Unit 5 - Week 3: Nozzle Characteristics

Week 3: Assignment

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-08-21, 23:59 IST.

1) Lower value of mass ratio is desirable in order to achieve higher thrust. Given statement is: *1 point*

- True
- False

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

2) For a typical rocket engine, the propellant burn rate is 0.4 kg/s with heat of combustion 52 MJ/kg. During combustion, the heat release rate is found to be 20 MJ/s. What is the efficiency of the combustor? *1 point*

- 0.96
- 0.97
- 0.98
- 0.99

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.96

3) Propulsive efficiency is minimum when exhaust velocity (V_e) is equal to airspeed at inlet (V). Given statement is: *1 point*

- True
- False

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

4) For an ideal nozzle, the outlet temperature and stagnation temperature are estimated to be 400 K and 1400 K respectively. Considering the specific heat energy for exhaust gases to be 1000 J/kg K, the exit velocity of exhaust gases is: *1 point*

- 1130 m/s
- 1240 m/s
- 1370 m/s
- 1410 m/s

No, the answer is incorrect.
Score: 0
Accepted Answers:
1410 m/s

5) After attaining sonic condition at throat for a fully expanded C-D nozzle for isentropic flow condition, the flow starts decelerating in diverging portion. Given statement is: *1 point*

- True
- False

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

6) The specific impulse for a rocket engine is 300 s and burnout to propellant mass ratio is 5. For this operating conditions, the total impulse to weight ratio is: *1 point*

- 50
- 60
- 70
- 80

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

7) For a rocket engine with constant thrust, maximum acceleration occurs: *1 point*

- just before the burnout
- just after the burnout
- at burnout
- None of these

No, the answer is incorrect.
Score: 0
Accepted Answers:
just before the burnout

8) At a certain altitude, the atmospheric pressure is lower than the exit pressure then the C-D nozzle is: *1 point*

- under-expanded
- over expanded
- Correctly expanded
- None of these

No, the answer is incorrect.
Score: 0
Accepted Answers:
under-expanded

9) A typical rocket engine at chamber pressure of 4 MPa with throat diameter 60 mm produces thrust with specific impulse of 200s and propellant burn rate of 5 kg/s. The total thrust produced by the rocket engine and value of thrust coefficient are: *2 points*

- 17kN & 0.88
- 10kN & 0.88
- 10kN & 0.72
- 17kN & 0.72

No, the answer is incorrect.
Score: 0
Accepted Answers:
10kN & 0.88

10) In an isentropic C-D nozzle, exhaust gas (γ=1.3 & M. wt=30 kg/kmol) at total temperature of 860K is flowing and the ratio of exit to total pressure is found to be 0.28. The exit velocity of exhaust gas at this operating condition is: *2 points*

- 550 m/s
- 964 m/s
- 845 m/s
- 725 m/s

No, the answer is incorrect.
Score: 0
Accepted Answers:
725 m/s

11) In a C-D nozzle, velocity for a monoatomic gas (γ=1.67 & M.wt=4 g/mole) is 1960 m/s at a particular location in diverging portion. If the local temperature happens to be 750 K, then the cross sectional area of the diverging portion at that location would be: (Assume sonic condition at throat with throat area=10 cm^2) *2 points*

- 12.5 cm^2
- 13.4 cm^2
- 14.6 cm^2
- 15.8 cm^2

No, the answer is incorrect.
Score: 0
Accepted Answers:
12.5 cm^2

12) Consider the following problem statement to answer the questions 12-14. *2 points*
A Gaseous mixture (γ=1.3 & M. wt=30 kg/kmol) at 400 K and 200 kPa is discharged from a reservoir to atmosphere through a C-D nozzle which has exit area of 5 cm^2. (P_{atm}=150 kPa)
12. Exit Mach number is:

- 1.43
- 1.63
- 0.68
- 0.84

No, the answer is incorrect.
Score: 0
Accepted Answers:
0.68

13) Exit velocity is: *2 points*

- 186 m/s
- 248 m/s
- 352 m/s
- 436 m/s

No, the answer is incorrect.
Score: 0
Accepted Answers:
248 m/s

14) Exit mass flow rate is: *2 points*

- 0.36 kg/s
- 0.26 kg/s
- 0.11 kg/s
- 0.18 kg/s

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