Unit 14 - Week 11 :

Assignment 11

The due date for submitting this assignment has passed. Due on 2019-10-16, 23:59 IST.
As per our records you have not submitted this assignment.

1) *1 point*

Assertion (A): For the same inlet conditions, the same compression ratios and the same heat rejection process, the heat addition during combustion for an air-standard Otto cycle is greater than that for an air-standard Diesel cycle.
Reason (R): On the $T - s$ diagram of an ideal gas (with s on the horizontal axis and T on the vertical axis), lines of constant specific volume through any given state point have steeper slopes than those of constant pressure.

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true, but R is not the proper explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.
(e) Both A and R are false.

a
b
c
d

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

2) *1 point*

For the same inlet conditions, the same compression ratios and the same heat rejection process, the correct relationship between the efficiencies of air standard Otto and Diesel cycles is

(a) $\eta_{Otto} < \eta_{Diesel}$
(b) $\eta_{Otto} > \eta_{Diesel}$
(c) $\eta_{Otto} = \eta_{Diesel}$
(d) Can't say

a
b
c
d

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

3) *1 point*

For the same inlet conditions, the same values of maximum pressure, maximum temperature and the same heat rejection process, the correct relationship between the efficiencies of air standard Otto and Diesel cycles is

(a) $\eta_{Otto} < \eta_{Diesel}$
(b) $\eta_{Otto} > \eta_{Diesel}$
(c) $\eta_{Otto} = \eta_{Diesel}$
(d) Can't say

a
b
c
d

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

4) *1 point*

Common Data for Questions 4 to 6:
To approximate an actual spark-ignition engine, consider an air-standard Otto cycle that has a compression ratio of 9:1, and a pressure and temperature at the beginning of the compression process of 100 kPa and 10°C. The heat addition by combustion gives the highest temperature as 2500 K.

Find the highest cycle pressure.

(a) 1368 kPa
(b) 2167 kPa
(c) 7946 kPa
(d) 8496 Kpa

a
b
c
d

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

5) *1 point*

The specific heat added by combustion is

(a) 286 kJ/kg
(b) 762 kJ/kg
(c) 1048 kJ/kg
(d) 1303 kJ/kg

a
b
c
d

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

6) *1 point*

The thermal efficiency of the cycle is

(a) 48.47%
(b) 58.47%
(c) 68.47%
(d) 74.47%

a
b
c
d

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

7) *1 point*

The mean effective pressure is

(a) 1055 kPa
(b) 1155 kPa
(c) 1251 kPa
(d) 1451 kPa

a
b
c
d

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

8) *0 points*

Common Data for Questions 8 to 10:
Air flows through a device entering at 300 K, 200 kPa and leaving at 500 K. The process is steady state polytropic with $n = 2.5$, and heat transfer comes from a 600 K source. Assume air to be an ideal gas with constant specific heats, c_p=1.004 kJ/kg.K and c_v=0.717 kJ/kg.K.

Find the maximum pressure.

(a) 3297 kPa
(b) 4297 kPa
(c) 6297 kPa
(d) 7297 kPa

a
b
c
d

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

9) *0 points*

The net specific work output is

(a) 309 kJ/kg
(b) 550 kJ/kg
(c) 790 kJ/kg
(d) 1031 kJ/kg

a
b
c
d

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

10) *0 points*

The thermal efficiency of the cycle is

(a) 58.34%
(b) 51.73%
(c) 69.83%
(d) 65.26%

a
b
c
d

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

11) *1 point*

Common Data for Questions 11 to 13:
A large stationary gas turbine power plant operating on an ideal air-standard Brayton cycle delivers a power output of 100 MW to an electric generator. The minimum temperature in the cycle is 300 K, and the maximum temperature is 1600 K. The minimum pressure in the cycle is 100 kPa, and the compressor pressure ratio is 14:1.

The power output of the turbine is

(a) 166 MW
(b) 512 MW
(c) 726 MW
(d) 851 MW

a
b
c
d

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

12) *1 point*

What fraction of the turbine output is required to drive the compressor?

(a) 0.66
(b) 0.60
(c) 0.51
(d) 0.40

a
b
c
d

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

13) *1 point*

What is the thermal efficiency of the cycle?

(a) 32.95%
(b) 42.95%
(c) 52.95%
(d) 62.95%

a
b
c
d

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