# Thermal-Fluid Unit 07: Power Conversion

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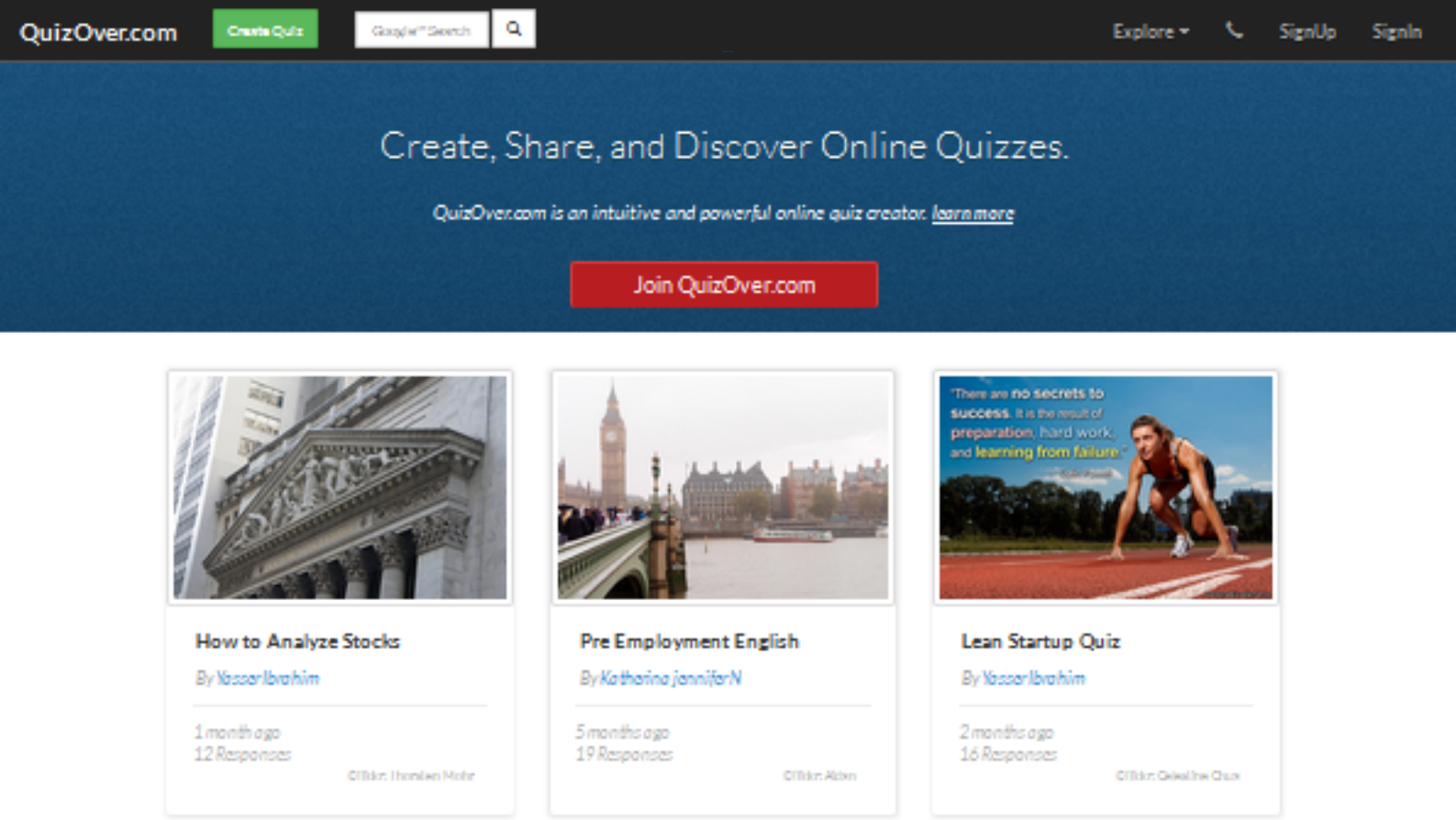
Published 2014

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# 4. Chapter: Unit 07: Power Conversion

## 1. Unit 07: Power Conversion Questions

# 4.1.1. Combustion of a fuel at 1200°K at a rate of 3 kW produces steam...

Author: Steve Gibbs

Combustion of a fuel at 1200°K at a rate of 3 kW produces steam at 550°K.The steam then produces 2 kW of work and rejects some heat to 310°K. What is the second-law efficiency of the process?

Please choose only one answer:

- 66%
- 74%
- 39%
- 89%
- 100%

# 4.1.2. A reciprocating, spark ignition engine takes in an air-fuel mixture...

Author: Steve Gibbs

A reciprocating, spark ignition engine takes in an air-fuel mixture at 20°C. It has a compression ratio of 12. The air-to-fuel ratio is 14, and the heating value of the fuel is 70,000 kJ/kg. For an air standard cycle analysis, what is the highest temperature reached in °K? You may assume C[sub]v[/sub] is approximately 0.7 kJ/kg K and that k=C[sub]p[/sub]/C[sub]v[/sub] = 1.4.

Please choose only one answer:

- 7934°K
- 791°K
- 5934°K
- 591°K
- 1243°K

# 4.1.3. A reciprocating, spark ignition engine takes in an air-fuel mixture...

Author: Steve Gibbs

A reciprocating, spark ignition engine takes in an air-fuel mixture at 20°C. It has a compression ratio of 12. The air-to-fuel ratio is 14, and the heating value of the fuel is 70,000 kJ/kg. For an air standard cycle analysis, what is the highest pressure reached? You may assume C[sub]v[/sub] is approximately 0.7 kJ/kg K and that k=Cp/Cv = 1.4.

Please choose only one answer:

- 2.34 atm
- 50 atm
- 23.4 atm
- 234 atm
- 325 atm

# 4.1.4. A reciprocating, spark ignition engine takes in an air-fuel mixture...

Author: Steve Gibbs

A reciprocating, spark ignition engine takes in an air-fuel mixture at 20°C. It has a compression ratio of 12. The air-to-fuel ratio is 14, and the heating value of the fuel is 70,000 kJ/kg. For an air standard cycle analysis, what is the thermal efficiency? You may assume C[sub]v[/sub] is approximately 0.7 kJ/kg K and that k=Cp/Cv = 1.4.

Please choose only one answer:

- 50%
- 66%
- 63%
- 75%
- 89%