Combustion in Air-breathing Aero Engines
Assignment No. 11

This assignment contains 8 multiple choice questions with 4 possible answers to each. Only one of the choice is correct and so select the choice that best answers the question. Correct choice rewards you with 1 point for each question. Wrong answers will reward you with 0 points (no negative marking). The questionnaire contains both numerical and concept-based questions. All the best!!!

1. Combustion achievable in afterburners cannot be completed in the gas turbine main combustor due to

a) Limited availability of oxygen

b) Limitation on turbine entry temperature

c) Limitation on liner temperature

d) Enhanced efficiency

Ans: b)

2. The Laser Induced Fluorescence (LIF) signal is proportional to

a) pressure

b) species mole fraction

c) velocity

d) laser wavelength

Ans b)

3. In LIF if the absorbed wavelength is given by λ_a and emitted wavelength is λ_e then

a) $\lambda_a > \lambda_e$

b) $\lambda_a < \lambda_e$

c) $\lambda_a = \lambda_e$

d) None of the above

Ans: b)

4. A student is required to design a PIV experiment for measuring pipe flow with an average velocity of 100 m/s. The camera pixel size is 1mm and the window size is 32x32 px. Then the correct choice for time delay between two laser shots would be

a) 8 micro seconds

b) 18 micro seconds

c) 80 micro seconds

d) 8 milliseconds

Ans: c) Use $0.1px < U\Delta t < \Delta s/4$

5. In a bluff body stabilized flame, as blowoff is approached, Von Karmann instability could set in when

a) pressure ratio between burnt and unburnt gases approaches unity

b) velocity ratio between burnt and unburnt gases approaches unity

c) density ratio between burnt and unburnt gases approaches unity

d) density ratio between burnt and unburnt gases approaches zero

Ans c)

6. In afterburners the preferred mode of flame stabilization is using

a) swirlers

b) plasma

c) bluff body

d) pilot flame

Ans c)

7. The density ratio between unburnt to burnt gases in the gas turbine main combustor is given by Rm and that in the afterburner while it is operational is given by Ra.

a) Rm > Ra

b) Rm = Ra < 2

c) Rm < Ra

d) Rm = Ra >=2

Ans a). In an afterburner combustion happens in already vitiated and high temperature air.

8. Premixed flames can extinguish by stretch when

a) Le = 1

b) 0<Le <1

c) Le > 1

d)Le < 0

Ans c)