

Unit 10 - Week 8

Course outline

How does an NPTEL online course work?

Week 0

Week 1

Week 2

Week 3

Week 4

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Week 6

Week 7

Week 8

Lecture 50 : Subsonic Parasite Drag Estimation

Lecture 51 : Component Buildup Method

Lecture 52 : Drag Estimation of Military Aircraft

Lecture 53 : Tutorial on Drag Polar Estimation of Military Aircraft

Lecture 54 : Lecture 46 : Estimation of Lift Coefficient

Lecture 55 : Lecture 47 : Estimation of Maximum Lift Coefficient

Lecture 56 : Lecture 48 : Flaps as High Lift Devices

Lecture 57 : Tutorial on Lift Coefficient Estimation of Transport Aircraft

Lecture 58 : Tutorial on Lift Coefficient Estimation of Military Aircraft

Quiz : Assignment 8

Assignment-8 Solutions

Weekly feedback

Download Videos

Week 9

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Week 11

Week 12

Live Session

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Assignment 8

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

Due on 2020-11-11, 23:59 IST.

1) What is the most compelling reason to try and maintain Laminar flow on a wing? 1 point

- Laminar flow is less resistant to separation compared to Turbulent flow
- Skin Friction Drag in Laminar flow is much lower than that in Turbulent flow
- Form Drag in Laminar flow is much lower than that in Turbulent flow
- Laminar flow results in much higher Lift Coefficient, hence a smaller wing area

No, the answer is incorrect.
Score: 0

Accepted Answers:

Skin Friction Drag in Laminar flow is much lower than that in Turbulent flow

2) Data of an aircraft is as follows: $S = 25 \text{ m}^2$, $AR = 8$, Taper ratio = 0.6, Angle of Incidence of Wing = 2 deg, Airfoil Section: NACA 63-209, (Zero Lift Angle of Attack = -1.5 deg), Lift Curve Slope = $6.3/\text{rad}$, and wing efficiency factor $e = 1$.

If the aircraft is flying at an altitude of 5000 m, with a speed of 330 kmph under ISA conditions, estimate the Lift produced (in N).

Hint

No, the answer is incorrect.
Score: 0

Accepted Answers:

(Type: Range) 22000,25000

2 points

3) Which of the following result(s) in the largest increase in stalling angle? 1 point

- Split flap
- Flower flap
- Plain flap
- Leading edge flap

No, the answer is incorrect.
Score: 0

Accepted Answers:

Split flap

4) Which of the following are components of subsonic parasite drag? 1 point

- Skin Friction Drag
- Form Drag
- Interference Drag
- Induced Drag

No, the answer is incorrect.
Score: 0

Accepted Answers:

Skin Friction Drag

Form Drag

Interference Drag

5) For the wing of a jet General Aviation Aircraft with the following characteristics,

Maximum Takeoff Mass, M_{TO}	4000 kg
Wing Planform Area, S	30 m^2
Cruise Velocity at 3000 m	463 kmph
Stall Velocity	120 kmph

The high lift device (split flap) will provide $\Delta C_L = 0.9$ when deflected.

Calculate the Maximum Lift Coefficient of wing without high lift devices.

Hint

No, the answer is incorrect.
Score: 0

Accepted Answers:

(Type: Range) 1.6,1.8

1 point

6) The wing efficiency factor, e depends upon 1 point

- Aspect Ratio
- Wing Sweep
- Wing Taper Ratio
- Wing Dihedral Angle

No, the answer is incorrect.
Score: 0

Accepted Answers:

Aspect Ratio

Wing Sweep

Wing Taper Ratio

7) For a twin engine general aviation aircraft Wing Planform Area, $S_{ref} = 30 \text{ m}^2$, the Wetted Surface Area, $S_{wet} = 65 \text{ m}^2$. The Zero-Lift Drag coefficient is _____ $\times 10^{-3}$

Hint

No, the answer is incorrect.
Score: 0

Accepted Answers:

(Type: Range) 9.5,10.00

1 point

8) The light airplane starts its cruise segment at 82 m/s at 3,000 m when it weighs 1450 kg. After cruising for a period of time at that altitude it is noticed it now weighs 1370 kg. Using a wing area of $S = 13.47 \text{ m}^2$ compute the final airspeed in (m/s) if the pilot maintains a constant lift coefficient.

Hint

No, the answer is incorrect.
Score: 0

Accepted Answers:

(Type: Range) 78,82

2 points