CBCS SCHEME

USN | | | | | | | | | | |

17AE73

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022
Aircraft Stability and Control

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   Derive an expression for wing contribution for the longitudinal static stability of an airplane and discuss about the significance of CG position with respect to wing aerodynamic centre.
(20 Marks)

OR

2   Derive an expression for tail contribution towards the longitudinal static stability of an airplane and discuss about downwash at the tail.
(20 Marks)

Module-2

3   a. Define directional static stability and explain the contribution of swept back wing towards static directional stability.
(15 Marks)

b. Briefly explain about the weather cock effect.
(05 Marks)

OR

4   Explain the following terms :
a) Adverse yaw   b) Assymmetric power condition.
(20 Marks)

Module-3

5   a. Derive an expression for the contribution of dihedral wing towards static lateral stability.
(10 Marks)

b. Obtain an expression for Roll control power.
(10 Marks)

OR

6   a. Briefly explain the following terms with relevant sketches:
i)) Phugoid mode   ii)) Short period mode.
(10 Marks)

b. Explain briefly about Aileron reversal.
(10 Marks)

Module-4

7   Derive the six DOF rigid body equation of motion for an aircraft.
(20 Marks)

OR

8   a. Obtain the derivatives due to change in forward speed.
(10 Marks)

b. Obtain the derivatives due to pitching velocity.
(10 Marks)

Module-5

9   Write short notes on the following :
a) Dutch roll   b) Spiral instability.
(20 Marks)

OR

10   a. Explain briefly about the Cooper-Harper scale.
(10 Marks)

b. Briefly, explain about the Routh's criteria.
(10 Marks)

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