**MAE 3524 Thermal Fluids Design  
Project 2**  
**Design of an Open OTEC Power Cycle for Multifaceted Utilization**

Student #1 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  
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Please sign the pledge:

“I/We did not copy the solution of this assignment from a solution manual or  
from other students.

Student #1 Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  
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**Design Project 2**

**Design of an Open OTEC Power Cycle for Multifaceted Utilization**

**Background and Objective:**

An island in the Pacific Ocean is seeking to develop a sustainable and efficient energy system that can leverage the ocean's thermal gradient. The challenge is to integrate power generation, freshwater production, and refrigeration in a single system that is economically viable and environmentally sustainable.

This project aims to design an open Ocean Thermal Energy Conversion (OTEC) power cycle with a net power output of 20 MW. The design should also account for the dual application of the system’s condensate as a freshwater supply and the utilization of deep cold water to augment the refrigeration cycle of an industrial cooling load.

1. Abstract: The purpose of this design project is the optimization of an open Ocean Thermal Energy Conversion process plant. Given a set of parameters and specifications, this project deduces an optimal pipe and plant configuration to achieve the highest economic impact possible. The optimization was done largely through MATLAB. **Results and conclusions needed.**
2. Background: Ocean Thermal Energy Conversion is a process that uses the thermal difference between warm surface and cold deep ocean water to generate power. Warm surface water is flash boiled into vapor and used to power a turbine. The cold water powers a condenser that converts the vapor back into water. The turbine generates electricity that can be utilized by a local power grid. The boiling and condensing process also desalinates the ocean water providing clean fresh water.
3. Problem Statement: Using the given set of parameters design an OTEC system that generates 20MW of electric power. This system needs to have an optimized pipe for bringing the cold water up from a depth of 600m. The plant also needs to be optimized around three different Mechanical Vapor Compression configurations. Once the systems are designed P-h and H-Q diagrams must be provided for all three configurations. The economic impact of the system must be analyzed and the optimal configuration identified. Determine when the system will break even and what the lifetime return on investment would be assuming a lifespan of 25 years.
4. **MATLAB CODE**
5. Design Review Analysis: **REVIEW DESIGN AND DISCUSS ERRORS/RESULTS/ASSUMPTIONS**