic Solids.
7. Determination Of Chemical Properties Of Soil Such As Chloride, Phosphorous, Potassium, Magnesium, Calcium, Sodium Etc.,

References:

1. Shams her Prakash, (1979) “Engineering Soil Testing”, Nemichand, New Delhi.
2. Joesph E Bowles, “Engineering Properties of Soil and Their Measurements”,McGraw Hill
3. John T. Germaine, Amy V. Germaine, (2009) “Geotechnical Laboratory Measurements”, John Wiley
4. William Lambe, (2003) “Soil Testing For Engineers”, MIT.

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	COMPUTATIONAL GEOTECHNICAL ENGINEERING LAB - II	L	T	P	C
21D12206		0	0	4	2
	Semester	II			

Course Objectives: Using Finite Element and Finite Difference software student should be able (Ex: Plaxis, FLAC, or any other software which is available)

- To perform two-dimensional finite element analysis of deformations and stability in geotechnical engineering
- To perform finite difference analysis of deformations and stability in geotechnical engineering
- To model shallow and deep foundations
- To evaluate stability of embankments
- To model reinforced soil walls

Course Outcomes (CO): During this course,

The students should be able to handle practical geotechnical engineering problems associated with foundations, slopes and retaining walls

List of Experiments:

1. Ultimate, Net and Safe Bearing Capacity Using Terzaghi and IS Code Methods.
2. Net Settlement Pressure
3. Hyperbolic Curve Fitting of Tri-axial Compression Data
4. Terzaghi One dimensional consolidation solution by FDM (perform analysis of substructures by packages)
5. Beam on Elastic Foundation by FDM
6. FDM Solution for Raft Foundation
7. Axial Loaded Piles by Direct FEM
8. Laterally Loaded Piles by FDM & FEM
9. Stability Analysis by Bishop theory
10. Stability Analysis by Method of Slices.

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	FOUNDATION ENGINEERING FOR PROBLEMATIC SOILS (PE – V)	L	T	P	C
21D12301a		3	0	0	3
	Semester	**III**			

Course Objectives: This Course Will Enable Students:

- In-situ testing in difficult grounds
- Design the foundations in earth movement conditions
- Improve the ground conditions

Course Outcomes (CO): Student will be trained

- Develop the in-situ methods to evaluate the bearing capacity under different criteria.
- Analyzeand design the grounds in shrinking areas
- Overcome the construction problems by adopting suitable methods

UNIT - I — Lecture Hrs:

INTRODUCTION:
Classification, Swelling and Shrinkage, Sensitivity, Settlement and Bearing Capacity of Clays, Fissures in Clay, Glacial Deposits and Difficult Rocks.
Site Investigation in Difficult Ground: Objectives, Difficulties in Determining the Characteristics of the Ground, Remedial Measures.

UNIT - II — Lecture Hrs:

IN-SITU TESTING AND GEOPHYSICAL SURVEYING:
Introduction, Penetrometers, SPT, CPT, Plate Bearing Tests, Pressure Meters, Seismic and Resistivity surveying, Methods of ground identification.
Ground Water And Foundations: Introduction, Effective Stress Theory, Oil Tanks On Poor Ground, Effect Of Raising The Ground Water Level – Reclaimed Land, FoundationOn The Sea Bed.

UNIT - III — Lecture Hrs:

FOUNDATIONS AND EARTH MOVEMENTS:
Introduction, Creep of Rock Masses, Landslides, Earthquake – Primary and Secondary Effects.
Design Of Foundations: Introduction, General Principles, Strip And Raft Foundations, Building On Shrinkable Soil, Building On Fill, RaftFoundation – Variable Soil And Make Up Ground, Pile Foundation –Choice, Types; Construction Problems.

UNIT - IV — Lecture Hrs:

STABILITY OF SLOPES IN DIFFICULT GROUND:
Introduction, Mechanism of Stability, Strength of Distorted Clay, Factor of Safety, Analysis, Remedial Measures.

UNIT - V — Lecture Hrs:

GROUND TREATMENT:
Introduction, Ground Water Lowering Techniques, Electro-Osmosis And Electro-Chemical Stabilization, Thermal Techniques, Grouts And Grouting, Reinforcements, Other Stabilization Techniques, Dynamic Consolidation, Pre Loading,
Vibroflotation, Stone Columns.

Textbooks:

1. Foundation In Difficult Ground – F G Bell, Butterworths & Co
2. Foundation Analysis And Design – J E Bowles, Tata McGraw Hill
3. Tropical soils in engineering practice by S. A. Ola, Balkema publications, Holland

Reference Books:

1. Foundation Engineering – (2001) M J Tomlinson - Phi
2. Soil stabilization principles and practice by Ingles, O. G. and metcaff, J. B., Butterworth,1972

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	REMOTE SENSING AND ITS APPLICATION IN GEOTECHNICAL ENGINEERING (PE-V)	L	T	P	C
21D12301b		3	0	0	3
	Semester	**III**			

Course Objectives: This Course Will Enable Students:

- Apply the concepts of Photogrametry and its applications such as determination of heights of objects on terrain.
- Understand the basic concept of Remote Sensing and know about different types of satellite and sensors.
- Illustrate Energy interactions with atmosphere and with earth surface features, Interpretation of satellite and top sheet maps
- Understand different components of GIS and Learning about map projection and coordinate system
- Develop knowledge on conversion of data from analogue to digital and working with GIS software

Course Outcomes (CO): Student will be trained

- Understand the concepts of Photogrametry and compute the heights of objects
- Understand the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies
- Understand the basic concept of GIS and its applications, know different types of data representation in GIS
- Understand and Develop models for GIS spatial Analysis and will be able to know what the questions that GIS can answer are
- Apply knowledge of GIS software and able to work with GIS software in various application fields

UNIT - I		Lecture Hrs:

Definitions And Introduction To Remote Sensing, Components Of Remote Sensing System, Active And Passive Remote Sensing, Electromagnetic Radiations And Their Interactions With The Earth Features And Atmosphere. Remote Sensing Satellite Orbits, Image Acquisition Process, Receptivity, Row/Path and Ground Swath and Coverage.

UNIT - II		Lecture Hrs:

Definitions And Introduction To Remote Sensing, Components Of Remote Sensing System, Active And Passive Remote Sensing, Electromagnetic Radiations And Their Interactions With The Earth Features And Atmosphere. Remote Sensing Satellite Orbits, Image Acquisition Process, Receptivity, Row/Path and Ground Swath and Coverage.

UNIT - III		Lecture Hrs:

Geometry, Radiometry And Pre-Processing Of Remotely Sensed Imagery. Ground Truth Collection and Geo-Referencing Of Imagery. Characteristics of Photographic Images. Colour, Tone and Texture, Photo-Interpretation Keys, Techniques of Photo-Interpretation. Digital Image Classification Techniques and Extraction of Thematic Information.

UNIT - IV		Lecture Hrs:

Global Positioning System *(GPS)* : Introduction & Components Of GPS, Space Segment, Control Segment And User Segment, Elements Of Satellite Based Surveys – Map Datum's, GPS Receivers, GPS Observation Methods And Their Advantages Over Conventional Methods. Geographic

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Information System (GIS) - Definition of GIS, Geographical Concepts and Terminology, Components of GIS, Data Acquisition, Raster and Vector Formats, Scanners and Digitizers.

UNIT - V		Lecture Hrs:

Role of Remote Sensing and GIS in Terrain Investigation and Advantages over Conventional Mapping Techniques. Extraction of Topographic Information from Remotely Sensed Data and Generation of Digital Terrain Model from Stereo Pairs of Images. Geological Mapping for the Geotechnical Investigations of Soil Strata. Monitoring Of Areas Prone To Landslides Using Remote Sensing, Digital Model and GIS. Application of Visible, Infra-Red and Microwave Remote Sensing For the Identification of Soil Types, Grain Size and Moisture Studies.

Textbooks:

1. Remote Sensing and Image Interpretation by Lillesandt.M. And Kiefer R.W. John Wiley and Sons. New York.
2. M. Anji Reddy, Textbook of Remote Sensing and Geographical Information systems, BS Publications, Hyderabad. 2011. ISBN: 81- 7800-112-8
3. Remote Sensing and GIS by B.Bhatta, Oxford University Press,New Delhi

Reference Books:

1. George Joseph , Fundamentals of Remote Sensing Universities Press, Hyderabad 2005
2. Introduction to Remote Sensing By J.B. Campbell, Taylor & Francis, London.
3. Introductory Digital Image Processing By J.R. Jensen, Prentice Hall International Ltd., London.
4. Remote Sensing and its applications by LRA Narayana University Press 1999.
5. Remote Sensing In Civil Engineering, By Kennie, T.J.M. And Matthews M.C.
6. Surrey University Press, Glasgow.

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	OFF SHORE GEO TECHNICAL ENGINEERING (PE-V)	L	T	P	C
21D12301c		3	0	0	3
	Semester	**III**			

Course Objectives: This Course Will Enable Students:

- Understand the type of soil strata available in offshore
- Develop a structure under different environmental condition
- Design the anchors in the sea
- Design the pipelines and cable structures

Course Outcomes (CO): Student will be trained

- Design the structure for wind, wave loads and dynamic loads
- Design the structure for overturning
- Design the pipeline and cable structures

UNIT - I		Lecture Hrs:

DESIGN OFOFFSHORE PLATFORMS:
Introduction, Fixed And Floating Platforms, Case Studies And General Features, Elements Of Hydrodynamics And Wave Theory, Fluid Structure Interaction, Steel Concrete And Hybrid Platforms Consolidation And Shear Strength Characteristics Of Marine Sediments.

UNIT - II		Lecture Hrs:

DESIGN CRITERIA:
Environmental Loading, Wind, Wave and Current Loads after Installation, Stability duringTowing Foundations: Site Investigations, Piled Foundation, Foundations for Gravity Structures, Pile-Supported Structures

UNIT - III		Lecture Hrs:

Behaviour under Dynamic Loading, Static and Dynamic Analysis of Platforms and Components

UNIT - IV		Lecture Hrs:

Dynamic Response in Deterministic and in deterministic Environment, Codes of Practice, Analysis of Fixed Platform and Semisubmersible Related Topics

UNIT - V		Lecture Hrs:

Anchor Design, Breakout Resistance Analysis and Geotechnical Aspects of Offshore Pipeline and Cable Design

Textbooks:

1. Offshore Geotechnical Engineering – Mark Radolph and Susan Gourvenec, Crc Press.
2. Construction Of Marine AndOffshore Structures – Ben C Gerwick, CRC Press.
3. Offshore Geotechnical Engineering – Etr Dean

Reference Books:

1. Frontiers In Offshore Geotechnics II – Susan Gourvenec And David White, Crc Press.
2. Frontiers in Offshore Geotechnics Ii – Vaughan Meyer, Crc Press
3. Geotechnical Aspects of Coastal and Offshore Structures: Proceedings Of The Symposium, Bangkok – AN S Balasubramaniam, Crc Press

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

AUDIT COURSE-I

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	ENGLISH FOR RESEARCH PAPER WRITING	L	T	P	C
21DAC101a		2	0	0	0
	Semester	I			

Course Objectives: This course will enable students:

- Understand the essentials of writing skills and their level of readability
- Learn about what to write in each section
- Ensure qualitative presentation with linguistic accuracy

Course Outcomes (CO): Student will be able to

- Understand the significance of writing skills and the level of readability
- Analyze and write title, abstract, different sections in research paper
- Develop the skills needed while writing a research paper

UNIT - I		Lecture Hrs:10
1Overview of a Research Paper- Planning and Preparation- Word Order- Useful Phrases - Breaking up Long Sentences-Structuring Paragraphs and Sentences-Being Concise and Removing Redundancy -Avoiding Ambiguity		
UNIT - II		Lecture Hrs:10
Essential Components of a Research Paper- Abstracts- Building Hypothesis-Research Problem - Highlight Findings- Hedging and Criticizing, Paraphrasing and Plagiarism, Cauterization		
UNIT - III		Lecture Hrs:10
Introducing Review of the Literature – Methodology - Analysis of the Data-Findings - Discussion-Conclusions-Recommendations.		
UNIT - IV		Lecture Hrs:9
Key skills needed for writing a Title, Abstract, and Introduction		
UNIT - V		Lecture Hrs:9
Appropriate language to formulate Methodology, incorporate Results, put forth Arguments and draw Conclusions		

Suggested Reading

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books) Model Curriculum of Engineering & Technology PG Courses [Volume-I]
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman'sbook
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	DISASTER MANAGEMENT	L	T	P	C
21DAC101b		2	0	0	0
	Semester	I			

Course Objectives: This course will enable students:

- Learn to demonstrate critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Critically evaluate disaster risk reduction and humanitarian response policy and practice from Multiple perspectives.
- Developanunderstandingofstandardsofhumanitarianresponseandpracticalrelevanceinspecific types of disasters and conflict situations
- Criticallyunderstandthestrengthsandweaknessesofdisastermanagementapproaches,planningand programming in different countries, particularly their home country or the countries they work in

UNIT - I

Introduction:
Disaster:Definition,FactorsandSignificance;DifferenceBetweenHazardandDisaster;Naturaland Manmade Disasters: Difference, Nature, Types and Magnitude.

Disaster Prone Areas in India:
Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post- Disaster Diseases and Epidemics

UNIT - II

Repercussions of Disasters and Hazards:
Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes,Volcanisms,Cyclones,Tsunamis,Floods,DroughtsandFamines,Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War and Conflicts.

UNIT - III

Disaster Preparedness and Management:
Preparedness: Monitoring of Phenomena Triggering ADisasteror Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT - IV

Risk Assessment Disaster Risk:
Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. TechniquesofRiskAssessment,GlobalCo-OperationinRiskAssessmentand Warning, People's Participation in Risk Assessment. Strategies for Survival.

UNIT - V

Disaster Mitigation:
Meaning,ConceptandStrategiesofDisasterMitigation,EmergingTrendsInMitigation.Structural Mitigationand Non-Structural Mitigation, Programs of Disaster Mitigation in India.

Suggested Reading

1. R.Nishith,SinghAK,"DisasterManagementinIndia:Perspectives,issuesandstrategies
2. "'New Royal book Company..Sahni,PardeepEt.Al.(Eds.),"DisasterMitigationExperiencesAndReflections",PrenticeHa

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COURSE STRUCTURE & SYLLABI

ll OfIndia, New Delhi.
3. GoelS.L.,DisasterAdministrationAndManagementTextAndCaseStudies",Deep&Deep Publication Pvt. Ltd., New Delhi

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	SANSKRITFOR TECHNICAL KNOWLEDGE	L	T	P	C
21DAC101c		2	0	0	0
	Semester	**I**			

Course Objectives: This course will enable students:

- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- LearningofSanskrittodevelopthelogicinmathematics,science&othersubjects enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge
- Knowledge from ancientliterature

Course Outcomes (CO): Student will be able to

- Understanding basic Sanskrit language
- Ancient Sanskrit literature about science &technology can be understood
- Being a logical language will help to develop logic in students

UNIT - I

Alphabets in Sanskrit,

UNIT - II

Past/Present/Future Tense, Simple Sentences

UNIT - III

Order, Introduction of roots

UNIT - IV

Technical information about Sanskrit Literature

UNIT - V

Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Suggested Reading

1.“Abhyaspustakam” –Dr.Vishwas, Sanskrit-Bharti Publication, New Delhi
2.“Teach Yourself Sanskrit” Prathama Deeksha- VempatiKutumbshastri, RashtriyaSanskrit Sansthanam, New Delhi Publication
3.“India’s Glorious ScientificTradition” Suresh Soni, Ocean books (P) Ltd.,New Delhi

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M.TECH. IN GEO TECHNICAL ENGINEERING
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AUDIT COURSE-II

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	PEDAGOGY STUDIES	L	T	P	C
21DAC201a		2	0	0	0
	Semester	**II**			

Course Objectives: This course will enable students:

- Reviewexistingevidenceonthereviewtopictoinformprogrammedesignandpolicy making undertaken by the DfID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Course Outcomes (CO): Student will be able to

Students will be able to understand:

- Whatpedagogicalpracticesarebeingusedbyteachersinformalandinformalclassrooms in developing countries?
- What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- Howcanteachereducation(curriculumandpracticum)andtheschoolcurriculumand guidance materials best support effective pedagogy?

UNIT - I

Introduction and Methodology: Aims and rationale, Policy back ground, Conceptual frame work and terminology Theories oflearning,Curriculum,Teachereducation.Conceptualframework,Research questions**.** Overview of methodology and Searching.

UNIT - II

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

UNIT - III

Evidence on theeffectivenessofpedagogicalpractices,Methodologyfortheindepthstage:quality assessmen t of included studies. How can teacher education (curriculumandpracticum) andthescho curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of th body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT - IV

Professional development: alignment with classroom practices and follow-up support, Peer support, Support from the head teacherandthecommunity.Curriculumandassessment,Barrierstolearning:limitedresourcesand large class sizes

UNIT - V

Researchgapsandfuturedirections: Researchdesign**,**Contexts**,**Pedagogy**,**Teachereducation**,** Curriculum and assessment**,** Dissemination and research impact.

Suggested Reading

1. AckersJ,HardmanF(2001)ClassroominteractioninKenyanprimaryschools,Compare, 31 (2): 245-261.
2. AgrawalM(2004)Curricularreforminschools:Theimportanceofevaluation,Journalof
3. Curriculum Studies, 36 (3): 361-379.
4. AkyeampongK(2003) Teacher training in Ghana - does it count? Multi-site teachereducation research project (MUSTER) country report 1. London: DFID.

5. Akyeampong K, LussierK, PryorJ, Westbrook J (2013)Improving teaching and learning of basic maths and reading in Africa: Does teacherpreparation count?International Journal Educational Development, 33 (3): 272–282.
6. Alexander RJ(2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
   Chavan M (2003)ReadIndia: A mass scale, rapid, 'learning to read'campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

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ANANTHAPURAMU – 515 002 (A.P) INDIA

M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	**STRESSMANAGEMENT BY YOGA**	**L**	**T**	**P**	**C**
21DAC201b		**2**	**0**	**0**	**0**
	Semester	**II**			
Course Objectives: This course will enable students:					
• To achieve overall health of body and mind • To overcome stres					
Course Outcomes (CO): Student will be able to					
• Develop healthy mind in a healthy body thus improving social health also • Improve efficiency					
UNIT - I					
Definitions of Eight parts of yog.(Ashtanga)					
UNIT - II					
Yam and Niyam.					
UNIT - III					
Do`sand Don't'sin life. i) Ahinsa,satya,astheya,bramhacharyaand aparigrahaii) Shaucha,santosh,tapa,swadhyay,ishwarpranidhan					
UNIT - IV					
Asan and Pranayam					
UNIT - V					
i)Variousyogposesand theirbenefitsformind &body ii)Regularizationofbreathingtechniques and its effects-Types ofpranayam					
Suggested Reading					
1.'Yogic Asanas forGroupTarining-Part-I": Janardan SwamiYogabhyasiMandal, Nagpur 2."Rajayogaor conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata					

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COURSE STRUCTURE & SYLLABI

Course Code	PERSONALITY DEVELOPMENT THROUGHLIFE ENLIGHTENMENTSKILLS	L	T	P	C
21DAC201c		2	0	0	0
	Semester	**II**			

Course Objectives: This course will enable students:

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

Course Outcomes (CO): Student will be able to

- StudyofShrimad-Bhagwad-Geetawillhelpthestudentindevelopinghispersonalityand achieve the highest goal in life
- The person who has studied Geetawilllead the nation and mankind to peace and prosperity
- Study of Neetishatakam will help in developing versatile personality of students

UNIT - I

Neetisatakam- Holistic development of personality
Verses-19,20,21,22(wisdom)
Verses-29,31,32(pride &heroism)
Verses-26,28,63,65(virtue)

UNIT - II

Neetisatakam- Holistic development of personality
Verses-52,53,59(dont's)
Verses-71,73,75,78(do's)

UNIT - III

Approach to day to day work and duties.
ShrimadBhagwadGeeta:Chapter2-Verses41,47,48,
Chapter3-Verses13,21,27,35,Chapter6-Verses5,13,17,23,35,
Chapter18-Verses45,46,48.

UNIT - IV

Statements of basic knowledge.
ShrimadBhagwadGeeta:Chapter2-Verses 56,62,68
Chapter12 -Verses13,14,15,16,17,18
Personality of Rolemodel. Shrimad Bhagwad Geeta:

UNIT - V

Chapter2-Verses 17,Chapter3-Verses36,37,42,
Chapter4-Verses18,38,39
Chapter18– Verses37,38,63

Suggested Reading

1."SrimadBhagavadGita"bySwamiSwarupanandaAdvaitaAshram(PublicationDepartment), Kolkata
2.Bhartrihari'sThree Satakam (Niti-sringar-vairagya) by P.Gopinath, RashtriyaSanskrit Sansthanam, New Delhi.

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OPEN ELECTIVE

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	COST MANAGEMENT OF ENGINEERING PROJECTS	L	T	P	C
21DOE301a		3	0	0	3
	Semester	I			

Course Objectives:

- To explain cost concepts and objectives of costing system and cost management process
- To provide knowledge and explain Cost behaviour in relation to Volume and Profit and pricing decisions.
- To know the concepts of target costing, life cycle costing and activity based cost management in a project or business.
- To discuss on budget and budgetary control , type of budgets in a business to control costs
- To provide knowledge on project, types of projects, stages of project execution, types of project contracts and project cost control.

Course Outcomes (CO): Student will be able to

- Know the cost management process and types of costs
- Learn and apply different costing methods under different project contracts
- To understand relationship of Cost-Volume and Profit and pricing decisions.
- Prepare budgets and measurement of divisional performance.
- Acquires knowledge on various types of project contracts, stages to execute projects and controlling project cost..

UNIT - I		Lecture Hrs:10

Introduction and Overview of the Strategic Cost Management Process - Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

UNIT - II		Lecture Hrs:12

Cost Behavior and Profit Planning: Marginal Costing- Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems; Pareto Analysis Just-in-time approach, Theory of constraints.; Divisional performance management: - Measurement of Divisional profitability - pricing decisions - transfer pricing.

UNIT - III		Lecture Hrs:10

Target costing- Life Cycle Costing - Activity-Based Cost management:- Activity based costing- Value-Chain Analysis- Bench Marking; Balanced Score Card.

UNIT - IV		Lecture Hrs:10

Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

UNIT - V		Lecture Hrs:12

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non-technical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process.

Textbooks:

1. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
2. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher

Reference Books:
1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi 2. Charles T. Horngren and George Foster, Advanced Management Accounting 3. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd
Online Learning Resources:
https://nptel.ac.in/courses/105/104/105104161/ https://nptel.ac.in/courses/112/102/112102106/

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COURSE STRUCTURE & SYLLABI

Course Code	INDUSTRIAL SAFETY	L	T	P	C
21DOE301b		3	0	0	3
	Semester	III			

Course Objectives:

- To know about Industrial safety programs and toxicology, Industrial laws , regulations and source models
- To understand about fire and explosion, preventive methods, relief and its sizing methods
- To analyse industrial hazards and its risk assessment.

Course Outcomes (CO): Student will be able to

- To list out important legislations related to health, Safety and Environment.
- To list out requirements mentioned in factories act for the prevention of accidents.
- To understand the health and welfare provisions given in factories act.

UNIT - I Lecture Hrs:

Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT - II Lecture Hrs:

Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT - III Lecture Hrs:

Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working andapplications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

UNIT - IV Lecture Hrs:

Fault tracing: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, I. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT - V Lecture Hrs:

Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: I. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance

Textbooks:

1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.

Reference Books:

1.Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
2. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London.

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M.TECH. IN GEO TECHNICAL ENGINEERING
COURSE STRUCTURE & SYLLABI

Course Code	**BUSINESS ANALYTICS**	**L**	**T**	**P**	**C**
21DOE301c		**3**	**0**	**0**	**3**
	Semester	**III**			

Course Objectives:

- The main objective of this course is to give the student a comprehensive understanding of business analytics methods.

Course Outcomes (CO): Student will be able to

- Students will demonstrate knowledge of data analytics.
- Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.
- Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
- Students will demonstrate the ability to translate data into clear, actionable insights.

UNIT - I	Lecture Hrs:
Business Analysis: Overview of Business Analysis, Overview of Requirements, Role of the Business Analyst. Stakeholders: the project team, management, and the front line, Handling Stakeholder Conflicts.	
UNIT - II	Lecture Hrs:
Life Cycles: Systems Development Life Cycles, Project Life Cycles, Product Life Cycles, Requirement Life Cycles.	
UNIT - III	Lecture Hrs:
Forming Requirements: Overview of Requirements, Attributes of Good Requirements, Types of Requirements, Requirement Sources, Gathering Requirements from Stakeholders, Common Requirements Documents. Transforming Requirements: Stakeholder Needs Analysis, Decomposition Analysis, Additive/Subtractive Analysis, Gap Analysis, Notations (UML & BPMN), Flowcharts, Swim Lane Flowcharts, Entity-Relationship Diagrams, State-Transition Diagrams, Data Flow Diagrams, Use Case Modeling, Business Process Modeling	
UNIT - IV	Lecture Hrs:
Finalizing Requirements: Presenting Requirements, Socializing Requirements and Gaining Acceptance, Prioritizing Requirements. Managing Requirements Assets: Change Control, Requirements Tools	
UNIT - V	Lecture Hrs:
Recent Trands in: Embedded and colleborative business intelligence, Visual data recovery, Data Storytelling and Data Journalism.	

Textbooks:

1. Business Analysis by James Cadle et al.
2. Project Management: The Managerial Process by Erik Larson and, Clifford Gray

Reference Books:

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.
2. Business Analytics by James Evans, persons Education.