Unit 9 - WEEK 08

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) *1 point*

Consider the following aircraft:

$W = 25000$ Kg, Cruise $V = 130$ m/s, $S = 60$ m^2, ρ at cruise altitude = 0.85 Kg/m^3, $AR = 5$, $\bar{X}_{cg} = \bar{X}_{ac} = 0.3$.

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

$C_{m_{ac}} = -0.1$, $C_{L_{a_w}} = C_{L_{a_t}} = 4.584$ per rad, $\alpha_{0L} = -2$, $i_w = 3°$, $i_t = -2°$, $\eta_t = 0.8$, $V_H = 0.45$, e =1, $\tau = 0.4$, $\delta_{e_{max}} = \pm 20°$.

Useful Formulae:

$$C_{m_o} = C_{m_{o_w}} + C_{m_{o_f}} + C_{m_{o_t}}$$

$$C_{m_{o_w}} = C_{m_{ac}} + C_{L_{o_w}}\left(\bar{X}_{cg} - \bar{X}_{ac}\right)$$

$$C_{m_{o_t}} = \eta V_h C_{L_{a_t}}(\epsilon_0 + i_w - i_t); \epsilon_0 = \frac{2C_{L_{o_w}}}{\pi\, AR_w}$$

$$\left[C_{m_{\delta_e}} = -C_{L_{a_t}} V_H \eta_t \tau\right]$$

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

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: *2 points*

- 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 $C_{m_{0_f}} = 0$) *2 points*

- -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 *1 point*

- -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: *2 points*

- 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 *2 points*

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

No, the answer is incorrect.
Score: 0
Accepted Answers:
-4.143 deg