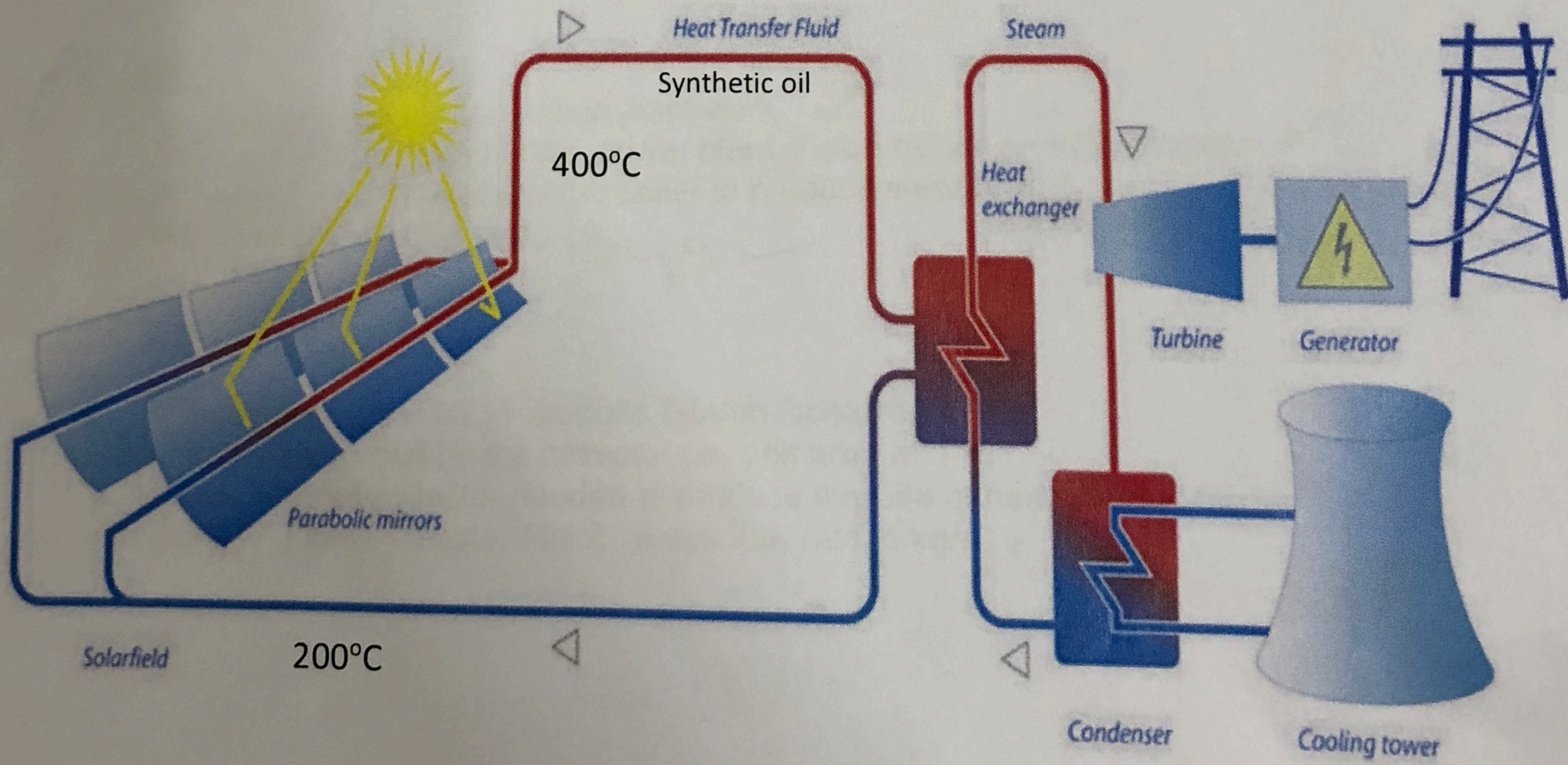
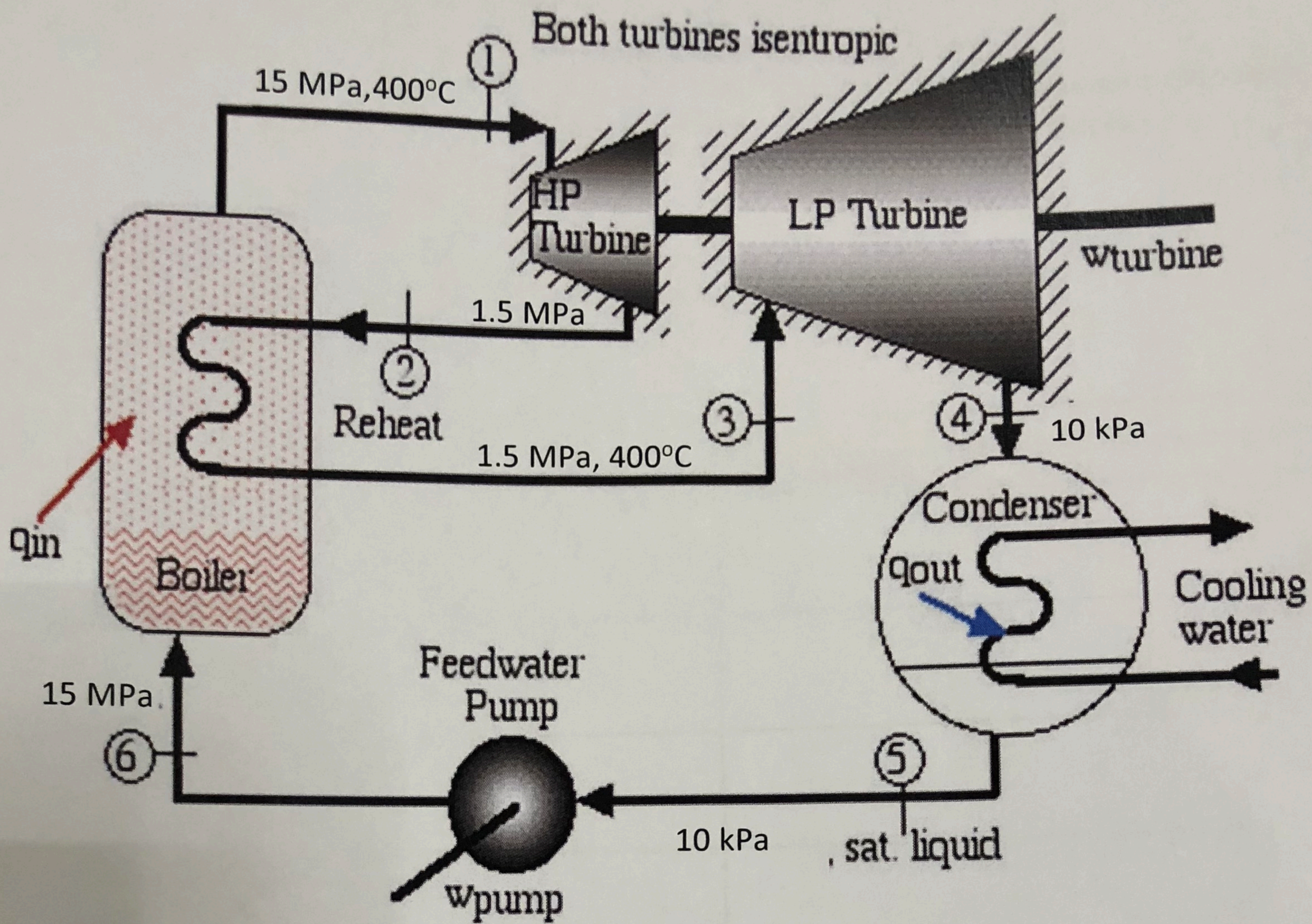


Group 1: Parabolic trough solar thermal power station



Requirements:

- 1- Assume power generation (power station output) 20 MW
- 2- Calculate the heat needed to produce steam from the steam cycle
- 3- Determine the number of PTC necessary to produce the needed heat to generate the steam
- 4- Detailed study of PTC (material (properties, size, design) , structure, and may be construction)
- 5- Selection of heat transfer fluid
- 6- Design of the piping system (layout)
- 7- Pressure losses in piping system and select a pump
- 8- Write a report
- 9- Presentation

Title		
ID	Name	Responsibility

Tasks:

Power plant

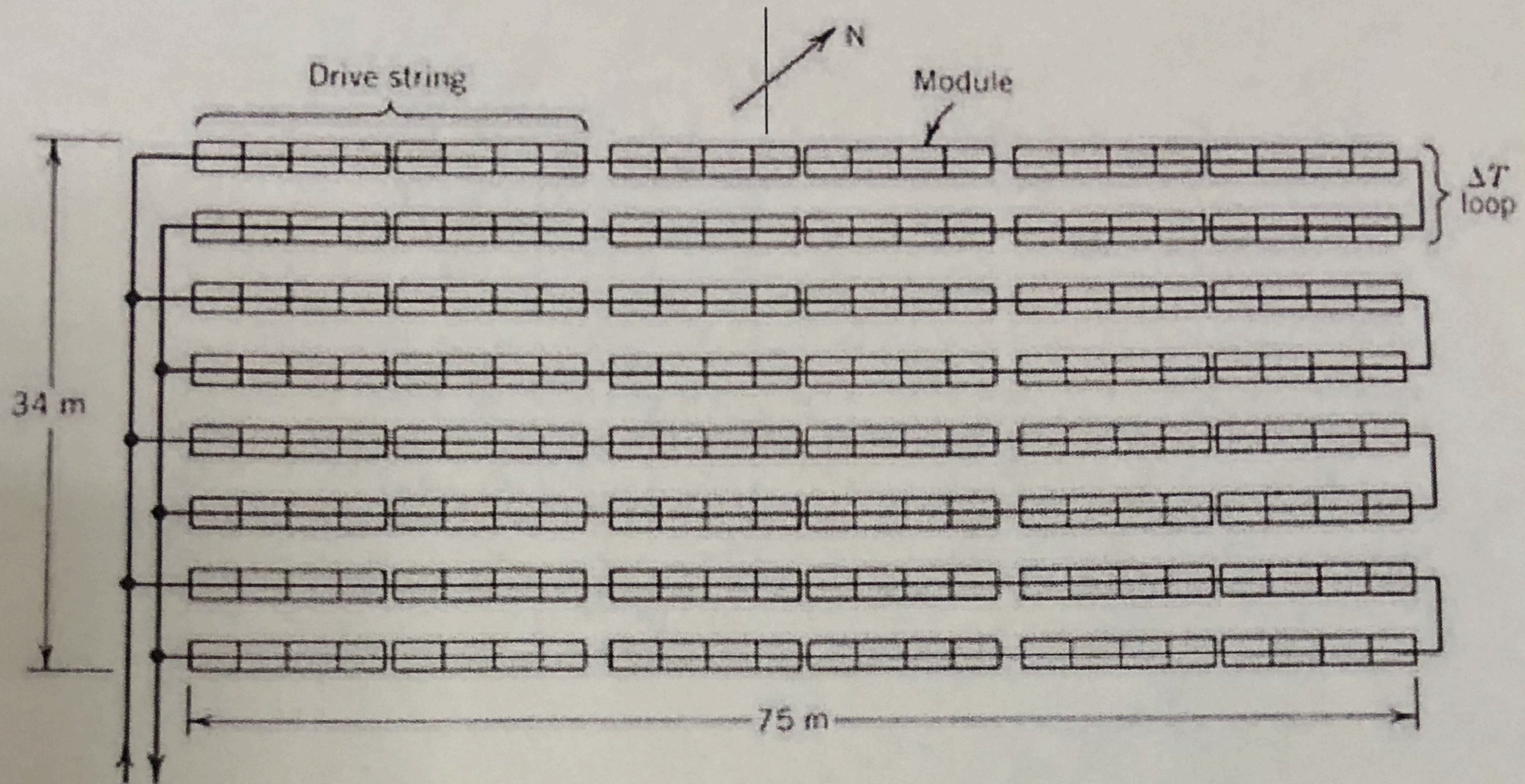
- 1- Describe how a steam power generation plant work ✓
- 2- Sketch the thermodynamic cycle of the power plant shown below on a Ph-diagram. ✓
- 3- Calculate the rate of heat needed by the boiler to produce steam. *20.25 MW*
- 4- Calculate the steam mass flow rate. *177 kg/s*

Collector

- 1- A detailed description of a PTC (Parabolic Trough Collector).
- 2- Calculate the heat absorbed by the collector per unit are (m') ←
- 3- Calculate the number of collector needed to produce the rate of heat needed for the boiler. ⊙
- 4- Calculate the HTF (heat Transfer Fluid) mass flow rate in kg/s ⊙

Piping System

- 6- Sketch the layout of the piping system of the solar field, the number of modules and number of loops etc
- 7- Specify the location of the minor losses devices (valves, elbows Tees,)
- 8- Figure out what is the recommended HTF velocity [m/s] in the piping system
- 9- Calculate the total losses
- 10- Select the pump.

**Report writer.**

- 1- Write an introduction on what the project is about.
- 2- Divide the project into 5 chapters below. Collect the work from your colleagues and prepare the report (a writing guideline will be provided soon)
 - a. Introduction
 - b. Power plant design
 - c. Collector design
 - d. Piping system
 - e. Conclusion and recommendations.