

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M-Tech III**

Subject: **Ground Improvement Techniques**

Total Theory Periods: **40**

Total Marks in End Semester Exam: **100**

Minimum number of class tests to be conducted: **02**

Branch: **Civil Engineering**

Code: **5110311(020)**

Total Tutorial Periods: **12**

Unit- I Ground Improvement Mechanical Modification:

Ground Improvement: Definition, Objectives of soil improvement, Classification of ground improvement techniques, Factors to be considered in the selection of the best soil improvement technique.

Mechanical Modification: Type of mechanical modification, Aim of modification, compaction, Principle of modification for various types of soils.

Unit- II Compaction

Effect of grain size distribution on compaction for various soil types like BC soil, lateritic soil, coarse-grained soil, micaceous soil. Effect of compaction on engineering behaviour like compressibility, swelling and shrinkage, permeability, relative density, liquefaction potential. Field compaction – static, dynamic, impact and vibratory type, Specification of compaction, Tolerance of compaction. Shallow and deep compaction

Unit- III Hydraulic Modification

Definition, aim, principle, techniques. gravity drain, lowering of water table, multistage well point, vacuum dewatering. Discharge equations. Design of dewatering system including pipe line effects of dewatering.

Unit- IV Drainage & Preloading

Drainage of slopes. preloading, vertical drains, sand drains. Assessment of ground condition for preloading, Electro kinetic dewatering.

Unit- V Grouting & Miscellaneous Methods (Only concepts)

Grouting: Introduction, Effect of grouting. Chemicals and materials used. Types of grouting. Grouting procedure. Applications of grouting.

Miscellaneous Methods (Only concepts): Introduction, Soil reinforcement. Thermal methods.. Ground improvement by confinement – Crib walls, Gabions and Mattresses. Anchors, Rock bolts and soil nailing.

Text Book:

1. Gopal Ranjan, ASR Rao “Basic and applied soil mechanics” New Age International (P) Ltd. Publisher, New Delhi
2. VNS Murthy “Soil Mechanics and Foundation Engineering Vol.- II” Sri Priya Technical Consultants, Bangalore.

Reference Book:

1. A. Singh & G.R. Chowdhry “Soil Engineering in Theory and practice”, CBS Publishers, 1990.
2. CECR Journals
3. IGC Proceeding

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M-Tech III**
Subject: **Analysis & Design of Foundation Structures**
Total Theory Periods: **40**
Total Marks in End Semester Exam: **100**
Minimum number of class tests to be conducted: **02**

Branch: **Civil Engineering**
Code: **5110331(020)**
Total Tutorial Periods: **12**

Unit- I

Foundation classification; Choice of foundations; Bearing capacity and settlement analysis of shallow foundations like footings and rafts, Deep foundations like piles, piers and Caissons

Unit- II

Analysis and design by conventional methods, shallow foundation structures, single, combined footings and Mats.

Unit- III

Analysis and design of deep foundations: pile foundations, piers, well foundations.

Unit- IV

soil-structure interaction, sub grade reaction methods, closed form solutions, finite differences and matrix methods, elastic theory methods, application to various foundation problems, evaluation of relevant soil parameters, recent advances.

Unit- V

Introduction to special foundations - ring foundations, off shore foundations, Foundations for transmission line towers, storage tanks, silos, chimneys etc

Text Book:

1. B.M Das “Principles of Foundation Engineering”, Seventh Edition, CL Engineering, 2013.
2. Swami Saran, “Analysis and Design of Substructures”, Oxford and IBH Publishing, New Delhi, 2008.
3. Ghosh Karuna Moy, “Foundation Design in Practice”, PHI Learning, 2009.

Reference Book:

1. Design of Foundation Systems, Ninan P Kurian, Narosa Publishing House, New Delhi, 2005.
2. Design of Reinforced Concrete Foundations, Varghese P. C, PHI Learning, 2009.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M-Tech III**

Subject: **Traffic Engineering**

Total Theory Periods: **40**

Total Marks in End Semester Exam: **100**

Minimum number of class tests to be conducted: **02**

Branch: **Civil Engineering**

Code: **5110332(020)**

Total Tutorial Periods: **12**

Unit- I

Introduction: Traffic Engineering Administration and functions. The road user and vehicle

Unit- II

Traffic Survey and Studies: Spot speed study, travel time study traffic volume study, origin and destination study parking study, accident study.

Unit-III

Traffic Control and Regulation: Road markings, Traffic signs, Traffic signals, Roadway delineator hazard marker, rumble strip, safety barriers, and regulation of traffic.

Unit-IV

Street light, TSM and Highway capacity

Unit- V

Theory of traffic flow: Scope definitions and basic diagram of traffic flow, car following queuing theory, vehicle arrivals headways and gaps.

Text Book:

1. L R Kadiyali "Traffic engineering and transport planning", Khanna Publishers, Delhi: 1987.
2. R. P. Roess, E.S.Prassas, W.R.McShane "Traffic Engineering Fifth Edition" By Pearson 2019

Reference Book:

1. D R Drew. *Traffic flow theory and control*. McGraw-Hill Book Company, New York, 1968.
2. Adolf D. May. *Fundamentals of Traffic Flow*. Prentice - Hall, Inc. Englewood Cliff New Jersey 07632, second edition, 1990.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M-Tech III**

Subject: **FEM in Geotechnical Engineering**

Total Theory Periods: **40**

Total Marks in End Semester Exam: **100**

Minimum number of class tests to be conducted: **02**

Branch: **Civil Engineering**

Code: **5110333(020)**

Total Tutorial Periods: **12**

Unit- I

Basic concept, process of discretization, principles and laws cause and effect, Global and local coordinates, different interpolation.

Unit- II

Requirement of approximation function, stress strain relation, Principle of minimum potential energy, integration

Unit- III

Potential energy approach, Direct stiffness method, Boundary conditions, Computer implementation.

Unit- IV

Stress distribution and deformation in isotropic and anisotropic soils, Built-up embankments, Seepage through porous media.

Unit- V

Sequence construction and excavation problems, Analysis of foundation, Dams underground structures and earth retaining structures. Analysis of flow through dams and foundation.

Text Book

1. Desai C.S. and Abel, J.F. (1987) "Introduction to FEM, A Numerical Method for Engineering."
2. Zienkiewicz, O.C. and ylor, R.L. "The finite Element Method" Fourth Ed. Meq Graw Hill Vol.1 (1989) and Vol 2 (1991)

References Books:

1. Bathe, K. "Finite Element Procedures in Engineering Analysis," Prentice Hall. 1982. Current Literature.
2. Y. M. Desai, T. I. Eldho, A. H. Shah "Finite Element Method with Applications in Engineering" by Pearson.