

Code No: 07A62101

R07

Set No. 2

III B.Tech II Semester Regular/Supplementary Examinations, May 2010
Flight Mechanics-II
Aeronautical Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Using proper sketches, explain stick free longitudinal stability of an airplane. [16]
2. Explain pure convergence and pure divergence and damped and negatively damped oscillations in the case of an airplane. [16]
3. (a) Explain various types of ailerons and compare the corresponding hinge moments through sketches.
(b) Explain various types of elevator tabs and compare the corresponding hinge moments through sketches. [8+8]
4. (a) Describe briefly about the spoilers and speed brakes.
(b) And their use in aircraft. [8+8]
5. (a) Three dynamic modes describe the lateral motion of an aircraft. What are they? Explain in detail.
(b) Explain the orientation and position of an airplane in terms of a fixed frame of reference. Illustrate with sketch. [8+8]
6. Derive an expression for stick force in a stick free longitudinal stability of an aircraft. Also explain the term elevator gearing. [16]
7. Establish that $(dC_m/dC_L)_{fixed}$ is the criterion of static longitudinal stability of airplane. Hence develop an expression for the same for an airplane with conventional wing tail combination. Include the effect of power plant in the expression. Explain the contribution of each part of the airplane. [16]
8. Derive an expression for the derivative of the stick force with load factor for a turn flight in terms of $C_{H\delta,e}$, $C_{H\alpha}$, $(dC_m/dC_L)_{Free}$, etc. Explain all the terms in the expression. [16]
