

**Design of Offshore Structures**
**01ST1213 (PEC)**
**Objective of the Course:**

- To learn the types and functions of offshore structure
- To study the behavior of structures subjected to waves
- To study the effect of the different load considerations in the analysis procedures for offshore structures.

**Credit Earned: 3**
**Students learning outcomes:**

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

1. Understand the types and functions of offshore structure.
2. Evaluate the loads and wave force experienced by offshore structure
3. Assess the performance of structures under offshore environmental conditions.
4. Analyse the offshore structures subjected to dynamic loads

**Teaching and Examination Scheme**

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	CS E (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
<b>1</b>	<b>Introduction</b>	<b>08</b>
	Types of Offshore Structures, Types of Offshore Platforms, Functions of offshore structures, Components of a Typical Offshore Structure, Structural Systems for shallow, medium and deep water, offshore pipelines and risers; Steel, concrete, and hybrid platforms, Ingredient materials and protective measure, Corrosion and other allowances	
<b>2</b>	<b>Analysis of Offshore Structures</b>	<b>14</b>
	Gravity Loads, Wind Load, Offshore Loads, Fatigue Load, Seismic Loads, Wave generation and Propagation, Small and finite amplitude wave theories, Wave energy, pressure distribution, Wave Forces on	

**Structural Engineering**

	cylindrical structures, Hydrostatic Pressure and Buoyancy, Environmental loading. Wind, wave and current loads, Loads and stability during handling and towing, Fatigue analysis of fixed and floating offshore structure, stress concentration, S-N curves.	
<b>3</b>	<b>Design of Offshore Structures</b> Design of Foundations, site investigations, gravity, jacket platforms, hybrid platforms, Piled foundation and behavior under dynamic loading, various design methods and codes, Design consideration, Design loads, Design of decking, Design of supporting legs, Design of braces, Design of concrete platforms, Design of slide walls, Design of wharf, jetty, dry dock, lock, spillway and dolphin.	<b>14</b>
<b>4</b>	<b>Dynamic Analysis</b> Characterization of Offshore Structure as an SDOF System, SDOF Models in Offshore Structures, MDOF Systems, response of fixed type offshore structures, articulated towers, single leg and multi-legged towers	<b>06</b>
		<b>42</b>

**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. D.V. Reddy, A. S. J. Swamidas, "Essentials of Offshore Structures", CRC Press, Taylor & Francis Group
2. Mohamed A. El-Reedy, "Offshore Structure, Design, Construction and Maintenance"
3. Narsimhan S & Kathirolu S., "Harbour and Coastal Engineering (Indian Scenario) – Vol I and II, National Institute of Ocean Technology.
4. Eugenio Fortaleza, "Active Control of Offshore Structures", Lambert Academic Publication
5. IS Codes: IS:4651, IS: 9527, IS:10020, IS:2911, IS: 456