

Unit 9 - WEEK 08

Course outline

How does an NPTEL online course work?

Week 01

Week 02

Week 03

Week 04

WEEK 05

WEEK 06

WEEK 07

WEEK 08

- Control: Elevator
- Control: Delta-e Required
- Control: Delta-e Required continued...
- Design Basics: Wing Loading & Thrust Loading
- Design Basics: Sweep & Dihedral
- Revision .
- Quiz : Assignment 08
- Feedback For Week 8
- Assignment 08 Solution

Text Transcripts

VIDEO DOWNLOADS

Assignment 08

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

Due on 2020-03-25, 23:59 IST.

1) Consider the following aircraft:

$W = 25000$ Kg, Cruise $V = 130$ m/s, $S = 60$ m², ρ at cruise altitude = 0.85 Kg/m³, $AR = 5$, $\bar{X}_{cg} = \bar{X}_{ac} = 0.3$.

Neutral point: $\bar{X}_{np} = 0.52$,

$C_{mac} = -0.1$, $C_{L\alpha_w} = C_{L\alpha_t} = 4.584$ per rad, $\alpha_{0L} = -2$, $i_w = 3^\circ$, $i_t = -2^\circ$,
 $\eta_t = 0.8$, $V_H = 0.45$, $e = 1$, $\tau = 0.4$, $\delta_{e_{max}} = \pm 20^\circ$.

Useful Formulae:

$$C_{m_0} = C_{m_{0w}} + C_{m_{0f}} + C_{m_{0t}}$$

$$C_{m_{0w}} = C_{m_{ac}} + C_{L_{0w}}(\bar{X}_{cg} - \bar{X}_{ac})$$

$$C_{m_{0t}} = \eta V_h C_{L_{\alpha_t}}(\epsilon_0 + i_w - i_t); \epsilon_0 = \frac{2C_{L_{0w}}}{\pi AR_w}$$

$$[C_{m_{\delta_e}} = -C_{L_{\alpha_t}} V_H \eta_t \tau]$$

$$\delta_e = -\frac{C_{m_0}}{C_{m_{\delta_e}}} + \frac{\left(-\frac{dC_m}{dC_L}\right)}{C_{m_{\delta_e}}} C_{L_{trim}}$$

Lift coefficient (C_L) for cruise is:

- 0.226
- 0.058
- 0.569
- 1.012

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.569

2) Downwash angle at tail (ϵ_0) is approximately in deg:

- 0.18 deg
- 1.16 deg
- 2.42 deg
- 2.92 deg

No, the answer is incorrect.
Score: 0

Accepted Answers:
1.16 deg

3) Value of C_{m_0} of the aircraft is (assume $C_{m_{0f}} = 0$)

- 0.1710
- 0.0379
- 0.1774
- 0.0774

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.0774

4) Value of $C_{m_{\delta_e}}$ i.e. ($dC_m/d\delta_e$) in per radian is close to

- 0.513
- 0.660
- 0.821
- 1.221

No, the answer is incorrect.
Score: 0

Accepted Answers:
-0.660

5) Static margin during cruise is close to:

- 0.52
- 0.46
- 0.16
- 0.22

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.22

6) For cruise flight δ_e required to trim the aircraft is approximately

- 4.143 deg
- 5.631 deg
- 8.761 deg
- 7.633 deg

No, the answer is incorrect.
Score: 0

Accepted Answers:
-4.143 deg

1 point

2 points

2 points

1 point

2 points

2 points