Week 6 : Assignment 6

The due date for submitting this assignment has passed.

Due on 2021-09-08, 23:59 IST.

As per our records you have not submitted this assignment.

1) If intercooling is incorporated between HP and LP compressor in a gas turbine cycle, then *1 point*

- the network output decreases while thermal efficiency increases.
- the network output increases while thermal efficiency decreases.
- the network output and also thermal efficiency decrease.
- the network output and also thermal efficiency increase.

No, the answer is incorrect.
Score: 0
Accepted Answers:
the network output increases while thermal efficiency decreases.

2) The pressure rises from P_1 to P_3 with perfect intercooling for a two-stage compressor. For minimum work input to compressors, the intermediate pressure P_2 is given by *0 points*

- $P_2 = \frac{P_1+P_3}{2}$
- $P_2 = \frac{P_1-P_3}{2}$
- $P_2 = P_3\sqrt{P_1/P_3}$
- $P_2 = \sqrt{P_1P_3}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$P_2 = \sqrt{P_1P_3}$

3) In aircraft propulsion, the axial flow compressor is often preferred to a centrifugal compressor because of *1 point*

- a high-pressure rise per stage.
- stall-free operation.
- low frontal area.
- higher thrust
- None of the above.

No, the answer is incorrect.
Score: 0
Accepted Answers:
low frontal area.

4) If the exhaust duct of an aircraft is chocked, then the shape of the duct would typically be, *1 point*

- a convergent nozzle
- a convergent-divergent nozzle.
- a divergent duct.
- none of these.

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

5) If C_a is the velocity of an aircraft and C_j being the exit jet velocity relative to the craft, then the propulsive efficiency of a turbojet engine will be, *1 point*

- $\frac{2C_a^2}{(C_j+C_a)^2}$
- $\frac{2C_a}{(C_j+C_a)}$
- $\frac{2C_j}{(C_j+C_a)}$
- $\frac{2C_j^2}{(C_j+C_a)^2}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
$\frac{2C_a}{(C_j+C_a)}$

6) Which of the following is a non-air breathing engine? *1 point*

- turboprop
- turbojet
- rocket
- turbofan

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

7) Following data refer to a single shaft gas turbine cycle with reheat operating at 300 K and 1 bar.
Compressor pressure ratio: 15
Turbine inlet temperature (both turbines): 1500 K
Isentropic efficiency of compressor, η_c = 0.85
Isentropic efficiency of turbine, η_t = 0.89
Pressure loss in the combustors and exhaust are neglected.
Assume for the cold air, $\gamma_a = 1.4$ and $C_{p_a} = 1.005kJ/kgK$ and for the hot gas $\gamma_g = 1.333$ and $C_{p_g} = 1.148kJ/kgK$.
Calculate the specific work output in kW/kg/s.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 455,475

3 points

8) Following Question 7, calculate the thermal efficiency of the cycle in percentage.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 32,37

2 points

9) A turbojet engine having the following component performance cruise at speed of *M*=0.77 and at an altitude of 10000 m.
The compressor work input: 300 kW/kg/s
Turbine inlet total temperature and pressure:1350 K and 3.5 bar
Isentropic efficiency:
(i) Compressor, η_c = 0.86
(ii) Turbine, η_t = 0.89
(iii) Intake, η_i = 0.93
(iv) Propelling nozzle, η_j = 0.95
Mechanical transmission loss is neglected. Ambient conditions at an altitude of 10000 m are 0.270 bar and 220 K. Assume for the cold air, $\gamma_a = 1.4$ and $C_{p_a} = 1.005kJ/kgK$ and for the hot gas $\gamma_g = 1.333$ and $C_{p_g} = 1.148kJ/kgK$.
Estimate the critical pressure ratio for the nozzle.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 1.85,2.1

2 points

10) Following Question 9, state whether the nozzle is choked or not. If choked them put 1 otherwise 2.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 1

1 point

11) Following Question 9, calculate the specific thrust for the simple turbojet engine in N-s/kg.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 675,695

1 point