**Project II**

Task 1

You work for a gas turbine design company and have a client who has a fairly loose specification for a new gas turbine engine getting designed. You are required to design an aviation gas turbine to power the aircraft with minimum efficiency requirements of 40%. Though the client wants to achieve lowest fuel consumption possible. The following guideline efficiencies have been given to assist in the design process.

Fan, compressor and turbine isentropic efficiencies 90%

Propelling nozzles isentropic efficiencies 94%

Mechanical transmission efficiency from turbine to compressor 96%

You have total discretion to assume the temperatures, pressures and any other variable you deem necessary unless stated above, though assumptions need to be of sensible values that are justified given current engineering technology.

Your brief summary report should include as a minimum the following;

1. Discuss selection of different components and types. You need to demonstrate why a particular type/component or value has been selected as compared to others. Your answers should have both numerical and theoretical response to this part.
2. What are outlet pressures and temperatures
3. Show calculations of work transfer from turbine to compressor, rest calculations are not needed.

Task 2

As there is a more and more push happening for Hydrogen to be used as fuel, students are required to review the literature and give their assessment of impact on Hydrogen powered industrial and aviation gas turbines on thermodynamic cycle and other impacts. This should be completed in less than one page.

Task 3

Students are required assess and discuss the changes required in an air conditioning system which is currently used to cool a room in Tuscaloosa. How can we change the room to store frozen food. You can also suggest changes to be done in a room. Explain what all needs to be done and how. This should be completed in less than one page.

Your submission should not exceed 5 pages of A4 including all text, equations. Use font size 12 and line spacing 1.

If helps, Students can write equations and draw diagrams by hand and place them in the submission.

Submission should be done on Turnitin (blackboard)

Deadline: - Midnight of April 25th 2024, Alabama time. No extensions would be given.

Note :- Mechanical transmission efficiency is the efficiency of work transfer from turbine to compressor. For an example if turbine is producing 100W for compressor, only 95W will actually reach compressor. Rest will be lost in frictional losses etc related to shaft power transfer. It is recommended that students go through gas turbine problem sheets uploaded in the folder.