

Roll No.....

Total No. of Printed Pages: 1

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B. Tech. Aeronautical Engg. (Semester –6th)
AIRCRAFT STABILITY AND CONTROL
Subject Code: BANES1603
Paper ID: [18110233]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a. The statically stable aircraft may be dynamically stable or unstable. Similarly, dynamically stable aircraft may be statically stable or unstable". Are the statements true. Justify your answer.
- b. What is meant by "Weather cock stability".
- c. How is dihedral useful for lateral stability.
- d. Differentiate between marginally stable and inherently stable airplanes.
- e. What is frise aileron.
- f. Explain the one engine inoperative condition.
- g. What affect do the elevators have on a plane?
- h. What are the different types of tabs?
- i. What is static margin? What is its importance in the Airplane stability?
- j. Define static stability and dynamic stability. Which stability is to be studied first?

Section – B

(5 marks each)

- Q2. Differentiate between stability and controllability of an airplane.
- Q3. Derive the equation for the control effectiveness of elevator.
- Q4. Explain briefly about adverse yaw effects and how it can be controlled by rudder?
- Q5. Explain the term stick force gradient.
- Q6. During a post stall maneuver, an airplane has an angle of attack of 80° and side slip 30° . If an airplane has a body axis bank of 90° , an elevation of 10° and an azimuth of 180° then in what direction the nose of the aircraft is pointing and in what direction airplane is moving.

Section – C

(10 marks each)

- Q7. What is directional stability and explain in detail about various requirements.
- Q8. Derive the various stability derivatives relevant to lateral dynamics.
- Q9. What is neutral point? Derive an expression to determine stick-fixed neutral point.