Approved

5439 OFFSHORE STRUCTURES

Teaching Schedule Per Week			Progressive Assessment		Examination Schedule (Marks)			
Lectures	Practical	Credits			Theory		Practical Ex.	Total
3	2	5	25	25	3Hrs	100	25	175

Pre-requisite	Source
Nil	MCL

Semester	Theory	Test	Total	TW	PR	Gr Total
	75	25	100	25	25	150

Rationale- New commercial sources of energy and minerals critical to human existence are being sought from the oceans due to the depletion of conventional land-based resources. Through this course students will learn the various aspects of ocean environment, type of offshore structures, materials and equipment used for construction. The installation of submarine pipeline used for transfer of oil & gas will be studied along with the repair works.

COURSE CONTENTS

	Hrs	Mks
	2	5
1. OCEAN RESOURCES Minerals – poly-metalic nodules, placer deposits, oil & gas, Gas Hydrates	5	10
2. OCEAN ENVIRONMENT Waves – wave height, wave period, wave direction, design wave height; Tides – different tide levels; Currents – variation of currents with depth; Wind – variation of windspeed and direction, wind speed during cyclones; Seabed characteristics – brief note on marine geotechnical investigations, geophysical survey, drilling and sampling procedures, in-situ testing techniques; Temperature and salinity variations with depth.	12	25
3. TYPES OF OFFSHORE STRUCTURES INCLUDING BASIC DESIGN CRITERIA Exploratory drilling structures – Jack-up-rigs, semi-submersibles, drill ships Production platforms – fixed structures (gravity and piled) – compliant structures (TLP and articulated tower) Single point mooring system; Mention of forces acting on the structures.	5	10
4. SUBMARINE PIPELINES Installation methods – lay-barge method, reel-barge method, tow method, pipeline trenching methods – jetting method, mechanical cutting, fluidization method, plowing method	8	15
5. EQUILIBRIUM OF FLOATING BODIES – Centre of Buoyancy Archimedes Principle; Buoyancy / Metacentre – Type of equilibrium of floating body – maximum length of body floating in water; Numerical problems	8	15
6. MATERIALS AND FABRICATION IN MARINE ENVIRONMENT Steel structures for offshore environment – types of steels and its strength requirements, fabrication and welding details – erection of structural steel – coatings and corrosion protection – Non-destructive testing of weld, concrete mixes and their proportion – concept of pre stressed concrete – placing of concrete underwater. Causes and failure of structures	8	20
7. CONSTRUCTION TECHNOLOGY Marine operations – cranes – barges – derrick barges – jack up barges, launch barges; Installation of offshore structures – steel jackets – removal of jacket from barge – lifting and launching – installation on the sea floor. Diving and underwater works; underwater concreting and grouting. Repair and maintenance of offshore structures. Repair methods – surface welding, hyperbaric welding, mechanical connectors, full encirclement sleeves, flexible pipe repair		
TOTAL	48	100