

ADVANCE GEOTECHNICAL ENGINEERING

Paper Code: ETCE-416

Paper: Advance Geotechnical Engineering

L	T/P	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

***Objective:** To introduce the fundamentals of soil dynamics and design of machine foundations as well as introduce the advanced topics of geotechnical engineering, such as, foundation of expansive soils and concepts and applications of geoenvironmental engineering.*

UNIT-I

Soil Dynamics: One Dimensional wave propagation, One Dimensional Wave in layered body, impedance ratio, angle of refraction, critical angle of incidence, introduction of attenuation of stress waves, Definitions of Material Damping and Radiation Damping in soil.

Measurements of Wave Propagation Velocity, Shear Modulus, Thickness of soil layers etc; Field Tests like Low Strain Test, Seismic Reflection Test, Seismic Refraction Test for Horizontal Layering and inclined or irregular layering, Suspension Logging Test, Steady States Vibration [Raleigh wave] Test, Seismic Cross Hole Test, Seismic Down Hole Test, Seismic Cone Test, Details and interpretation of Standard Penetration Test and Cone Penetration Tests. Laboratory Tests: Cyclic Triaxial Shear Test, Introduction of Centrifuge and Shaking Table Test.

[T1,T2] [No. of Hours: 12]

UNIT-II

Machine Foundation: Types of Machine Foundations, General Requirements, Design Data, Dynamic Loads induced in simple Crank Mechanism, Permissible Amplitudes and Bearing Pressure, General Theory of Transmissibility of force for Vibrating machines in brief

Analysis and Design of Block Type Machine Foundations: Brief review of Empirical Methods based on considering Soil as a Semi infinite Elastic Solid and Soil as a spring, Barkans Method of Analysis for Block Foundations including Vertical sliding, rocking and yawing of vibrations. Introduction of codes related with Machine Foundations.

[T1,T2][No. of Hours: 12]

UNIT-III

Foundation on Expansive Soils: Identification of expansive soils by field inspection and Laboratory Tests, general mechanism and characterization of swelling, Types of Damages in Building on expansive clay. Design of foundation on expansive soils like under-reamed piles, Computation of collapse settlement, Retaining walls in expansive soils, Treatment of cracked buildings.

[T1,T2][No. of Hours: 10]

UNIT-IV

Environmental Geo-technology: Contamination due to landfills, subsurface contamination due to leachate and its effects. One dimensional analysis of contaminant transport, contaminated sites, Containment of solid waste in landfills, Vertical barrier for containment, Geo-technical reuse of construction and industrial waste materials

Case study of Ash disposal from Thermal power plant, Ash pond and its design with/without geo-textiles, Environmental impact and control.

[T1,T2][No. of Hours: 10]

Text Books:

[T1] Fundamentals of Soil Dynamics by B.M. Das, Elsevier Publication

[T2] Foundation engineering, Varghese, PHI Learning Pvt. Ltd.

References Books:

[R1] Foundation for Machine: Analysis and Design by S. Prakash and V. K. Puri, John Wiley

[R2] Geotechnical Earthquake Engineering by Kramer, Pearson publications.

[R3] Gulati-Datta - Geo-Technical Engineering, Tata McGraw Hill Publishers

[R4] Waste containment systems, waste stabilization and landfills: design and evaluation, Hari D Sharma, and Sangeeta P.Lewis, John Willey and Sons.

- [R5] V.N.S. Murthy -Advanced Foundation Engineering, CBS Publishers and Distributors.
[R6] Foundation analysis and Design, Bowles, McGraw Hill Education(I) Pvt. Ltd.