

Internal Combustion Engines , ME422 Yeditepe Üniversitesi

Homework #1 to be submitted by 24th November, 2017

- 1) Compare **Otto** and **Diesel Cycles** with the same compression ratio (ϵ) and equal heat addition to the cycle, indicating which cycle has greater thermal efficiency.

For a given pressure ratio of $\beta = 3.5$ for the Otto Cycle, calculate the load ratio, (α) for the Diesel Cycle to obtain the same heat addition value.

Discuss your results.

- 2) Calculate the **thermal efficiency, indicated and brake power output and torque** of a single cylinder, four stroke 1.0 liter spark ignition engine assuming that it runs according to the **ideal Otto Cycle** (at full load, WOT at 3400 rpm).

Calculate conditions (**T** and **p**) at state (1), (2), (3) and (4) of the Otto Cycle.

Engine data and operating conditions are given as;

Engine bore to stroke ratio is 1.0

Compression ratio is 10:1

Mechanical efficiency is 85%

Combustion efficiency is 98%

Fuel is iso-octane with a heating value of 44300 kJ/kg

Air/Fuel ratio is 15:1

At the beginning of the compression stroke conditions in the cylinder are 100 kPa and 50 °C

Discuss your results and indicate any deviations from the real engine operating conditions.