Assignment 11

The due date for submitting this assignment has passed. **Due on 2018-10-17, 23:59 IST**.
As per our records you have not submitted this assignment.

1) which of the following option about gas power cycles is correct?

- pressure ratio → Brayton cycle, compression ratio → Diesel cycle, cut-off ratio → Otto cycle
- pressure ratio → Diesel cycle, compression ratio → Brayton cycle, cut-off ratio → Otto cycle
- pressure ratio → Brayton cycle, compression ratio → Otto cycle, cut-off ratio → Diesel cycle
- pressure ratio → Otto cycle, compression ratio → Diesel cycle, cut-off ratio → Brayton cycle

**No, the answer is incorrect.**
Score: 0

**Accepted Answers:**
pressure ratio → Brayton cycle, compression ratio → Otto cycle, cut-off ratio → Diesel cycle

2) As a car gets older, the mean effective pressure will

- increase
- decrease
- remains the same
- none of these

**No, the answer is incorrect.**
Score: 0

**Accepted Answers:**
decrease

3) The single-stage compression process of an ideal Brayton cycle without regeneration is replaced by a multistage compression process with intercooling between the same pressure limits. Based on this fact, tick the correct option from below,

- the back work ratio increases and thermal efficiency also increases
- the back work ratio increases and thermal efficiency decreases
- the back work ratio decreases and thermal efficiency increases
- the back work ratio decreases and thermal efficiency also decreases

**No, the answer is incorrect.**
Score: 0

**Accepted Answers:**
the back work ratio decreases and thermal efficiency also decreases

4) For a specified compression ratio,

- A diesel engine is more efficient than a gasoline engine
- A gasoline engine is more efficient than a diesel engine

Score: 0
5) An ideal Otto cycle with a specified compression ratio is executed using different working fluid. Tick the correct option for which the thermal efficiency will be the highest.

- air
- ethane
- argon
- none of these

No, the answer is incorrect.
Score: 0
Accepted Answers:
argon

6) Consider two vapor-compression refrigeration cycles of the same working conditions except the condition of refrigerant at throttling valve. If the first refrigerant enters as a saturated liquid and the second as subcooled liquid at the same temperature, then which cycle do you think will have a higher COP?

- 1st one will have higher COP than 2nd one
- 2nd one will have higher COP than 1st one
- both the cycle will have same COP
- 1st one will have COP double that of 2nd one

No, the answer is incorrect.
Score: 0
Accepted Answers:
1st one will have higher COP than 2nd one

7) State whether the following statement is TRUE or FALSE.

“Ideal vapor-compression refrigeration cycle does not involve any internal irreversibilities”

- TRUE
- FALSE

No, the answer is incorrect.
Score: 0
Accepted Answers:
FALSE

8) Tick the correct option where water can be used as working fluid instead of R-134a in air-condition application.

- vapour compression refrigeration
- absorption refrigeration
- both the system
- none of these

No, the answer is incorrect.
Score: 0
Accepted Answers:
absorption refrigeration

9) Refrigerant-134a enters the compressor of a refrigerator at 100 kPa and -20 °C at a rate of 0.5 m³/min and leaves at 0.8 MPa. The isentropic efficiency of the compressor is 80%. The refrigerant enters the throttling valve at 0.75 MPa and 26 °C and leaves the evaporator as saturated vapor at -26
1. Determine the power input to the compressor.

- 3.62 kW
- 1.84 kW
- 4.25 kW
- 2.34 kW

No, the answer is incorrect.
Score: 0
Accepted Answers:
2.34 kW

10) With reference to Q9 determine the rate of heat removal from the refrigerated space.

- 6.17 kW
- 5.21 kW
- 8.57 kW
- 4.26 kW

No, the answer is incorrect.
Score: 0
Accepted Answers:
6.17 kW

11) With reference to Q9 determine the pressure drop and rate of heat gain in the line between the evaporator and the compressor.

- 1.73 kPa and 2.02 kW
- 17.3 kPa and 0.202 kW
- 1.73 kPa and 0.202 kW
- 0.173 kPa and 2.02 kW

No, the answer is incorrect.
Score: 0
Accepted Answers:
1.73 kPa and 0.202 kW

12) A reversible absorption refrigerator consists of a reversible heat engine and a reversible refrigerator. The system removes heat from a cooled space at -15 °C at a rate of 100 kW. The refrigerator operates in an environment at 25 °C. If the heat is supplied to the cycle by condensing saturated steam at 150 °C, determine, the rate at which the steam is condensed.

- 0.4 kg/s
- 0.25 kg/s
- 0.04 kg/s
- 0.025 kg/s

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.025 kg/s

13) With reference to Q12 determine the power input to the reversible refrigerator.

- 20.82 kW
- 25.6 kW
- 15.51 kW
- 10.15 kW

No, the answer is incorrect.
Score: 0
Accepted Answers:
15.51 kW
14) With reference to Q12 determine the second law efficiency of an actual absorption chiller operating at the same temperature limits whose COP is 1.0.

- 0.52
- 0.48
- 0.82
- 0.7

No, the answer is incorrect.
Score: 0
Accepted Answers: 0.52

15) Consider an ideal gas-turbine cycle with two stages of compression and two stages of expansion. The pressure ratio across each stage of the compressor and turbine is 3. The air enters each stage of the compressor at 300 K and each stage of the turbine at 1200 K. Determine the back work ratio.

- 0.18
- 0.40
- 0.34
- 0.24

No, the answer is incorrect.
Score: 0
Accepted Answers: 0.34

16) With reference to Q15, determine the thermal efficiency of the cycle with a regenerator having effectiveness factor of 75% if used.

- 40.4%
- 55.3%
- 48.2%
- 50%

No, the answer is incorrect.
Score: 0
Accepted Answers: 55.3%

17) A four-cylinder two-stroke 2.0-L diesel engine that operates on an ideal Diesel cycle has a compression ratio of 22 and a cutoff ratio of 1.8. Air is at 70 °C and 97 kPa at the beginning of the compression process. Using the cold-air standard assumptions, determine how much power the engine will deliver at 2300 rpm.

- 64 kW
- 24 kW
- 48 kW
- 52 kW

No, the answer is incorrect.
Score: 0
Accepted Answers: 48 kW

18) Someone has suggested that the air-standard Otto cycle is more accurate if the two isentropic processes are replaced with polytropic processes with a polytropic exponent n = 1.3. Consider such a cycle when the compression ratio is 8, \( P_1 = 95 \text{ kPa}, \) \( T_1 = 15 \text{ °C}, \) and the maximum cycle temperature is 1200 °C. Use \( R = 0.287 \text{ kPa-m}^3/\text{kg-K}, \) \( C_p = 1.005 \text{ kJ/kg-K}, \) \( C_v = 0.718 \text{ kJ/kg-K} \) for air at room temperature. Determine the heat transferred to and rejected from this cycle.
With reference to Q18, determine the thermal efficiency of the cycle.

- 50%
- 40%
- 60%
- 45%

No, the answer is incorrect.
Score: 0
Accepted Answers:
50%