

## Deep Foundation Systems and Tunnels

<b>Course Name</b>	<b>Deep Foundation Systems and Tunnels</b>
<b>Course Name as on Certificate</b>	<b>Deep Foundation Systems and Tunnels</b>
<b>Certificate Type</b>	Certificate of Completion by IITM Pravartak and L&T EduTech
<b>Certificate Issued by</b>	IIT MADRAS and L&T EduTech
<b>Course Objectives</b>	<p><b><u>Course Overview</u></b></p> <p>This course has a systematic and concise treatment to geological and geotechnical aspects of deep excavations and deep foundations. Construction methodologies like top down and bottom up techniques, Drill and blast, cut and cover, box pushing, NATM and NMT for deep excavations and tunnels Instrumentation monitoring of underground construction are explained with illustrations and case studies. Support systems like sheet piles, soldier piles, secant piles, contiguous piles and diaphragm walls for deep excavations are dealt in detail. The materials, equipment, workmanship, EHS, quality and design considerations for deep foundations such as the Piles, caissons, wells and coffer dam systems are elaborated. The usage of software tools like Plaxis, Roc lab and Wallap for modelling piles and excavation support systems are demonstrated.</p> <p><b><u>Course Objectives</u></b></p> <ul style="list-style-type: none"> <li>• Explain the construction and design of pile foundations</li> <li>• To Explore the concepts of Deep excavations and Pre-excavation support systems</li> <li>• Discuss the tunnel construction methods and support systems</li> <li>• Emphasis and explain the significance and methods of tunnel monitoring</li> </ul>
<b>Eligibility</b>	Students pursuing Diploma/ UG /PG Programs in Civil Engineering
<b>Pre Requisites</b>	Soil Mechanics, Foundation Engineering, Structural Analysis

<b>Target Segment</b>	Students pursuing Diploma/ UG / PG Programs in Civil Engineering Faculties / Working Professionals in the above domain & other aspiring learners		
<b>Course Content</b>	<b>See Enclosed Programme details – as Annexure 1</b>		
<b>Pedagogy</b>	Online Self paced E-Learning Content		
<b>Assessment</b>	One Final Assessment		
<b>Programme Faculty</b>	L&T Industry Experts		
<b>Duration</b>	Units : 5 Hours : 30		
<b>Class Schedule</b>	Self-Paced		
<b>Programme Highlights/USPs</b>	<ul style="list-style-type: none"> <li>• Introduction to deep foundations and construction practices in Pile foundations</li> <li>• Deep excavations</li> <li>• Diaphragm walls</li> <li>• Pre-Excavation support systems</li> <li>• Tunnel construction methodologies</li> <li>• Tunnel Support Systems</li> <li>• Instrumentation and Monitoring in tunnels</li> </ul>		
<b>Programme Mentor</b>	<p><b>Dr. G .D Raju</b>  <b>Chief Geotechnical Engineering Manager, L&amp;T Construction</b></p> <p>Dr. G.D Raju is a Rock &amp; geomechanics Engineer and a former Scientist at “National Institute of Rock Mechanics” . He earned his PhD from McGill University, Canada and has experience in working in projects across India, Canada, Singapore and Bhutan. With extensive experience of over 25 years in the field of Mining, tunneling, oil and natural gas and Civil construction he heads the geotechnical division of Heavy Civil Infrastructure at Larsen and Toubro. He and his team are involved in design of tunnels, caverns, Foundation of bridges and geotechnical aspects of nuclear reactor projects.</p>		
<b>Total Fees</b>		<b>Total Fees (Rs.)</b>	
	Total Programme Fee	Rs 5,100/- inclusive of tax	

**ANNEXURE 1**

Proposed Course outline / programme / plan – Unit wise syllabus details.

**Unit – I : Deep Excavations and Deep Foundations**

Introduction to deep excavations, types of deep foundations, Design basis for pile foundations and selection of Pile foundations, Site investigations

**Unit – II : Construction and design of Pile foundations**

Bored Cast in situ piles, Precast driven Piles, Under reamed Piles, Pile group and Load testing on piles, Challenges in piling operations, Quality control of Piles

**Unit – III : Underground Metro stations and Retaining structures**

Diaphragm walls, Secant piles, Contiguous piles, Soldier piles, Design of Embedded Earth retaining systems, shafts.

**Unit – IV : Tunnels and Pre-Excavation support systems**

Methods of construction of tunnels, top down methods, Bottom up methods, Drill and blast, NATM, NMT, Cut and cover tunnels, Support systems – Rock Bolts, Lattice girders, Anchors, shotcrete, face support, umbrella arch systems

**Unit – V : Tunnel Monitoring systems**

Instrumentation and monitoring, Monitoring Plan, Trigger limits , Case studies