

Geotechnical Engineering
Offshore Geotechnical Engineering
01GT0111 (PEC)
Objective of the Course:

1. To impart knowledge about the offshore Geotechnical Engineering
2. To study understanding of behavior of the structure under tidal condition and continuous exposure to water currents.

Credit Earned: 3
Students learning outcomes:

After successful completion of the course, it is expected that student will be able to,

1. To analyse index and engineering properties of marine clays
2. To adopt suitable investigation method and sampling techniques for these marine deposits and select necessary design parameters.
3. Student will be able to differentiate and analyse wind and wave forces required for design as per location and standards.
4. Design suitable offshore foundation

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	CSE (I)	IA (M)	Viva (V)	Term Work (TW)	
03	00	00	03	50	20	30	25	25	150

Detailed Syllabus

Sr. No.	Title of the unit	Number of hours
1	Introduction	06
	Offshore structures and foundations, Identify and describe key challenges of offshore engineering design, Physical and engineering properties of marine soils	
2	offshore site investigation	12
	Challenges of site investigation in marine environment, Different site investigation techniques, sampling techniques, Geophysical methods, Recent advancements in site investigation and sampling used for marine soil deposits, Interpret selected geotechnical site investigation data	
3	Wave and Wind Forces	12
	Wave and Wind Mechanics: Wave generation process, small and finite amplitude wave theories, Wave forces on vertical, inclined cylinders,	

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	structures –current forces and use of Morison equation, Effect of wave loading on offshore foundations, Behavior of sands and clays under cyclic loading, Laboratory experiments including Repeated loading, Cyclic behavior of soils based on fundamental theory of mechanics	
4	Offshore Foundations: Different offshore and nearshore foundations, Gravity platforms, Jack-up rigs, pile foundations and cassions, Identify the main types of offshore foundation systems and describe the drivers during foundation design, perform selected foundation design calculations to illustrate the interplaying mechanisms	12
	Total	42

Suggested Theory Distribution

The suggested theory distribution as per Bloom’s taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	5%	20%	25%	25%	20%

Instructional Method and Pedagogy:

1. Use of Learning Management system like canvas
2. Demonstration through presentations on power point and videos and lectures
3. Brainstorming and group discussion sessions
4. Collaborative learning

Recommended Study Material
Reference Book:

1. Randolph M and Gourvene S, Offshore Geotechnical Engineering, CRC Press,2017.
2. Ben C. Gerwick, “Construction of Marine and Offshore Structures”, CRC Press, 1999.
3. B. Gou, S. Song, J. Chacko and A. Ghalambor, “Offshore Pipelines”, GPP Publishers, 2006.
4. S. K. Hakrabarti, “Handook of Offshore Engineering”, Elsevier, 2005.
5. M. J. Tomlinson, “Pile Design and Construction”, E and F Spon, 1994
6. Offshore Structural Engineering -Thomas H. Dawson, Prentice Hall Inc Englewood Cliffs, N.J. 1983
7. Offshore Structures, Vol.1, -Reddy, D.V. and Arockiasamy, M.,Krieger Publishing Company, Malabar, Florida, 1991.
8. Hydrodynamics of Offshore Structures -Chakrabarti, S.K. Computational Mechanics Publications, 1987
9. Dynamic Analysis of Offshore Structures, -Brebria, C.A.Walker, S., New-nes Butterworths, U.K. 1979.