

Engineering Thermal-Fluid Systems MCQ

Author: Steve Gibbs

Professor @The Saylor Foundation

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1. Thermal-Fluid Systems MCQ

- Unit 05: Heat Exchangers
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4. Chapter: Unit 05: Heat Exchangers

1. Unit 05: Heat Exchangers Questions

4.1.1. A countercurrent heat exchanger operates with the following tempera...

Author: Steve Gibbs

A countercurrent heat exchanger operates with the following temperatures: cold fluid inlet 15°C, cold fluid outlet 25°C, hot fluid inlet 90°C, and hot fluid outlet 30°C. Calculate the logarithmic-mean temperature difference in °C.

Please choose only one answer:

- 45°C
- 30°C
- 27°C
- 25°C
- 50°C

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4.1.2. A fluid with heat capacity 2.2 kJ/kg K enters a heat exchanger at 9...

Author: Steve Gibbs

A fluid with heat capacity 2.2 kJ/kg K enters a heat exchanger at 90°C and leaves at 30°C at a flow rate of 5 kg/s. Calculate the heat removal from this fluid.

Please choose only one answer:

- 660 W
- 6.60 kW
- 66.0 kW
- 660 kW
- 66.0 W

Check the answer of this question online at QuizOver.com:

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4.1.3. A fluid with heat capacity 2.2 kJ/kg K enters a heat exchanger at 9...

Author: Steve Gibbs

A fluid with heat capacity 2.2 kJ/kg K enters a heat exchanger at 90°C and leaves at 30°C at a flow rate of 5 kg/s. If the heat capacity of the cooling fluid for the heat exchanger is 1 kJ/kg K, what is its flow rate in kg/s?

Please choose only one answer:

- 66 g/s
- 6.6 kg/s
- 66 kg/min
- 660 kg/s
- 66 kg/s

Check the answer of this question online at QuizOver.com:

Question: [A fluid with heat capacity 2.2 kJ/kg K enters Steve Gibbs @The Thermal](#)

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4.1.4. If $T_{lm} = 27^{\circ}\text{C}$, $Q = 660 \text{ kW}$, and $A = 10 \text{ m}^2$...

Author: Steve Gibbs

If $T_{lm} = 27^{\circ}\text{C}$, $Q = 660 \text{ kW}$, and $A = 10 \text{ m}^2$ for a countercurrent heat exchanger, what is the overall heat transfer coefficient in $\text{W/m}^2 \text{ K}$?

Please choose only one answer:

- $24 \text{ W/m}^2 \text{ K}$
- $242 \text{ W/m}^2 \text{ K}$
- $2418 \text{ W/m}^2 \text{ K}$
- $24180 \text{ W/m}^2 \text{ K}$
- $2.4 \text{ W/m}^2 \text{ K}$

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4.1.5. A countercurrent heat exchanger operates with the following tempera...

Author: Steve Gibbs

A countercurrent heat exchanger operates with the following temperatures: cold fluid inlet 20°C, hot fluid inlet 90°C. The heat capacity of the hot fluid is 2.2 kJ/kg K. The heat capacity of the cold fluid is 1 kJ/kg K. The flow rate of the hot fluid is 5 kg/s. The flow rate of the cold fluid is 66 kg/s. The area for heat transfer is 10 m². The overall heat transfer coefficient is 2418 W/m² K. What are the outlet temperatures?

Please choose only one answer:

- $T_{\text{hoto}} = 29.6^\circ \text{C}$, $T_{\text{coldo}} = 30.1^\circ \text{C}$
- $T_{\text{hoto}} = 29.6^\circ \text{C}$, $T_{\text{coldo}} = 40.1^\circ \text{C}$
- $T_{\text{hoto}} = 29.6^\circ \text{C}$, $T_{\text{coldo}} = 50.1^\circ \text{C}$
- $T_{\text{hoto}} = 19.6^\circ \text{C}$, $T_{\text{coldo}} = 20.1^\circ \text{C}$
- $T_{\text{hoto}} = 39.6^\circ \text{C}$, $T_{\text{coldo}} = 30.1^\circ \text{C}$

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4. Chapter: Unit 06: Cooling and Refrigeration

1. Unit 06: Cooling and Refrigeration Questions

4.1.1. Calculate the maximum COP for a vapor absorption refrigeration syst...

Author: Steve Gibbs

Calculate the maximum COP for a vapor absorption refrigeration system operating with a heat source (generator) at 110°C, a chiller temperature (absorber) of 5°C, and a condenser temperature of 30°C.

Please choose only one answer:

- 0.5
- 1.9
- 2.1
- 0.43
- 2.3

Check the answer of this question online at QuizOver.com:

Question: [Calculate the maximum COP for a vapor absorption Steve Saylor Thermal](#)

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4.1.2. Find the Carnot coefficient of performance for a refrigeration syst...

Author: Steve Gibbs

Find the Carnot coefficient of performance for a refrigeration system operating between 320°K and 285°K.

Please choose only one answer:

- 6.5
- 8.14
- 0.12
- 0.16
- 3.0

Check the answer of this question online at [QuizOver.com](http://www.quizover.com):

Question: [Find the Carnot coefficient of performance Steve Gibbs Saylor Thermal](#)

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4.1.3. For a vapor-compression refrigeration system, the enthalpy of the r...

Author: Steve Gibbs

For a vapor-compression refrigeration system, the enthalpy of the refrigerant at the evaporator input is 88 kJ/kg; the enthalpy at the compressor input is 190 kJ/kg; the enthalpy at the compressor output is 260 kJ/kg. The compression is isenthalpic. What is the coefficient of performance of the system?

Please choose only one answer:

- 1.0
- 2.0
- 1.5
- 0.66
- 3.0

Check the answer of this question online at QuizOver.com:

Question: [For a vapor-compression refrigeration system Steve Gibbs @The](#)

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4.1.4. A refrigeration system with a COP of 3.5 is used to make ice from w...

Author: Steve Gibbs

A refrigeration system with a COP of 3.5 is used to make ice from water at 0°C at a rate of 1000 lbs per day. What is the minimum power required by the refrigerator?

Please choose only one answer:

- 100 W
- 200 W
- 1000 W
- 500 W
- 5000 W

Check the answer of this question online at QuizOver.com:

Question: [A refrigeration system with a COP of 3.5 is Steve Gibbs @The Saylor](#)

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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%

Check the answer of this question online at QuizOver.com:

Question: [Combustion of a fuel at 1200 deg K at a rate Steve Gibbs @The](#)

Flashcards:

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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 $C_{p/v}$ is approximately 0.7 kJ/kg K and that $k = C_{p/v} / C_{v/v} = 1.4$.

Please choose only one answer:

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

Check the answer of this question online at QuizOver.com:

Question: [A reciprocating spark ignition engine takes Steve Gibbs @The Saylor](#)

Flashcards:

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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_v is approximately 0.7 kJ/kg K and that $k=C_p/C_v = 1.4$.

Please choose only one answer:

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

Check the answer of this question online at QuizOver.com:

Question: [A reciprocating spark ignition engine takes Steve Gibbs @The Saylor](#)

Flashcards:

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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_v is approximately 0.7 kJ/kg K and that $k=C_p/C_v = 1.4$.

Please choose only one answer:

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

Check the answer of this question online at QuizOver.com:

Question: [A reciprocating spark ignition engine takes Steve Gibbs @The Saylor](#)

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4. Chapter: Unit 04: Piping Networks

1. Unit 04: Piping Networks Questions

4.1.1. Water flows through a narrow (ID = 750 micron) capillary at 1 ml/mi...

Author: Steve Gibbs

Water flows through a narrow (ID = 750 micron) capillary at 1 ml/min. The surface of the capillary is smooth. The capillary is 1 m long. Calculate the pressure drop over a 1 m length.

Please choose only one answer:

- 2.1 kPa
- 2.1 Pa
- 42 kPa
- 21 Pa
- 4.2 Pa

Check the answer of this question online at QuizOver.com:

Question: [Water flows through a narrow ID 750 micron Steve Gibbs @The Saylor](#)

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4.1.2. A fluid of density 0.78 g/cm³ and viscosity 2.2 cP flows through a ...

Author: Steve Gibbs

A fluid of density 0.78 g/cm³ and viscosity 2.2 cP flows through a 5 inch ID pipe with surface roughness $e/D = 0.005$ at a flow rate of 500 kg/min. The pipe is 100 m long. What is the pressure drop over the pipe?

Please choose only one answer:

- 7.5 Pa
- 7.5 kPa
- 750 kPa
- 750 Pa
- 75 Pa

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Question: [A fluid of density 0.78 g/cm³ and viscosity Steve Gibbs @The Saylor](#)

Flashcards:

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4.1.3. Water flows through a 0.5 inch ID 90-degree elbow at 50 L/min. What...

Author: Steve Gibbs

Water flows through a 0.5 inch ID 90-degree elbow at 50 L/min. What is the associated pressure drop?

Please choose only one answer:

- 1.75 kPa
- 1.75 Pa
- 35 Pa
- 17.5 kPa
- 175 kPa

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Question: [Water flows through a 0.5 inch ID 90-degree Steve Gibbs @The Saylor](http://www.quizover.com/question/water-flows-through-a-0-5-inch-id-90-degree-steve-gibbs-the-saylor?pdf=1505)

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4.1.4. A fluid with density 0.05 g/cm³ and viscosity 0.05 cP flows through...

Author: Steve Gibbs

A fluid with density 0.05 g/cm³ and viscosity 0.05 cP flows through a 1 inch ID pipe at a flow rate of 1 gpm. Which of the following best describes the type of flow? I. Laminar II. Turbulent III. Transitional

Please choose only one answer:

- I only
- II only
- III only
- I and III only
- II and III only

Check the answer of this question online at QuizOver.com:

Question: [A fluid with density 0.05 g/cm³ and viscosity Steve Gibbs @The Thermal](#)

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4. Chapter: Unit 02: Measurement of Flow

1. Unit 02: Measurement of Flow Questions

4.1.1. Bernoulli's equation describes the conservation of energy under the...

Author: Steve Gibbs

Bernoulli's equation describes the conservation of energy under the restrictions of all of the following EXCEPT:

Please choose only one answer:

- Incompressible flow
- Inviscid flow.
- Steady flow
- Laminar flow.

Check the answer of this question online at QuizOver.com:

Question: [Bernoulli's equation describes the conservation Steve Saylor Foundat](#)

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4.1.2. An incompressible fluid with density 0.55 kg/m^3 flows th...

Author: Steve Gibbs

An incompressible fluid with density 0.55 kg/m^3 flows through a contraction in a pipe from an ID of 0.5 in to an ID of 0.4 in at a flow rate of $0.0005 \text{ m}^3/\text{s}$. Calculate the pressure change over the contraction according to Bernoulli's equation.

Please choose only one answer:

- 61.3 Pa
- 122 Pa
- 1116 Pa
- 6130 Pa
- 613 Pa

Check the answer of this question online at QuizOver.com:

Question: [An incompressible fluid with density 0.55 kg Steve Gibbs @The](#)

Flashcards:

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4.1.3. A fluid with a density 7 times that of water is used in a manometer...

Author: Steve Gibbs

A fluid with a density 7 times that of water is used in a manometer. A manometer reading of what height of this fluid corresponds to a pressure difference of 12.7 psi?

Please choose only one answer:

- 12.7 m
- 12.7 cm
- 1.27 m
- 7.0 m
- 17.1 m

Check the answer of this question online at QuizOver.com:

Question: [A fluid with a density 7 times that of water Steve Gibbs @The](#)

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4.1.4. Air is flowing through a pipe with an internal diameter of 12 cm. I...

Author: Steve Gibbs

Air is flowing through a pipe with an internal diameter of 12 cm. It passes through an orifice of diameter 5 cm. The air density at the operating conditions is about 1.3 kg/m^3 . The observed pressure difference across the orifice is approximately 100 mm Hg, and the flow coefficient for the orifice is approximately 0.7. What is the mass flow rate of air in m^3/s ?

Please choose only one answer:

- $2.0 \text{ m}^3/\text{s}$
- $0.2 \text{ m}^3/\text{s}$
- $0.4 \text{ m}^3/\text{s}$
- $0.002 \text{ m}^3/\text{s}$
- $4.0 \text{ m}^3/\text{s}$

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Question: [Air is flowing through a pipe with an internal Steve @The Saylor](#)

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4.1.5. A sharp-crested, rectangular weir of length 18 ft and height of 1 f...

Author: Steve Gibbs

A sharp-crested, rectangular weir of length 18 ft and height of 1 ft exhibits a head of 3 inches of water. Calculate the water flow in ft^3/s and assume that the head of velocity approach is small.

Please choose only one answer:

- 0.75 ft^3/s
- 0.75 ft^3/min
- 7.5 m^3/hr
- 0.075 ft^3/s
- 0.75 gal/min

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Question: [A sharp-crested rectangular weir of length Steve Gibbs @The Saylor](#)

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4. Chapter: Unit 03: Equipment for Moving Fluids

1. Unit 03: Equipment for Moving Fluids Questions

4.1.1. How do pumps and fans/blowers differ?

Author: Steve Gibbs

How do pumps and fans/blowers differ?

Please choose only one answer:

- By size
- By operating pressures
- By operating speeds
- By cost
- By types of operating fluids

Check the answer of this question online at [QuizOver.com](http://www.quizover.com):

Question: [How do pumps and fans/blowers differ Steve Gibbs @The Saylor Foundat](http://www.quizover.com/question/how-do-pumps-and-fans-blowers-differ-steve-gibbs-the-saylor-foundat?pdf=1505)

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4.1.2. From what depth is it possible to "suck" water without causing cavi...

Author: Steve Gibbs

From what depth is it possible to "suck" water without causing cavitation?

Please choose only one answer:

- 100 m
- 50 m
- 39.3 m
- 33.9 m
- 33.9 ft

Check the answer of this question online at [QuizOver.com](http://www.quizover.com):

Question: [From what depth is it possible to suck water Steve Gibbs @The](http://www.quizover.com/question/from-what-depth-is-it-possible-to-suck-water-steve-gibbs-the?pdf=1505)

Flashcards:

<http://www.quizover.com/flashcards/from-what-depth-is-it-possible-to-suck-water-steve-gibbs-the?pdf=1505>

Interactive Question:

<http://www.quizover.com/question/from-what-depth-is-it-possible-to-suck-water-steve-gibbs-the?pdf=1505>

4.1.3. A centrifugal pump is used to lift water at seventy-five gallons pe...

Author: Steve Gibbs

A centrifugal pump is used to lift water at seventy-five gallons per minute against a head of 100 feet of water. The efficiency of the pump is 75%. Approximately, what is the power required by the pump?

Please choose only one answer:

- 1.9 W
- 190W
- 1.9kW
- 3.8 W
- 38 W

Check the answer of this question online at QuizOver.com:

Question: [A centrifugal pump is used to lift water at Steve Gibbs @The Saylor](#)

Flashcards:

<http://www.quizover.com/flashcards/a-centrifugal-pump-is-used-to-lift-water-at-steve-gibbs-the-saylor?pdf=1505>

Interactive Question:

<http://www.quizover.com/question/a-centrifugal-pump-is-used-to-lift-water-at-steve-gibbs-the-saylor?pdf=1505>

4.1.4. For flow equipment operating in parallel, flow rates add; for equip...

Author: Steve Gibbs

For flow equipment operating in parallel, flow rates add; for equipment operating in series,

_____.

Please choose only one answer:

- Temperatures add
- Pressures divide
- Pressures add
- Reciprocal flow rates add
- Flow rates divide

Check the answer of this question online at QuizOver.com:

Question: [For flow equipment operating in parallel flow Steve Gibbs @The Thermal](#)

Flashcards:

<http://www.quizover.com/flashcards/for-flow-equipment-operating-in-parallel-flow-steve-gibbs-the-thermal?pdf=1505>

Interactive Question:

<http://www.quizover.com/question/for-flow-equipment-operating-in-parallel-flow-steve-gibbs-the-thermal?pdf=1505>

4.1.5. A positive displacement pump is called so because it provides flow ...

Author: Steve Gibbs

A positive displacement pump is called so because it provides flow independent of _____.

Please choose only one answer:

- Output pressure
- Operating speed
- Suction pressure
- Operating temperature
- Fluid composition

Check the answer of this question online at QuizOver.com:

Question: [A positive displacement pump is called so Steve Gibbs @The Saylor](#)

Flashcards:

<http://www.quizover.com/flashcards/a-positive-displacement-pump-is-called-so-steve-gibbs-the-saylor?pdf=1505>

Interactive Question:

<http://www.quizover.com/question/a-positive-displacement-pump-is-called-so-steve-gibbs-the-saylor?pdf=1505>

4. Chapter: Unit 01: Thermodynamics, Mechanics, and Energy Conversion

1. Unit 01: Thermodynamics, Mechanics, and Energy Conversion Questions

4.1.1. The equation of continuity is a mathematical expression of _____...

Author: Steve Gibbs

The equation of continuity is a mathematical expression of _____.

Please choose only one answer:

- Conservation
- Generation or production
- Time evolution
- Hospitality
- Confluence

Check the answer of this question online at QuizOver.com:

Question: [The equation of continuity is a mathematical Steve Gibbs Saylor Thermal](#)

Flashcards:

<http://www.quizover.com/flashcards/the-equation-of-continuity-is-a-mathematical-steve-gibbs-saylor-therma?pdf=1505>

Interactive Question:

<http://www.quizover.com/question/the-equation-of-continuity-is-a-mathematical-steve-gibbs-saylor-therma?pdf=1505>

4.1.2. Which of the following occurs during the process of a thermodynamic...

Author: Steve Gibbs

Which of the following occurs during the process of a thermodynamic cycle?

Please choose only one answer:

- Mass is exchanged to perform work.
- Pressure oscillates.
- Pressure and temperature remain constant.
- Heat and/or work are exchanged with no net change in state variables.
- No net mass flow occurs.

Check the answer of this question online at QuizOver.com:

Question: [Which of the following occurs during the Steve Gibbs Saylor Foundat](#)

Flashcards:

<http://www.quizover.com/flashcards/which-of-the-following-occurs-during-the-steve-gibbs-saylor-foundat?pdf=1505>

Interactive Question:

<http://www.quizover.com/question/which-of-the-following-occurs-during-the-steve-gibbs-saylor-foundat?pdf=1505>

4.1.3. Correlations for convective heat-transfer coefficients are often re...

Author: Steve Gibbs

Correlations for convective heat-transfer coefficients are often represented by Nu defined by which of the following?

Please choose only one answer:

- k/hD
- $\mu / \rho D$
- $h L / k$
- $k L / h$
- $\mu R / \nu$

Check the answer of this question online at [QuizOver.com](http://www.quizover.com):

Question: [Correlations for convective heat-transfer Steve Gibbs @The Saylor](#)

Flashcards:

<http://www.quizover.com/flashcards/correlations-for-convective-heat-transfer-steve-gibbs-the-saylor?pdf=1505>

Interactive Question:

<http://www.quizover.com/question/correlations-for-convective-heat-transfer-steve-gibbs-the-saylor?pdf=1505>

4.1.4. Calculate the Reynolds number for water flowing through a 1.5" diam...

Author: Steve Gibbs

Calculate the Reynolds number for water flowing through a 1.5" diameter pipe at 4.5 gallons per minute.

Please choose only one answer:

- 1500
- 2500
- 6500
- 9500
- 10500

Check the answer of this question online at [QuizOver.com](http://www.quizover.com):

Question: [Calculate the Reynolds number for water Steve Gibbs Saylor Foundat](http://www.quizover.com/question/calculate-the-reynolds-number-for-water-steve-gibbs-saylor-foundat?pdf=1505)

Flashcards:

<http://www.quizover.com/flashcards/calculate-the-reynolds-number-for-water-steve-gibbs-saylor-foundat?pdf=1505>

Interactive Question:

<http://www.quizover.com/question/calculate-the-reynolds-number-for-water-steve-gibbs-saylor-foundat?pdf=1505>

4.1.5. Which of the following is NOT a state variable?

Author: Steve Gibbs

Which of the following is NOT a state variable?

Please choose only one answer:

- Time/Date
- Temperature
- Specific volume
- Pressure
- Gibbs free energy

Check the answer of this question online at [QuizOver.com](http://www.quizover.com):

Question: [Which of the following is NOT a state variable Steve Saylor Foundat](http://www.quizover.com/question/which-of-the-following-is-not-a-state-variable-steve-saylor-foundat?pdf=1505)

Flashcards:

<http://www.quizover.com/flashcards/which-of-the-following-is-not-a-state-variable-steve-saylor-foundat?pdf=1505>

Interactive Question:

<http://www.quizover.com/question/which-of-the-following-is-not-a-state-variable-steve-saylor-foundat?pdf=1505>

4.1.6. Which thermodynamic cycle is most closely associated with the opera...

Author: Steve Gibbs

Which thermodynamic cycle is most closely associated with the operation of steam turbines?

Please choose only one answer:

- Otto
- Rankine
- Diesel
- Stirling
- Lenoir

Check the answer of this question online at [QuizOver.com](http://www.quizover.com):

Question: [Which thermodynamic cycle is most closely Steve Gibbs @The Saylor](#)

Flashcards:

<http://www.quizover.com/flashcards/which-thermodynamic-cycle-is-most-closely-steve-gibbs-the-saylor?pdf=1505>

Interactive Question:

<http://www.quizover.com/question/which-thermodynamic-cycle-is-most-closely-steve-gibbs-the-saylor?pdf=1505>